READING AND WRITING TECHNICAL ENGLISH ONLINE

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THE VIRTUAL UNIVERSITY OF TUNIS

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INTRODUCTION

TO: IMI STUDENTS

WELCOME TO YOUR ONLINE COURSE OF TECHNICAL ENGLISH

This course has been designed to meet the needs of Internet and Multimedia information students. The needs of such students whether as students or future professionals to gain access to massive information available online and in print have become all the more evident in a rapidly changing world. We believe that developing one's competencies in reading and writing technical English may facilitate coping with the requirement of this situation.

COURSE OBJECTIVES

- To assist students develop good reading-writing habits.
- To provide guidelines to use various reading-writing strategies.
- To help students become knowledgeable about the genre of research articles, abstracts, technical reports…etc
- To help students master the kind of lexis appropriate for technical English.
- To help students master the kind of structures, notions, and functions appropriate for technical English (e.g.: compounds, impersonal forms).
- To help students develop correspondance skills for the discipline.
- To provide a suitable framework for reading extensively.

PRE-REQUISITES

This course is designed for post-graduate students specializing in Internet and multimedia information, and who need to master technical English. The students should have completed about 8 years of English (both secondary and tertiary), and their proficiency level in English could be characterized as of upper intermediate to advanced.

2: Comprehension: Content Reading and Guessing Word Meaning
3: Expressing Technical and Scientific Functions (Purpose, clarification…)
4: Writing: Memos and Reports
5 : Extensive reading

CHAPTER 7: COHERENCE II

1: Free Reading
2: Comprehension: Reading for Main Ideas
3: Expressing Technical and Scientific Functions:(Comparing, opposing…)
4: Writing: Coherence II
5 : Extensive Reading

CHAPTER 8: REPORTS II

1: Free Reading
2: Comprehension: making inferences
3: Expressing Technical and Scientific Functions:(Setting the context, illustrating)
4: Writing: Reports II
5 : Extensive Reading

CHAPTER 9: RESEARCH RESULTS II

1: Free Reading
2: Comprehension: Search Reading and Scanning
3: Expressing Technical and Scientific Functions:(Experimenting, hypothesizing)
4: Writing: Summarizing Research Results
5 : Extensive Reading

CHAPTER 10: SUMMARY OF SCIENTIFIC FUNCTIONS

1: Free Reading
2: Comprehension: Interpreting and Predicting
3: Expressing Scientific Functions(sequencing, planning an article…)
4: Free Writing
5 : Extensive Reading

HOW TO WORK FOR THIS COURSE?

Distance learning has the advantage of giving learners the freedom to work at their own pace, and to choose the weekly time slot for working on courses. However, It is

important that students develop regular, disciplined, and assiduous work habits in order to benefit from this course.

COURSE RESPONSIBILITIES AND SCHEDULE

The course requires an approximate overall weekly work of 3 to 4 hours for 10 weeks. Students are encouraged to take part in all the individual and group activities offered in this course as well as attend the tutorial sessions. It is also highly recommended that students interact with and each other and the tutor.

By the end of this course , you will be evaluated by means of a test *in presentiel.* This test will assess the students' competencies developed in this course; mainly, the ability to use different reading and writing skills pertaining to technical English.

Chapter 1

Coherence

Objectives :

- Free Reading
- Comprehension: Skimming and Predicting
- Understanding Sentence Structure
- Practising Compounds
- Recognizing Coherence in Texts

Time Now :

1. Reading

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Journal of Computer-Mediated Communication

Published by
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School at USC

9(2) January 2004 Margaret McLaughlin and Sheizaf Rafaeli, Editors

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An official publication of the International Communication Association

Susan Herring, Indiana University
Editor-Elect

Web Site Attitude

As more and more consumers spend more money on the Internet, traditional retailers and manufacturers as well as entrepreneurial dot-coms are jousting to explore and shape this new business opportunity. Their long-term survival and profitability may be determined by how well the Web site helps form and sustain

Our Virtual Images

While some earlier research on avatars concluded that more anthropomorphic images are more engaging, interesting and attractive, the author reports that the features that lead to engagement and interest are more complicated than simply the extent to which an image is anthropomorphic. In this study, looking 'more human' did not make the partner more engaging or attractive.

Behavior Settings

Virtual communities may be understood as operating within an emerging environmental form: virtual behavior settings, a construct which takes into account considerations of the distinctive qualities of time, place, and objects in CMC. Virtual behavior settings are examined in terms of the emergence and maintenance of

positive attitudes toward the site and utlimately toward the product or the company.

Personalized iTV ads

The authors present a lifestyle-based approach for the delivery of personalized advertisements in digital interactive television. Results from an empirical validation provide evidence for the effectiveness and usefulness of the approach when compared with machine learning algorithms and user modeling evaluation methodologies, as well as traditional marketing targeting practices.

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setting programs, their participants, and their operation within physical behavior settings.

Coding Online Talk

Burnett's typology of information exchange in virtual communities attempts to provide a framework for examining the range of their activities. The typology is applied to two online health support groups. Revisions are proposed which reflect more accurately activities found within the communities. By providing a metric through which to address such questions, the revised typology will allow a richer understanding of virtual communities as social information environments.

Comprehension check

- Reading 1
- Language study

2. Comprehension check

- Reading 1
- Language study

Reading 1

- Exercise 1
- Exercise 2
- Exercise 3

Exercise 1: Skimming for general information

Study the following web page, and then answer the questions that follow:

1- What type of web page is it?

2- What is the source, date and place of publication of the web page?

3- Who are the potential readers of this web page?

4- What are the topics developed in this page?

Auto-evaluation

Exercise 2 : Predicting

The web page summarizes recent research on different aspects of Computer-Mediated

Communication. See if you can predict some of the ideas in it.

1- What are the characteristics that make virtual images more attractive and engaging for viewers?

2- Which resumé would focus on the behaviour of virtual communities?

3- What are attitudes to web sites influenced by?

4- Can advertisements be personalized? Compare this with traditional marketing practices?

5- Is communication online different from communication in face to face? If so, what are some of the differences you can think of?

Exercise 3 : Reading

2. Comprehension check

- Reading 1
- Language study

Language study

- Exercise 1
- Exercise 2
- Exercise 3

Exercise 1

Match each word from Column A with its equivalent in Column B. (Notice there are more words than you need in Column B).

A	B
1. jousting	a. background properties
2. sustain	b. try
3. delivery (n), to deliver(v)	c. experiental, experimental
4. empirical	d. distribution
5. targeting	e. connecting
6. avatars	f. maintain, uphold
7. anthropomorphic	g. aiming at, having as objective
8. features	h. fighting
9. settings	i. characteristics
10. attempt (n), to attempt	j. manifestations
	k. treating someone/something as

human

I. central

Auto-evaluation

Exercise 2

Tick the appropriate equivalent for the following **compound** nouns and adjectives**,**

1- Computer-mediated communication

A computer that mediates communication

Communication that is mediated via a computer

2- Web site attitude

Attitudes to web sites

Web attitude sites

3- Personalized iTV ads

Personalized advertisements on interactive TVs

Interactive and personalized TV advertisements

4- Traditional marketing targeting practices

The practice of traditional target marketing

Targeting practices of traditional marketing

Auto-evaluation

Exercice 3

Translate to French the following compounds:

Compounds (mots composés)

Compound nouns and adjectives are frequently used in technical English to express a single complex idea. they allow concepts to be expressed in a precise and concise way. In compounds, the main (determining) noun is always placed at the end of the string of nouns.

Example: a low-temperature power system

What are we describing here? —> a system

so "a system" is the main noun

Differents structures of compounds

1. Substantive + adjective

e.g. low-frequency system (système à basse frequence)

2. Substantive + substantive

e.g. Water-proof material (matériau étanche)

3. Adjective + substantive

e.g. national-security satellites (des satellites de sécurite nationale)

4. Adjective + adjective

e.g. standard long-term effects (effets classiques et à long terme)

5. Substantive + past participle

e.g. a computer-aided design (dessin/projet assisté par ordinateur)

6. Adverb + past participle

e.g. the above-mentioned project (le projet mentionné ci-dessus)

7. Adjective + past participle

e.g. stellar-based astology (astrologie à partir des etoiles)

8. Substantive + present participle

e.g. a disease-causing virus (un virus qui cause des maladies)

9. Adjective or adverb + present participle

e.g. fast-rising standards (niveaux qui augmentent vite)

remote-sensing detectors (detecteurs à distance)

link to exercises on compounds

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back

4. Language study 2

Compounds

Exercise 1

Tick the appropriate equivalent for the following **compound** nouns and adjectives**,**

1- Computer-mediated communication

A computer that mediates communication

Communication that is mediated via a computer

2- Web site attitude

Attitudes to web sites

Web attitude sites

3- Personalized iTV ads

Personalized advertisements on interactive TVs

Interactive and personalized TV advertisements

4- Traditional marketing targeting practices

The practice of traditional target marketing

Targeting practices of traditional marketing

Auto-evaluation

Exercice 2

Translate to French the following compounds:

1) Long-term survival

……

2) A cross-section

……

3) A laboratory set-up

……

4) a power station

……

5) Metal particles

……

6) Two online health support groups

……

Auto-evaluation

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link to compounds

Answer key

Language study

Exercise 1

1) --h

2) --f

3) --d

4) --c

5) --g

6) --j

7) --k

8) --i

9) --a

10) –b

Exercise 2

1) b

2) a

3) a

4) b

Exercise 3

1) survie de longue durèe

2) section transversale

3) un montage de laboratoire

4) une station electrique

5) des particules metalliques

6) deux groupes d'assistance medicale en ligne

Answer key

Reading

Exercise 1

1. editorial page. First page in a journal (or something similar).
2. *Journal of Computer-Mediated Communication* (JCMC). Vol 9/2, January 2004. Annenberg School.
3. people interested in Computer-Mediated communication (or something similar).
4. attitudes to different aspects of CM CMC (or something similar).

Exercise 2

Free answers

Exercise 3

a—3, b—4, c—1, d—2, e—5

3. Language study 1
Recognizing sentences

- Recognizing Sentences, Run-Ons and Fragments (Basic)
- Recognizing Sentences, Run-Ons and Fragments (Advanced)

Recognizing Sentences, Run-Ons and Fragments (Basic)

Available online at: http://www.writing.eng.vt.edu/exercises/grammar1.html
Retrieved on September 1, 2004

The sentence is the fundamental unit of expression in professional writing. To maintain credibility as a professional, you have to know what constitutes a sentence. In the exercise below, identify whether each of the highlighted word groups is a sentence (S), fragment (F), or run-on (RO). Note that a run-on is a specific grammatical term referring not to a long sentence, but to a group of words containing two or more independent clauses that are incorrectly joined.

1. **Although the shock sphere is still strong at the end of the fireball's life, the sphere is no longer strong enough to heat the air to incandescence.**

Sentence

Fragment

Run-On

---

2. **At that point the shock sphere is no longer strong enough to heat the air to**

incandescence, however, the sphere is still very strong.

Sentence

Fragment

Run-On

---

3. **At the end of the fireball's life, the shock sphere no longer being strong enough to heat the air to incandescence.**

Sentence

Fragment

Run-On

---

4. **Both sites produce the same three sources of energy: coal, oil, and natural gas. Both sites, however, do not produce these sources in the same proportions.**

Sentence

Fragment

Run-On

---

5. **The plant shutdown was more than just another company having to close its doors, Bolens was a way of life for hundreds of families in the small town where the company was located.**

Sentence

Fragment

Run-On

---

6. **Both designs produce the same three pollutants (nitrogen oxides, sulfur dioxides, and hydrocarbons) in roughly the same proportions, therefore, both designs have similar effects on the environment.**

Sentence

Fragment

Run-On

---

7. **Because both designs produce the same three pollutants (nitrogen oxides, sulfur dioxides, and hydrocarbons) in roughly the same proportions, both designs have similar effects on the environment.**

Sentence

Fragment

Run-On

---

8. **An oval shape is necessary in the die cavity, otherwise, the flow of metal from the hammering would be restricted.**

Sentence

Fragment

Run-On

---

9. **Not only does fresh ventilation reduce moisture levels in animal pens, but it also improves the health and longevity of livestock.**

Sentence

Fragment

Run-On

---

10. **Primary bodies are those that are outside the zone of protection, thus, they are susceptible to the effects of a direct lightning stroke.**

Sentence

Fragment

Run-On

3. Language study 1
Recognizing sentences

- Recognizing Sentences, Run-Ons and Fragments (Basic)
- Recognizing Sentences, Run-Ons and Fragments (Advanced)

Recognizing Sentences, Run-Ons and Fragments (Advanced)

Available online at: http://www.writing.eng.vt.edu/exercises/grammar3.html
Retrieved on September 1, 2004

1. **Both bombs produce the same three effects: heat, blast, and radiation; however, the bombs do not produce the effects in the same proportions.**

   Sentence

   Fragment

   Run-On

2. **Both bombs produce the same three effects: heat, blast, and radiation. The first of which usually causes the most fatalities.**

   Sentence

   Fragment

   Run-On

---

3. **Heat, blast, and radiation are the bomb's three main effects, the first of which usually causes the most fatalities.**

Sentence

Fragment

Run-On

---

4. **Both Mars and Earth are rapidly rotating planets, both have seasonal climate changes, and both have heat exchange of solar radiation between the atmosphere and the surface.**

Sentence

Fragment

Run-On

---

5. **The Great Comet of 1811 not only had a large nucleus (between 30 and 40 kilometers), it also had a large coma, extending a length the diameter of the Sun.**

Sentence

Fragment

Run-On

---

6. **The higher the temperature, the lower the pressure.**

Sentence

Fragment

Run-On

Key to Grammar exercises

Recognizing Sentences, Run-Ons and Fragments (Advanced)

1- Congratulations, you have answered #1 correctly.

Original: Both bombs produce the same three effects: heat, blast, and radiation; however, the bombs do not produce the effects in the same proportions.

Revision: Both bombs produce the same three effects: heat, blast, and **radiation. However,** the bombs do not produce the effects in the same proportions.

Discussion: Original was a run-on. After a list following a colon, the sentence must end. More discussion in *CE* (page 103).

2- Congratulations, you have answered #2 correctly.

Original: Both bombs produce the same three effects: heat, blast, and radiation. The first of which usually causes the most fatalities.

Revision: Both bombs produce the same three effects: heat, blast, and radiation. The first of **these three** usually causes the most fatalities.

Discussion: The original second group of words is a fragment. The word "which" makes that second group of words a dependent clause, which by definition cannot stand alone as a sentence. More discussion in *CE* (page 111).

3- Congratulations, you have answered #3 correctly.

Original: Heat, blast, and radiation are the bomb's three main effects, the first of which usually causes the most fatalities.

Discussion: no mistake. The clause following the word "effects" is dependent and therefore can be joined with just a comma to the initial independent clause.

4- Congratulations, you have answered #4 correctly.

Original: Both Mars and Earth are rapidly rotating planets, both have seasonal climate changes, and both have heat exchange of solar radiation between the atmosphere and the surface.

Discussion: This group of words is a periodic sentence with the series of parallel clauses joined by the coordinating conjunction "and."

5- Congratulations, you have answered #5 correctly.

Original: The Great Comet of 1811 not only had a large nucleus (between 30 and 40 kilometers), it also had a large coma, extending a length the diameter of the Sun.

Revision: The Great Comet of 1811 not only had a large nucleus (between 30 and 40 kilometers), **but** it also had a large coma, extending a length the diameter of the Sun.

Discussion: The original group of words is technically a run-on, although it is accepted as a sentence in many informal writing situations. To make it an undisputed sentence, you should add the coordinating conjunction "but."

6- Trick question.

Original: The higher the temperature, the lower the pressure.

Possible Revision: The higher the temperature **is,** the lower the pressure **is.**

Discussion: This group of words is a technically a fragment that almost everyone lets pass as a sentence. Most people would treat this word grouping as having an understood verb in both the dependent clause and the independent clause (much as a command has the understood subject "you"). Should you feel uncomfortable with treating this word grouping as a sentence, simply add the verbs in the dependent and independent clauses. More discussion in *CE* (page 111).

Key to Grammar exercises

Key to Grammar exercises

(recognizing sentences, run-ons and fragments)

1- Congratulations, you have answered #1 correctly.

Original: Although the shock sphere is still strong at the end of the fireball's life, the sphere is no longer strong enough to heat the air to incandescence.

Discussion: No grammatical mistake exists. This group of words is a sentence with an introductory **dependent clause** coupled to an **independent clause.**

2- Congratulations, you have answered #2 correctly.

Original: At that point the shock sphere is no longer strong enough to heat the air to incandescence, however, the sphere is still very strong.

Revision: At that point, the shock sphere is no longer strong enough to heat the air to **incandescence. However,** the sphere is very strong.

Discussion: The original was a run-on. The adverb "however" cannot join two independent clauses. Note that several ways exist to correct this run-on. Also note that beginning a sentence with "however" is not an error. More discussion exists in *CE* (pages 115 and 129) and *CSW* (259, 270).

3- Congratulations, you have answered #3 correctly.

Original: At the end of the fireball's life, the shock sphere no longer being strong enough to heat the air to incandescence.

Revision: At the end of the fireball's life, the shock sphere **is** no longer strong enough to heat the air to incandescence.

Discussion: The original was a fragment without a verb. The verb "is" makes this group of words a sentence. More discussion exists in *CE* (page 111).

4- Congratulations, you have answered #4 correctly.

Original: Both sites produce the same three sources of energy: coal, oil, and natural gas. Both sites, however, do not produce these sources in the same proportions.

Discussion: No grammatical mistake exists. The first sentence is a simple independent clause that introduces a list, and the second sentence is a simple independent clause with the adverb "however" inserted as a parenthetical between the subject and the verb.

5- Congratulations, you have answered #5 correctly.

Original: The plant shutdown was more than just another company having to close its doors, Bolens was a way of life for hundreds of families in the small town where the company was located.

Revision: The plant shutdown was more than just another company having to close its **doors--Bolens** was a way of life for hundreds of families in the small town where the

company was located.

Discussion: The original was a run-on. While such a run-on is allowed in informal writing, it is not accepted in formal writing. Although several ways, including a semicolon, exist to join these two independent clauses, the em-dash perhaps works best to show their relationship. More discussion exists in *CE* (pages 106, 130).

6- Congratulations, you have answered #6 correctly.

Original: Both designs produce the same three pollutants (nitrogen oxides, sulfur dioxides, and hydrocarbons) in roughly the same proportions, therefore, both designs have similar effects on the environment.

Revision: Both designs produce the same three pollutants (nitrogen oxides, sulfur dioxides, and hydrocarbons) in roughly the same **proportions. Therefore,** both designs have similar effects on the environment.

Discussion: The original was a run-on. The adverb "therefore" cannot join two independent clauses. More discussion exists in *CE* (pages 115 and 129) and *CSW* (259, 270).

7- Congratulations, you have answered #7 correctly.

Original: Because both designs produce the same three pollutants (nitrogen oxides, sulfur dioxides, and hydrocarbons) in roughly the same proportions, both designs have similar effects on the environment.

Discussion: No grammatical mistake exists. This group of words is a sentence with an introductory dependent clause coupled to an independent clause.

8- Congratulations, you have answered #8 correctly.

Original: An oval shape is necessary in the die cavity, otherwise, the flow of metal from the hammering would be restricted.

Revision: An oval shape is necessary in the die **cavity; otherwise,** the flow of metal from the hammering would be restricted.

Discussion: The original group of words was a run-on. Because the word "otherwise" is not a coordinating conjunction, it cannot join two independent clauses. More discussion exists in *CE* (pages 115 and 129) and *CSW* (259, 270).

9- Congratulations, you have answered #9 correctly.

Original: Not only does fresh ventilation reduce moisture levels in animal pens, but it also improves the health and longevity of livestock.

Discussion: No grammatical mistake exists. Because the word "but" is a coordinating conjunction, it can join two independent clauses.

10- Congratulations, you have answered #10 correctly.

Original: Primary bodies are those that are outside the zone of protection, thus, they are susceptible to the effects of a direct lightning stroke.

Revision: Primary bodies are those that are outside the zone of **protection. Thus,** they are susceptible to the effects of a direct lightning stroke.

Discussion: The original was a run-on. The adverb "thus" cannot join two independent clauses. More discussion exists in *CE* (pages 115 and 129) and *CSW* (259, 270).

5. Writing:
coherence (basic)

Writing: Coherence

- Exercise 1
- Exercise 2

Exercise 1

Read the text below one paragraph at a time and choose from the titles provided in the box the one that best summarises that paragraph.

Safeguard Your Software
by Reid Goldsborough | Jan 01 '00

a) danger of viruses
b) types of viruses
c) viruses and downloading files
d)introduction of the problem
e) first caution against viruses
f) what are viruses?
g) viruses and the internet
h) second precaution against viruses
i) viruses and attachments
j) are antiviruses popular among computer users?

1) How many times have you heard a comment like this: "My computer is acting up. It must be a virus." Truth is, most computer glitches are caused by software conflicts or "user error." (……)

2) Viruses do get a lot of publicity, and it's easy to see why. They have an ominous and mysterious aura. How can a machine catch a virus? Can computer viruses, like such human viruses as HIV, be deadly? (……)

3) Computer viruses are simply small computer programs that aim to do harm. They're written by disturbed individuals, the kind of sociopaths who place razor blades in apples at Halloween. Like human viruses, computer viruses can replicate, spreading like a disease from one computer to another through shared floppy disks, infected CD-ROM discs or over the Internet. (……..)

4) Some viruses - more hoaxes than true viruses - are innocuous, doing no more harm than scaring people with a message flashing on screen that reads "Gotcha!" Other viruses, however, can destroy all the data on your hard drive. (……..)

5) Computer viruses can't harm your hardware. So the first line of defense, as with every potential computer disaster, is to make regular backups of the vital data stored on your hard drive and to ensure that the backups themselves are reliable.
(……)

6) The next safety step is to consider using antivirus software. Some people suspect that new viruses are created and spread by the very companies that develop antivirus programs. After all, there's a lot of money to be made here.
(……)

7) Sales of antivirus software reached $135 million in 1998, according to estimates from the market research firm PC Data. According to Ziff-Davis Market Intelligence, five of the 10 top-selling utility programs are antivirus packages.
(…….).

8) Some people avoid the Internet entirely for fear of catching a virus. A few words of reassurance: Your computer can't become infected by reading email messages. Viruses, as programs, must be run, or "executed," to do their damage. Simply reading an email message doesn't run anything except the programs you already have on your system. (……..)

9) The situation becomes slightly more complicated with email attachments. These appendages to email messages can potentially include "macro" viruses, which can infect your system and are the fastest growing type of virus. But you have to initiate action beyond just reading the email message, such as clicking on the attachment with your mouse, for these mini-programs to do their dirty work.Fortunately, you have protection here as well. Many people simply delete email attachments if they come from someone they don't know. What's more, the latest versions of antivirus programs include protection against macro viruses. (……)

10) Finally, be careful. Download files only from reputable Web sites or FTP file repositories. Avoid "pirate" sites and the "Warez" newsgroups, where people illegally trade commercial programs. These files are more likely than others to be infected with viruses (…….).

Auto-evaluation


Comments

Exercise 2

Read the sentences below and rearrange them to get a text that indicates the following organization of ideas:

1 - Presentation of the main idea (creation of Windows Server 2003)

2 - Extra information on the program

3 - Technical characteristics of the program

4 - Industries that support it

5 - Advantages for using the program

Microsoft Confirms HPC Plans

Following weeks of denials by officials, Microsoft Corp.

Jul 05 '04

(A) The HPC edition will support industry standards, such as MPI (Message Passing Interface), and will be supported by OEMs and partners including Advanced Micro Devices Inc., Dell Inc., IBM, Intel Corp., Hewlett-Packard Co., Verari Systems Inc. and Cornell Theory Center, Microsoft officials said.

(B) The new version will be known as Windows Server 2003, HPC Edition and is expected to ship in the second half of next year. Pricing and packaging decisions have not yet been made, officials said.

(C) Windows Server HPC is designed for customers running scalable, parallel computing workloads in vertical markets such as engineering, life sciences and finance.

(D) Following weeks of denials by officials, Microsoft Corp. has confirmed plans to create a high-performance-computing edition of Windows Server 2003.

(E) Dave Lifka, chief technology officer for the Cornell Theory Center, an interdisciplinary research center at Cornell University, in Ithaca, N.Y., runs 1,000 servers and migrated from Unix to Windows in 2000. Lifka said he is excited about the advances that “Longhorn,” the next version of Windows, will bring. “[Longhorn] keeps getting richer and more integrated,” Lifka said. “We chose Windows because we wanted to make it easier for our users to have access to HPC.”

Auto-evaluation

Answer key to writing : coherence

Exercise 1

1. d
2. a
3. f
4. b
5. e
6. h
7. j
8. g
9. i
10. c

Exercise 2

A. 4
B. 3
C. 2
D. 1
E. 5

The Research Article

Objectives

1. Reading
2. Comprehension check
3. Research articles
4. Writing
5. Extensive reading

Author :

Mme
Nebila DHIEB-HENIA

Chapter 2

The Research article

Objectives :

- Free Reading
- Comprehension: Careful Reading
- Familiarizing with Research Articles
- Writing Short Resumés
- Extensive Reading

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1. Reading

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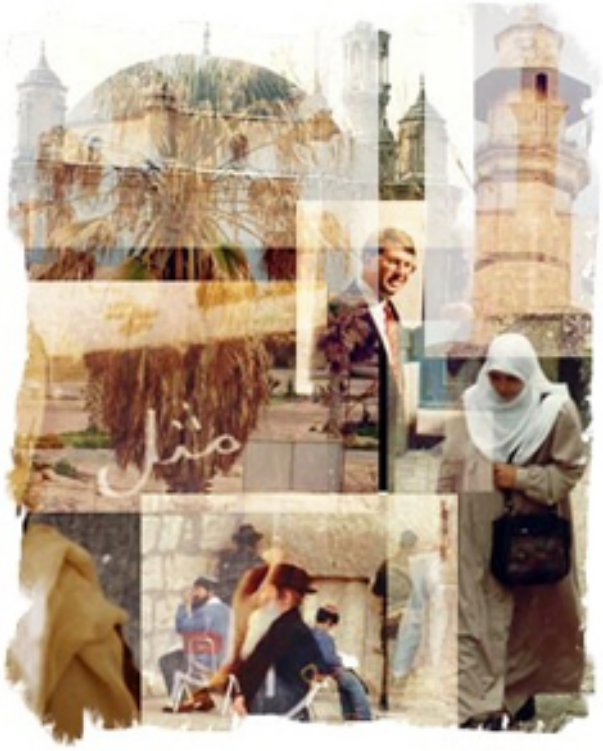

In this issue:

Technologies of Despair and Hope:
CMC in the Middle East
A Special Issue of JCMC Edited by Charles Ess and Fay Sudweeks

The simplistic view of a monolithic Islamic world pitted against an equally monolithic West disappears quickly into much more complex local histories and politics that provide as many counter-

UAE Women & the Net

Young women of the United Arab Emirates stand as examples of users who can consciously chose what elements of global cultures they wish to appropriate while they simultaneously insist on preserving their own cultural values and practices.

Palestinian Israelis & CMC

There have been distinct changes in the use of CMC and ICTs among the Palestinian Israeli minority in Israel which serves to maintain the existing political and social disenfranchisement of this group within the larger Israeli society.

Kuwaiti Youth & the Net

The stories told by Kuwaiti university students suggest that Internet use by youths is creating new forms of communication

examples to, as examples of, these broad categories. Articles in this special issue provide us with a careful, detailed, and nuanced look at the diffusion and impacts of CMC technologies in the Middle East, with reports on Afghanistan, Israel, Kuwait, and the United Arab Emirates.

Voices of Afghan Women

After 9/11, the voices of otherwise silenced women in Afghanistan were significantly amplified on the Internet. RAWA.org demonstrates how a Web site contended with discourses of war and fundamentalism while envisioning democracy and constructing new leadership identities for women.

across gender lines, interrupting traditional social rituals, and giving young people new autonomy in how they run their lives.

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also in this issue

Bearing Witness on the Web

Recent technological advances offer opportunities for victims of genocide, ethnic cleansing, or other enacted hate to bear witness under the gaze of a global audience on the Internet.

Disability and Online Safety

The visual anonymity associated with online interaction offers people with disabilities the potential to participate in social interaction beyond the stigma of a disabled identity. But the online medium also can become a deceptive social space where people with disabilities become victims of malevolent acts.

2. Comprehension check

- Reading
- Language

Reading

Read the web page "Technologies of despair and hope: Liberatory potentials and practices" quickly, and then answer the following true or false statements.

1. This issue of CMC is totally devoted to Middle-Eastern countries.
2. The view of CMC is that there are two poles in the world: a monolithic Islamic east against a monolithic west.
3. Rawa.org gave more voice to Afghan women.
4. UAE women show unconditional adherence to internet-transmitted global cultures.
5. There are political and social ends for the use of internet and CMC. Give examples.
6. CMC has a liberatory potential in the Middle-East.
7. CMC has both positive and negative bearings for disabled people. Explain.

Auto-evaluation

---

2. Comprehension check

- Reading
- Language

Language

- Exercise 1
- Exercise 2
- Exercise 3

Exercise 1

Rearrange the following list of words into synonyms and antonyms. Context clues from the web page may be of help to determine the possible meaning of words.

Examples - constructing -to appropriate - interrupting - practices - maintaining - narrow - counter-examples - complex - broad - local - building - global - simple - make one's own - rituals

- ……..... ……..

- ……..... ……..

- ……..... ……..

- ……..... ……..

- ……..... ……..

- …… ……

- …… ……

- …… ……

Auto-evaluation 1

Auto-evaluation 2

Exercise 2

Link each verb with the appropriate preposition:

provide	in
stand	to
insist	on
serve	as
participate	within

Auto-evaluation

Exercise 3

Parallelism, Pronoun References, and Modifier Placement

Available online at: http://www.writing.eng.vt.edu/exercises/grammar2.html
Retrieved 28 August 2004

Each of the following may have one of the following errors: faulty parallelism, unclear pronoun reference, or misplaced modifier. Click on the word or phrase that causes the error. If no error exists, click on "No error." Corresponding information for this exercise can be found in *The Craft of Editing* (denoted *CE*) and *The Craft of Scientific Writing* (denoted *CSW*). Note: In the general preferences of your browser, please do not override this document's choice of font colors. Also, these exercises work best when you remove the underline option for links in your browser.

1. Although design flaws in the Titanic were realized soon after its sinking in 1912, the reasons for the severe damage inflicted by the iceberg remained a mystery until its discovery in 1985.

(No error)

Give up?

2. Once the earthquake has subsided, you are not yet out of danger. Often the electricity has gone out and it is dark. However, striking a match or any open flame may cause a gas explosion.

(No error)

Give up?

3. At this time, the Department of Energy is only considering Yucca Mountain as a possible storage site for nuclear waste. For that reason, this report will not consider other sites.

(No error)

Give up?

4. Scientists have problems assuring that the viral vectors apply themselves to the correct cells. When implanted, they tend to migrate throughout the body and miss targeted cells

more often than not.

(No error)

Give up?

5. Reductions of up to 80 percent in heat and mass transfer coefficients were measured due to outgassing.

(No error)

Give up?

6. The objectives of the Viking mission were to obtain high-resolution images of the Martian surface, characterize the structure and composition of the atmosphere and surface, and to search for evidence of life.

(No error)

Give up?

7. Mars and Earth are similar in that both are rapidly rotating planets and both have seasonal climate changes.

(No error)

Give up?

8. The decoder was either faster than the worst case specified by the manufacturer, or the HC11 held the data longer than the minimum time specified by Motorola.

No error)

Give up?

Exercise 1

Rearrange the following list of words into synonyms and antonyms. Context clues from the web page may be of help to determine the possible meaning of words.

Examples - constructing -to appropriate - interrupting - practices - maintaining - narrow - counter-examples - complex - broad - local - building - global - simple - make one's own - rituals

---

1 . constructing / building

○ synonyms ○ antonyms

2 . to appropriate / make one's own

○ synonyms ○ antonyms

3 . practices / rituals

○ synonyms ○ antonyms

4 . maintaining / preserving

○ synonyms ○ antonyms

5 . narrow / broad

○ synonyms ○ antonyms

6 . counter-examples / example

○ synonyms ○ antonyms

7 . complex / simple

○ synonyms ○ antonyms

8 . local / global

○ synonyms ○ antonyms

Résultats

Key to grammar exercises

Parallelism

1- Congratulations, you have answered #1 correctly.

Discussion: Incorrect pronoun reference. Although the writer intended the second "its" to refer to the Titanic, someone could misread the reference to be the iceberg. To correct, change the second "its" to "Titanic's." More discussion in *CSW* (pages 93-94).

2- Congratulations, you have answered #2 correctly.

Discussion: Faulty parallelism. The gerundial phrase "striking a match" is not parallel with the noun phrase "any open flame." Moreover, the position of "striking" causes an ambiguity: Are open flames to be struck? To correct, replace the words "striking a match" with "a lit match." More discussion in *CE* (page 123) and *CSW* (page 259).

3-Congratulations, you have answered #3 correctly.

Discussion: Misplaced modifier. Although the writer intended the word "only" to modify "Yucca Mountain," someone could easily assume that the word modifies "considering." To correct, move "only" such that it precedes "Yucca Mountain." More discussion in *CE* (pages 119, 122) and *CSW* (page 92).

4-Congratulations, you have answered #4 correctly.

Discussion: Incorrect pronoun reference. To avoid confusion, the word "they" should be "vectors." More discussion in *CSW* (pages 93-94).

5-Congratulations, you have answered #5 correctly.

Discussion: Misplaced modifier. Were the reductions measured because of outgassing, or were the reductions at the level of 80 percent because of outgassing? Because the writer intended the second possibility, the sentence should be rewritten: "Measured were reductions of up to 80 percent in heat and mass transfer coefficients. These large reductions occurred because of outgassing." More discussion in *CE* (page 119) and *CSW* (page 92).

6-Congratulations, you have answered #6 correctly.

Discussion: Faulty parallelism. The list of three verb phrases is not parallel. To correct, insert the word "to" before "characterize." More discussion in *CE* (page 123) and *CSW* (page 259).

7-Congratulations, you have answered #7 correctly.

Discussion: no error.

8-Congratulations, you have answered #8 correctly.

Discussion: Faulty parallelism. With an either/or construction, what appears on the right of the "either" must be parallel with what appears on the right side of the "or." More discussion in CE (page 123) and CSW (page 259).

Correction: Either the decoder was faster than the worst case specified by the manufacturer, or the HC11 held the data longer than the minimum time specified by Motorola.

4. Writing a summary of a research article

Exercise 1

Answer the following questions for this article or any other article of your choice. Articles may be found at www.worlscinet.com/compsci.shtml or at www.ascusc.org.jcmc/

1. When was the article published?
2. Where was the article published?
3. what is the general topic of the article?
4. What is the research problem of the study? (in other words, what do/does the researcher(s) want to investigate?)
5. What is/are the main finding(s) of this study?
6. What is/are the author(s) conclusions?

Exercise 2

Use the information collected in Exercise 2 to write a paragraph summarizing the article. Insert the following discourse markers:

The results indicated that…- the author studied/investigated…and more particularly...- the article was published in…- the conclusion(s) to be drawn from this study is/are….

Comprehension Check

Read the web page "Technologies of despair and hope: Liberatory potentials and practices" quickly, then say whether the following statements are true or false.

Question 1

This issue of CMC is totally devoted to Middle-Eastern countries.

○ True ○ False

Question 2

The view of CMC is that there are two poles in the world: a monolithic Islamic east against a monolithic west.

○ True ○ False

Question 3

Rawa.org gave more voice to Afghan women.

○ True ○ False

Question 4

UAE women show unconditional adherence to internet-transmitted global cultures.

○ True ○ False

Question 5

There are political and social ends for the use of internet and CMC. Give

examples.

○ True ○ False

Question 6

CMC has a liberatory potential in the Middle-East.

○ True ○ False

Question 7

CMC has both positive and negative bearings for disabled people. Explain.

○ True ○ False

Résultats

Go back

3. Familiarization with research articles

Reading
Reading study

Available online at: http://www.ascusc.org/jcmc/vol5/issue3/hoffman.html
Retrieved 28 August 2004

JCMC 5 (3) March 2000

Message Board

The Evolution of the Digital Divide: How Gaps in Internet Access May Impact Electronic Commerce

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Table of Contents

Abstract

Enthusiasm for the anticipated social dividends of the Internet appears boundless. Indeed, the Internet is expected to do no less than virtually transform society. Yet even as the Internet races ambitiously toward critical mass, some social scientists are beginning to examine carefully the policy implications of current demographic patterns of Internet access and usage. Key demographic variables like income and education drive the policy questions surrounding the Internet because they are the most likely have a differential impact on the consequences of interactive electronic media for different segments in our society. Given these concerns, we set out to conduct a systematic investigation of the differences between whites and African Americans in the United States with respect to computer access, the primary current prerequisite for Internet access, and Web use. We wished to examine whether observed race differences in access and use can be accounted for by differences in income and education, how access influences use, and when race matters in the calculus of equal access. The particular emphasis of this research is on how such differences may be changing over time. We believe our results may be used as a window through which policymakers might view the job of ensuring access to the Internet for the next generation.

Introduction

That application of the Internet known as the World Wide Web has been riding an exponential growth curve since 1994 (Network Wizards, 1999; Rutkowski, 1998), coinciding with the introduction of NCSA's graphically-based software interface Mosaic for "browsing" the World Wide Web (Hoffman, Novak, & Chatterjee, 1995).

Currently, over 43 million hosts are connected to the Internet worldwide (Network Wizards 1999). In terms of individual users, somewhere between 40 to 80 million adults (eStats, 1999) in the United States alone have access to around 800 million unique pages of content (Lawrence & Giles, 1999), globally distributed on arguably one of the most important communication innovations in history.

Enthusiasm for the anticipated social dividends of this "revolution in democratic communication" (Hoffman, 1996) that will "harness the powerful forces of science and technology"(Clinton, 1997a) for all members of our society appears boundless. The Internet is expected to do no less than virtually transform society. Nowhere is this confidence expressed more clearly than in President Clinton's aggressive objective to wire every classroom and library in the country by the year 2000 (*NetDay*, 1998), followed by every home by the year 2007, so that "every 12-year-old can log onto the

Internet" (Clinton, 1997b).

Yet even as the Internet races ambitiously toward critical mass, some social scientists are beginning to examine carefully the policy implications of *current* demographic patterns of Internet access and usage (Hoffman, Kalsbeek, & Novak, 1996; Hoffman & Novak, 1998; Hoffman, Novak, & Venkatesh, 1997; Katz & Aspden, 1996). For while Clinton's "Call to Action for American Education" (Clinton, 1997a) may be likely to guarantee universal access for our nation's next generation, are the approximately 200 million Americans presently over the age of 16 equally likely to have access to the Internet? The findings thus far are both obvious and surprising, with important implications for social science research and public policy.

Key demographic variables like income and education drive the policy questions surrounding the Internet. These variables are important because they are the most likely to have a differential impact on the consequences of interactive electronic media for different segments in our society. Looming large is the concern that the Internet may not scale *economically* (Keller, 1996), leading to what Lloyd Morrisett, the former president of the Markle Foundation, has called a "digital divide" between the information "haves" and "have-nots."

For example, although almost 70 percent of the schools in this country have at least one computer connected to the Internet, less than 15 percent of classrooms have Internet access (Harmon, 1997). Not surprisingly, access is not distributed randomly, but correlated strongly with income and education (Coley, Cradler, & Engel, 1997).A recent study of Internet use among college freshman (Sax, Astin, Korn, & Mahoney, 1998) found that nearly 83 percent of all new college students report using the Internet for school work, and almost two-thirds use email to communicate. Yet, closer examination suggests a disturbing disparity in access. While 90.2 percent of private college freshman use the Internet for research, only 77.6 percent of students entering public black colleges report doing so. Similarly, although 80.1 percent of private college freshman use email regularly, only 41.4 percent of students attending black public colleges do.

Further, although numerous studies (CyberAtlas, 1999; Maraganore & Morrisette, 1998) suggest that the gender gap in Internet use appears to be closing over time and that Internet users are increasingly coming from the ranks of those with lower education and income (Pew Research Center, 1998), the perception persists that the gap for race is not decreasing (Abrams, 1997).

Hoffman and Novak (1998) examined racial differences in Internet access and use at a single time point and found in 1997 that, overall, whites were significantly more likely than African Americans to have a home computer in their household and also slightly more likely to have PC access at work. Whites were also significantly more likely to have ever used the Web at home, whereas African Americans were slightly more likely to have ever used the Web at school. As one might expect, increasing levels of income corresponded to an increased likelihood of owning a home computer, regardless of race. Although income explained race differences in computer ownership and Web use, education did not. That is, they found that whites were still more likely to own a home computer than were African Americans and to have used the Web recently, despite controlling for differences in education.

Their most striking findings, however, were for students. Hoffman and Novak (1998) found no differences among white and African American students when students had a home computer.However, among students without a computer in the home, white students were much more likely than African American students to have used the Web, and also more likely to have used the Web at locations other than home, work or school. They concluded that access translates into usage, and that whites are more likely than African Americans to use the Web because they are more likely to have access.

In 1998, the Commerce Department's National Telecommunications and Information Administration (McConnaughey & Lader, 1998) analyzed data on computer penetration rates from the October 1997 Census Current Population Survey (CPS) as part of an ongoing examination of the digital divide.This analysis represented an update from their 1995 study of similar data from the November 1994 CPS.The authors concluded that the gap between the technology haves and have-nots had *increased* between 1994 and 1997, with African Americans and Hispanics actually farther behind whites in terms of home computer ownership and Internet access and with an even wider gap between individuals at upper and lower income levels.

More recently, Babb (1998) investigated home computer ownership and Internet use among low-income individuals and minorities. She found that African Americans and Hispanics were less likely to own computers, even after adjusting for income and education and termed this finding, consistent across seven different data sets under examination, the "single most important finding" of her study.

Interestingly, some have suggested that United States policy itself may be a contributing factor in the growing digital divide. Cooper and Kimmelman (1999) argue that the Telecommunications Act of 1996 has had the unintended and unfortunate consequence of increasing the division between the telecommunications haves and have-nots" As evidence, they point to 1) increased concentration and less competition in the telecommunications and cable industries, 2) significant increases or flat prices, instead of declines, in cable, long distance, and local phone rates, and 3) a growing disparity among those market segments employing heavy use of telecommunications networks like the Internet and those whose use is more modest.

The consequences to American society of this race gap in Internet use are expected to be severe (Beaupre & Brand-Williams, 1997). Just as A. J. Liebling observed for the freedom of the press (Liebling, 1960), the Internet may provide for equal economic opportunity and democratic communication, but only for those with access. The United States economy may also be at risk if a significant segment of our society, lacking equal access to the Internet, wants for the technological skills to keep American firms competitive.

Given these concerns, we set out to conduct a systematic investigation of the differences between whites and African Americans in the United States with respect to computer access, which is the primary current prerequisite for Internet access, and Web use. We wished to examine whether observed race differences in access and use can be accounted for by differences in income and education, how access impacts use, and when race matters in the calculus of equal access. The particular emphasis of this research is on how such differences may be changing over time. We believe our results may be used as a window through which policymakers might view the job of ensuring access to the Internet for the next generation.

Objectives

To address these issues, we undertook a comparative analysis of Web usage and access across racial/ethnic groups in the United States, with a major focus on differences between whites and African-Americans at three different points in time. Our analysis is based on primary data from three population projectable, nationally representative surveys of

Internet use among Americans, including the first survey on Internet use to collect data on race and ethnicity.

Because we have three waves of data collection spanning a period of eighteen months, this research permits reliable survey-based answers to the question of the magnitude of race differences over time. Previously, Hoffman and Novak (1998) established clear baseline measures that document racial differences in Internet access and use, and the extent to which racial differences may themselves depend upon specific demographic variables.Our objective in the current research is to examine these differences over time and determine to what extent the observed racial gaps in access and usage have evolved.We believe that demographic disparities in Internet access and usage have important implications for the growth of electronic commerce.Therefore, documenting the evolution of the digital divide is an important first step in understanding how differential access to and usage of the Internet impacts the course of its commercial growth.

This work is intended to stimulate discussion among scholars and policy makers interested in how differences in Internet access and use among different segments in our society affects their ability to participate and reap the rewards of that participation in the emerging digital economy. For that reason, we have attempted to present the results in a manner that allows the data to speak, as it were, for itself.

This paper is organized according to specific analysis objectives. In section two we begin by comparing the demographic composition of our three samples with U.S. Census data for a comparable time period. Overall, we find that the three CommerceNet/Nielsen IDS cross-sections are representative of the U.S. population, although results for some minority groups (Asian-Americans and Native Americans) are based upon sample sizes too small to permit projectability to the U. S. population. Next, in section three, we consider differences over time in Internet access and use among African-Americans, and whites in the U.S. over age 16, with respect to key demographic variables. This is followed, in section four, by a detailed analysis of racial differences adjusting for demographic variables, including student status, home computer ownership, education, income, gender, and the presence of children in the home. In section five we explore racial differences in online consumer behavior and business uses of the Internet. This set of comprehensive analyses is followed in section six by an evaluation of the implications of technology access for learning and knowledge. Finally, in section seven we summarize the major issues surrounding the social and economic uses of the Internet. This summary is presented as a series of discussion and policy points relevant to the development of an open research agenda concerning the socioeconomic impact of the Internet and electronic commerce in the United States and globally.

Sample Composition

The three surveys used in this research are the: 1) Spring 1997 CommerceNet/Nielsen Internet Demographic Study (IDS) conducted in December 1996 and January 1997; 2) Fall 1997 IDS, conducted in August and September 1997; and 3) Spring 1998 IDS, conducted in May and June 1998 (Nielsen Media Research 1997a; 1997b; 1998). Hereafter, these studies will be referred to as the IDS 2, IDS 3, and IDS 4, respectively.

The IDS 2, conducted in December 1996/January 1997, was the first nationally projectable survey of Internet usage to collect data on race and ethnicity. That permitted us, for the first time, to obtain baseline estimates of differences in Internet and Web use among racial and ethnic groups in the United States (see Hoffman & Novak, 1998). The IDS 3 and IDS 4 also included race and ethnicity, permitting changes to be tracked over time. Additionally, the survey instruments used in IDS 3 and 4 were identical, though slightly modified from IDS 2, thereby ensuring complete comparability across two of the three surveys, and reasonable comparability from IDS 2 to IDS 3 and IDS 4.

Each CommerceNet/ Nielsen IDS is based upon an unrestricted random digit dial sampling frame, and used a computer-assisted telephone interviewing system to obtain respondents. Eligible respondents were persons 16 years and older in the U.S. and Canada. In this paper, only the data from the United States respondents were used. When weighted, the respondents represent and allow projection to the total population of individuals in the United States aged 16 and over. Respondent weights in the IDS were adjusted by Nielsen so that marginal weighted distributions of Education, Gender, Race (African-American / non-African-American), Hispanic Origin, and Age were equivalent to Census estimates for the US and Canada. All results in this paper are based on *weighted analyses* in which the Nielsen IDS respondent weights were applied to the raw counts, producing population projectable estimates.

The particulars of each survey are summarized below.

	Spring 1997 IDS	**Fall 1997 IDS**	**Spring 1998 IDS**
Survey	*IDS 2*	*IDS 3*	*IDS 4*
Time Frame	December 1996 and January 1997	August 1997 and September 1997	May 1998 and June 1998
Number of United States respondents	5,813	7,157	4,042
Total weighted US population aged 16 and over	199.9 million	202.3 million	202.4 million

Table 1 compares the three CommerceNet/Nielsen Internet Demographic Studies, IDS 2, IDS 3, and IDS 4, conducted in December 1996/January 1997, August/September 1997, and May/June 1998, respectively, to March 1995 Census Current Population Survey (CPS) estimates for key demographic variables.The Nielsen IDS samples are representative of the US population. By comparing the weighted percentages from each Nielsen IDS with corresponding weighted percentages from the Census CPS, we find that the distributions reported in Table 1 differ only slightly. These slight

differences are because 1) Nielsen used more recent CPS data, and 2) the Nielsen adjustment combined US and Canada, while our analysis deals only with the U.S.

One point of departure is race, specifically the percentages for white and other categories in IDS 2 and 3 and "other" in IDS 4. Note that the Census CPS reports more whites, while the Nielsen IDS 2 and 3 report more "other" race.

CommerceNet/Nielsen Internet Demographic Survey							1995 CPS
	IDS2		IDS3		IDS4		
	Raw Count	Weighted %	Raw Count	Weighted %	Raw Count	Weighted %	Weighted %
Age:							
<25	909	15.37	1,024	15.30	608	15.29	*16.3*
25-45	2,780	43.39	3,295	42.95	1,738	42.32	*43.9*
46-64	1,402	25.35	1,743	25.90	1,034	26.55	*24.0*
>64	722	15.89	1,095	15.85	662	15.84	*15.7*
Total	5,813	100%	7,157	100%	4,042	100%	*100%*
Education:							
less than h.s.	659	21.89	830	21.88	478	21.88	*21.9*
high school grad	1,723	31.98	2,007	31.98	1,167	32.01	*32.3*
some college	1,641	25.44	2,330	25.39	1,303	25.40	*25.6*
college grad	1,790	20.69	1,990	20.75	1,094	20.71	*20.2*
Total	5,813	100%	7,157	100%	4,042	100%	*100%*
Gender:							
Male	2,444	48.01	2,954	48.03	1,624	48.02	*48.1*
Female	3,369	51.99	4,203	51.97	2,418	51.98	*51.9*
Total	5,813	100%	7,157	100%	4,042	100%	*100%*
Student status:							
Full time	469	8.51	523	8.06	296	8.55	*7.7*
None/part time	5,318	91.49	6,615	91.94	3,726	91.45	*92.3*
Total	5,787	100%	7,138	100%	4,022	100%	*100%*
Race:							
White	4,906	78.59	6,000	79.54	3,447	83.41	*84.0*
African American	493	11.75	691	11.75	441	11.76	*11.7*
Asian	127	2.09	130	1.99	97	3.03	*2.6*
American Indian	75	1.62	101	1.85	57	1.80	*0.5*
Other	212	5.95	235	4.87	0	0	*1.2*
Total	5,813	100%	7,157	100%	4,042	100%	*100%*
Ethnicity:							
Hispanic	319	9.51	448	9.50	164	9.51	*9.3*
Non-Hispanic	5,494	90.49	6,709	90.50	3,878	90.49	*90.7*
Total	5,813	100%	7,157	100%	4,042	100%	*100%*

Table 1. Demographic comparisons of the three CommerceNet/Nielsen Internet demographic studies with the 1995 Census CPS (US population aged 16 and older)

Table 2 presents the distributions of key demographic variables for each IDS by race and Hispanic origin, compared to the Census CPS. Note that because each Nielsen IDS is adjusted so that the marginal percentages of African-Americans and non-African-Americans corresponds to Census results, it does not necessarily follow that race-specific demographic distributions for other racial/ethnic groups (i.e., Asian-Americans, Hispanics, and Native Americans) from Nielsen IDS and Census CPS will be necessarily comparable. We see that:

·Distributions for whites are comparable and consistent over time.

·African-Americans, in the IDS 2, are both slightly overrepresented in the oldest and youngest age categories and in the lowest and highest education categories. However, the differences are not very large. There is a larger difference in IDS 2 and 4 for ages 25-45, with African Americans underrepresented in this age group. In the IDS 3, African Americans are overrepresented in the oldest age category and the highest education category, while high school graduates are underrepresented. In IDS 4, African Americans are older and less educated. In IDS 2, 3, and 4, there are somewhat more African American students and women than in the Census CPS.

·Results for Hispanics, particularly in the IDS 4, and to a lesser extent in IDS 2, are based upon smaller numbers of respondents and in some cases exhibit substantial departures from Census CPS demographic distributions. IDS 2 Hispanic respondents were much more likely to be younger, more highly educated, and students (all groups that are more likely to use the Internet). We expect a substantial upward bias in measures of Internet access and use for Hispanic respondents in IDS 2. In IDS 4, Hispanics were more likely to be older and better educated, female, and full time students. Sample sizes permitting, comparisons of Hispanics with other groups will need to adjust for these demographic variables statistically before final conclusions can be drawn.

·Due to the large samples sizes for whites and African-Americans (and the demographic skew for Hispanic respondents in the IDS 2 and 4), the majority of our analyses contrast whites and African-Americans.

The comparisons in Table 2 are important because they point out the challenges inherent in obtaining truly representative weighted samples. Additionally, these comparisons illustrate that readers must be careful when generalizing survey sample results to determine how the weighted sample compares to the population.

Schement (1997) presents a detailed discussion of the overlap between Census race categories of white, African-American, Native American, and Asian-American and the ethnic categories of Hispanic/non-Hispanic. We attempted to form mutually exclusive race/ethnic categories (e.g. Hispanic whites, non-Hispanic whites, Hispanic African-Americans, non-Hispanic African-Americans, etc.). But, due to discrepancies between the Nielsen IDS and Census CPS demographic distributions for Hispanics, we instead opted to treat race and Hispanic/non-Hispanic ethnicity as two separate and overlapping categorizations. This means that where the Hispanic category appears in the tables to follow, Hispanics may include individuals who also characterize themselves as white or African American or another race. Note that where sample sizes for a particular segment are too small for reliable estimation of percentages, those percentages have not been reported.

	White				African American				Hispanic			
	IDS2	IDS3	IDS4	CPS	IDS2	IDS3	IDS4	CPS	IDS2	IDS3	IDS4	CPS
N	4,906	6,000	3,447		493	691	441		319	448	164	
Age:												
<25	12.79	13.87	13.81	15.5	22.63	19.18	21.16	20.8	31.63	22.02	23.44	23.5
25-45	43.53	41.38	42.03	43.1	38.66	47.20	39.92	47.5	51.04	52.19	43.11	50.6
46-64	26.75	27.72	27.63	24.7	20.81	19.27	24.49	20.7	13.34	17.32	23.08	18.2
>64	16.94	17.03	16.53	16.8	17.84	14.35	14.44	11.0	3.98	8.47	10.36	7.7
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education:												
less than h.s.	18.56	18.69	19.11	20.4	35.93	31.65	38.18	30.2	36.67	49.47	44.22	48.9
high sc grad	33.45	33.38	32.64	32.5	27.27	27.58	28.66	34.1	24.68	25.47	23.73	25.4
some college	26.44	25.66	26.28	25.8	20.30	26.54	22.86	24.6	26.16	16.69	21.70	18.2
college grad	21.56	22.27	21.97	21.3	16.50	14.23	10.30	11.1	12.49	8.37	10.35	7.5
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Gender:												
Male	47.87	48.09	49.07	48.5	42.32	43.86	40.41	45.1	46.09	49.09	45.54	50.2
Female	52.13	51.91	50.93	51.5	57.68	56.14	59.59	54.9	53.91	50.91	54.46	49.8
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Student status:												
Full time	6.94	7.45	7.32	7.3	12.98	10.64	11.21	9.4	19.36	8.91	15.48	8.2
None/pttime	93.06	92.55	92.68	92.7	87.02	89.36	88.79	90.6	80.64	91.09	84.52	91.8
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 2. Demographic distributions over time conditional on race and ethnicity of the three CommerceNet/Nielsen Internet Demographic Studies compared to the 1995 Census CPS (US Population Aged 16 and Older)

Demographic Differences in Web Access and Use Among African-Americans and Whites

Demographic Differences Across Race/Access Segments

Three usage segments are compared in this section: respondents who have 1) no Internet access, 2) Internet access only, but have never used the Web, and 3) ever used the Web. Table 3a shows results for whites, and Table 3b for African Americans. The sample sizes for Hispanics with were too low for reliable reporting. The major demographic differences between whites and African-Americans occur for age and income.

·The youngest (16-24) age segment differentiates usage segments more for African-Americans than for whites. African American Web users are more likely to be under 25, across all three surveys. Overall, Web users are more likely to be under 46 years of age.

·Overall, Web users are more likely to have some college or a college degree, although African American Web users are more likely to not have a high school education than white Web users. However, our African American samples

overrepresent students and some of the individuals in this group are students.

Tables 3a and 3b may provide evidence of an education-driven digital divide. However, it is larger for African Americans than for whites, though it appears to narrow in IDS 4. Of African Americans with no Internet access, 70.27% were high school graduates or had less than a high school education in IDS 2, compared with only 62.11% of whites in the same educational categories with no Internet access. Of course, African Americans are more likely, in general, to have less education, so this result requires further study.

Similarly, of African American Web users, 56.34% had some college or college degrees in IDS 2, compared to 70.89% of white Web users. This gap also does not appear to be diminishing over time. However, to the extent that African Americans are less likely to have some college or a college degree, this result is tentative.

·Occupation categories were defined as follows**.**The professional, homemaker, full-time student, and retired/not currently working categories were self-identified single-response. The white-collar category included those respondents who indicated their primary occupation was either technical, administrative/managerial, clerical, sales, or service worker. The blue collar category included those respondents who indicated their primary occupation was laborer or craftsman/ craftswoman. Due to its extremely low representation in the sample, respondents indicating they were in the military were excluded from analyses including the occupation variable. For this reason, the Occupation column totals may not necessarily sum to 100 percent. Web users are most likely to be professional, white collar, and students, regardless of race. The percentage of African American Web users who are blue-collar workers has more than tripled over time.

	IDS2			IDS3			IDS4		
	no access	access only	Web user	no access	access only	Web user	no access	access only	Web user
N	2,825	569	1,365	3,183	569	2,227	1,630	285	1,522
Age:									
<25	7.41	15.66	25.39	6.81	11.14	26.58	7.10	8.50	23.49
25-45	38.95	50.04	52.74	36.02	46.90	48.75	34.81	46.30	50.57
46-64	29.61	25.52	19.52	29.63	34.15	22.93	29.99	38.09	22.35
>64	24.02	8.78	2.35	27.54	7.81	1.74	28.10	7.11	3.59
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education:									
less than h.s.	21.93	13.38	11.64	21.99	12.33	14.66	25.04	9.62	13.22
high school grad	40.18	30.74	17.46	42.23	35.75	17.69	43.01	37.84	18.60
some college	23.68	30.79	31.58	22.37	30.18	30.13	21.39	38.78	29.77
college grad	14.20	25.09	39.31	13.41	21.74	37.51	10.56	13.76	38.41
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Occupation:									
Professional	12.28	22.33	26.33	11.33	17.51	26.24	11.00	17.67	27.64
White collar	28.51	38.76	39.16	27.16	38.27	38.95	23.76	37.82	38.40
Blue collar	13.68	9.64	5.63	15.16	15.14	7.04	16.65	15.96	7.34
Homemaker	13.92	9.32	3.80	13.94	11.16	4.47	16.43	9.38	4.29
Student	2.13	9.59	18.28	1.64	7.46	17.78	1.42	5.78	15.27
Retired	29.10	9.63	4.85	30.77	10.45	5.52	30.40	12.74	5.78
Total	100%	99.26%	98.06%	100%	100%	100%	99.67%	99.36%	98.72%
Household Income									
<$10K	11.49	3.79	2.59	12.80	3.10	2.87	13.60	5.51	2.53
$10K - $19,9	14.12	6.73	5.34	15.87	8.65	5.01	15.91	9.11	4.47
$20K - $29,9	17.67	12.47	9.69	18.97	14.28	9.63	17.39	15.60	10.16
$30K - $39,9	17.62	16.20	11.36	17.35	14.37	13.48	18.31	12.37	11.65
$40K - $59,9	20.93	28.41	27.44	21.14	30.53	26.13	19.21	30.46	25.95
$60K +	18.17	32.39	43.57	13.87	29.07	42.88	15.58	26.95	45.24
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Gender:									
Male	43.65	48.22	60.68	44.96	44.51	54.66	44.71	45.37	55.40
Female	56.35	51.78	39.32	55.04	55.49	45.34	55.29	54.63	44.60
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
% or column who...									
Owns a PC?	26.52	63.43	81.86	23.61	54.51	77.57	21.63	51.28	77.57
PC access at work?	23.39	58.43	68.16	26.32	58.18	64.48	23.75	54.89	63.05

Table 3a. Demographic differences over time in Web access and use for whites

	IDS2			IDS3			IDS4		
	no access	access only	Web user	no access	access only	Web user	no access	access only	Web user
N	298	73	109	387	108	190	266	30	144
Age:									
<25	16.20	21.25	46.30	13.00	17.53	38.51	10.78	5.46	49.47
25-45	37.23	53.43	39.13	46.72	51.82	50.12	38.40	47.24	41.76
46-64	22.76	21.04	14.10	22.02	22.96	11.01	28.68	46.46	8.31
>64	23.80	4.28	0.47	18.27	7.70	0.35	22.15	0.84	0.47
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education:									
less than h.s.	40.52	16.09	29.45	36.57	25.39	16.37	41.57	38.27	30.63
high school grad	29.75	33.70	14.21	35.35	24.71	11.57	33.00	32.20	17.14
some college	17.71	27.45	26.04	20.70	36.96	37.51	18.75	22.90	32.50
college grad	12.03	25.58	30.30	7.37	12.94	34.54	6.67	6.63	19.74
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Occupation:									
Professional	11.32	24.02	28.59	12.36	25.23	26.55	11.84	15.60	18.95
White collar	23.13	35.66	28.56	25.80	39.60	38.91	22.89	54.82	28.94
Blue collar	14.00	7.46	2.99	18.47	10.36	3.08	13.09	18.61	9.61
Homemaker	10.28	2.72	0.00	11.13	3.37	1.10	20.75	0.00	2.15
Student	7.10	17.33	30.46	5.39	9.01	28.36	4.42	3.18	29.60
Retired	33.56	9.87	8.09	26.85	12.43	1.99	25.68	5.29	4.66
Total	99.39%	97.06%	98.70%	100%	100%	100%	98.67%	97.49%	93.91%
Household Income									
<$10K	34.28	9.02	15.62	30.92	12.63	4.55	26.80	4.75	8.56
$10K - $19,9	19.87	11.31	2.90	28.80	12.23	4.24	21.50	22.54	6.98
$20K - $29,9	17.70	22.00	10.63	15.43	19.71	11.93	19.07	27.86	12.44
$30K - $39,9	8.87	8.32	11.23	6.00	16.33	19.36	12.00	14.33	14.48
$40K - $59,9	10.94	24.28	27.43	12.52	26.46	18.81	11.25	19.81	24.75
$60K +	8.34	25.07	32.30	6.33	12.64	41.11	9.38	10.71	32.79
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Gender:									
Male	38.15	53.55	55.40	38.68	44.01	55.78	34.10	46.46	53.61
Female	61.85	44.65	44.60	61.32	55.99	44.22	65.90	53.54	46.39
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
% or column who...									
Owns a PC?	16.70	44.18	65.05	14.82	34.53	65.62	12.09	29.30	68.24
PC access at work?	18.74	65.39	63.54	24.49	58.20	67.49	24.45	44.85	63.00

Table 3b. Demographic differences over time in Web access and use for African Americans

·The lowest income group (<$40K) differentiates usage segments much more for African-Americans than for whites. Of African-Americans with no Internet access, 80.72% had household incomes less than $40,000 in IDS 2, compared with

only 60.9% of whites with no Internet access. Thus, within African-Americans, the income-driven digital divide appears larger than for whites. Further, it is not diminishing over time. Again, however, African Americans are more likely to have lower incomes than whites, so these results are tentative until further study. Similarly, of African American Web users, 59.73% had household incomes above $40,000 in IDS 2, compared with 71.01% of white Web users. This gap has also not diminished over time. This concern for an ever-widening gap within African-American income segments has been identified by sociologists as a serious one, which "will continue to grow as the black middle class moves forward and poor black Americans stagnate" (Beaupre& Brand-Williams, 1997).

Katz & Aspden (1997) reported evidence of what Lloyd Morrisett of the Markle Foundation has termed a digital divide, with Internet users being generally wealthier and more highly educated. Sparrow and Vedantham (1995) summarize the broader information technology situation as follows:

Information technologies include basic telephone service, personal computing, and computer networking. Although these technologies are becoming everyday conveniences for many Americans, some communities are being left out. Disparities exist in levels of access between rich and poor and between suburban and inner-city residents. (p.19)

In summary, Tables 3a and 3b show evidence of a digital divide for both whites and African-Americans. Within both racial groups, Web users were most likely to be among the wealthiest individuals (those with incomes above the median of $40,000), while the segment with no Internet access was the most likely to be composed of individuals with the lowest incomes (less than $40,000). The same holds true for Education. The Web user segment was most likely to consist of individuals with some college or who had completed college, while the segment with no access was most likely to be composed of those with a high school education or less. All these effects were more pronounced for African Americans than whites and these effects appear to persist over time.

Racial Differences in Web Access and Use Over Time

In this section, we analyze differences among whites and African Americans in Web use adjusting for key demographic variables. Each demographic analysis will first examine differences in Web use among all respondents. Then, we examine detailed Web use behavior for recent Web users only. Below we provide statistics on recent Web use for each IDS to facilitate these comparisons.

Aggregate Recent Web Use Over Time

	IDS 2	IDS 3	IDS 4
Raw Count	1555	2305	1562
Recent Web Users in Millions	45.02	56.23	69.55
% Recent Web Users	22.5	27.8	34.4
Total Number of People in Millions	199.93	202.34	202.37

Recent Web Use Over Time by Race

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Raw Count	1304	2015	1368	104	151	117
Recent Web Users in Millions	35.22	48.36	60.41	3.9	4.04	5.21
% Recent Web Users	22.4	30.04	35.78	16.6	16.97	21.89
Total Number of People in Millions	157.12	160.95	168.81	23.5	23.8	23.8

In IDS 2, 16.6% of African-Americans had used the Web in the six months preceding the survey. This translated into 3.9 million African-American Web users at the beginning of 1997. Thus, there is substantial support for the claim of at least one million active African-American Web users, and our baseline figure of 3.9 million African-Americans who had used the Web in the past 6 months in 1997 is considerably higher than estimates of one million African-Americans with Internet access that have been reported elsewhere (*New Media Week*, 1997; *Interactive Marketing News*, 1997). Note that this number has been steadily increasing, so that by IDS 4, almost 22 percent of African Americans had ever used the Web, amounting to over 5 million African Americans in June 1998 who had used the Web in the past six months.

Race Differences Over time in Web Use

Table 4 presents a series of comparisons among whites and African-Americans on key indicators of Web access and use.

In IDS 2, overall, whites were more likely than African-Americans to have access to the Internet, and to have ever used the Web. Whites were also more likely to own a computer, have PC access at work, and have fax, cable, and a satellite dish at home.

As Table 4 shows, the percentages of access and use for both whites and African Americans have increased over time, but the gaps persist. In fact*, the overall gap between whites and African Americans in Internet access and having ever used the Internet have actually increasedover time*. In IDS 2, 35.8% of whites had Internet access, compared to 31.68% of African Americans. By IDS 4, although 49.33% of whites had access, the percentage of African Americans with Internet access had risen only a few percentage points, to 35.54%. Similarly, in IDS 2, 24.34% of whites had ever used the Internet, compared to 18.76% of African Americans. In IDS 4, eighteen months later 40.37% of whites had ever used the Internet, compared to 27.98% of African Americans.

Although whites are still more likely to own a PC and to have PC access at work, these gaps have not increased over time. Further, the gaps in cable and satellite ownership have disappeared. In fact, satellite penetration has doubled among African Americans and the penetration rate in IDS 4 equals that for whites.

Our estimate of 29% of African-American households with access to a personal computer in IDS 2, 3, and 4 compares with estimates provided by Simmons Market Research Bureau (*Interactive Marketing News*, 1997), which reported that 23% of African-Americans owned a personal computer. The gap between whites and African-Americans in computer ownership has been cited as the key explanation for corresponding gaps in Web usage.A Yankelovich Monitor study (*Interactive Daily*, 1997) "suggests that what bars entry to cyberspace among African Americans is owning a home PC, not lack of interest in the Internet"" However, a Forrester Research study (Walsh, 1999) cites "technology optimism" as an important predictor of technology adoption. Further research is required to understand these increasing gaps in access and usage.

A number of reasons have been provided in the popular press for the gap between whites and African-Americans in computer ownership. Price and value are often cited as explanations. For example, Malcolm CasSelle, co-founder of NetNoir, stated, "African-Americans just don't perceive the value of the Internet. Many blacks would pay $500 for a TV, and you could get a computer, though maybe not a top-of the line one, for not much more than that" (Holmes, 1997). Similarly, Larry Irving, assistant secretary of Commerce, noted that WebTV is in the under-$500 price range, and "laptop and PC prices are coming down. As that continues to happen, the Internet will become more prevalent in the African-American community"" (Holmes, 1997).

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Respondents						
N	4,906	6,000	3,447	493	691	441
Current Access	35.84	43.25	49.33	31.68	38.99	35.54
Ever used	24.34	33.56	40.37	18.76	23.22	27.98
Own a PC	44.24	44.62	46.66	28.92	29.05	29.07
PC access at work	38.23	42.07	42.35	32.97	38.96	36.70
Home fax	14.00	13.68	14.86	9.04	7.26	8.03
Cable	68.46	72.87	74.49	63.36	72.87	75.11
Satellite	10.55	11.96	13.52	5.06	7.49	12.69
Among Recent Web Users						
N	1,304	2,015	1,368	104	151	117
First Used						
...in past 2 years +	16.17	33.14	49.47	6.79	31.91	43.98
...in past 1-2 years	18.41	23.95	19.99	15.78	20.77	17.61
...in past year	22.40	23.77	15.69	15.42	26.09	19.46
...in past 6 months	18.65	9.39	8.81	18.39	9.23	6.10
...in past 3 months	24.36	9.74	6.05	43.62	12.00	12.85
Last Used						
...in past 6 months	8.40	7.68	5.37	10.50	4.70	2.32
...in past 3 months	12.09	11.67	6.57	30.94	21.19	11.46
...in past month	21.95	19.38	19.30	23.77	26.86	21.44
...in past week	27.89	26.81	30.19	18.90	25.62	35.62
...in past 24 hours	29.68	34.46	38.56	15.88	21.63	29.17
Frequency of Use						
...once a day +	18.49	22.20	26.79	15.33	15.67	25.33
...few times/week	28.59	29.30	31.54	25.92	27.97	32.26

sec3_1

...once a day +	18.49	22.20	26.79	15.33	15.67	25.33
...few times/week	28.59	29.30	31.54	25.92	27.97	32.26
...two-four times/month	26.67	24.77	25.03	28.25	26.10	23.28
...once a month or less	26.25	23.73	16.64	30.50	30.26	19.13
Ever Used						
...at home	61.36	64.94	68.85	46.44	55.02	60.83
...at work	44.15	51.77	50.55	36.73	63.37	61.06
...at school	28.31	29.26	28.79	44.39	40.18	57.07
...at other locations	26.22	39.40	35.06	24.39	48.36	53.69

Table 4. Race differences over time on key Web usage variables

However, our analysis suggests that PC penetration rates are not increasing overall among African Americans. Although the percentage of whites owning a home computer has increased slightly over time, approaching fifty percent, the overall percentage of African Americans who own a home computer has remained at 29%. Later we will investigate home computer ownership among different usage segments.

Overall, then, the gap in access and use is persistent and appears to be increasing. However, a different picture emerges when we examine recent Web users. In IDS 2, whites were more frequent and more recent Web users than African Americans. White recent Web users in IDS 2 were also more likely to have ever used the Web from home and work, while recent African American Web users were more likely to have ever used the Web from school. African Americans in IDS 2 were much more likely to be newer users, and whites were much more likely to have been using the Web for two years or more.

But over time, is apparent that African American Web users have made significant gains in Web use. Indeed, the gaps are diminishing rapidly. The gap in Web use at home has decreased dramatically (even as the overall PC penetration rate among African Americans stagnates) and African Americans now appear to be more likely than whites to have ever used the Web from work, school or other locations. Additionally, African American Web users are becoming more recent and more frequent Web users. In fact, differences between white and African American Web users in their recency and frequency of Web use have disappeared. African Americans are still among the newest users, but are now also joining the ranks of the long-term users. By IDS 4, 43.98 percent of African American recent Web users, compared to 49.47 percent of white recent Web users, had been using the Web for two years or more. This suggests that one cause of the digital divide arises from the differential lack of access.

Student Status

The differences on most indicators of Internet access and use, and also home computer ownership between whites and African-Americans is greater for students (Table 5b) than non-students (Table 5a).We examine non-students first.

*Non-Students.*As Table 5a reveals, white non-students in IDS 2 were more likely to have access to the Web, to have ever used the Web, to own a PC, and have PC access at work. Additionally, white non-students were also more likely than African Americans to have a home fax, cable, and a satellite dish.

Over time, and similar to the previous analysis, overall differences between white and African American non-students actually appear to be *increasing.* Note that the percentage of white non-students who own a home computer is increasing

slightly, but that the percentage of African American non-students who own a home computer is actually *decreasing* over time. At the same time, the percentages of African American non-students who have cable or a satellite dish have increased and are now similar to the penetration rates for whites.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Non-Student Respondents						
N	4,554	5,581	3,212	423	619	388
Current Access	32.59	39.60	46.05	27.31	35.29	30.34
Ever used	20.94	29.94	36.89	14.69	18.66	21.98
Own a PC	42.09	42.51	44.90	28.66	27.94	25.67
PC access at work	39.12	43.19	43.06	34.71	40.17	35.61
Home fax	13.70	13.28	14.40	9.27	7.78	8.20
Cable	68.29	72.54	74.49	64.23	73.06	74.91
Satellite	10.69	11.87	13.77	5.02	7.60	11.37
Among Recent Non-Student Web Users						
N	1,089	1,722	1,194	83	123	88
First Used						
...in past 2 years +	16.74	32.90	49.54	6.99	29.15	37.85
...in past 1-2 years	19.02	22.59	19.37	20.91	20.38	19.96
...in past year	22.62	24.74	15.17	16.70	26.89	20.40
...in past 6 months	18.32	9.50	9.27	19.96	10.19	7.51
...in past 3 months	23.41	10.27	6.65	35.44	13.40	14.28
Last Used						
...in past 6 months	7.65	6.65	5.59	11.54	5.97	3.34
...in past 3 months	12.08	11.07	7.02	31.74	16.26	11.66
...in past month	21.82	19.07	18.81	21.42	28.65	19.48
...in past week	27.28	27.54	28.62	18.26	26.42	34.97
...in past 24 hours	31.17	35.68	39.96	17.04	22.70	30.55
Frequency of Use						
...once a day +	20.08	22.69	28.16	12.61	14.83	24.39
...few times/week	27.54	30.50	31.03	26.28	28.59	34.28
...two-four times/month	26.34	23.72	22.76	25.82	25.61	20.58
...once a month or less	25.73	23.09	18.05	35.59	30.97	20.75
Ever Used						
...at home	63.17	65.54	68.12	49.56	59.94	64.48
...at work	50.74	56.99	55.60	46.64	68.81	66.86
...at school	18.23	19.69	20.77	30.82	29.12	38.67
...at other locations	24.83	36.44	32.59	29.29	42.69	52.35

Table 5a. Race difference over time on key Web usage variables for non-students

Among non-student recent Web users, we see that over time African Americans are making steady gains in Web use.Since IDS 2, African Americans are increasingly likely to have been using the Web for two years or more, more likely to have ever used the Web at home, work, school, or other locations, and more likely to be more recent and frequent users of the Web.

However, white non-student recent Web users are making similar gains, and in some cases, their use still outpaces that of African Americans. For example, whites are still more likely to be among the most recent Web users. In IDS 4, 39.96 percent of whites reported using the Web in the past 24 hours, compared to 30.55 percent of African Americans.

On the other hand, differences in Web use frequency (a few times a week or more) between white and African American non-student recent Web users have disappeared. Additionally, African American non-students are more likely to have used the Web from work, school or other locations. Because African American non-students are also more likely than whites to be the newest users, we may expect increasing gains in Web use, compared to white non-students, over time.

These results point out the importance of home computer ownership and multiple access points for African Americans and other minority groups. African American non-students are significantly less likely to own a home computer than white non-students (and in fact, even less likely over time), and consequently we believe, exhibit lower overall rates of access and usage.

Yet, among recent Web users, who by definition have access somewhere, recency and frequency usage rates for *African American respondents has over time come to mirror that of whites.*

Students. Table 5b shows clearly that, overall, Web access, usage and PC penetration rates are considerably higher for students than non-students, regardless of race. Additionally, Web access, usage and PC penetration rates are all rising over time, for *both* white and African American students.

In fact, 53.83 percent of African American students owned a home computer in IDS 4, compared with only 25.67 percent of African American non-students.Eighteen months earlier, in IDS 2, the PC penetration rate was considerably lower (and similar to non-students): only 31.88 percent of African American students, compared with 28.66 percent of African American non-students, owned a home PC.

At the same time, Table 5b reveals clear disparities in Internet access and use between African American and white students. For example, though both groups have higher rates over time, white students are more likely to have Web access, and to have ever used the Web, and these differences persist over time.

What might explain the persistent gap in Internet and Web access and use between African-American and white students? White students are more likely to own home computers than African American students and this difference remains over time, despite the fact that home computer ownership over time among white students is flat and home computer ownership among African American students has been steadily and impressively rising.

However, the gaps in access and usage are clearly *decreasing* over time and this may in part be due to increasing rates of PC ownership among African American students. Additionally, African American students were more likely to have access to a PC at work in IDS 4. Thus, one could hypothesize that as PC ownership and PC access rates continue to rise, so will overall Web access and usage rates. Eventually, we would expect the access and usage gaps between white and African American students to disappear.

We now turn to an analysis of recent student Web users, shown in the lower panel of Table 5b. Sample sizes are very small for African American students who are recent Web users, so results for this sub-segment must be interpreted with extreme caution. Nevertheless, we include them for comparability with non-student recent Web users in Table 5a.

African American recent Web user students, like their white counterparts, are increasingly likely to be more recent and more frequent Web users. In fact, the differences between the two groups, as for non-students, have effectively disappeared. However, white students are still more likely to have ever used the Web from home, while African American students are more likely to have ever used the Web from work and school.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Student Respondents						
N	336	405	218	64	68	50
Current Access	80.33	87.82	90.25	62.78	71.12	74.97
Ever used	62.72	78.15	83.26	43.20	58.16	72.82
Own a PC	72.98	69.24	69.50	31.88	39.77	53.83
PC access at work	26.62	27.97	32.95	22.04	30.67	47.60
Home fax	18.42	18.19	20.59	7.77	3.09	7.21
Cable	71.54	76.16	74.84	62.21	72.51	75.73
Satellite	9.17	13.50	10.60	4.85	6.95	23.93
Among Recent Student Web Users						
N	212	289	170	20	28	29
First Used						
...in past 2 years +	13.81	34.02	48.58	6.29	42.09	57.83
...in past 1-2 years	15.85	31.20	23.31	0.00	22.21	12.32
...in past year	21.04	19.23	18.66	11.73	23.14	17.35
...in past 6 months	20.36	9.02	6.41	13.86	5.70	2.89
...in past 3 months	28.94	6.53	2.84	68.12	6.86	9.62
Last Used						
...in past 6 months	11.90	12.91	4.28	7.46	0.00	0.00
...in past 3 months	11.80	14.87	4.23	29.10	39.42	0.00
...in past month	22.09	20.34	22.37	31.66	20.23	5.34
...in past week	30.91	22.89	38.63	19.19	22.67	73.28
...in past 24 hours	23.30	29.00	30.49	12.58	17.67	21.37
Frequency of Use						
...once a day +	11.60	20.22	18.80	24.09	18.72	27.47
...few times/week	32.27	23.00	34.32	25.37	25.70	27.66
...two-four times/month	27.55	29.69	37.66	37.31	27.91	29.42
...once a month or less	28.58	27.09	9.22	13.22	27.67	15.46
Ever Used						
...at home	52.80	62.24	70.42	37.63	36.86	52.55
...at school	73.50	76.75	73.69	80.47	98.93	94.79
...at other locations	32.35	53.92	49.37	9.49	70.35	56.76

Table 5b. Race difference over time on key Web usage variables for students

Home Computer Ownership

In this section, we examine the impact of home computer ownership on Web access and usage. Because there are such dramatic differences between students and non-students, we treat student status as a separate variable in this analysis. We first analyze non-students and then turn to students.

*Non-Students.*Table 6a compares Web access and usage patterns for white and African American non-students who do not own a home computer. Table 6b shows the same comparison for white and African American non-students who do own a home computer. First, it is quite clear that the presence of a computer in the home has a dramatic impact overall on access and usage. *Non-student respondents, regardless of race, are much more likely to have access to the Web and to have ever used the Web if they own a home computer.* Additionally, among non-students with a home computer, whites are more likely to have access and to have ever used the Web, but the differences are small.

Yet, there are striking gaps in access and usage among non-students without a home computer.In IDS 4, whites were more likely than African Americans to have access to and have ever used the Web. Further, the gap in use among non-students without a home computer is *increasing* over time.

Turning to an examination of recent Web users, we first examine those non-students who do not own a home computer. Sample sizes for African Americans in this sub-segment are very small, so results must be interpreted with extreme caution. Here we notice that whites and African Americans have similar rates of usage frequency and recency, suggesting once again, that *given access, usage follows* for both groups. African Americans without a home computer are more likely than whites to have ever used the Web at school or other locations.

Among non-students recent Web users with a home computer, both recency and frequency of Web use increase over time for both whites and African Americans, and differences are diminishing rapidly. By IDS 4, 73.85 percent of white non-students with a home computer had last used the Web within the past week, compared to 67.58% of African Americans and 64.62% of whites had used the Web a few times a week or more, compared to 59.05% of African Americans.

Both groups enjoy similarly high percentages of having ever used the Web at home; 80.55% of whites and 82.12% of African Americans in IDS 4 had ever used the Web at home. In IDS 4, African American non-students were more likely than their white counterparts to have ever used the Web at work, at school and at other locations.

Non-Students Without a Home Computer

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Non-Student Respondents Without a Home Computer						
N	3,258	3,134	1,733	282	421	271
Current access	13.91	19.35	22.87	14.23	22.77	16.91
Ever used	6.47	11.37	14.84	4.99	7.04	8.84
Among Recent Non-Student Web Users Without a Home Computer						
N	207	417	276	22	32	24
First Used						
...in past 2 years +	11.45	23.22	37.30	5.98	21.47	34.17
...in past 1-2 years	8.53	19.76	21.35	8.26	13.04	12.30
...in past year	21.02	28.09	22.81	21.37	32.34	15.02
...in past 6 months	22.88	12.57	10.97	35.61	16.71	10.12
...in past 3 months	36.13	16.36	7.57	28.77	16.44	28.40
Last Used						
...in past 6 months	17.04	12.64	11.97	31.20	17.53	0.00
...in past 3 months	15.75	20.00	12.36	25.36	14.95	9.83
...in past month	30.26	25.54	26.27	12.96	26.36	30.44
...in past week	21.96	24.35	27.40	22.08	30.43	30.97
...in past 24 hours	14.99	17.46	22.01	8.40	10.73	27.75
Frequency of Use						
...once a day +	16.34	13.73	14.13	15.29	7.74	19.77
...few times/week	18.56	20.21	25.20	44.08	38.12	37.84
...two-four times/month	24.22	23.14	28.14	7.65	13.22	22.83
...once a month or less	40.89	42.92	32.53	32.98	40.93	19.56
Ever Used						
...at home	7.54	19.63	24.80	10.83	12.36	14.59
...at work	58.22	56.10	64.99	41.88	69.29	64.27
...at school	21.56	21.11	22.17	35.75	26.52	53.38
...at other locations	33.18	50.40	45.89	31.05	53.94	60.47

Table 6a. Race differences in Web access and use by student status and home computer ownership

Non-Students With a Home Computer

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Non-Student Respondents With a Home Computer						
N	2,025	2,442	1,479	140	197	116
Current access	58.36	66.87	74.31	59.76	66.56	69.35
Ever used	40.87	55.09	63.82	38.50	48.53	60.19
Among Recent Non-Student Web Users With a Home Computer						
N	882	1,304	918	61	91	64
First Used						
...in past 2 years +	17.88	35.75	52.88	7.31	31.46	39.12
...in past 1-2 years	21.29	23.43	18.83	24.87	22.59	22.59
...in past year	22.84	23.77	13.09	15.24	25.25	22.25
...in past 6 months	17.34	8.55	8.80	15.06	8.22	6.62
...in past 3 months	20.66	8.50	6.40	37.52	12.48	9.42
Last Used						
...in past 6 months	5.61	4.90	3.83	5.39	2.50	4.53
...in past 3 months	11.29	8.41	5.55	33.73	16.35	12.30
...in past month	19.98	17.19	16.76	24.06	29.34	15.59
...in past week	28.44	28.48	28.95	17.07	25.20	36.39
...in past 24 hours	34.68	41.01	44.90	19.74	26.31	31.19
Frequency of Use						
...once a day +	20.88	25.26	32.00	11.81	16.90	26.03
...few times/week	29.83	33.47	32.62	20.99	25.82	33.02
...two-four times/month	26.80	23.84	21.30	30.84	29.21	19.78
...once a month or less	22.49	17.43	14.08	36.36	28.07	21.17
Ever Used						
...at home	75.27	78.97	80.55	61.68	74.26	82.12
...at work	49.12	57.29	53.01	48.13	68.66	67.79
...at school	17.51	19.29	20.39	29.28	29.90	33.47
...at other locations	23.02	32.31	28.94	28.74	39.26	49.48

Table 6b. Race differences in Web access and use by student status and home computer ownership

Students. Tables 6c and 6d below show the analysis for students with and without a computer in the home.

Sample sizes are much smaller for African-American students when segmented by whether they have a computer at home, so the results must be interpreted with caution. Compared to Tables 6a and 6b, Tables 6c and 6d show that students are more likely to have access to the Web and to use the Web, compared to non-students.

Regardless of race, non-students with a home computer have access and usage rates that are similar to students without a home computer. Students with a home computer enjoy the highest levels of access and use, while non-students without a home computer have the lowest levels of access and use.

Additionally, having a computer in the home leads to much higher levels of Web access and use for students of both races, but the difference is clearly more dramatic for non-students than students. That is, the differences in access and usage for non-students with and without a home computer are larger than the differences for students with and without a home computer. Presumably this is because students have more opportunities for access at school, even if they do not

own a computer at home.

However, without a computer in the home, there is a much larger gap between African-American and white students in terms of Web access, and the corresponding percentages of having ever used the Web are also smaller. In fact, the gap in access for students without a computer in the home appears to be *increasing.*

It also appears that the presence of a computer in the home is bringing African American and White students to parity in Internet access and Web use.

Increasing the Internet access opportunities for students, especially African-American students without home computers, may help to reduce the gaps in access and usage.

Students Without a Home Computer

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Student Respondents Without a Home Computer						
N	89	125	59	42	41	24
Current access	65.14	73.13	78.76	59.65	60.22	61.90
Ever used	45.21	65.99	65.78	38.47	51.98	60.02

Table 6c. Race differences in Web access and use by student status and home computer ownership

Students With a Home Computer

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Student Respondents With a Home Computer						
N	247	280	159	22	27	26
Current access	85.59	94.40	95.30	69.06	87.61	86.19
Ever used	69.19	83.55	90.93	53.13	67.53	83.80

Table 6d. Race differences in Web access and use by student status and home computer ownership

Education

Tables 7a-7d show the influence of education on Web access and usage between whites and African Americans. In general, increasing levels of education lead to higher levels of Web access, usage, PC ownership and PC access at work.

However, these levels are higher for whites than for African Americans and these race differences persist even after adjusting for education. In fact, *the gaps in access and usage are largest for those with a college degree.*

Less Than High School and High School Graduates. At the lowest levels of education, whites are more likely than African Americans to have access to the Web, to have ever used the Web, and to own a computer. What is more, these differences persist over time.

Among those with less than a high school education, African Americans are gaining ground faster than whites in Web access, use and PC ownership over time. Overall, the gaps are smaller here. Whites are more likely to have access to a PC at work, in IDS 2 and IDS 3. By IDS 4, there is no difference between whites and African Americans with less than a high school education on this variable. However, students are included in this group and that could account for some of these gains.

Among high school graduates, levels of computer ownership among both groups are stagnant, and whites are more likely than African Americans to own a PC. African American high school graduates are more likely to have access to a PC at work than are white high school graduates. Additionally, the gap in access and use between whites and African Americans is larger for high school graduates than for those without a high school degree.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Respondents with Less Than High School Education						
N	492	609	360	93	125	98
Current access	23.46	32.89	32.83	21.41	25.92	29.96
Ever used	14.93	26.45	28.26	15.46	11.85	22.40
Own a PC	28.92	31.99	32.60	15.26	10.25	20.70
PC access at work	11.26	16.72	13.28	7.64	10.09	13.73
Home fax	8.29	9.48	9.55	2.40	0.97	6.93
Cable	61.41	69.63	68.88	42.19	62.78	64.48
Satellite	10.82	13.76	13.17	3.89	8.32	16.56

Table 7a. Race differences over time on key Web usage variables for respondents with less than high school education

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All High School Graduate Respondents						
N	1,475	1,710	998	149	187	129
Current access	23.09	28.13	33.35	25.64	23.38	25.37
Ever used	12.42	17.77	22.87	9.39	9.52	16.69
Own a Computer	32.31	31.18	35.30	20.26	22.23	21.34
PC access at work	30.01	32.20	31.67	26.98	35.18	36.20
Home fax	8.95	8.69	9.87	7.87	4.30	5.66
Cable	68.61	72.37	74.08	70.69	70.86	81.44
Satellite	12.34	13.72	15.20	3.09	8.20	9.34

Table 7b. Race differences over time on key Web usage variables for high school

Some College. Table 7c shows the results for respondents with some college, but no degree. In IDS 4, whites were more likely to have Web access, to have ever used the Web, and to own a home computer. Except for access, the gaps are diminishing over time. African Americans are more likely to have PC access at work.

Larger sample sizes permitted us to examine Web usage patterns among recent Web users with some college. In IDS 2, twice as many African Americans as whites with some college education reported using the Web for the first time (50.62 percent of African Americans compared to 25.25 percent of whites). More than twice as many whites as African Americans reported using the Web for two years or more (14.23 percent whites compared to 5.97 percent African Americans). Thus, in IDS 2, whites were more likely to be long-term users and African Americans were more likely to be newer users.

By IDS 4, similar percentages of African Americans and whites have been using the Web for two years or more; 43.81 percent of whites and 46.59 percent of African Americans had been using the Web for two years or more.

In IDS 2, whites were more both recent and frequent users of the Web, compared to African Americans. Over time, however, these differences have effectively vanished, with 65.82 percent of whites and 66.87 percent of African Americans in IDS 4 reporting using the Web within the past week. Similarly, 29.13 percent of whites and 26.30 percent of African Americans with some college used the Web once a day or more in IDS 4, and African Americans with some college are actually more likely than whites to have used the Web a few times a week.

In IDS 2, whites with some college were more likely to have ever used the Web at home and work, and African Americans were more likely to have ever used the Web at school. By IDS 4, African Americans were more likely than whites to have ever used the Web at work, school or other locations. The percentage of African Americans who have ever used the Web at home has risen dramatically, going from 47.33 percent in IDS 2 to 76.52 percent by IDS 4

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Respondents with Some College						
N	1,397	1,943	1,117	131	242	151
Currently Have access	42.51	50.67	58.85	41.46	53.51	47.25
Ever used	28.40	39.40	45.49	23.31	32.06	39.69
Own a Computer	53.44	52.03	51.33	44.34	36.37	46.31
PC access at work	47.09	52.98	53.26	49.36	58.22	60.64
Home fax	16.65	15.79	16.60	10.62	10.19	9.99
Cable	70.09	73.24	77.22	75.10	80.42	80.03
Satellite	11.42	12.40	13.51	4.68	7.76	12.60
Among Recent Web Users with Some College						
N	388	700	451	32	53	48
First Used						
...in past 2 years +	14.23	31.18	43.81	5.97	20.58	46.59
...in past 1-2 years	19.53	22.24	22.05	1.16	26.86	25.44
...in past year	21.70	26.78	17.08	22.10	29.96	16.62
...in past 6 months	19.28	10.90	9.53	20.14	10.90	3.55
...in past 3 months	25.25	8.89	7.53	50.62	11.70	7.79
Last Used						
...in past 6 months	10.59	6.79	4.89	4.19	5.78	0.00
...in past 3 months	12.97	12.04	9.65	27.72	22.24	9.14
...in past month	18.44	22.36	19.64	28.25	25.92	23.98
...in past week	28.03	28.77	26.13	20.23	27.08	37.02
...in past 24 hours	29.97	30.04	39.69	19.61	18.99	29.85
Frequency of Use						
...once a day +	18.44	20.27	29.13	16.58	18.23	26.30
...few times/week	27.49	30.30	28.33	21.57	35.74	39.73
...two-four times/month	24.55	26.66	24.15	29.50	24.12	18.28
...once a month or less	29.53	22.77	18.39	32.35	31.91	15.69
Ever Used						
...at home	60.06	61.31	68.99	47.33	50.05	76.52
...at work	38.76	48.20	47.87	27.99	61.16	67.30
...at school	26.26	29.78	24.51	40.02	44.12	44.19
...at other locations	24.24	38.77	32.74	22.73	48.52	54.01

Table 7c. Race differences over time on key Web usage variables for respondents with some college

*College Graduates.*Table 7d examines differences in access and use for college graduates.In IDS 2, whites had higher levels of access, usage, and home computer ownership than African Americans. In IDS 3, it appeared that these differences had disappeared. But then in IDS 4, African American rates dropped, leading to dramatic differences and larger gaps. *Thus, it appears that education does not account for the digital divide in access and usage and home PC ownership.*

Interestingly, both whites and African American college graduates have high levels of PC access at work and there is no gap on this variable. Outside of this finding, it is an interesting question to ask why there is such a large gap in access and usage between educated African Americans and whites. Further examination of college educated African Americans in IDS 4 is warranted.

Among recent Web users who are college graduates, we find other interesting results. Whites and African Americans report similar levels of recency and frequency of use, as with those with some college. Whites and African American college graduates are also equally likely to have ever used the Web from home, work, or school. However, there is a small tendency for African Americans college graduates to be more likely to have ever used the Web from other locations, and this difference has persisted over time.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Respondents with College Degrees						
N	1,542	1,738	972	120	137	63
Current access	57.85	65.92	75.78	51.00	69.10	58.34
Ever used	43.37	56.50	70.18	33.09	55.09	53.49
Own a PC	64.65	66.81	70.21	54.09	70.43	43.60
PC access at work	63.21	65.52	70.86	76.40	74.16	70.09
Home fax	23.47	22.26	24.79	23.52	21.72	14.40
Cable	72.28	75.92	76.74	83.00	85.13	85.96
Satellite	6.49	7.29	11.34	6.40	3.76	7.83
Among Recent Web Users with College Degrees						
N	650	913	623	43	68	31
First Used						
...in past 2 years +	21.98	40.61	58.12	16.06	42.92	49.41
...in past 1-2 years	21.30	24.39	20.29	41.77	23.83	19.43
...in past year	22.80	20.85	12.13	11.68	22.19	21.69
...in past 6 months	16.57	7.47	5.60	15.49	6.70	3.69
...in past 3 months	17.36	6.68	3.85	15.00	4.36	5.78
Last Used						
...in past 6 months	5.58	5.64	4.24	7.46	5.12	3.85
...in past 3 months	12.12	10.10	5.55	26.93	12.77	5.11
...in past month	22.68	15.29	16.27	17.19	34.77	12.56
...in past week	24.86	28.01	28.01	24.82	23.83	41.29
...in past 24 hours	34.76	40.96	45.93	23.60	23.51	37.19
Frequency of Use						
...once a day +	23.67	25.78	31.32	17.92	17.92	17.92
...few times/week	27.76	31.51	31.51	21.49	25.88	35.34
...two-four times/month	24.62	23.28	21.87	23.68	32.18	29.82
...once a month or less	23.95	19.42	15.30	36.90	24.02	16.92
Ever Used						
...at home	66.47	69.01	67.52	60.75	56.83	67.92
...at work	62.69	68.00	68.51	70.15	72.38	71.52
...at school	23.53	19.86	22.23	28.39	24.05	23.20
...at other locations	24.34	31.56	28.55	33.17	35.27	37.02

Table 7d. Race differences over time on key Web usage variables for college graduates

Income

Tables 8a and 8b show the relationship between income and Web access and usage for whites and African Americans. Not surprisingly, respondents whose household income is above the median income of $40,000 report higher levels of access, use, home computer ownership and PC access at work. Below we examine race differences within income levels.

Household Income Less Than $40,000. At household incomes below $40,000, whites are more likely than African Americans to have access to the Web, to have ever used the Web, and to own a home computer. The gaps in access and use may actually be increasing, although the gap in home PC ownership appears to be improving slightly. There is no difference between whites and African Americans in PC access at work at this income level.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
N	1,967	2,472	1,315	244	381	223
Current access	24.67	28.69	32.92	21.68	28.13	24.98
Ever used	14.52	20.63	24.68	10.83	13.51	17.42
Own a PC	29.49	28.45	30.52	14.39	16.26	19.81
PC access at work	26.37	30.93	28.72	19.55	30.83	30.65
Home fax	6.31	6.23	7.27	3.54	2.91	6.36
Cable	63.16	66.67	68.43	60.29	67.64	75.95
Satellite	10.90	12.14	13.42	4.96	6.02	11.30

Table 8a. Race differences over time on key Web usage variables for respondents with household income below $40,000

Household Income of $40,000 and Above. Above the median household income of $40,000, differences between whites and African Americans in access, usage, PC ownership and PC access at work are greatly diminished compared to respondents with less household income.

We also examined recent Web users at this income category. In IDS 2, there were significant differences in the length of time that whites and African Americans had been online. We found that 170.8 percent of whites had used the Internet for two years or more, while only 9.08 percent of African Americans had. In contrast, African Americans were almost twice as likely as whites to be new users in IDS 2. By IDS 4, these gaps had disappeared with over fifty percent of both African Americans and whites to have been Web users for two years or more.

In IDS 2, 59.48 percent of whites, compared to 44.21 percent of African Americans were the most recent users. By IDS 4,

this gap had largely disappeared, with 73.78 percent of whites and 75.22 percent of African Americans with incomes of $40,000 and over reporting they last used the Web within the past week.

A similar result was found for frequency of use. In IDS 2, 49.69 percent of whites, compared to 30.94 percent of African Americans, used the Internet a few times a week or more. By IDS 4, 62.86 percent of whites and 59.08 percent of African Americans had.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Respondents with Household Income $40,000+						
N	1,993	2,332	1,366	138	173	114
Current access	51.55	60.07	66.84	58.42	64.26	58.01
Ever used	35.66	47.78	56.51	35.60	44.92	50.36
Own a PC	62.31	61.24	63.60	64.95	63.61	61.26
PC access at work	57.78	61.28	63.02	75.32	72.40	60.48
Home fax	22.25	21.69	22.61	26.75	19.72	18.10
Cable	75.26	77.75	78.94	87.23	90.10	84.26
Satellite	11.05	12.22	14.33	9.27	9.80	12.96
Among Recent Web Users with Household Income $40,000+						
N	753	1,063	750	57	71	56
First Used						
...in past 2 years +	17.08	33.70	52.00	9.08	33.13	56.29
...in past 1-2 years	20.32	25.45	19.20	26.93	21.92	21.27
...in past year	20.68	24.87	14.60	7.75	24.52	17.99
...in past 6 months	18.74	8.27	9.11	15.25	7.54	0.00
...in past 3 months	23.19	7.70	5.09	41.00	12.89	4.45
Last Used						
...in past 6 months	7.93	6.48	4.31	5.86	3.35	4.08
...in past 3 months	10.26	9.60	4.77	29.22	21.13	8.83
...in past month	22.31	17.06	17.14	20.70	31.69	11.87
...in past week	28.17	28.42	31.17	22.69	20.71	44.50
...in past 24 hours	31.31	38.43	42.61	21.52	23.13	30.72
Frequency of Use						
...once a day +	18.18	24.25	30.06	12.51	14.60	31.52
...few times/week	31.51	31.07	32.80	18.43	29.10	27.56
...two-four times/month	26.50	25.70	22.71	37.80	24.95	28.81
...once a month or less	23.81	18.98	14.43	31.26	31.36	12.11
Ever Used						
...at home	65.64	68.32	71.85	53.85	62.40	78.73
...at work	52.22	61.87	59.26	56.91	69.19	64.38
...at school	23.00	24.21	22.89	28.76	25.75	37.26
...at other locations	24.43	34.97	32.00	31.26	35.64	47.29

Table 8b. Race differences over time on key Web usage variables for respondents with household income $40,000 and over

Gender

Tables 9a and 9b report the relationship between gender and Web access and use for whites and African Americans. It is clear that overall levels of Web access and use are lower for women than men. Among recent Web users, men are more likely to have been using the Web longer, and to have used the Web more recently. Women are more likely to be newer users. While white men are more frequent users than white women, African American men are not more frequent Web users than African American women. Below we analyze differences by race for each gender.

Men. As Table 9a shows, white men are more likely to have access to the Web, to have ever used the Web, and to own a PC at home than African American men and these differences have persisted over time. Interestingly, the percentage of respondents who report owning a PC at home has grown for white men, but not African American men. There is a small tendency for white men to be more likely to have PC access at work.

Among recent Web users, African American men are much more likely than white men to be newer Web users and this finding persists over time. In IDS 2, white men were more than three times as likely as African American men to have been online for two years or more (20.31 percent versus 6.20 percent). By IDS 4, over fifty percent of white and African American men had been online that long.

In IDS 2, white men were more likely than African American men to be the most recent Web users (65.46 percent compared to 37.04 percent). By IDS 4, both white and African American men were equally and highly likely to have used the Internet recently (75.03 percent compared to 71.37 percent, respectively).

White men were also more frequent Web users than African American men in IDS 2 (55.94 percent versus 38.9 percent). White men were still more likely to be more frequent Web users than African American men by IDS 4, though the difference had shrunk considerably (67.5 percent versus 54.65 percent).

Over time, the percentage of African American men ever using the Web at home, work, school or other locations has increased considerably. In contrast, the percentage of white men who ever used the Web at school is flat, has grown only modestly for home and work, and has fallen for ever used at other locations. By IDS 4, African American men were more likely to have ever used the Web at school or at other locations, compared to white men.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Male Respondents						
N	2,045	2,465	1402	192	265	151
Currently Have access	41.97	47.05	53.85	38.94	45.74	45.72
Ever used	30.08	38.14	45.45	22.02	28.85	37.04
Own a PC	47.59	47.64	49.66	31.43	33.40	34.03
PC access at work	43.55	46.25	45.47	39.38	42.23	42.01
Home fax	16.89	15.77	16.78	12.42	9.81	10.19
Cable	68.01	73.12	74.15	64.41	77.42	78.24
Satellite	12.02	13.10	13.17	2.98	4.70	15.28
Among Male Recent Web Users						
N	714	1,042	662	55	81	53
First Used						
...in past 2 years +	20.31	36.90	57.44	6.20	29.56	55.37
...in past 1-2 years	20.55	24.91	18.66	17.27	19.93	19.12
...in past year	20.26	22.11	13.15	13.07	28.40	10.07
...in past 6 months	17.14	7.80	6.54	18.34	10.58	0.00
...in past 3 months	21.73	8.28	4.19	45.11	11.53	15.44
Last Used						
...in past 6 months	6.98	6.22	3.88	10.04	3.43	2.63
...in past 3 months	9.31	10.52	4.87	29.90	21.62	3.89
...in past month	18.25	16.57	16.21	23.03	22.49	22.12
...in past week	28.42	24.55	28.35	16.56	28.28	40.08
...in past 24 hours	37.04	42.14	46.68	20.48	24.18	31.29
Frequency of Use						
...once a day +	23.82	28.56	34.12	9.75	16.87	25.97
...few times/week	32.12	31.85	33.38	29.15	29.60	28.68
...two-four times/month	24.48	19.94	20.08	27.06	22.94	22.40
...once a month or less	19.58	19.65	12.42	34.04	30.59	12.95
Ever Used						
...at home	63.74	67.66	70.12	41.86	53.70	64.65
...at work	48.87	54.54	54.71	35.65	59.24	60.62
...at school	28.35	28.49	28.89	39.80	44.06	62.58
...at other locations	60.43	42.24	36.57	30.12	48.68	55.27

Table 9a. Race differences over time on key Web usage variables for men

Women. White women are more likely than African American women to have access to the Web, to have ever used the Web, to own a PC and to have PC access at work and these differences have persisted over time. As for men, the percentage of women owning PCs at home has increased over time for white women, but not African American women.

In IDS 2, African American women were much more likely than white women to be new users, but over time this difference has vanished. White women were more likely in IDS 2 than African American women to have used the Internet most recently (45.32 percent versus 31.75 percent). By IDS 4, 60.74 percent of white women, compared to 56.79 percent of African American women, had used the Internet within the past week. In contrast to previous results, African American women were more likely than white women to be the most frequent Internet users (44.38 percent versus 33.36 percent in

IDS 2). By IDS 4, this gap had diminished with 49.02 percent of African American women, compared to 46.53 percent of white women having used the Web a few times a week or more. African American women were more likely to have ever used the Web

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Female Respondents						
N	2,861	3,535	2,045	301	426	290
Currently Have access	30.12	39.72	44.98	26.26	33.80	28.62
Ever used	17.98	29.33	35.29	15.63	17.97	21.74
Own a PC	41.16	41.82	43.78	27.07	25.65	25.70
PC access at work	33.34	38.19	39.33	28.32	36.39	33.10
Home fax	11.35	11.74	13.02	6.56	5.28	6.57
Cable	68.87	72.65	74.82	62.58	69.31	72.98
Satellite	9.21	10.90	13.85	6.59	9.68	10.93
Among Recent Female Web Users						
N	590	973	706	49	70	64
First Used						
...in past 2 years +	9.74	28.03	39.31	7.58	35.41	30.29
...in past 1-2 years	15.07	22.66	21.66	13.77	22.02	15.80
...in past year	25.74	26.04	18.92	18.58	22.64	30.76
...in past 6 months	21.01	11.55	11.70	18.46	7.22	13.42
...in past 3 months	28.45	11.73	8.42	41.61	12.71	8.73
Last Used						
...in past 6 months	10.62	9.64	7.27	11.12	6.60	1.95
...in past 3 months	16.39	13.23	8.74	32.35	20.54	20.65
...in past month	27.67	23.19	23.25	24.77	33.37	20.60
...in past week	27.06	29.88	32.54	22.07	21.65	30.20
...in past 24 hours	18.26	24.05	28.20	9368	17.83	26.59
Frequency of Use						
...once a day +	10.23	13.58	17.35	22.73	13.85	24.55
...few times/week	23.13	25.84	29.18	21.65	25.50	24.47
...two-four times/month	30.06	31.33	31.40	29.83	30.89	24.34
...once a month or less	36.59	29.25	22.06	25.80	29.76	26.64
Ever Used						
...at home	57.66	61.23	67.22	52.62	57.00	65.20
...at work	36.83	48.00	45.23	38.18	69.52	61.61
...at school	28.26	30.32	28.68	50.57	34.43	50.38
...at other locations	19.67	35.54	33.13	16.66	48.55	51.78

Table 9b. Race differences over time on key Web usage variables for women

Children at Home

Tables 10a and 10b compare Web use in the presence of children in the home for whites and African Americans. Not surprisingly, overall levels of access and usage are higher for respondents who report having children under seventeen in the household. Below we examine Web access and usage by race.

No Children Under Seventeen. In IDS 4, whites without children at home were more likely than African Americans without children at home to have access to the Web, to have ever used the Web, to own a PC, and to have PC access at work. Some of these gaps were persistent.

Among recent Web users, over fifty percent of both groups had been using the Web for two years or more by IDS 4, although African Americans without children at home were much more likely than whites to be newer users, especially in IDS 2 and IDS 4.

By IDS 4, there were few differences in recency and frequency of Web use between whites and African Americans. African Americans, were more likely to have ever used the Web at school and other locations.

Children Under Seventeen.

Whites were more likely to have access to the Web, to have ever used the Web, to own a PC, and slightly more likely to have PC access at work. The percentage of respondents owning a home PC, though higher for whites than African Americans, has remained constant over time.

Among recent Web users, whites with children at home were more likely to be long-term Web users and to be more recent users, but not more frequent users, compared to African Americans with children at home.

Whites were also more likely to have ever used the Web at home, though this has diminished over time. African Americans were more likely to have ever used the Web at school and other locations.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Respondents with No Kids < 17						
N	3,067	3,777	2,272	256	393	236
Current access	30.26	35.97	42.91	27.71	36.94	27.04
Ever used	20.47	28.32	35.39	16.18	20.56	23.67
Own a PC	36.36	36.82	40.59	19.18	25.49	24.37
PC access at work	34.15	37.54	39.69	25.56	34.67	33.29
Home fax	12.09	11.29	12.65	7.81	5.55	5.53
Cable	68.28	73.43	73.69	61.26	71.32	73.25
Satellite	9.56	11.27	12.62	2.71	5.39	12.80
Among Recent Web Users with No Kids < 17						
N	771	1,145	817	53	89	54
First Used						
...in past 2 years +	18.92	35.62	53.35	10.79	33.41	52.93
...in past 1-2 years	18.17	23.51	19.05	15.04	14.11	16.10
...in past year	23.73	24.11	14.70	15.97	33.55	13.62
...in past 6 months	18.84	7.86	7.98	14.61	9.77	1.91
...in past 3 months	20.34	8.90	4.93	43.59	9.16	15.44
Last Used						

Last Used						
...in past 6 months	7.55	6.64	4.56	2.53	6.09	5.25
...in past 3 months	11.91	10.41	6.10	21.02	19.68	4.25
...in past month	18.41	19.77	18.30	27.68	27.37	13.62
...in past week	27.38	27.91	28.54	25.40	24.45	37.18
...in past 24 hours	34.74	35.27	42.50	23.37	22.42	39.70
Frequency of Use						
...once a day +	23.93	22.60	29.52	20.35	13.69	30.72
...few times/week	28.90	30.89	30.40	25.52	31.01	38.48
...two-four times/month	24.67	23.52	24.60	19.28	27.18	18.70
...once a month or less	22.50	22.98	15.47	34.85	28.13	12.10
Ever Used						
...at home	60.90	63.92	67.87	54.25	54.70	60.82
...at work	47.29	52.53	56.63	37.42	62.77	58.88
...at school	27.98	28.25	25.17	32.55	39.92	49.50
...at other locations	25.55	37.93	32.92	26.33	45.87	49.46

Table 10a. Race differences over time on key Web usage variables for respondents with no children under 17 in household

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among All Respondents with Kids < 17						
N	1,838	2,220	1,172	237	297	205
Current access	44.59	54.20	59.46	36.24	41.48	45.45
Ever used	28.97	41.57	48.08	20.83	25.53	32.98
Own a PC	56.45	56.35	56.30	40.38	34.06	34.55
PC access at work	44.58	48.93	46.45	41.58	44.63	40.69
Home fax	16.93	17.25	18.32	10.49	9.64	10.96
Cable	68.76	72.00	75.73	65.81	74.90	77.29
Satellite	12.09	13.00	14.98	7.83	10.04	12.56
Among Recent Web Users with Kids < 17						
N	533	867	549	51	62	63
First Used						
...in past 2 years +	13.22	30.55	44.81	3.94	30.24	36.82
...in past 1-2 years	18.66	24.30	21.16	16.30	28.11	18.63
...in past year	20.98	23.48	16.82	15.03	17.86	24.14
...in past 6 months	18.45	11.02	9.81	21.08	8.64	9.45
...in past 3 months	28.69	10.65	7.40	43.65	15.15	10.77
Last Used						
...in past 6 months	9.32	8.78	6.34	16.17	3.18	0.00
...in past 3 months	12.28	12.91	7.14	37.99	22.85	17.17
...in past month	25.73	19.04	20.54	20.99	26.29	27.63
...in past week	28.43	25.74	32.13	14.29	26.91	34.38
...in past 24 hours	24.24	33.54	33.85	10.56	20.77	20.82
Frequency of Use						
...once a day +	12.64	21.74	23.44	11.83	17.88	21.06
...few times/week	28.26	27.64	32.97	26.21	24.58	27.32
...two-four times/month	28.62	26.15	25.61	36.49	24.89	26.91
...once a month or less	30.28	24.46	17.97	27.48	32.65	24.71
Ever Used						
...at home	61.79	66.02	69.99	40.89	55.39	60.84

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Ever Used						
...at home	61.79	66.02	69.99	40.89	55.39	60.84
...at work	40.79	51.03	43.26	36.24	64.03	62.77
...at school	28.67	30.32	32.90	52.80	40.47	63.08
...at other locations	26.93	40.86	37.45	23.01	51.72	57.05

Table 10b. Race differences over time on key Web usage variables for respondents with children under 17 in household

Differences in Commercial Web Usage for African-American and White Web Users

Web Shopping

In Table 11, we briefly consider two key Web shopping items. Note that the items used to measure these shopping behaviors are not comparable across the three surveys, because their definition changed after IDS 2. This means we can compare percentages within IDS 2, and then from IDS 3 to IDS 4. But it is not possible to draw a comparison from IDS 2 to IDS 3 or from IDS 2 to IDS 4.

Note that overall, the rate of searching for information on the Web and purchasing products on the Web is increasing over time.

In IDS 2, whites were more likely to use the Web to purchase a product or service online. In IDS 3 and IDS 4, whites were also more likely to purchase online, but the gap is closing.

However, in IDS 2, both whites and African Americans were equally likely to search for product information online. Yet in IDS 3 and IDS 4, whites are more likely than African Americans to have searched the Web for product information. This result is interesting because Novak, Hoffman and Yung (1999) find that there is more skill involved in buying products online than searching for information online. Thus, these differences may not be due to different skill sets of whites versus African Americans. Potential explanations of the differences in search behavior are that African-Americans are less interested in comparing products and services online, are obtaining this information from other sources, or are simply finding less of interest to search for online.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among Recent Web Users						
N	1,304	2,015	1,368	104	151	117
Search for Product Information	74.44	57.15	64.36	75.01	46.49	47.53
Buy Online	16.10	17.10	27.84	11.78	12.10	23.87

Table 11. Race differences over time on key Web shopping variables

Business uses of the Web

Katz and Aspden (1997) found that Internet users ranked business opportunities as a relatively unimportant reason for current Internet users, but a very important reason for non-users. This was phrased, however, in terms of"making money"" In Table 12, we examine business uses of the Web among recent Web users with access to a PC at work. As with Web shopping variables, items in IDS 2 are not comparable to items in IDS 3 and IDS 4, so no direct comparisons may be made from IDS 2 to IDS 3 or IDS 2 to IDS 4.

In IDS 2, whites were more likely than African Americans to use the Web to research competitors, publish product information, sell products and services, for customer service and support and for vendor support and communication.

In IDS 3, a number of these race differences in business uses of the Web have gone away and some new differences emerged. For example, whites were more likely than African Americans to use the Web for internal communication, and still more likely to use the Web for customer service support and vendor support and communication.

By IDS 4, African Americans were, for the first time, more likely than whites to have access to an Intranet at work, to use the Web for internal communication, and for customer service and support. However, whites were more likely to use the Web to buy products or services. It is likely that these differences may reflect different job functions.

	White			African American		
	IDS2	IDS3	IDS4	IDS2	IDS3	IDS4
Among Recent Web Users With Access to a PC at Work						
N	915	1,368	910	76	109	77
Intranet Access at Work	44.04	60.64	58.33	44.32	56.11	70.94
Use Web for						
...Internal Communication	17.64	32.59	32.96	17.40	22.43	41.90
...Collaboration with Colleagues	17.43	34.74	35.13	16.43	35.36	37.90
...Research Competitors	20.43	33.22	33.91	14.10	31.11	35.01
...Publish Product Information	13.82	22.71	22.35	6.37	21.21	20.49
...Sell Products or Services	6.52	11.93	10.01	1.24	9.06	8.45
...Buy Products or Services	9.68	26.88	29.21	12.00	24.54	23.70
...Customer Service & Support	13.37	32.84	32.16	6.88	20.68	39.98
...Vendor Support & Communication	15.31	35.24	31.42	6.76	25.49	30.63

Table 12. Race differences over time on key business uses of the Web

Implications of the Digital Divide for Knowledge

Does the digital divide affect media consumption patterns for different segments in our society? The question is relevant because it has implications for individual knowledge and learning. One way of controlling the flow of information to different segments of society is through access (Tichenor et al., 1980; Donohue et al., 1995). However, even when information is accessible to everyone, the relative amount of knowledge gained between the haves and have-nots can widen (Tichenor et al., 1970, 1980). A variety of factors contribute to the widening of this *knowledge gap.* Differences across segments in their education (Tichenor et al., 1970), interest in the topics covered (Chew & Palmer, 1994; Gaziano, 1983; Robinson, 1972; Tichenor et al., 1980), and interpersonal contact with others familiar with topics covered in the media (Chaffee, 1972; Dervin & Greenberg, 1972; Tichenor et al., 1980) all affect an individual's motivation to seek out and consume information. For instance, if the media covers topics of personal relevance to the "have-nots," then they are motivated to actively consume this information (Tichenor et al., 1980). In this instance, access narrows the knowledge gap. However, if the media covers topics that are remote to the have-nots" (which is often the case with mass media, see Donohue et al., 1995), then they only passively consume the information and the gap widens (Reagan, 1996; Tichenor et al., 1980).

A related motivating factor for consuming content regarding a topic gaining mass media exposure is whether this topic will be discussed in the individual's social circles (Tichenor et al., 1980). If those in one's social network are unlikely to mention the topic, the individual, even if she or he processes the information, has a lower probability of being able to subsequently digest, debate, ponder and ultimately remember this information than someone who is already an expert on the topic. In contrast, those who are already experts on a topic are likely to be consulted and questioned by others. The expert thus has motivation to both process the information as well as an opportunity to subsequently analyze this information in greater depth than the nonexpert.

Such reinforcing factors contributing to the knowledge gap may also be contributing to the racial divide on the Internet, in terms of both adoption and usage.For instance, mass media coverage of the Internet is likely of greater interest and relevancy to those who are already on the Internet and/or have family and friends who are online than those who have not adopted. If we start with a base rate of fewer minorities than whites using the Internet, then an information gap may exist (and potentially widen) between the races in terms of how to access, use and benefit from the Internet as mass media coverage of the Internet increases.

There may also be fewer cross-channel references across media for those in the minority, especially for those in lower socioeconomic segments. For instance, schools, churches, local retailers or other community services in urban poor neighborhoods may not have Web sites or use the Internet for communication. Consequently, Internet content may seem remote or irrelevant to the personal lives of the majority of urban poor. In fact, in a 1970s study on the urban poor's

exposure to mass media, it was found that poor African-Americans were more likely to talk interpersonally or use "nonestablished" channels for local news than were poor whites (Dervin & Greenberg, 1972). As with "established" mass media, minorities may not perceive the Internet to be a useful substitute or supplement to their current sources.

Indeed, from a uses and gratification perspective (cf., Finn, 1997; Robinson, 1972), the racial divide may in part be due to differences in the perceived benefits of the Internet relative to other media currently adopted or activities currently engaged in. Research conducted in 1994 suggests that, at least at that time, home connectivity to the Internet was driven by entertainment needs as well as to pass time (Perse & Dunn, 1998). Those who have not adopted the Internet may feel that other media sources such as television already sufficiently fulfill these needs. Interestingly, using media as a pastime is said to occur when there is no functional relevancy of the media for the user (Reagan, 1996). Perhaps adopters in 1994 were using the Internet not because they had any particular need to fulfill but rather in order to determine which future needs the Internet could fulfill. Such a luxury (in terms of time and money) may only be affordable to those in the upper socioeconomic strata.

Usage of different media also depends upon people's interests as well as the topic area of interest (Reagan, 1996). The greater interest an individual has in a topic, the more media sources she or he is likely to consult. For instance, an avid NBA fan is likely to consult cable as well as local television programs, radio, print and perhaps even the Internet to find additional information about the NBA. Furthermore, certain topics are more likely to increase exposure to specific media. For instance, interest in financial news corresponds with increased exposure to print media (Reagan, 1996). It is unclear which topics would coincide with increased usage of the Internet, and whether these relations would vary across demographic differences.

Researchers examining the increased specificity of cable programming and print materials to target special interest groups forecast that such specialization of media content may only widen knowledge gaps (Tichenor et al., 1980). The Internet is largely organized around special interest groups and topics.Consequently, even if the Internet is accessible to all segments of society, the knowledge gap may continue to exist in specialized topic areas.At the same time, Internet communities break down status, time and geographical barriers, such that discussion of special interest topics are no longer limited to one's immediate geographical surroundings.Thus, knowledge gaps in the future may occur between those with different interests rather than across demographic segments.

Developing a Research Agenda

Based upon the results we have presented, we raise a series of points for further discussion. We believe these issues represent the most pressing unanswered research questions concerning access and the impact of the digital divide on the emerging digital economy:

1) ***Computers in the home.*** While previous research has shown that inequalities in Internet access in schools persist (Educational Testing Service 1997, Sax, et. al. 1998), our results suggest that inequalities in Internet access at home may be even more problematic. The role of access to the Internet at home needs to be much more clearly understood (Abrams 1997). Whites are more likely to have access to the Internet and to have ever used the Web than African Americans and these gaps appear to be *increasing* over time. Our results are consistent with other recent research (Babb, 1998; Cooper & Kimmelman, 1999; McConnaughey & Lader, 1998) that has explored the digital divide. However, we have probed more deeply and discovered that among recent Web users, who by definition have access, the gaps in Web use have been *decreasing* over time. By IDS 4, in most cases there were no or only slight differences between whites and African Americans in how recently they had used the Web, how frequently, or in their length of time online.

Gaps in general Web access and use between African-Americans and whites appear to be driven by whether or not there is a computer present in the home. Access to a personal computer, whether at home, work, school or somewhere else, is important because it is currently the dominant mechanism by which individuals can access the Internet. We have shown that access translates into usage. Overall, individuals who own a home computer are much more likely than others to use the Web. This suggests that programs that encourage home computer ownership (see, for example, Roberts 1997) and the adoption of inexpensive devices that enable Internet access over the television should be aggressively pursued, especially for African Americans.

Morrisette (1999) forecasts that by the year 2003, over half of all households in the United States will have access to the Internet, but that PC penetration could stall at 60 percent of households. Research is necessary to understand what motivates individual-level adoption of home computers and related technologies, as well Internet adoption, both within and outside the home. Additionally, research is required to understand the long-term impact of home computer ownership on Internet access and use.

Katz and Aspden (1997) investigated the role of social and work networks in introducing people to the Internet. The dominant three ways people were originally introduced to the Internet were 1) teaching by friends or family, 2) learning at work, and 3) self-teaching. Formal coursework was the *least* often mentioned way people were introduced to the Internet. Long term Internet users were most likely to have learned at work; for recent Internet users, friends/family and self-teaching were equally important. These results reinforce the importance of the presence of a computer at home, or the opportunity to access the Web from locations other than the home, in stimulating Web use.

Insight into the importance of reducing this gap in Web use between whites and African-Americans is provided by Anderson and Melchior's (1995) discussion of *information redlining*. Information redlining signifies the relegation of minorities into situations where satisfying their information needs is weighed against their economic and social worth. From the minority point of view, this is both an access issue and a form of discrimination. The new technologies of information are not simply tools of private communication as a telephone is, or tools of entertainment as a television is. They provide direct access to information sources that are essential in making social choices and keeping track of developments not only in the world at large, but also within their immediate neighborhoods. Unless the neighborhoods

are properly served, there is no way out of information redlining for most of these disadvantaged groups. Research on this topic is warranted.

We found interesting differences in media use between whites and African Americans that also deserve further probing. For example, although the rate of home PC ownership among African Americans is flat or even decreasing, the rates of cable and satellite dish penetration are increasing dramatically for African Americans. At a minimum, our results suggest that African Americans may make better immediate prospects than whites for Internet access through cable modems and satellite technology.

2) ***Web use outside of the home.*** In addition to gaps in home computer ownership, the implications of differential Internet access at locations outside the home, including school, the workplace and other locations needs to be clearly understood. Our research suggests that additional access points stimulate usage. Research is necessary to understand the impact of multiple access points on Web use, particularly for individuals who have no access at home.

Public-private initiatives such as Bell Atlantic's efforts in Union City and Bill Gates announcement of a $200 million gift to provide library access to the Internet are a step in the right direction (Abrams, 1997). It has also been noted that "community networks and public access terminals offer great potential for African-American communities" (Sheppard, 1997). Further, the recent roll-out of E-rate funds (Schools and Libraries Corporation, 1998) provides a significant opportunity for researchers to understand the factors important in stimulating Web usage among those least likely to have access.

3) ***School Web use.*** The role of Web access in the schools, compared to other locations, needs to be clearly understood. Students enjoy the highest levels of Internet access and Web use, especially when there are computers in their households. However, white students are still more likely than African American students to have access and to use the Internet, and these gaps persist over time. Indeed, our findings closely parallel statistics comparing student Internet use at private universities and black public colleges (Sax, et. al., 1998). As a recent report by the Educational Testing Service (1997) makes clear:

· There are major differences among schools in their access to different kinds of educational technology.

· Students attending poor and high-minority schools have less access to most types of technology than students attending other schools.

· It will cost about $15 billion, approximately $300 per student to make all our schools "technology rich"" This is five times what we currently spend on technology, but only 5% of total education spending.

Anderson and Melchior (1995) cited lack of proper education as an important barrier to technology access and adoption. Access to technology does not make much sense unless people are properly educated in using the technologies. Our data do not speak to the quality of the hardware/network connections, or the quality of information technology education that is provided by school. As noted by the ETS report, creation of educational opportunities requires financial commitment that cannot be generated by the minority groups from within their resources.

4) ***Comparisons of all racial/ethnic groups.*** Comparisons of Hispanics are preliminary in this working paper. Comparison among additional minority groups, in particular, Asian-Americans and Native Americans, are required.

Understanding the differences in Internet access and use among *all* racial and ethnic groups in the United States is required for a comprehensive understanding of technology adoption and its impact on the digital economy. Subsequent studies need to oversample members of minority groups. This is required so that there will be sufficient numbers of all minority groups to perform post-stratification adjustments to create weights that yield population projectable results for each minority group.

5) ***Differences in search behavior.*** Reasons for the gap between African-Americans and whites in Web search behavior need to be clearly understood. Such differences could have important implications for the ultimate success of commercial efforts online. White Web users are more likely to report searching for product or service-related information than African Americans. One possibility is that despite a range of sites such as NetNoir [1], the African-American Financial Index [2] (Castaneda, 1997), and Black Entertainment Television [3], general purpose search agents may not be perceived as an effective way to locate Web content that is compelling to African-American users. This suggests the development of search engines and portals targeted to the interests of racial/ethnic groups.

6) ***Shopping behavior.*** We found no differences between African-Americans and whites in the incidence of Web shopping. Is this because race doesn't matter for "lead users" who are most likely to shop, or is this because commercial Web content better targets racial and ethnic groups than does non-commercial Web content? Previous research (Novak, Hoffman, & Yung, 1999) suggests that more skill is required to shop online than to search. However, as noted above, whites are more likely to search for information online than are African Americans. More generally, consumer behavior in the commercial Web environment is complex and only weakly understood. Further research is needed to explore fully the differences in consumer behavior on the Web and their implications for commercialization.

7) ***Multicultural content.*** Studies investigating the extent of multicultural content on the Web are needed. Another possibility for the gap between African-Americans and whites in Web search behavior is that there is insufficient content of interest to African-Americans.*Interactive Marketing News* (1997) claimed that "while there are about 10 million sites on the Web, there are fewer than 500 sites targeted" to African-Americans. However, others have commented on the multicultural diversity of the Web. Skriloff (1997) reported, "there are thousands of Web sites with content to appeal to Hispanics, African-Americans, Asian-Americans, and other ethnic groups.A Web search for Latino sites, reported in the Feb./March 1997 issue of Latina Magazine, turned up 36,000.Many of these sites are ready-for-prime time with high quality content, graphics, and strategic purpose""

8) ***Community building.*** Are there different cultural identities for different parts of cyberspace? Schement (1997) notes that by the year 2020, major U.S. cities such as Los Angeles, Chicago, and New York will have increasingly divergent ethnic profiles, and will take on distinctive cultural identities. An important question is whether there are divergent ethnic profiles for areas of cyberspace. While the questions in the three IDS do not allow us to directly address this issue, our analyses provide some preliminary evidence of divergent ethnic profiles for various Web usage situations. For example, African Americans appear to be more likely to use the Web at school and at other locations, and in some cases, are more likely to use the Web at work. How much of this is driven by the lack of a PC in the home and how much by other factors we have yet to hypothesize and investigate?

In addition to facilitating community building at the global level, the Web also facilitates neighborhood-level community building. Schwartz (1996) discusses how the Internet can be used as a vehicle for empowering communities. Anderson

and Melchior (1995) raise the issue of the ways in which telecommunications can be used to strengthen communities. Thus, we should expect to find neighborhood Web sites emerging as an important aspect of cyberspace, and that these Web sites will parallel the ethnic profiles of the corresponding physical communities.

9) ***Income and Education.*** Income matters, but only after a certain point. Household income explains race differences in Internet access, use, home computer ownership and PC access at work. In terms of overall access and use, higher household income positively affects access to a computer. But at lower incomes, gaps in access and use between whites and African Americans existed and were increasing. Research is necessary to determine the efforts most likely to be effective to ensure access for lower-income Americans, especially African Americans.

The situation is different with education. As with income, increasing levels of education positively influences access, Web use, PC ownership and PC access at work. However, whites are still more likely than African Americans to have access to and use the Internet, and own a home computer, and these gaps persist even after controlling for educational differences.

The policy implication needs to be carefully considered: To ensure the participation of all Americans in the information revolution, it is critical to improve the educational opportunities for African Americans. How this might best be achieved is an open research question.

Footnotes

[1] http://www.netnoir.com/

[2] http://nestegg.iddis.com/aaindex/dex.html, (but recently shut down).

[3] http://www.msbet.com/

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3. Familiarization with research articles

- Reading
- Reading study

Reading 2:
Developing students' awareness of technical research articles

Exercise 1

Examine the document " The Evolution of the Digital Divide: How Gaps in Internet Access May Impact Electronic Commerce". Don't panic! You are not supposed to read it all! Not yet!

Answer the following questions.

- Is this document similar to (S)or different from (D):		
a book?	S	D
a newspaper?	S	D
a dictionary/ encyclopaedia	S	D

- How is the title?	Long	short
- How is the topic ?	general	specific
- Who is the information addressed to?	People in general	
	People specialized in the subject	

- Is the document divided into sections?	Yes	No
- What is the first section called?	……..	
- What is the function of the abstract in the document?	- A summary of the main idea	
	- A summary of the whole article	
- Are there illustrations?	Yes	No

- What kind of illustrations are they?

Photos? Diagrams? Graphs? Tables? Maps?

- What is/are the name of author(s) and origin(s)?

- What is the time of publication of this document?

- What is the time of research/experimentation of this article?

- Where was this article published?

- What type of problem is posed (as indicated in the title)?

- Difficulty of collecting data (=information)
- Missing data
- Interpretation of data
- Development of theory

- In which section is the literature reviewed?

Abstract introduction results

- How is the description of the methods/strategy used to address the problem?

Detailed Broad

- Are the results stated in details?

Yes No

- What is/are the means used to make results explicit?

Textual illustrations a mixture of text and illustrations

- Look at the bibliography or reference list of the document. Are they:

old recent mostly recent mostly old

Auto-evaluation

Exercise 2 : writing a summary of a research article

Answer the following questions for this article or any other article of your choice. Articles may be found at www.worlscinet.com/compsci.shtml or at www.ascusc.org.jcmc/

1. When was the article published?

2. Where was the article published?

3. what is the general topic of the article?

4. What is the research problem of the study? (in other words, what do/does the researcher(s) want to investigate?)

5. What is/are the main finding(s) of this study?

6. What is/are the author(s) conclusions?

Exercise 3

Use the information collected in Exercise 2 to write a paragraph summarizing the article. Insert the following discourse markers :

The results indicated that…- the author studied/investigated…and more particularly...- the article was published in…- the conclusion(s) to be drawn from this study is/are….

Exercise 1

Examine the document " The Evolution of the Digital Divide: How Gaps in Internet Access May Impact Electronic Commerce". Don't panic! You are not supposed to read it all! Not yet!

Answer the following questions.

Part 1 of the exercise

1 . Is this document similar to (S)or different from (D):

a book?	○ S	○ D
a newspaper?	○ S	○ D
a dictionary/ encyclopaedia	○ S	○ D

2 . How is the title?

- ○ Long
- ○ Short

3 . How is the topic ?

- ○ general
- ○ specific

4 . Who is the information addressed to?

- ○ People in general
- ○ People specialized in the subject

5 . Is the document divided into sections?

- ○ Yes
- ○ No

7 . What is the function of the abstract in the document?

- ○ A summary of the main idea
- ○ A summary of the whole article

8 . Are there illustrations?

- ○ Yes
- ○ No

9 . What kind of illustrations are they?

- ☐ Photos?
- ☐ Diagrams?
- ☐ Graphs?
- ☐ Tables?
- ☐ Maps?

14 . What type of problem is posed (as indicated in the title)?

- ○ Difficulty of collecting data (=information)
- ○ Missing data
- ○ Interpretation of data
- ○ Development of theory

15 . In which section is the literature reviewed?

- ○ Abstract
- ○ introduction
- ○ results

16 . How is the description of the methods/strategy used to address the problem?

- ○ Detailed
- ○ Broad

17 . Are the results stated in details?

- ○ Yes
- ○ No

18 . What is/are the means used to make results explicit?

- ○ Textual
- ○ illustrations
- ○ a mixture of text and illustrations

19 . Look at the bibliography or reference list of the document. Are they:

- ○ old
- ○ recent
- ○ mostly recent
- ○ mostly old

Résultats

Part 2 of the exercise

6 . What is the first section called?

Submit Reset

10 . What is/are the name of author(s) and origin(s)?

Submit Reset

11 . What is the time of publication of this document?

Submit Reset

12 . What is the time of research/experimentation of this article?

Submit Reset

13 . Where was this article published?

Submit Reset

Answer key

Exercise 1

1.

   a. D

   b. D

   c. D

2. Long
3. specific
4. People specialized in the subject
5. Yes
6. abstract
7. A summary of the whole article
8. Yes
9. Diagrams Graphs Tables
10. Donna L. Hoffman, Thomas P. Novak and Ann E. Schlosser , Vanderbilt
11. 2000
12. 1996-1997-1998
13. 13. JCMC 5/3, 2000
14. Missing data
15. Introduction
16. Detailed
17. Yes
18. A mixture of text and illustrations
19. Mostly recent

Exercise 2

Free answers

Exercise 3

Free answers depending on the article chosen

Sample answer for “the digital divide…”

The article was published in JCMC 5/3, 2000. the authors studied/investigated how access to the internet may affect electronic commerce, and more particularly the differences between whites and African Americans in the United States with respect to computer access.
The results indicated that there are racial differences in Web access and use over time and that there are also differences in commercial Web usage for African-American and White Web users.

the conclusion to be drawn from this study is: the importance of reducing this gap in Web use between whites and African-Americans by, for example, making computers available at home and at school for the different categories of society.

back

5. Extensive reading

Available online at: http://www.ascusc.org/jcmc/vol6/issue1/Ebersole.html
Retrieved 28 August 2004

Extensive reading question:

What is the main issue discussed by the author in this article?

JCMC 6 (1) September 2000

Message Board

Collab-U CMC Play E-Commerce Symposium Net Law InfoSpaces Usenet
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Uses and Gratifications of the Web among Students

Samuel Ebersole

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Abstract

This study was designed to explore how some students in ten public schools view the WWW and how their attitudes and opinions affect their use of this new medium in an educational context. An exploratory principal components analysis of forty use statements resulted in an eight factor solution. Additionally, student responses to a computer-administered survey instrument were collected and analyzed revealing significant differences in the way that students describe their use of the WWW. Gender, grade level, and amount of time spent using the WWW were used to create between-group comparisons of the WWW use categories that made up the computer-administered survey instrument. The final phase of data analysis was a content analysis of sites visited by students. A total of 123,071 URLs were collected from the computers used to administer the computer survey instrument. These were reduced to a total of 500 sites that were reviewed by media specialists. Students were found to be visiting commercial sites at a much higher proportion than those in other domains. Also, the commercial sites received the lowest rating for "suitability for academic research" of all the domain names. And while students reported their purpose for using the WWW as "research and learning" fifty-two percent of the time, the coders found only twenty-seven percent of the sampled sites to be "suitable" for that purpose.

Introduction

This [PC/Internet] technology promises to have a far larger and more serious impact on our society than the introduction of television, possibly as great an influence on history as the industrial revolution or the printing press. Television primarily involves only leisure time; this technology will affect work, school and play-personal, family and business relationships. (*Surveying, 1999)*.

The introduction of a new medium into society has frequently been a flash-point for media effects research focusing on children and adolescents (Wartella & Reeves, 1985). In each case children have been recognized as a special audience, one that deserves special consideration (Dorr, 1986; Wartella, 1995). The introduction of television prompted numerous studies (e.g., Schramm, Lyle & Parker, 1961), and provoked much discussion and public debate over its proper place in society. The effects of the media on children's mental development has been a common theme (e.g., Van Evra, 1990; Winn, 1977). From early on, media effects researchers have focused the attention of the nation on the media's dysfunctional effects. From the Payne Fund studies on the effects of motion pictures (e.g., Charters, 1933; Dale, 1935) to Dr. Fredrick Wertham's (1954) exposé of comic books to the Surgeon General's (1972) report on television and violence, social scientists have examined how the media have served to undermine the positive influences of family and social institutions (McLeod & Reeves, 1980; Wartella & Reeves, 1985). [1]

Researchers exploring the effects of educational media, however, have argued from a similar set of assumptions to reach dramatically different conclusions. Instead of exploring the possible negative effects of the media, proponents of "powerful effects" have heralded the positive effects promised by the use of educational media in the classroom (e.g., Kozma, 1994; Salomon, 1978). The history of educational technology, specifically the use of mass media in an educational context, is infused with promises of revolutionary proportions (Cuban, 1986). Access to books, instructional motion pictures, radio, and more recently television and interactive multimedia has been envisioned as the panacea for all that ails our educational system. The use of the World Wide Web in the classroom is only the latest in a long history of mass media technologies that have been embraced by the educational

establishment. Libraries, along with the liberating technologies of the postal service and telephones, were once envisioned as facilitating the elimination of schools (Illich, 1970). [2] Educational films, radio and television programs, and educational computer software have all been employed with similar hope and optimism. The belief that Web will lead to the promised land is but the most recent manifestation of this technological utopianism.

Statement of the Problem

The Internet, and more specifically the WWW, is being eagerly adopted by school districts, administrators, and teachers almost without exception. However, the use of the WWW in the classroom marks the first deployment of an educational medium in which the end user can access a virtually unlimited breadth of content. Hecht (1997) argued, "having the Internet in the classroom is like equipping each classroom with a television that can be turned on at any time and tuned in to any of 100,000 unrestricted channels, only a tiny fraction of which are dedicated to educational programming (and even those have commercials)." McNealy (1999) voiced a similar concern when he wrote, "Right now, putting students in front of Internet terminals is no better than putting them in front of TV sets. It may even be worse" (p. 17A). And while the resource is huge-Lawrence and Giles (1999) estimated 800 million web pages-some have argued that only a fraction of the millions of Web pages hold any educational value for this K-12 audience (see, for example, Bennett, Wilkinson, & Oliver, 1996; Kirk, 1996; Tillman, 1998).

This raises some interesting questions regarding the use of the WWW in an educational context. Even students who seek out educational content may be thwarted by the very attributes heralded by WWW proponents, e.g., the WWW's breadth and depth of information. Research into selective exposure, defined as "behavior that is deliberately performed to attain and sustain perceptual control of particular stimulus events," (Zillmann & Bryant, 1985, p. 2) has raised questions about new media technologies that provide an abundance of choice and place even greater control over consumption in the hands of the consumer. In a nonlinear medium, when educational content is sometimes packaged as "edu-tainment," what is to prevent students from skipping over the "education?" Preliminary data collected during a pilot study (Ebersole, 1999) indicated that for middle and high school students accessing the WWW from computers in public schools, the most frequently visited sites were those that were also the least educational. And while "research" was the most frequent response to the question "why are you using the WWW at this time?" content analysis of the sites visited suggested that "looking for something interesting" was the more likely explanation for the majority of sites visited.

Significance of the Study

There have been calls for research to determine the effect of computers with Internet access on student achievement (Kozma & Quellmalz, 1996). Linda Roberts, Director of the Office of Educational Technology, spoke at the SchoolTech Exposition and Conference and reminded educators of the need to collect data that will support or reject the spending of billions of dollars for computers and wiring (Mendels, 1998, April 27). A recent US Department of Education report (National Center for Educational Statistics, 1997) concluded by listing four challenges that remain for educators and school districts as they embrace this new educational technology. The challenges are: technical support for hardware and software; teacher training and development; "increasing effective use of the Internet to enhance student learning; and protecting students from inappropriate material on the

Internet". Research into the use of the WWW in public schools has important implication for local, state, and national policy and funding initiatives. While a study such as the present one is only a small step in the quest to assess the value of this new medium, it is important in that it permits identification of the motivations of individual users. The study can also help to identify crucial points where intervention may be necessary in order to realize the WWW's full potential as an educational resource. Once we understand what motivates students to utilize this medium, we can better design incentives that encourage educational use and discourage use that distracts students from that goal.

Theory: Uses and Gratifications

According to Rice and Williams (1984), "the new media provide fertile test beds for many of our theories and models" (p. 55). One mass media theory that has repeatedly been cited as holding promise for the analysis of new media is uses and gratifications. In addition to the article by Rice and Williams, articles by Williams, Strover and Grant (1994), Newhagen and Rafaeli (1996), Morris and Ogan (1996), and December (1996) have also included references to the suitability of uses and gratifications for new media research. As an "active audience" theory, uses and gratifications provides a vantage point from which to look at the ways that audiences respond to the breadth and depth of information that is made available by these new media. Newhagen and Rafaeli (1996) have suggested that uses and gratifications theory may be especially useful because of the "mutability" of the Web, or what Newhagen calls its "chameleon-like character" (p. 11). The diversity of content is much greater for the WWW than for traditional electronic media. While television, radio, and to a lesser degree print media are subject to regulatory and societal scrutiny, the WWW is virtually unregulated. Because of this, the WWW literally has something for everybody. The fact that this range of material is available at school, library, workplace, and home would suggest that potential uses for the Internet may far exceed those provided by other media.

Few studies have taken a uses and gratifications approach to studying the Internet and even fewer have narrowed their focus to look at the WWW (e.g., Charney, 1996; Stetter, 1997; Yoo, 1996, and Kaye, 1998). December (1996) identified "communication, interaction, and information" as the three broad categories for why people use the Internet. Charney (1996) concluded from a study of university students that the Internet is used "to keep informed, for entertainment and diversion, to maintain communication, and to look at the sights and sounds of the 'Net" (p. 88), but most frequently for entertainment-diversion (p. 90). A 1995 study of college students' WWW usage resulted in "six motivational categories: entertainment, social interaction, passing the time, escape, information, and Web site preference" (Kaye, 1998, p. 34). According to the 9th WWW User Survey conducted by Georgia Tech (GVU's 9th WWW user survey, 1998), the WWW's youngest users (11-20) use the web mainly for "entertainment" (81%), "education" (70%), "time wasting" (67%), and "personal information" (60%).

Methods

Combining qualitative and quantitative approaches, this study employed open-ended questions, interviews, two types of survey research, and content analysis of WWW sites visited by students. Some of the data was collected with the active participation of the subjects, while other data was collected using passive data collection techniques. Using multiple methodologies allowed for increased richness of data and a clearer picture of the phenomena under investigation. [3]

Subjects

The population for this study was comprised of middle-school and high-school students at selected public schools in five districts in a western state. The districts were selected in consultation with the state's Department of Education to reflect a cross-section of schools in urban and rural settings that have Internet access. The participants for this study were selected using two different approaches. For the first survey, which was administered on paper, a stratified convenience sample was employed. At one middle school and one high school in each district a class representing each grade (sixth, seventh, eighth, ninth, tenth, eleventh, and twelfth) was selected to take the paper survey. The second survey was administered electronically at the computer. Students attending middle and high schools in these districts have access to the WWW using computers available in the schools' media centers. However, not all students had parental permission to access the WWW. Only students who had been granted parental permission and who had signed and submitted the required forms to their local school administrators were permitted to access the computer-administered survey. Of these, participation in the second phase of the survey was voluntary and by self-selection. The survey was installed as the default home page in the media centers for a period of time sufficient to gather approximately 100 responses from each school.

Survey Data Collection

The two primary survey instruments employed in the current study will be referred to as the "paper survey" and the "computer survey." The paper survey is a 75-item survey instrument that was administered to students in their classrooms at selected public middle schools and high schools. The paper survey contains sections designed to measure the students' : 1) affinity for the WWW, 2) assessment of the value of the WWW for various purposes, 3) skill level for computer and WWW use, 4) use of the WWW, 5) avoidance of the WWW, and 6) demographics. Following this, the computer survey was administered to the students at the time and place of their access to the WWW-specifically the school's media center or library. The computer survey is comprised of just four questions: grade, gender, how much the student uses the WWW, and the student's purpose for using the WWW at this particular time. This survey was intentionally kept very short in order to prevent student frustration and a perception of "time-off-task" that may have jeopardized the support of school administrators.

Passive Data Collection Design for This Study

December (1996) and Newhagen and Rafaeli (1996) recognized the fact that the Internet provides excellent opportunities for data collection. As Rafaeli noted, any social scientist who has looked at an Internet server must be struck by the research possibilities present in the data that is passing through that computer (p. 6). In order to take advantage of this unique feature of the WWW, the design of this study calls for passive data collection to follow the survey research. Both Netscape Navigator and Microsoft's Internet Explorer browsing software generate a cache or "global history" file that resides on the user's hard drive and which retains a list of

addresses (Uniform Resource Locators or URLs) of WWW sites last visited. This list of URLs listing WWW pages and graphics visited most recently is extensive and can be thousands of sites long.

At the beginning of the data collection phase the cache files on the computers in the schools' Media Centers were deleted. At the end of the collection period the cache files were copied to a disk and the data prepared for analysis. A total of 123,071 URLs were collected from the more than 80 Macintosh and Windows personal computers on which the survey instrument had been installed. First, the number of occurrences of web sites from the five generic top-level domains (commercial [.com], educational [.edu], governmental [.gov], network [.net], and organizational [.org]), and the United States (.us) domain was recorded. In order to facilitate content analysis of the sites visited, URLs ending with .gif and .jpg were first stripped from the list and then a UNIX grep script was written and applied to the remaining sites to reduce the list to the number of randomly selected sites that could be evaluated and coded given the time and resources available. The subsequent 500 URLs were then collected into a single WWW page and two educators/media specialists, one male and the other female, from a nearby school district were asked to analyze these WWW pages and serve as evaluators. The pages were assigned a "use" category based on the same choices that had been presented to the students on the computer-administered survey and were rated for "suitability as a source for academic research" on a scale of 1-3: 1 = not suitable, 2 = questionable, and 3 = suitable. The evaluators were instructed to look at each WWW page with consideration for the grade level of the students being studied.

Results

Respondents to the paper survey (n = 791) ranged in age from 10-21 years (M = 14.45) and were enrolled in the 6th grade (12%), 7th grade (130, 17%), 8th grade (123, 16%), 9th grade (14%), 10th grade (15%), 11th grade (12%), and the 12th grade (16%). Average self-reported grade point average (GPA) was 3.28, and 51% were male. Ethnicity of respondents is as follows: American Indian (2%), Asian (3%), Black (9%), Hispanic (16%), White (69%), and other (2%). Respondents to the computer-administered survey (n = 1083) were enrolled in the 6th grade (5%), 7th grade (21%), 8th grade (19%), 9th grade (14%), 10th grade (15%), 11th grade (12%), and the 12th grade (16%). Of these, 59% were male.

Attitudes towards the WWW

Questionnaire items 1 through 5 were statements designed with the goal of determining the students' affinity for the WWW. This was operationalized by summing five Likert-scale responses with results ranging from 5-25 (M = 12.57, SD = 4.12, Cronbach's alpha = .83). The statement "Using the WWW is very important to me" received the strongest support (M = 3.05) while the statement "I would feel lost without the WWW" received the least (M = 1.97).

The next set of items was designed to explore the students' beliefs about the WWW-in particular the WWW's value as a source of information, entertainment, and as a means of communication. As a source of information (M = 1.68, 1 = excellent, 4 = poor), students rated the WWW as "excellent" 44% of the time, "good" 46% of the time, "fair" 9% of the time, and "poor" 2% of the time. As a source of entertainment (M = 1.90), students rated the WWW as "excellent" 36% of the time, "good" 42% of the time, "fair"

18% of the time, and "poor" 4% of the time. And as a means of communication (M = 1.78), students rated the WWW as "excellent" 42% of the time, "good" 42% of the time, "fair" 14% of the time, and "poor" 3% of the time. Based on these responses, students rate the WWW highest for information, followed by communication, and then entertainment.

The most common response to a general question asking overall skill at using computers was "good" (47%), followed by "average" (30%), "excellent" (20%), and "below average" (3%). Additional questions asked students how long they have being using the WWW, how many times per week, and how many hours per week they use the WWW. To the question, "For how long have you been using the World-Wide Web?" the most common response was "1-2 years" (32%), followed by "more than 2 years" (29%), "6 mo.-1 year" (23%) and "less than 6 months" (17%). To the question, "Approximately how many times per week do you use the World-Wide Web?" the most common response was "1-2 times" (35%), followed by "less than 1" (28%), "3-5 times" (23%), and "more than 5 times" (15%). And in response to the question "About how many hours per week do you use the World-Wide Web?" respondents answered "1-2 hours" (34%), "less than 1" (33%), "3-5 hours" (20%), "6-10 hours" (9%), and "10+ hours" (5%).

An additional four items assessed the respondent's skill at using the WWW. Students' self-reported skill at using the WWW was operationalized as the sum of responses to four Likert-scales. Skill at using the WWW ranged from 4 to 20 (M = 13.86, SD = 3.25, Cronbach's alpha = .78).

Students were also asked to indicate the locations where they access the WWW. The 625 students who responded to question 20 indicated the following places were used to access the WWW; home (69%), school (61%), friend's house (32%), public library (23%), and, other (11%).

Reasons for using the WWW

Questionnaire items 21 through 60 addressed reasons why students might choose to use the WWW. These items were generated from statements made by middle school and high school students who responded anonymously to an open-ended question asking them to list several things "that the World-Wide Web is good for." Additional use statements were taken from fill-in-the-blank responses to the computer survey questionnaire in the pilot study.

Because of the paucity of research in uses and gratifications of the relatively new WWW, exploratory factor analysis (SPSS Principal Components Analysis with Varimax rotation) was employed to group these use statements into categories. A preliminary principal components analysis was performed on an incomplete data set in order to arrive at a list of "use statements" that became part of the computer-administered survey instrument. Those seven use statements were: "for research and learning," "to communicate with other people," "for access to material otherwise unavailable," "to find something fun or exciting," "for something to do when I'm bored," "for sports and game information," and, "for shopping and consumer information." Once the complete data set was collected via the paper survey instrument, another principal components analysis was conducted. This time the result was eight factors with eigenvalues greater than 1.0 accounting for a total of 58% of the total variance. These factors differed slightly from those derived from the earlier analysis. [4] (see Table 1).

Items	FAC1	FAC2	FAC3	FAC4	FAC5	FAC6	FAC7	FAC8
Factor 1: Research and Learning (eigenvalue = 10.57, variance after rotation = 14%)								
Because it is a good source of news	.488	.237	-.048	.117	.266	.141	-.165	.238
To complete homework assignments	.553	.063	.114	.031	.296	-.336	.392	.047
To get up-to-date facts and information	.445	.195	.026	.080	.214	.224	-.117	.397
To learn how to use computers better	.423	.307	.172	-.095	-.019	.206	.195	.074
To learn new things †	.501	.554	.140	.019	.132	.045	.009	.082
Because it provides a new outlook on learning	.727	.264	.149	.000	.067	.113	-.045	.015
Because it's educational	.749	.237	.054	-.071	-.024	.110	-.047	-.052
To find articles and references	.675	-.115	-.008	.035	.270	.241	-.086	.071
Because it is an excellent source of information	.682	.118	.085	.126	.233	.025	-.090	.056
To find out what's going on in the world	.566	.175	.227	.269	-.058	.256	-.037	.196
So that I can do better in school	.763	.190	.140	.077	-.048	-.014	.077	.007
To conduct research for class	.766	-.061	.009	.026	.214	-.046	.013	-.046
Factor 2: Easy Access to Entertainment (eigenvalue = 3.73, variance after rotation = 9%)								
Because it's so easy	.185	.521	.049	.203	.286	-.007	-.161	.256
Because it's fun	.094	.746	.129	.281	.148	.037	.091	.091
To learn new things †	.501	.554	.140	.019	.132	.045	.009	.082
To play games †	.036	.434	.102	.325	.028	.030	.537	.068
Because it's exciting	.238	.712	.180	.177	.063	.084	.130	-.001
For entertainment †	-.002	.508	.212	.467	.149	.076	.190	.077
To find interesting things	.351	.573	.117	.121	.206	.237	-.007	.024
Because computers are cool †	.226	.453	.105	.428	-.075	.331	.094	-.096
Factor 3: Communication and Social Interaction (eigenvalue = 2.19, variance after rotation = 9%)								
To chat with other people	-.030	.033	.716	.220	.241	-.103	.161	.122
To find people	.086	.101	.637	.056	.104	.027	.158	.232
So that I can have foreign language friends	.168	.232	.594	-.034	-.129	.221	-.089	.110
To email friends	.096	-.005	.520	.263	.279	.082	-.079	.184
To talk with people from around the world	.145	.156	.788	.061	-.020	.123	.038	.011
To meet new people	.116	.106	.801	.165	-.003	.135	.009	.063
Factor 4: Something to Do When Bored (eigenvalue = 1.68, variance after rotation = 7%)								
For entertainment †	-.002	.508	.212	.467	.149	.076	.190	.077
For browsing	.266	.185	.109	.510	.254	.239	-.007	-.022
Because it gives me something to do	.018	.258	.186	.761	.055	.045	.100	.104
When I'm bored	-.003	.152	.155	.796	.085	-.017	.064	.106
Because computers are cool †	.226	.453	.105	.428	-.075	.331	.094	-.096

Factor 5: Access to Material Otherwise Unavailable (eigenvalue = 1.53, variance after rotation = 6%)								
To find things not in the library	.240	.060	-.020	-.004	.652	-.041	-.063	-.088
Because it is convenient	.143	.198	.131	.264	.537	.041	-.088	.170
To download software and other free stuff †	-.115	.177	.217	.042	.425	.438	.302	.153
Because I can access things otherwise unavailable to me	.167	.178	.119	.086	.617	.280	.067	.020
Factor 6: Product Info and Tech Support (eigenvalue = 1.17, variance after rotation = 5%)								
To download software and other free stuff †	-.115	.177	.217	.042	.425	.438	.302	.153
To get product information	.197	.102	.136	.040	.245	.489	.044	.125
To get information about games †	.011	.292	.067	.272	-.012	.467	.511	-.002
To get technical support	.348	.097	.261	.127	.064	.610	.148	.096
Factor 7: Games and Sexually Explicit Sites (eigenvalue = 1.09, variance after rotation = 5%)								
To get sports information and statistics †	.243	-.002	-.018	.072	-.072	.194	.439	.413
To access sexually explicit sites	-.191	-.001	.058	-.001	-.032	.055	.672	.077
To play games †	.036	.434	.102	.325	.028	.030	.537	.068
To get information about games †	.011	.292	.067	.272	-.012	.467	.511	-.002
Factor 8: Consumer Transactions (eigenvalue = 1.08, variance after rotation = 4%)								
For shopping and making purchases	.001	.023	.247	.054	-.015	.089	.107	.701
To look up music and concert information	.020	.138	.268	.084	.102	-.010	.092	.674
To get sounds, pictures, or animations for projects *	.259	.360	.077	.091	.366	.097	.180	.199
Cronbach Alpha (for scale)	.887	.844	.823	.813	.601	.653	.617	.577

* Denotes item that did not meet the criteria for factor loading

† Denotes item that loaded highly on two factors

Correlation Analyses

Following the independent-sample *t* tests, Pearson product-moment correlation coefficients were computed among the eight WWW use scales and three variables measured at the interval level. The three variables that were correlated with the eight factors were grade, affinity for the WWW, and skill level at using the WWW. Not surprisingly, both affinity and skill are positively correlated with every type of use as defined by this study. The few significant correlations between grade and uses suggest that students in the lower grades are more likely to say that they use the WWW for easy access to entertainment, for something to do when bored, for product information and technical support, and for games and sexually explicit sites. Likewise, students in the higher grades are more likely to say that they use the WWW for access to material otherwise unavailable. A significant negative correlation was obtained between grade level and affinity for the WWW (r = -.15, p = .001). This suggests that as respondents increase in age and grade level, they become less enamored of the WWW. Note, however, that this reduction in affinity for the WWW does not appear to result in less use with increased age. The correlation between grade level and skill level was not significant (r = -.02, p = .717). The lack of correlation between grade and skill level may be accounted for by the likelihood that students rated their skill level against that of their peers rather than against an objective scale.

Reasons for avoiding the WWW

In addition to seeking reasons why students choose to use the WWW in a school setting, questions were asked in an attempt to discover possible reasons why students would choose to avoid using the WWW. Ten avoidance statements were presented to students who were asked to respond on the same agree/disagree scale. An analysis of the avoidance statements suggested that face-to-face interaction with peers is the leading reason given for not spending time using the WWW. Other important factors included several statements about negative issues commonly attributed to the WWW, e.g., pornography, illegal activity, and other users who may have suspect motives. And while schools often have fast connections to the Internet, these users appeared to be consistent with the general population of WWW users who perceive the WWW to be too slow, especially when downloading graphically intensive sites. On a positive note, the social stigma that has been associated with computer expertise-i.e., that "computers are for nerds"-does not appear to carry much weight with these respondents.

Results of the Computer-Administered Survey

Unlike the nearly even split by gender in the paper survey, the respondents to the computer-administered survey were slightly more than 59% male. This could indicate that males are heavier users of the WWW at school, or that they were more likely to respond to the survey. While the breakdown of respondents by grade level to the paper and computer surveys was identical for high school students, there was a substantial difference in the number of sixth, seventh, and eighth grade students responding to the two surveys. The reduced percentage of sixth grade students responding to the computer-administered survey was explained in part by the fact that one district did not provide Internet access to sixth grade students. Because there was no way to prohibit multiple responses from students responding to the computer-administered survey, the data reported here should not be interpreted as representing unique students, but rather as sessions at a computer.

In response to the question asking the average amount of time spent using the WWW each week, the most common response was, "less than 1 hour per week" (36%) followed by "1 to 2 hours per week" (23%), "3 to 5 hours per week" (18%), "more than 10 hours per week" (17%), and "6 to 10 hours per week" (6%). Respondents to the computer-administered survey gave the following reasons for using the WWW: "for research and learning" (*n* = 541, 52%), "to communicate with other people" (*n* = 74, 7%), "for access to material otherwise unavailable" (n = 55, 5%), "to find something fun or exciting" (n = 85, 8%), "for something to do when I'm bored" (n = 56, 5%), "for sports and game information" (*n* = 65, 6%), and, "for shopping and consumer information" (*n* = 10, 1%). In addition, 165 students (16%) chose not to select from the seven options presented. Of these, 94 students elected to write-in a response to this question. The write-in responses offered by students to explain their purpose for using the WWW were grouped into categories as follows: specific research topics (*n* =20), sexually explicit material (*n* =20), games and amusements (*n* =14), general research and learning (*n* =11), combinations of things (*n* =10), communication (*n* =5), and other unclassified (*n* =14).

Content Analysis of Sites Visited

Because there are normative expectations for media content consumed in school for educational purposes, content analysis of

sites visited by students was employed to better understand the nature of the content being consumed. Of the 123,071 URLs collected, 77% (*n* = 94,426) were from the .com domain, 5% (*n* = 6,289) were from .net, 5% (*n* = 5,704) were from .org, 4% (*n* = 4,842) were from .edu, 1 percent (*n* = 1,640) were from .gov, 1% (*n* = 1,403) were from .us, and 7% (*n* = 8,767) were from another or unidentified domain name. These numbers stand in contrast to the distribution of domain names that makes up the current state of the WWW. According to the latest survey of WWW domain names by host count, conducted by Internet Software Consortium in January of 2000, the actual make-up of the WWW is not as heavily skewed towards the commercial domain sites as the student sample would suggest (see Table 2).

Table 2. Domain Names by Host Count

Domain Name	Number of sites*	% of total (com, net, edu, us, org, gov)	% of 123,071 Web pages visited by students
com (commercial)	29075185	50.4	77
net (network)	18305485	31.7	5
edu (education)	6313781	10.9	4
jp	2680659		
uk	2240216		
us	2062653	3.6	1
mil	1908413		
de	1778831		
ca	2153807		
au	1181376		
org (organization)	1063901	1.8	5
nl	839912		
fr	867981		
gov (government)	842854	1.5	1
Total	57663859	99.9%	93% (7% = other)

*Source: Internet Software Consortium, January 2000

The next step was a more detailed content analysis of randomly selected WWW pages visited by students. Once intercoder reliability was established at an adequate level (alpha = .92), the 500 randomly selected WWW pages were analyzed for educational value and use category. The "suitability" rank most often assigned by the evaluators was "not suitable" (*n* = 262, 57%), followed by "suitable" (*n*= 135, 29%), and "questionable" (*n* = 65, 14%). The use category most often assigned by the evaluators was "for research and learning" (*n* = 126, 27%), followed by "access to material otherwise unavailable" (*n* = 102, 22%), "to find something fun and exciting" (*n* = 76, 17%), followed by "for shopping and consumer information" (*n* = 61, 13%), "for something to do when I'm bored" (*n* = 45, 10%), "for sports and game information" (*n* = 30, 7%), and finally, "to communicate with other people" (*n* = 22, 5%).

When compared to the use categories self-reported by the students responding to the computer-administered survey there is clearly a disparity between the way that students and media specialists view the content and potential use of these WWW sites. Students' self-reported uses of the WWW was as follows: "for research and learning" (*n* = 541, 52%), followed by "to find something fun and exciting" (*n* = 85, 8%), "to communicate with other people" (*n* = 74, 7%), "for sports and game information" (*n* = 65, 6%), "for something to do when I'm bored" (*n* = 56, 5%), "for access to material otherwise unavailable" (*n* = 55, 5%), and finally, "for shopping and consumer information" (*n* = 10, 1%).

The disparity between self-reported uses of the WWW and evaluators' assessments of actual sites visited invites several possible explanations. First, as an audience-centered theory of media use, uses and gratifications allows for individual interpretation of content. It should not be surprising that students and media specialists frequently envision different uses for the same Web site. Second, students may be responding to the survey with answers that they believe are socially acceptable. Even with the anonymity provided by the computer survey technique, students may feel some pressure to respond in a manner that is congruent with the stated purpose of the WWW in school as elaborated in the school district's Acceptable Use Policy-namely, academic research. However, there may be another factor at work here. It could be that students are starting out with the intention to conduct academic research, but are finding themselves frustrated or distracted by the other offerings so readily available on the WWW.

The analysis comparing domain and "suitability for academic research" indicated low ratings for .com and .net, with higher values for .org and .gov (see Table 3). In fact, the most frequently visited domain name (.com) had the lowest educational value and one of the least frequently visited domain names, (.gov), had the highest educational value as determined by the evaluation of the media specialists.

Table 3. Mean Suitability for Academic Research of Sites by Leading Domain

Domain	(N)	Mean suitability for academic research as assigned by coders *
.com	(410)	1.59
.org	(25)	2.78
.edu	(16)	2.44
.net	(12)	1.75
.gov	(9)	3.0
.us	(5)	2.0
other	(23)	1.94

Note: * 1 = not suitable, 2 = questionable, 3 = suitable

Discussion

In order for educators and researchers to evaluate the benefit of WWW use by students in public schools it is necessary to begin by attempting to understand how students perceive the WWW, what they use it for, and what gratifications they receive during periods of access. This research explored the active and goal-directed use of the WWW by middle school and high school students in 10 public schools located in five public school districts. Consistent with the study's exploratory nature the results included the identification of gratifications sought from this new electronic interactive medium within a school setting. While this study did not provide answers to questions about the effect of WWW usage on student performance it did provide answers to a more fundamental set of questions. Two survey instruments were used to assess the following: students' affinity for the WWW, the amount of time spent using the WWW, students' self-assessed skill level, their beliefs about the relative value of the WWW as a

source of both information and entertainment and as a means of communication, and their reasons for using or not using the WWW. And finally, student use of the WWW was monitored by sampling actual sites visited and by content-analyzing these sites for educational value.

Granted there is much excellent information available on the WWW. But as this study's content analysis of sites visited seems to indicate, students frequently are either not looking for it, or if they are, are unsuccessful in finding it. It is quite possible that users who approach a Web search with instrumental intentions may soon find themselves distracted by the entertaining and diverting offerings available. The ease with which one can travel to any corner of the vast Web can be both a blessing and a curse. And this is not a unique observation. A study of 6th and 9th grade science students found that without substantial guidance and assistance, students were often unsuccessful in locating useful academic information on the WWW (Lyons, Hoffman, Krajcik, & Soloway, 1997). According to the researchers, "one overall theme is clear from the data: students need a tremendous amount of support to be successful in online inquiry" (p. 12).

Commercialization of the WWW

The commercialization of the WWW and the growth of online advertising is another area of growing concern for educational technology advocates. The disproportionate use of commercial WWW sites by students in this study is just one indicator of the potential exposure of children to advertising. Students are often unaware of the questionable nature and value of information from commercial WWW sites. Lyons et al. (1997) found that students "often choose a commercial site (.com in the URL) over a government (.gov) or education (.edu) site" (p. 21-22), an observation supported by this research.

While unregulated advertising itself is cause for concern, the unique capability afforded by the WWW to collect user information and track usage raises even greater concern. The Zap Me corporation announced a program to give free computers with satellite-based Internet service to schools in exchange for the opportunity to include advertising in a corner of the monitor. In a New York Times article dated February 25, 1999, Richtel described the Zap Me system, which tracks the user's "grade level, sex and Zip code" in order to "dish out age and sex-appropriate advertisements" (p. G7). At the time of the article the company had "given computers to 55 schools in eight states." This kind of targeted advertising and the collection of user data for commercial purposes should be of concern not only to privacy advocates but also to educators and parents who are concerned about the negative effects of consumer-driven culture.

Socialization

More than a decade ago Rosengren and Windahl (1989) wrote,

...today's moral panics about videos, cable, satellites, computer games and the like, may concern rather ephemeral phenomena. It may be true that for some time media novelties may have a capacity to spell-bind children, preventing them from other, perhaps better, activities. But it is probably also true that such an influence will be transient and will be greatly reduced or even vanish as the "new" media find their place in society. (p. 250)

While some of the moral panic spoken of by Rosengren and Windahl may have faded, it appears obvious that the "new" medium of the moment, the WWW, has simply attracted, and perhaps amplified, the concern that was once focused on the old media. According to Stephen Kerr, professor in the College of Education at the University of Washington,

The Net's beauty is that it's uncontrolled… It's information by anyone, for anyone. There's racist stuff, bigoted, hate-group stuff, filled with paranoia; bomb recipes; how to engage in various kinds of crimes, electronic and otherwise; scams and swindles. It's all there. It's all available… That's the antithesis of what classroom kids should be exposed to. (quoted in Oppenheimer, 1997, p. 61)

Concern about inappropriate material available on the WWW is one reason for the widespread use of acceptable use policies. Perhaps the issues of greatest concern focus on the presence of hate speech, sites promoting violent behavior and the means to carry out violent activities, pornography, and sexually explicit material. The unregulated nature of the WWW and its diversity of content providers serves to ensure the widest possible range of content. While other educational media are controlled by the school teachers and administrators who make decisions about what books, videos, and magazines to place in the media collection, the unfiltered WWW has been made available to students who frequently operate on an honor code of self-regulation.

Limitations

The most obvious limitation of this study is the sample and the methodology employed in its selection. Use of non-probabilistic sampling for schools chosen and self-selection of students taking the computer-administered surveys are acknowledged as restricting the generalizability of this study. Because of the non-random nature of the sample, generalization to the larger population of US adolescents is discouraged. However, this study aided in the identification of several motivations for use of the WWW at school and these offer heuristic value for future research.

As Charney (1996) found using a similar approach to study college students' use of the WWW, a complicating factor is that student use of this medium is confounded by use that has been assigned by a teacher. Unlike uses and gratifications studies of other media, use of the WWW, especially in a school setting, is a mixture of uses motivated by personal interest as well as those prescribed by authority figures. In this study there was no way to differentiate student use that was self-motivated versus use that was encouraged or even mandated by teachers.

Also, because of the need to protect the anonymity of respondents, students were not identified in a way that allowed comparisons between the two survey instruments. Neither were comparisons possible between the responses to the survey instruments and the content analysis of WWW sites visited by students. A research design that allowed for anonymous tracking of responses from one survey instrument to the next, and then tied WWW sites visited to a specific anonymous respondent, would have added heuristic value to the study.

On a related note, the analysis of sites visited by students did not take into account sites that were visited accidentally or for only a short period of time. It is quite possible that sites ranking low on "suitability for academic research" were visited only briefly while more suitable sites were visited for longer periods of time, or even printed for later use.

Conclusions

In the opening chapter of *Failure to Connect*, Healy (1998) stated: "Today's children are the subjects of a vast and optimistic experiment" (p. 17). Referring to the use of computers for educational purposes, Healy argued that computers raise more questions than they answer and concluded with a call for accountability and common sense. Cuban (1996) had a similar response and couched his assessment in an historical context.

First, techno-reformers' claims for what new machines can do are so inflated that public expectations continually get disappointed. Overselling has been (and continues to be) part of a familiar American cycle of creating a crisis, naming schools or teachers as a problem, and putting forward new machines (film, television, computers) as the best solution. Yet each technological innovation has had, at best, an uneven record in entering schools and classrooms. Why?

Based on this exploration of WWW use in school, several findings would appear to have policy implications for schools using or making plans to use the WWW for educational purposes. First, while students believe the WWW to be a valuable source of reliable information, their use of the WWW suggests other motivations. Analysis of sites visited indicated that by nearly a two-to-one margin students visited sites rated "unsuitable for academic research" versus sites rated "suitable." Seeking out "pleasurable experience" appeared to win out over "learning information" (Swanson, 1992) when students were given access to the WWW within the school setting. Furthermore, the types of sites visited most frequently, i.e., commercial sites, were rated as having the lowest educational value.

Also of note is the incongruity between students' self-reported use of the WWW and the uses suggested by the analysis of sites visited by students. Either students falsely reported their intentions or intervening variables affected the process of searching for and obtaining relevant information. One untested hypothesis to emerge from this study is that the best of intentions may be confounded by the ease with which students can access a myriad of competing sites that vie for their attention. Another possibility is that the students' understanding of research is more broadly defined and includes looking for content that has little or no relationship to traditional academic pursuits.

When it comes time to evaluate the appropriateness and effectiveness of media technology in the schools media effects researchers cannot have it both ways. Either media effects are real and the potential benefit of educational media must be balanced by constant vigilance against access to WWW sites that are at best a distraction and at worst a hindrance to the educational and social development of our children. Or, media effects are limited and mediated by user motives, attitudes, and use patterns, and any potential benefit of educational media in the schools is contingent on the proper psychological and sociological predictor variables. If this is the case, attention to these factors must be a top priority and WWW access must be implemented with the goal of creating the proper climate for learning to occur. In either case WWW literacy efforts-teaching students how to most effectively use the best resources on the WWW-are sorely needed. Since picking and choosing only the best WWW resources for students is not a viable option, giving students the tools to make wise decisions about media content is crucial.

Footnotes

1 According to Wartella and Reeves (1985) the first recorded instance of concern about media's effect on children was Plato's warning about storytellers in *The Republic*.

2 One could argue that Illich (1970) envisioned the WWW as an educational resource long before its time when he wrote, "The current search for new educational funnels must be reversed into the search for their institutional inverse: educational webs which heighten the opportunity for each one to transform each moment of his living into one of learning, sharing, and caring" (pp. xix-xx, emphasis in the original). Illich continued, "We need research on the possible use of technology to create institutions which serve personal, creative, and autonomous interaction and the emergence of values which cannot be substantially controlled by technocrats. We need counterfoil research to current futurology" (p. 2). In describing an alternative to school, Illich might have been describing the modern listserv or chat forum: "The most radical alternative to school would be a network or service which gave each man [*sic*]the same opportunity to share his [*sic*] current concern with others motivated by the same concern" (p. 19). The great difference, however, between what Illich envisioned and what WWW advocates are promoting is the locus of responsibility.

3 For the full study, including survey instruments, see Ebersole (1999).

4 It is interesting to note that the list of "uses" is similar those found by researchers exploring the uses and gratifications of "old" media. Information, entertainment, social utility, passing the time, and other traditionally defined uses of the media are present with some distinctions made possible by the interactive nature of this new medium.

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Chapter 3

Abstracts

Objectives :

- Free Reading
- Comprehension: Reading for Main Ideas and Guessing from Context
- Practising Impersonal Forms
- Writing Abstracts
- Extensive Reading

Time Now :

1. Reading

Available online at: http://www.ascusc.org/jcmc/vol8/issue3/
Retrieved 28 August 2004

Journal of Computer-Mediated Communication
8(3) April 2003 Margaret McLaughlin and Sheizaf Rafaeli, Editors

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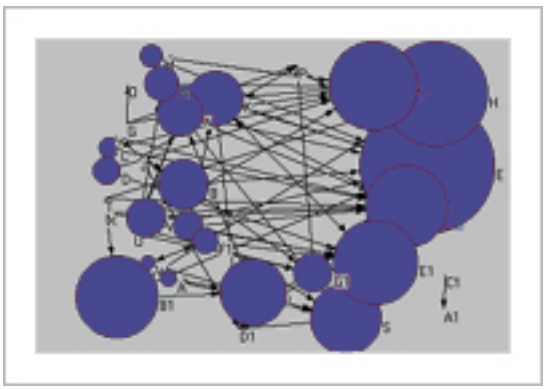

Electronic Networks and Democracy
Edited by Nicholas Jankowski

In this issue:

Editor's Introduction

In this special issue we present studies of community-based information systems and virtual arenas for political information and debate

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More than Technology

The author explains the obstacles which discourage Internet users from more direct involvement in political life and explores the possibilities for more

Why Create?

There is an underlying assumption held by government that simply by introducing technology to disadvantaged communities, the digital divide will be removed and people will go online. The author critically examines this assumption.

Nets & Social Capital

The ICT literature posits that community networking should positively affect levels of social capital in a community. The author uses social network analysis to examine this idea.

Homophily Online?

The author reports that people appreciate the diversity of persons and viewpoints they encounter in their chosen

interactive, open political engagement.

Phronesis & IT Design

The authors argue that social researchers should become involved in the process of community network design and adopt an orientation toward inquiry based on the concept of *phronesis*.

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political discussion spaces and are not primarily oriented towards finding like-minded others online.

Networked Individualism

Internet use is reinforcing the pre-existing turn to societies in the developed world that are organized around networked individualism rather than group or local solidarities. The result has important implications for civic involvement.

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2. Comprehension Check

Pre-reading

Exercise 1 : **Activating background knowledge**

Before you start reading any text it is important to find how much you already know about the topic/subject of the text

The title of this web page is "electronic networks and democracy". Look at the headlines and answer the following question:

In what ways could electronic networks affect democracy in the world?

Exercise 2 : **Careful reading**

Read the web page quickly and check your answers. Tick all the correct answers.

1. Electronic networks reinforce the organization of society into groups.
2. Electronic networks design should be studied by social researchers.
3. Electronic networks reinforce individualism in developed societies.
4. Diversity rather than similarity in political orientation is appreciated by Internet users.
5. Internet users can become more involved in politics through the internet.
6. Governments' belief that the digital divide can be easily removed by introducing more technology is simplistic.
7. Community networks on the Internet affect social capital.
8. Social network analysis can help study the relationship between community networking and social capital.
9. Developed societies have already a tendency to cluster around networked

individualism.

10. In online discussions, Internet users are primarily attracted by people of the same political orientation.

Auto-evaluation

Exercise 3

Paraphrase the following:

a) Community-based information systems

……

b) People…are not primarily oriented towards finding like-minded others online.

……

Exercise 4

Use context clues (indicators) to guess the meaning of these words.

- **arenas (par2 L3): -** computers - spaces - offices - communities

- **inquiry (par3 L5): -** request -involvement - network - research

- **underlying (par4 L1):** - fundamental - unnecessary - passive - obvious

- **disadvantaged (par4 L3):** - underprivileged -disliked -underestimated - uninvolved


Go


Key

Ce QCM comporte 10 questions.

Exercise 2 : Careful reading

1 . Read the web page quickly and check your answers. Tick all the correct answers.

- ☐ 1 . Electronic networks reinforce the organization of society into groups.
- ☐ 2 . Electronic networks design should be studied by social researchers.
- ☐ 3 . Electronic networks reinforce individualism in developed societies.
- ☐ 4 . Diversity rather than similarity in political orientation is appreciated by Internet users.
- ☐ 5 . Internet users can become more involved in politics through the internet.
- ☐ 6 . Governments' belief that the digital divide can be easily removed by introducing more technology is simplistic.
- ☐ 7 . Community networks on the Internet affect social capital.
- ☐ 8 . Social network analysis can help study the relationship between community networking and social capital.
- ☐ 9 . Developed societies have already a tendency to cluster around networked individualism.
- ☐ 10 . In online discussions, Internet users are primarily attracted by people of the same political orientation.

Score RAZ

Score =

Correct answers :

Answer key

Exercise 1

Free answers

Exercise 2

These answers should be ticked: 2-3-5-6-7-8-9

Exercise 3

a) Systems of information that are based on the notion of community

b) When working online, people in general do not search for people who have similar ideas, beliefs,..etc

Exercise 4

- **arenas:** spaces

- **inquiry:** research

- **underlying:** fundamental

- **disadvantaged:** underprivileged

Back

3. Language study
Impersonal forms

Available online at: http://lc.byuh.edu/CNN_N/s00/gram11May.html
Retrieved 2 december 2002

ACTIVE vs. PASSIVE

Instructions:From the options listed for each item below, choose the option that shows the most correct active or passive form.

"Ancient Reminders of Glory"

WALCOTT: Next stop, Egypt, a Middle Eastern country located in the northeast corner of Africa. Egypt is considered by many as the birthplace of civilization. The ancient Egyptians developed a great culture about 5,000 years ago. They created the world's first national government, basic forms of arithmetic, and a 365-day calendar. But perhaps their best known achievements are the pyramids they built as tombs for their rulers. The gigantic stone structures **[Problem #1 (a) have preserved/ (b) have been preserved]** by the dry climate for about 4,500 years. They are marvels of architecture and engineering and **[Problem #2 (a) serve/ (b) are served]** as a reminder to the glory of ancient culture.

(BEGIN VIDEOTAPE)

(voice-over): It's the site that draws thousands of visitors to Egypt every year: the ancient pyramids, one of the Seven Wonders of the World. Now tourists will have another pyramid to marvel at. A French expedition team **[Problem #3 (a) has uncovered/ (b) has been uncovered]** a pyramid that **[Problem #4 (a) built/ (b) was built]** for a queen.

DR. ZAHI HAWASS, DIRECTOR OF THE GIZA PLATEAU: By the discovery of this new

pyramid, the number of pyramids became now 108 pyramids.

WALCOTT: The pyramid **[Problem #5 (a) believed/ (b) is believed]** to be about 4,000 years old and **[Problem #6 (a) discovered/ (b) was discovered]** in an ancient royal cemetery south of Cairo. Researchers say it is the tomb of Queen Ankhes-Pepy. She **[Problem #7 (a) acquired/ (b) was acquired]** power when her son, Pepy II, became pharaoh at the tender age of six.

Her newly-discovered pyramid is significant because it is the first time a queen's burial chamber **[Problem #8 (a) has found/ (b) has been found]** to carry a pyramid text. The texts are special prayers inscribed on walls to protect the dead and ensure sustenance in the afterlife. Until this discovery, such texts **[Problem #9 (a) had only found/ (b) had only been found]** in the pyramids of kings.

AUDRAN LABROUSSE, DIRECTOR OF THE FRENCH EXPEDITION: When we found this extraordinary discovery, of course it was a very great moment because we **[Problem #10 (a) searched/ (b) were searched]** for this tomb for 10 years.

WALCOTT: The French team plans to restore the pyramid using its original stones and fragments found around the area. They hope to have it **[Problem #11 (a) restored/ (b) restoring]** within three years.

Auto-evaluation

"Ancient Reminders of Glory"

01: (b) have been preserved

02: (a) serve

03: (a) has uncovered

04: (b) was built

05: (b) is believed

06: (b) was discovered

07: (a) acquired

08: (b) has been found

09: (b) had only been found

10: (a) searched

11: (a) restored

4. Writing: Abstracts

- Exercise 1
- Exercise 2
- Exercise 3

Link to abstracts & impersonal forms

Exercise 1

Read the abstract *"Predicting job performance with a fuzzy rule-based system",* then, match each of the following steps with the appropriate paragraph.

- (A) Discussion
- (B) Objective of the study
- (C) Statement of the problem
- (D) Method
- (E) Results

Exercise 2

a) Fill in the abstract entitled *"The task of problem formulation"* with the correct impersonal forms in the box

b) Pick out of the abstract the sentence that indicates the objective of the study. Write it in the space below:

sec4

check Reset

Exercice 3

Choose the correct word from the options provided to get a meaningful abstract on *Intelligence Chinese Document Indexing System.*

Sous-Sections : I | II | III | IV | V

What is an Abstract?

The abstract is an important part in a specialized scientific or technical article. It summarizes the whole article. Therefore, It should have certain characteristics mainly **clarity** and **conciseness** as required by the international form of scientific discourse.

It is used to identify and classify articles in bibliographical journals such as *Mathematical Review, Physical Abstracts.*

Content of an abstract?

The abstract should give the reader an exact and concise knowledge of the entire article :

- What the author did
- How the author did it
- What the author found
- What the author concluded

"an abstract should state briefly the purpose of the research, the principal results, and major conclusions. For a typical paper, an 80-200 word abstract is usually adequate"

ANSI (American National Standards Institute)

Steps to follow to write an abstract

An abstract is usually divided into 4 steps:

1) Introducing purposes

- Author's intention, thesis or hypothesis
- Goals or objectives of research or problem

2) Describing methodology

- Indication of experimental design
- Data procedures or methods used
- Scope of the research (sample size…)

3) Summarizing results

- Observations and findings
- Solutions to the problem

4) Presenting conclusions

- Interpret results
- Draw inferences
- Indications and applications of the present findings

Main linguistic feature of the abstract?

Impersonal forms and nominlalizations (use of nouns)

---

back

Impersonal forms

Scientific and technical English makes frequent use of impersonal forms. These forms evacuate the actor and hence give more focus to the action itself.

The passive

- **Example 1** : The teachers immediately recognized Kepler's genius.

—> Kepler's genius **was** immediately **recognized** (by his teachers).

- **Example 2** : The University of Iowa made the first computer-graphics image in 1970s.

—> The first computer-graphics image **was made** in 1970s (by Iowa University).

Note :

S/He	made	X	—>	X **was** made
They	made	X	—>	X **was** made
S/He	made	Xs	—>	Xs **were** made
You	have made	X	—>	X **has been made**
You	have made	Xs	—>	Xs **have been made**

Modals

- **Example 1** : You should use the 120-D printer with single sheets.

—> The 120-D printer **should be used** with single sheets.

- **Example 2** : We can convert thermal energy into electrical energy only at efficiency of about 30%.

—> Electrical energy **can be converted** into thermal energy only at efficiency of about 30%.

- **Example 3** : We will devote most of this article to describing those recent investigations.

—> Most of this article **will be devoted** to describing those recent investigations.

……ING

- **Example 1** : We require sophisticated computer-based technology to study the use of fibre optics.

—> **Studying** the use of fibre optics requires sophisticated computer-based technology.

- **Example 2** : They can extend the project to the entire country if they use a wider network.

—> **By using** a wider network the project can be extended.

If you think you need some exercise on active/passive structure Click here.

Title: **Predicting Job Performance with a Fuzzy Rule-Based System**

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Abstract: Classification problems affect all organizations. Important decisions affecting an organization's effectiveness include predicting the success of job applicants and the matching and assignment of individuals from a pool of applicants to available positions. In these situations, linear mathematical models are employed to optimize the allocation of an organization's human resources. Use of linear techniques may be problematic, however, when relationships between predictor and criterion are nonlinear.

(……..).

As an alternative, we developed a fuzzy associative memory (FAM: a rule-

based system based on fuzzy sets and logic) and used it to derive predictive (classification) equations composed of measures of job experience and job performance.

(……)

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(……)

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(……..)

We discuss the apparent nonlinear relationships between experience and performance, and the advantages and implications of using these systems to develop and describe behavioral models.

(……..).

Keywords: Fuzzy logic; fuzzy set theory; fuzzy associative memory; behavioral models; job performance; job experience

Full Text: View full text in PDF format (227KB)

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PREDICTING JOB PERFORMANCE WITH A FUZZY RULE-BASED SYSTEM

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Classification problems affect all organizations. Important decisions affecting an organization's effectiveness include predicting the success of job applicants and the matching and assignment of individuals from a pool of applicants to available positions. In these situations, linear mathematical models are employed to optimize the allocation of an organization's human resources.

Use of linear techniques may be problematic, however, when relationships between predictor and criterion are nonlinear. As an alternative, we developed a fuzzy associative memory (FAM: a rule-based system based on fuzzy sets and logic) and used it to derive predictive (classification) equations composed of measures of job experience and job performance. The data consisted of two job experience factors used to predict measures of job performance for four US Air Force job families. The results indicated a nonlinear relationship between experience and performance for three of the four data sets. The overall classification accuracy was similar for the two systems, although the FAM provided better classification for two of the jobs. We discuss the apparent nonlinear relationships between experience and performance, and the advantages and implications of using these systems to develop and describe behavioral models.

Keywords: Fuzzy logic; fuzzy set theory; fuzzy associative memory; behavioral models; job performance; job experience.

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1. Predicting Job Performance with a Fuzzy Rule-Based System

Classification problems affect all organizations. Important decisions affecting an organization's effectiveness include predicting the success of job applicants, and the matching and assignment of individuals from a pool of applicants to available positions. In these situations, mathematical models are employed to optimize the allocation of an organization's human resources. Factors that predict a criterion are used to develop a model that allows the organization to make decisions so that incorrect classifications are minimized. Conventional statistical techniques, commonly, correlation, regression, discriminant function analysis, etc. serve as the basis for these models.

In practice, relationships between behavioral phenomena are often treated as linear for two reasons: (1) linear techniques have been demonstrated to be fairly robust with respect to nonlinear relationships, and (2) if a relationship is known to be nonlinear, the form of nonlinearity (quadratic, exponential, etc.) must be known and specified in order to produce a predictive equation of reasonable accuracy. Use of a linear technique when relationships are nonlinear becomes problematic, however, as the relationships depart from linearity.

Below we discuss an alternative technique that can be employed for prediction and classification decisions. We show that it provides an attractive alternative to traditional linear statistical techniques because of its ability to model linear and nonlinear relationships without *a priori* specification of the form of the relationship between predictors and criterion. Moreover, we show that it provides an explanation of model relationships using *linguistic* descriptions that may ease the interpretation of the resulting model, making it especially attractive for non-technical managers.

We had two primary goals for this research. First, was to compare the classification accuracy of a traditional linear statistical technique, discriminant function analysis, with an adaptive approach, fuzzy associative memories (FAM). FAMs represent knowledge regarding mappings between inputs and output as linguistic rules. A second and important goal was to assess the interpretation of the rules induced with the FAM.

We begin our discussion with a description of fuzzy set theory, which serves as the basis for the system.

1.1. *Fuzzy set theory*

Zadeh proposed fuzzy set theory as a means of representing and reasoning with information characterized as vague, ambiguous, and uncertain.[18]

> As the complexity of a system increases, our ability to make precise and yet significant statements about its behavior diminishes until a threshold is reached beyond which precision and significance (or relevance) become almost mutually exclusive characteristics (p. 228).

Zadeh's *Principle of Incompatibility* is based on the observation that it is difficult to make precise qualitative descriptions about complex systems. Specifically, there is an inverse relationship between the complexity of a system and our ability to make measurably precise statements about interrelationships among system components, and predictions about system outcomes.

The principle of incompatibility stems from our reliance on Aristotelian logic and classical set theory to describe phenomena. Recall that classical set theory proscribes values of set membership to: μ_a: $X \rightarrow \{0, 1\}$. Thus, classical set theory requires that an element (entity) is either a member of a set ($\mu_a = 1$) or not a member of that set ($\mu_a = 0$). Fuzzy set theory however allows grades of membership over the continuum of real numbers: m_a: $X \rightarrow [0, 1]$. A defining characteristic of fuzzy set theory is that an element may have a non-zero membership grade in disparate sets.

Classical set theory is employed, either implicitly or explicitly, in much of everyday life. In an organizational setting, for example, a supervisor may evaluate employees' job performance using a five-point Likert scale ranging from poor (1) to excellent (5). Each employee is typically assigned a single rating per dimension. An employee may receive a rating of 5 for quantity of work and 4 for quality of work, indicating that his or her quantity of work production is "excellent", and the quality of his or her work is "good". An intriguing, and often overlooked, question is: at what point does a worker's quantity of work production change from "good" to "excellent"? If an average worker is expected to produce, say, 1000 widgets a day, how many widgets is a good worker expected to produce? Say it is expected that someone producing an average of 1200 widgets per day receives a rating of "good". It is difficult to justify why an employee producing one less widget is allocated to an entirely different performance category.

Imprecision and vagueness present a double-edged sword; humans categorize, round off, quantize, to aid in understanding complex phenomena, and yet our decision making is not hindered by this imprecision.[5] As scientists, however, we tend to predict or explain these relationships or phenomena using precise, crisp, categorizations. Yet we find it very difficult, if not impossible in certain circumstances, to develop adequate mathematical models of these relationships.

1.2. *Fuzzy associative memories*

Fuzzy set theory has been extended to the development of fuzzy associative memories (FAM).[11] A FAM is a rule-based system that employs fuzzy logic as part of the inference process. The incorporation of fuzzy set theory into rule-based systems recognizes that there is often ambiguity, vagueness, and imprecision in information employed in decision making. A simple example will illustrate. Say we have three rules that map motivation and intelligence to job performance:

IF motivation is Low AND intelligence is Low
THEN performance is Low

IF motivation is Low AND intelligence is High
THEN performance is Moderate

IF motivation is High AND intelligence is High
THEN performance is High.

Each rule maps two linguistic variables (the psychological constructs of motivation and intelligence) to a third linguistic variable (job performance). FAMs take on the general form IF A is B THEN X is Y, denoting a mapping between (ostensibly) causally related domains. Although FAMs are represented linguistically, they have a mathematical basis as defined by the membership functions that specify the shape of the fuzzy sets and the calculus of fuzzy logic that determine how the membership grades are combined.

In conventional expert systems a single rule fires at each iteration. In fuzzy systems, all rules fire in parallel at each iteration. If a fuzzy system contains 100 rules, then all 100 will fire. Most rules fire to different degrees, indicating differential applicability.

The operators AND and OR are used to combine clauses in the rule antecedents. For example:

IF motivation is Low *AND* intelligence is High
THEN performance is Moderate

IF motivation is High *OR* is intelligence High
THEN performance is High.

To simplify, these rules can be represented as (Low & High ⇒ Moderate), and (High | High ⇒ High), with "&" denoting "AND", "|" denoting "OR," and "⇒" denoting "THEN". Combination operators allow for the creation of antecedent clauses of arbitrary complexity. Zadeh's conceptualization of combining multiple clauses uses the *minimum* membership grade of clauses combined with AND, and the maximum membership grade of clauses combined with OR. Because most simple clauses are combined with the AND operator, the method of composing antecedent clauses is called *max-min composition.*[12]

To illustrate, say an employee has been measured for motivation on a psychological scale (0 = lowest motivation and 10 = highest motivation) at $\text{Motivation}_{\text{SCORE}} = 8$. We also measure the employee's intelligence using a standard intelligence test which has a $\bar{X} = 100$ and $\sigma = 15$; $\text{Intelligence}_{\text{SCORE}} = 111$. Say we wish to use these measures of motivation and intelligence to predict future job performance, a common task in personnel selection. We now have three linguistic variables, motivation, intelligence, and performance. If we represent the three linguistic variables with the fuzzy sets Low, Moderate, and High, we would have twenty-seven possible rules. Say, however, we know the following rules to be true:

Rule 1: (Low & Low ⇒ Low)

Rule 2: (Low & Moderate ⇒ Moderate)
Rule 3: (Low & High ⇒ High)
Rule 4: (Moderate & Low ⇒ Low)
Rule 5: (Moderate & Moderate ⇒ Moderate)
Rule 6: (Moderate & High ⇒ High)
Rule 7: (High & Low ⇒ Low)
Rule 8: (High & Moderate ⇒ Moderate)
Rule 9: (High & High ⇒ High) .

(Note each combination of linguistic variable is mapped to a single consequent fuzzy set, and the first linguistic variable in each rule is motivation and the second intelligence).

Say we find that the membership grades for the employee's motivation score ($\text{Motivation}_{\text{SCORE}} = 8$) are: $m_{\text{low}} = 0.00$, $m_{\text{moderate}} = 0.26$, $m_{\text{high}} = 0.79$. For intelligence ($\text{Intelligence}_{\text{SCORE}} = 111$): $m_{\text{low}} = 0.00$, $m_{\text{moderate}} = 0.65$, $m_{\text{high}} = 0.32$. We will use the minimum of the membership grades across the two clauses because the antecedent clauses are combined with AND, required by max-min composition. This minimum is used to restrict the height (i.e. strength) of the consequent clause of the rule, indicating that the "truth" of the consequent can only be as "true" as the antecedent. Thus, through max-min composition the following are defined:

$$m_{\text{low}} = 0.00 = \max \begin{cases} \min(0.00, 0.00) \\ \min(0.00, 0.26) \\ \min(0.00, 0.79) \end{cases} \tag{1}$$

$$m_{\text{moderate}} = 0.65 = \max \begin{cases} \min(0.65, 0.00) \\ \min(0.65, 0.26) \\ \min(0.65, 0.79) \end{cases} \tag{2}$$

$$m_{\text{high}} = 0.32 = \max \begin{cases} \min(0.32, 0.00) \\ \min(0.32, 0.26) \\ \min(0.32, 0.79) \, . \end{cases} \tag{3}$$

Therefore, the height of the fuzzy set consequent Low is limited (truncated) at 0.00, Moderate at 0.65, and High at 0.32. Therefore, our predictive classification of the employee's job performance based on current measures of motivation and intelligence would be Moderate.

1.2.1. *Defuzzification*

If a "crisp" decision is required then the aforementioned truncated consequent set must be "defuzzified". Simply, an expected fuzzy value is calculated based on the consequent fuzzy sets. That is, given the area under the clipped consequent fuzzy sets, calculate the integral that defines the expected value. The most often employed method is defined by:

$$\bar{B} = \frac{\sum_{j=1}^{p} y_j m_B(y_j)}{\sum_{j=1}^{p} m_B(y_j)} \tag{4}$$

where y_j is the scalar value for fuzzy set j, and $m_b(y_j)$ is the corresponding membership.[12]

1.2.2. *Rule generation*

The example illustrated above presupposes that a set of rules exists which map inputs to output. For the example above, there were 27 *possible* rules; however, we need a method to determine which consequent fuzzy set is appropriate for a particular antecedent. For example, if a consequent can take on one of the values of Low, Moderate, or High for a particular antecedent, then we have the following dilemma as to which is the appropriate consequent:

$$\text{Low \& Low} \Rightarrow \mathit{Low}$$

$$\text{Low \& Low} \Rightarrow \mathit{Moderate}$$

$$\text{Low \& Low} \Rightarrow \mathit{High}.$$

That is, we need a method of determining which of the following linguistic values for the consequent set is most appropriate for the antecedent Low & Low.

Numerous methods exist to generate rules from data. These methods can be either *supervised*, where the class membership is known, or *unsupervised* where class membership is identified adaptively and stochastically as a result of passing training cases through a stochastic learning algorithm, which determines probabilistically in which group a particular case is most likely to occur.[11,15]

There are numerous unsupervised learning algorithms from which to choose; including adaptive K-means clustering,[13] ISODATA, backpropogation, fuzzy C-means, mountain clustering, Widrow-Hoff rule, Kalman filters,[15] genetic algorithms,[6,8,14] signal and differential Hebbian learning, ARTMAP and Fuzzy ARTMAP,[1,2] competitive learning,[16] and differential competitive learning,[11] to mention a few. A significant concern for our research was the substantive interpretability of the resulting rules, especially because most subjective behavioral data is typically much noisier than physical data measurements that are commonly employed in demonstrating the algorithms described above.

For this research we chose *differential competitive learning* for rule generation[11] primarily because our own research has demonstrated that the resulting rules tend

to be meaningful and interpretable when applied to subjective behavioral data. A plausible alternative would have been to select a number of different rule generation methods and to evaluate each in terms of (a) the substantive interpretability of the generated rules, and (b) the predictive accuracy for each set of rules. Given that our motivation for this research was both a proof of concept as to whether an adaptive system provides as good (or better) classification than a traditional linear system in mapping subjective behavioral input data to subjective behavioral output data, as well as providing meaningful and interpretable rules, we choose to use DCL exclusively. Further research is warranted as to a comparison of the ability of all rule generation method to provide interpretable rules from subjective behavioral data.

1.2.3. *Differential competitive learning*

DCL identifies a number of representative prototypes from a set of training cases and adaptively estimates the probability of their occurrence in a particular group. The structure of DCL allows for a representation within a neural net framework.[11] The neural net topology is a two-layer feed forward self-associative neural network. An input layer $\mathbf{F}_x$ consisting of n neurons, and an output layer $\mathbf{F}_y$ consisting of p neurons. The input layer $\mathbf{F}_x$ is fed randomly sampled training cases. $\mathbf{W}_{ij}$ is an $n \times p$ (variables x rules) matrix that contains the connection weights between $\mathbf{F}_x$ and $\mathbf{F}_y$. $\mathbf{M}_{ij}$ is a $p \times p$ (rules x rules) weight matrix that implements a *laterally inhibitive* effect between the neurons in the activation layer $\mathbf{F}_y$. Winning neurons are those whose weight vector correlates most highly with the training case. The winning neurons have their activations excited, whereas losing neurons have their activations inhibited (reduced).

DCL modifies the weight vectors toward the decision class centroids. The winning neuron has its weight vector updated according to the following:

$$m(t+1) = m_j(t) + c_t \Delta y_j(t)[x(t) - m_j(t)]\,. \tag{5}$$

The constant c is a learning parameter that is reduced as the systems learns so that the system stabilizes toward cluster centroids as learning continues. For this research, c was calculated (as described in Ref. 11) as:

$$c = 0.1 \cdot \left(1 - \frac{t}{N}\right) \tag{6}$$

where t is the iteration number and N is the sample size. $\Delta y_j(t)$ denotes the change in the jth neuron's activation from temporally contiguous iterations:

$$\Delta y_t = \operatorname{sgn}[y_j(t+1) - y_j(t)] \tag{7}$$

where the signum operator $\operatorname{sgn}(x)$ is defined as:

$$\operatorname{sgn}(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -1 & \text{else}\,. \end{cases} \tag{8}$$

This suggests that the system should *learn* (i.e. have its weights modified toward the decision class centroid) *only* if there is a change in the activation of the neuron. The activation of the winning neuron in the competition layer $\mathbf{F}_y$ is updated according to the following algorithm:

$$y_j(t+1) = y_j(t) + \sum_j^n x_i m_{ij}(t) + \sum_k^p y_k w_{kj} \,. \tag{9}$$

The first sum calculates the dot product, i.e. correlation between a pattern vector and weights of the winning neuron in competition layer $\mathbf{F_y}$. The second sum implements lateral inhibition: non-winning neurons are *inhibited* from learning. The lateral inhibitory weight matrix $\mathbf{W}_{kj}$ is a square matrix with the number of rows equal to the number of rules:

$$W = \begin{bmatrix} +1 & -1 & \dots & -1 \\ -1 & +1 & \dots & -1 \\ & & \vdots & \\ -1 & -1 & \dots & +1 \end{bmatrix} . \tag{10}$$

Because only a single neuron wins at time t, the winning neuron is the only neuron that has a positive change in its activation, whereas the non-winning neurons are reduced in activation, perhaps even with a sign change.

2. Method

2.1. *Participants*

Between 1982 and 1990, the Air Force Human Resources Laboratory conducted a large-scale effort to develop a measurement technology for systematically obtaining job performance data. These data could be used to (1) respond to a Congressional mandate to link the Armed Services Vocational Aptitude Battery to performance measures; (2) evaluate Air Force training programs; and (3) serve as criteria for research and development projects.[9,10] The data employed here are part of that larger effort. Data gathered for eight different specialties (jobs) were employed. These specialties were later grouped into four job families: electrical ($N = 237$), mechanical ($N = 516$), administrative ($N = 344$), and general ($N = 382$).

Several measures of job experience were collected and employed in this study. Some measures were common to all eight specialties, whereas others were unique to each specialty. A single measure of job performance was employed in these analyses — a job sample test score. To reduce the numerous measures of experience to a manageable and reliable set, we conducted a factor analysis on each set of experience measures for each specialty (the complete work of which is described in Ref. 4). We employed exploratory principle axis factoring with squared multiple correlations as communality estimates. The decisions on the number of factors to retain and rotate were based on past research and substantive interpretability. In each case two factors

were retained — a "general" job experience factor (common to all jobs), as well as a "specific" job experience factor (tasks unique to each job). Because of the different variables used in each analysis for each specialty, there was not a large overlap across the jobs in terms of the consistency of the variables loading on each of the factors. This is expected, however, given the proportion of general experience to the specific experience variables.

Factor scores were computed and used as the criterion in subsequent parts of this study. Factor scores were generated using the regression method[17] for each individual based on the two factor solutions. Thus, for each case, two predictor variables (factor scores for the general and specific experience factors) were employed to predict the measure of job sample test performance.

2.2. *Rule generation*

We employed three fuzzy sets (Low, Moderate, and High) to represent each of the linguistic variables (general and specific work experience, and job performance). 27 rules were required to span the product space [i.e. three (general experience factor levels) X three (specific experience factor levels) X three (job performance levels)]. Thus, 27 *a priori* rules were developed. Three-quarters of the available data cases were then submitted to the DCL algorithm to reduce the 27 rules to a set of nine plausible rules, each of which mapped a combination of general/specific experience fuzzy set to a single job performance fuzzy set (low, moderate, or high). As an example, given the following hypothetical outcome:

Table 1. DCL learning outcomes illustration.

General	**Specific**	**Performance**	**Winning Proportion**
Low	Low	*Low*	0.60
Low	Low	*Moderate*	0.25
Low	Low	*High*	0.15

would indicate that the most plausible (probable) consequent for the rule antecedent Low & Low is *Low* as suggested by the proportion 0.60. Note the uncertainty however; the rule Low & Low is not guaranteed to result in a low level of performance. Rather, the most probable level of performance consequent given the rule Low & Low is Low. There is a decreasing level of plausibility that the same rule could lead to performance levels of Moderate (25%) and High (15%), respectively.

Contiguous fuzzy sets were allowed an overlap of approximately 25% as suggested by researchers.[5,11] This decision rule defined the upper and lower limits for the ramped membership functions (Low and High fuzzy sets), and the center for the triangle fuzzy set Moderate.

3. Results

We employed cross-validation to provide a rigorous test of the predictive abilities of both FAM and linear technique. We split each of the data sets for the four job families into two parts using a three-fourths (developmental sample) and one-fourth split (cross validation sample). We first developed FAM rules using the larger of the subsamples. For each job family we then used these rules to predict performance using the smaller subsample. We used the results from the first sample (FAM rules) to interpret the relationship between the forms of experience and performance, and the second sample to compare the predictive ability of each of the techniques.

We first present the results of the model development runs for the discriminant function models followed by the rules induced from the FAM rule (model) development runs. Following this, we present the results of primary interest — the classification accuracy of the models based on the cross-validation runs.

Table 2 presents the sample sizes and breakdowns for the model development and cross-validation samples. Table 3 presents the results for the discriminant models for each of the job families. Table 4 presents the magnitudes and statistical significance of the parameter estimates for each of the four models.

Table 2. Breakdown of model development and cross-validation sample sizes.

Job Families	Total N	Model Development N	Cross-validation N
Administrative	344	259	85
Electrical	237	175	62
General	382	287	95
Mechanical	516	387	129

Table 3. Statistical significance of discriminant models.

Job Families	X^2	Prob. $<$
Administrative	39.84	0.00
Electrical	20.56	0.00
General	9.85	0.01
Mechanical	35.24	0.00

Table 4. Parameter estimates and statistical significance of the discriminant model.

Job Families	General	Prob. $<$	Specific	Prob. $<$
Administrative	-0.92	0.00	-0.58	0.00
Electrical	-0.66	0.00	-0.38	0.00
General	-0.19	0.09	-0.32	0.01
Mechanical	-0.49	0.00	-0.53	0.00

Table 3 indicates that all discriminant models achieved statistical significance at the 0.01 level. To achieve the best results, prior probabilities were used in the calculation of the classification rates. Table 4 indicates that general experience was statistically significant for all job families except the general family, whereas specific experience was significant for all families.

3.1. *Rule development results*

Tables 5 through 8 present the results of the derived rules for the four families. An analysis of these tables indicates a different pattern of rules across the families. This suggests that job family moderates the relationship between experience and

Table 5. Rules for the administrative job family.

		Specific Experience	
	Low	Moderate	High
General Experience			
Low	Low	Low	Moderate
Moderate	High	High	High
High	Moderate	Moderate	Moderate

Note. Cell values are predicted performance classifications based on general/specific experience.

Table 6. Rules for the electrical job family.

		Specific Experience	
	Low	Moderate	High
General Experience			
Low	Low	Low	High
Moderate	Low	Low	High
High	High	High	Low

Note. Cell values are predicted performance classifications based on general/specific experience.

Table 7. Rules for the general job family.

		Specific Experience	
	Low	Moderate	High
General Experience			
Low	Moderate	Moderate	High
Moderate	Low	Moderate	High
High	Low	Moderate	High

Note. Cell values are predicted performance classifications based on general/specific experience.

Table 8. Rules for the mechanical job family.

		Specific Experience	
	Low	Moderate	High
General Experience			
Low	Low	Low	High
Moderate	Low	High	Moderate
High	High	Moderate	Moderate

Note. Cell values are predicted performance classifications based on general/specific experience.

performance. That is, the relationship between experience and performance *depends* upon the job family under consideration. The results of cross-validation will be used to aid in interpreting the pattern of rules as described below.

3.1.1. *Percent correct classification*

The percent correct classification was calculated so that the classification accuracy of the two models could be compared for each job family. To calculate this index, the proportion of correct classifications (contained in the positive diagonal of each of Tables 9 through 12) was multiplied by the actual N in each category, then were summed, then divided by the total sample size. For example, percent correct classification for the administrative family for the FAM rules (Table 5) is calculated as:

$$\frac{[(0.25 \times 29) + (0.69 \times 26) + (0.47 \times 30)]}{85} = 0.46 \times 100\% = 46\%\,.$$

Thus, the percent correct classification for the FAM model for the administrative family is 46%.

3.1.2. *Rules for the administrative family*

The pattern of rules for the administrative family (Table 5) suggests a nonlinear relationship between experience and performance. Collapsing cells across general experience indicates that there is no effect of specific experience on performance. Collapsing cells across specific experience cells suggests there is a nonlinear effect for general experience. For example, at low levels of general experience performance is predicted to be low (with the exception of the Specific High cell). For Moderate general experience, performance is High; however, High general experience leads to only Moderate performance.

The pattern of rules across general experience suggests an inverted U distribution, and if these rules are reflective of reality, it suggests a nonlinear relationship between experience and performance, i.e. a nonlinear effect for general experience. The results of cross validation further support this finding, as the percent correct

classification was calculated as 46% for the FAM and 42% for the discriminant model, respectively, indicating that the FAM model provided better classification than the discriminant model. This difference may be due to the nonlinear relationship between general experience and performance.

3.1.3. *Rules for the electrical family*

The pattern of rules for electrical job family (Table 6) is fairly straightforward except for the High & High cell (explained below). There appears to be a nonlinear relationship underlying the data. For instance, for both Low and Moderate levels of experience, performance is predicted to be low *as long as* performance in the alternate type of experience is low or moderate, expressed in rule-based format:

> IF general experience is (Low OR Moderate) AND (specific experience is Low or Moderate) THEN performance is Low.

Once experience is High in either type of experience, however, performance is predicted to be High (IF general experience is High OR specific experience is High THEN performance is High). This rule applies to all High cells except the High & High cell, where performance is Low. This prediction is not intuitive, and could have resulted from range restriction — there were not enough cases to obtain a reliable estimate for this cell. If these rules are reflective of reality, then it can be said that performance is High when experience either specific or general experience is High, but *not both*, which of course, is the traditional exclusive-or (XOR).

Percent correct classification for the FAM model suggests the answer could be due to range restriction. The percent correct classification was calculated as 45% for the FAM and 45% for the discriminant model, indicating that the pure linear model did as good a job as the adaptive model in terms of prediction. If this were a nonlinear model we might expect that the FAM model would perform better than the linear model.

3.1.4. *Rules for the general family*

The pattern of rules for the general job family (Table 7) clearly indicates the importance of specific experience in the determination of performance. The rules suggest that there is no effect of general experience (seen by collapsing across specific experience cells). The effect of specific experience on performance is clear by noting that, except for the (Low & Low) cell, performance mirrors specific experience. This finding is consistent with the discriminant model, which showed that only specific experience was statistically a significant predictor of performance.

The pattern of rules in Table 7 provides a clear picture of the relationship between experience and performance. There appears to be a purely linear relationship between specific experience and performance, with no effect for general experience. Thus, we could expect that the discriminant model would provide *as good* a predictive model as the FAM. However, the cross-validation results displayed in Table 11

indicate that the cell weighted percentage correct classification (calculated from values within the cells on the positive diagonal of Table 11) was 51% for the FAM model, and 40% for the discriminant model. This result is counterintuitive, and perhaps further research would suggest explanations as to why the two models were not comparable in terms of prediction when the rules suggest a simple linear relationship.

3.1.5. *Rules for the mechanical family*

Table 8 presents the pattern of rules for the mechanical job family. This pattern appears to indicate a complex nonlinear relationship between levels of experience for both types of variables. The pattern suggests the following rules:

> IF general experience is High AND specific experience is Low THEN performance is High
>
> IF general experience is Low AND specific experience is High THEN performance is High
>
> IF general experience is Moderate OR specific experience is Moderate THEN performance is High.

Visually there is a very clear pattern of results: the upper left-hand quadrant of the table consist of low levels of performance; the negative diagonal cells predict high levels of performance; the bottom right hand quadrant of the table predicts moderate performance.

The cross-validation results muddle the interpretation. There appears to be a nonlinear relationship, and one would expect the adaptive FAM model to provide better classification than the linear model. The cell weighted percent correct classification (calculated from the values within the cells on the positive diagonal of Table 12) indicate that the linear discriminant model out performed the FAM model (percent correct classification of 42% and 30% respectively).

3.2. *Cross-validation*

Tables 9 through 12 present classification rates for both the FAM and discriminant analyses. When interpreting the classification rates it is important to note that a purely random method of classification would result in (approximately) a 33% correct classification rate in each cell on the diagonal, given that the distribution was approximately equal across each category (i.e. approximately equal probabilities for the low, moderate, and high cells).

Table 13 combines the results across Tables 9 through 12 to provide an overview as to how the FAM and discriminant models compared in terms of correct classification within each predicted category. The FAM exhibited very poor prediction for the Low cells (25% hit-rate), which is substantially below that which would occur by chance. In contrast, the discriminant model provided significantly better prediction for the Low cells with a hit-rate of 53%. For the moderate cells, we see that

Table 9. Classification for the administrative job family: FAM(DISCRIM).

		Actual			
		Low	Moderate	High	All
Predicted	Low	**0.25 (0.48)**	0.06 (0.34)	0.06 (0.10)	0.11 (0.31)
	Moderate	0.58 (0.34)	**0.69 (0.46)**	0.47 (0.57)	0.62 (0.46)
	High	0.17 (0.17)	0.26 (0.19)	**0.47 (0.33)**	0.27 (0.24)
	N	29	26	30	85

Note: Percent correct classification for FAM = 0.47, DISCRIM = 0.42

Table 10. Classification for the electrical job family: FAM (DISCRIM).

		Actual			
		Low	Moderate	High	All
Predicted	Low	**0.65 (0.70)**	0.36 (0.31)	0.26 (0.22)	0.41 (0.40)
	Moderate	0.30 (0.10)	**0.36 (0.16)**	0.39 (0.30)	0.35 (0.19)
	High	0.05 (0.20)	0.26 (0.53)	**0.35 (0.48)**	0.23 (0.40)
	N	20	19	23	62

Note: Percent correct classification for FAM = 0.45, DISCRIM = 0.45

Table 11. Classification for the general job family: FAM (DISCRIM).

		Actual			
		Low	Moderate	High	All
Predicted	Low	**0.25 (0.42)**	0.06 (0.42)	0.06 (0.28)	0.11 (0.39)
	Moderate	0.58 (0.32)	**0.69 (0.42)**	0.47 (0.38)	0.62 (0.38)
	High	0.17 (0.26)	0.26 (0.16)	**0.47 (0.33)**	0.27 (0.23)
	N	31	43	21	95

Note: Percent correct classification for FAM = 0.47, DISCRIM = 0.42.

Table 12. Classification for the mechanical job family: FAM (DISCRIM).

		Actual			
		Low	Moderate	High	All
Predicted	Low	**0.03 (0.56)**	0.00 (0.34)	0.13 (0.36)	0.04 (0.42)
	Moderate	0.77 (0.16)	**0.57 (0.21)**	0.60 (0.17)	0.64 (0.18)
	High	0.19 (0.26)	0.42 (0.44)	**0.28 (0.47)**	0.33 (0.40)
	N	38	38	53	129

Note: Percent correct classification for FAM = 0.30, DISCRIM=0.42.

the FAM model exhibited a hit-rate of 61% and the discriminant model 33%. The High cells for the FAM and discriminant models are fairly comparable, although the discriminant model outperformed the FAM model slightly (42% and 37% hit-rates, respectively).

Table 13. Combined classification rates for job families based on cross-validation: FAM (DISCRIM).

	Low	Moderate	High
Number Correct	29 (62)	77 (41)	47 (53)
Proportion Correct	0.25 (0.53)	0.61 (0.33)	0.37 (0.42)
Combined *N*	118	126	127

Note: Cell weighted percent correct classification
FAM = 0.42: DISCRIM = 0.42

The aggregate percent correct classification for the two models was exactly the same — 42% — suggesting that both models providing predictive ability 33% better than chance occurrence.

4. Discussion

Classification accuracy for the two systems is mixed. Overall, the two models provided the same classification accuracy of 42%. That is, a 33% improvement over that which would occur by chance, given the base rate of 33% in each of classification categories.

The FAM model provided better prediction for the administrative (Table 9) and general (Table 11) job families. The discriminant model provided better classification for the mechanical family (Table 12), and the classification accuracy was the same for the electrical family (Table 10).

The pattern of rules for the jobs suggests some fairly complex relationships between experience and performance. For the administrative job family the pattern of rules (Table 5) across general experience suggests an inverted "U" distribution, where performance is Low at Low levels of experience; performance is High at Moderate levels of experience; and performance declines to Moderate at High levels of experience. A possible explanation of this nonlinear pattern could be boredom or reduced motivation. Motivation has been shown to have a positive relationship to performance. For example, as one works and gains experience there is a high motivation level, and performance increases with experience. However, as experience increases there may be a reduction in motivation — due to boredom in having learned all there is to know about the job — which could then result in a lower level of performance. The percent correct classification for the FAM and discriminant models was 46% and 42% respectively, suggesting that the relationship between experience and performance may be nonlinear.

The pattern of rules for electrical job family (Table 6) allow for a straightforward interpretation. Performance is Low when experience is Low OR Moderate. High experience, however, results in High performance. The High & High cell was anomalous, where performance was predicted to be Low. This could be due to an insufficient number of cases (range restriction) to obtain a reliable estimate for that cell.

The patterns of rules for the general job family (Table 7) are easily interpretable. The rules suggest that there is no effect of general experience, as can be seen by collapsing across, or ignoring, the specific experience cells. The effect of specific experience on performance is clear by noting that, except for the (Low & Low) cell, the performance outcome mirrors specific experience. This finding is consistent with the discriminant model, which showed that specific experience only was a statistically significant predictor of performance. Given the clear linear relationship, one would expect the linear model to provide as good a predictive model as the FAM model; however, the FAM provided significantly better classification accuracy. Percent correct classification was 51% and 40% for the FAM and discriminant models, respectively. The fact that the adaptive model provided better classification than the linear model, when a clear linear relationship exists, is counterintuitive. Further research might suggest explanations as to why the two models were not comparable in terms of prediction when the rules clearly suggest a simple linear model.

The pattern of rules for the mechanical job family suggested a nonlinear relationship between experience and performance. Visually, there is a very clear pattern of results — the upper left hand quadrant of the table consist of Low performance; the negative diagonal cells predict High performance; the bottom right hand quadrant predicts Moderate performance. Given that there is a clear nonlinear relationship between experience and performance, one would expect that the FAM model would provide better classification than the linear model. The hit-rates suggested otherwise. This was the only job family for which the discriminant model out performed the FAM model (cell weighted percent correct classification of 42% and 30% respectively for the cross-validation sample). The improvement over chance for the linear model was 33%; however, the adaptive model actually performed *worse* than chance by 10%

4.1. *Improving FAM performance*

As the cross-validation runs showed, the overall classification accuracy was the same for both FAM and discriminant models. The FAM model outperformed the discriminant model for two job families, performed the same for one, and worse for one. We used information on prior probabilities to enhance the accuracy of the discriminant models. However, we made no similar effort to modify the FAM models so as to optimize (or improve) accuracy. The rationale was that there are numerous methods to "tweak" these models, and the selection of one or a combination of alternative modifications would be somewhat arbitrary. However, further research should be conducted where modifications are made to determine their effect on both classification accuracy (one goal of this research), and substantive interpretation of the induced rules (our second goal).

We allowed the fuzzy sets to overlap approximately 25%, however, other degrees of overlap (smaller or larger) could have led to increased accuracy. This 25%

heuristic has been advocated by several researchers.[5,11] Identifying the precise degree of overlap to optimize classification, however, would have required experimentation given an unlimited number of ways in which the degree of overlap could be modified. This is not meant to say that such modifications should not be made; rather, such modifications were outside the scope of the goals of this research.

A second method of testing ways to improve classification would be the use of different numbers of fuzzy sets to represent each linguistic variable. For example, we could have used two, five, seven, or nine fuzzy sets to represent any of the linguistic variables. Again, experimentation would have been required to determine the appropriate number of fuzzy sets to optimize classification accuracy. A complicating factor is that the number of fuzzy sets could be allowed to vary across the linguistic variables. We might have represented general experience with two, specific experience with five and performance with nine fuzzy sets.

A third method would be to use different rule generation methods. We chose DCL because our own research has shown that the resulting rules tend to be meaningful and interpretable when applied to subjective behavioral data. A plausible alternative would have been to select a number of different rule generation methods and to evaluate each in terms of (a) the substantive interpretable of the generated rules, and (b) the predictive accuracy for each set of rules. Numerous methods exist to generate rules; however, such demonstrations have typically used physical data measurements which are typically less noisy than subjective behavioral data. An obvious extension of the current research is to test a number of different rule generation methods to determine their relative performance in generating rules which are meaningfully interpretable, as well as providing a good mapping from inputs to outputs.

4.2. *Nonlinear phenomena in the social and behavioral sciences*

As indicated at the beginning of this paper, linear statistical techniques are the most common models used in the social and behavioral sciences because they have proven to be fairly robust in explaining and predicting relationships between phenomena. In the last 20 years or so there has been an increased interest in the application of nonlinear methods to social and behavioral phenomena which may be nonlinear.

Perhaps the most well known nonlinear relationship is between anxiety and performance. Mild levels of anxiety have actually served to enhance performance up to a point. At one point, the effect of anxiety on performance asymptotes; thereafter increasing levels of anxiety attenuate performance. Visually this relationship is seen as an inverted "U" distribution, similar to the pattern of rules for the administrative job family.

A recent example of nonlinear behavioral phenomena concerns multi-trait multimethod data (MTMM). MTMM data is derived when multiple sources are used to measure multiple concepts. The resulting data are often used to show convergent and discriminant validity, two requirements for construct validity. For example, if

three individuals rated a single person on three distinct and ostensibly uncorrelated concepts, such as motivation, intelligence, and anxiety levels, we could use that data to calculate a nine × nine correlation matrix. We would expect that correlations between ratings for the *same* concept across different raters should be substantially higher than correlations between ratings for *different* concepts within a single rater. However, this is often not the case. Method variance, variance in ratings attributable to the source of measurement, has been attributed as an explanation as to why correlations between different concepts can often be as high as correlations for the same concept.[3] It has long been accepted that the effect of method variance on rating variance was additive (linear). However, recent research has shown that nonlinear models provide a better fit to the data[4] suggesting that the effect is nonlinear.

4.3. *Managerial uses of fuzzy rules*

A primary advantage of the FAM is that the linguistic, natural language nature of the rules should facilitate in the understanding of the results, especially for those unsophisticated in statistics. Thus, the linguistic nature would be a natural aid in communicating results between those without technical expertise in statistics. These techniques should be applicable to any situation in which managers or administrators want to optimize the prediction of certain outcomes, such as in selection, placement, and classification decisions, *and* want to be able to interpret and communicate the meaning of the prediction or classification model.

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Abstract 1 :

Classification problems affect all organizations. Important decisions affecting an organization's effectiveness include predicting the success of job applicants and the matching and assignment of individuals from a pool of applicants to available positions. In these situations, linear mathematical models are employed to optimize the allocation of an organization's human resources. Use of linear techniques may be problematic, however, when relationships between predictor and criterion are nonlinear.

check Reset

Abstract 2 :

As an alternative, we developed a fuzzy associative memory (FAM: a rule-based system based on fuzzy sets and logic) and used it to derive predictive (classification) equations composed of measures of job experience and job performance.

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Abstract 3 :

The data consisted of two job experience factors used to predict measures of job performance for four US Air Force job families.

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Abstract 4 :

The results indicated a nonlinear relationship between experience and performance for three of the four data sets. The overall classifiation accuracy was similar for the two systems, although the FAM provided better classification for two of the jobs.

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Abstract 5 :

We discuss the apparent nonlinear relationships between experience and performance, and the advantages and implications of using these systems to develop and describe behavioral models.

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Title: **The Task of Problem Formulation**

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Abstract: Problem formulation is an important organizational task because it facilitates effective problem solving. However, it is not well-……..(1) Past studies ……(2) problem formulation by ……..(3) the behavior of individuals performing problem formulation tasks. This approach ……(4) difficult due to differences in individual knowledge of the task domain. This study examines problem formulation ……(5) on the characteristics of the task rather than on an individual performing the task. A rational model of the task of problem formulation ……(6) and examined for its implications on individual problem formulation behavior. An empirical investigation of individual's performing problem formulation shows limited support for the proposed model.

Keywords: Problem formulation; problem definition; theory of task

Full Text: View full text in PDF format (259KB)

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List of words:

(a) have examined - (b) examining - (c) understood - (d) is developed - (e) has proven - (f) by focusing

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THE TASK OF PROBLEM FORMULATION

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Problem formulation is an important organizational task because it facilitates effective problem solving. However, it is not well understood. Past studies have examined problem formulation by examining the behavior of individuals performing problem formulation tasks. This approach has proven difficult due to differences in individual knowledge of the task domain. This study examines problem formulation by focusing on the characteristics of the task rather than on an individual performing the task. A rational model of the task of problem formulation is developed and examined for its implications on individual problem formulation behavior. An empirical investigation of individual's performing problem formulation shows limited support for the proposed model.

Keywords: Problem formulation; problem definition; theory of task.

1. Introduction

Problem solving is an important task in managerial activity. Problem formulation is a crucial step in problem solving. If it is done successfully, it enhances and facilitates business effectiveness and efficiency. If it is done unsuccessfully, problem formulation invites sub-optimal behavior as the business wastes effort trying to solve the wrong problem, and it may detrimentally affect the ability of the business to achieve its objectives. By understanding how individuals formulate problems, researchers can suggest how to improve an individual's problem formulation effectiveness by demonstrating deficiencies in the process, identifying more effective processes, or contributing to the development of decision support systems to facilitate problem formulation.

The objective of this paper is to better describe the task of problem formulation. To examine problem formulation, the paper focuses on the task of problem formulation rather than on the behavior of individuals involved in problem formulation. The rationale behind this approach is that behavior is dependent primarily on task requirements. Examining behavior to understand problem formulation leads to difficulties when the subjects do not optimize their problem formulation behavior with respect to the task. This can lead to differing behaviors between subjects and difficulty in understanding how problem formulation is, or should be, performed. Understanding the requirements of the task will allow examination of problem formulation behavior of individuals with respect to a standard or benchmark for evaluation of the behavior. In other words, if what should be done to perform a task is known, the behavior exhibited during task execution may be understood more easily. Task standards may also provide guidelines for developing tools to aid problem formulation activity.

The paper is organized as follows. First, the relevant problem formulation literature is reviewed with a focus on (1) defining problem formulation, (2) the importance of problem formulation, (3) the difficulty of problem formulation, and (4) models of problem formulation behavior. Second, requirements of a theory of a task are explored. Third, a model of the problem formulation task is developed and its implications are discussed. Fourth, the behavior of individuals formulating a problem is analyzed with the proposed model. Finally, the conclusions of the study and directions for future research are discussed.

2. Literature Review

2.1. *Definition of problem formulation*

A *problem* is an emergent undesirable situation that must be corrected. Problem solving consists of problem identification, problem formulation, and problem correction. Problem identification is concerned with determining that a discrepancy exists in the environment of concern, that is, identifying the symptoms. Problem formulation, defined in this paper, involves all activities associated with determining what problem to solve to correct the undesirable situation. Problem formulation includes activities such as defining an undesirable gap between the current state and the desired state, and searching for and identifying the causes of the discrepancy. Problem formulation does not include activities that attempt to alleviate the discrepancy or manipulate its causes.

2.2. *Importance of problem formulation*

Problem formulation is an important activity in the problem-solving process for at least three reasons. First, not formulating a problem correctly can be costly. An effective solution can be realized reliably only if the correct problem is addressed.[8,21,27,29,25,33,32] Second, problems are addressed best proactively,[28] and

problem formulation potentially affects all succeeding phases of the problem solving process.[31,32] Finally, if creative solutions are desired, problem formulation is important because the creativity of the problem formulation impacts the creativity of the solution.[6,7,30] This is because alternative problem formulations can suggest starkly different solution activities.[11]

Though problem formulation is important to effective problem solving, it is not always done well (or done at all) by organizations. Nutt[16,17,19] demonstrates that organizations are less successful in applying the problem formulation tactic than in using other approaches. However, problem formulation may be the only feasible approach in many situations. The challenge is to understand how to improve the effectiveness of this tactic.

2.3. *Difficulty of problem formulation*

Problem formulation is a difficult process,[31] which may contribute to its lack of effectiveness. Niederman[15] suggests three characteristics that make the task of problem formulation difficult:

(1) It is predominantly ill-structured because the initial state (the symptoms), the goal state (the appropriate problem to address), and the procedures that may be used to reach the goal state, are poorly defined.
(2) It requires examination and evaluation of large quantities of information, which is notably difficult for individuals because of the limitations on their information processing capabilities.[12,23,24,27]
(3) It involves judgment about the validity of information and conflicting goals. Judging which one of the many conflicting goals is desired is potentially both a point of conflict[1] and a difficult task.[4]

2.4. *Models of behavior*

The range of behaviors associated with the performance of problem formulation tasks is not well understood. Because there is a dearth of research in the process of individual managerial problem formulation, and to review the current understanding of problem formulation behavior, several studies are examined in a range of disciplines, including managerial problem formulation,[3,20,26] medical diagnosis,[5] and art.[7]

An early effort at understanding the process of managerial problem formulation was undertaken by Pounds.[21] Pounds considers problem formulation as identifying a difference between the real situation and some desired reality, and determining that it is important to reduce or eliminate this difference. Cowan[3] uses the term *problem recognition* to describe problem identification and problem formulation. Although he does not explicitly describe what problem formulation entails, he does suggest that it can be a highly automatic process, especially in a familiar situation. Smith[25] breaks the effort to correct problems into two major phases — problem

formulation and problem solving. Problem formulation contains three stages — problem identification that recognizes the problem, problem definition that specifies the problem, and problem structuring that decides how to go about solving the problem. Problem solving consists of the activities undertaken to correct the formulated problem.

Problem formulation in medical diagnosis is concerned with the process of determining what is medically wrong with the individual having the symptoms. Significant to the study of problem formulation in this domain is the presumption that there is one correct answer to which most individuals would agree. This differs from managerial problem formulation, where the presumption is that there may be more than one problem formulation to effectively remedy the situation. The hypothetico-deductive model of the process of medical inquiry formulated by Elstein, Shulman, and Sprafka[5] includes four major activities: (1) cue acquisition to collect data for the diagnostic activity; (2) hypothesis generation to constrain or better define the ill-defined medical problem; (3) cue interpretation to determine if a cue, or available data, confirms or disconfirms a hypothesis; and (4) hypothesis evaluation.

Problem formulation in art is concerned with the process used by the individual artist to choose what to draw, paint, or write about. To formulate problems to solve by painting/writing/etc an artist manipulates personal perceptions, ideas, feelings, and memories.[7] Getzels and Csikszentmihalyi,[7] in a longitudinal study of art students, identified both analytical and creative problem formulation processes in students that led to differences in the originality of the work produced.

The above studies, taken together, indicate that there is not a strong understanding of problem formulation. Several discrepancies contribute to this conclusion. First, problem formulation is not always defined in the same manner indicating that these studies may not be analyzing the same phenomenon. For example, Pounds[21] considers problem formulation as comparing the output of a model of the situation to the existing situation and identifying any discrepancies as problems, while Getzels and Csikszentmihalyi[7] consider problem formulation in art as identifying personal perceptions and feelings to solve through an artistic median such as painting or writing. Second, all these studies do not examine the process of problem formulation at the same level of analysis. For example, Pounds[21] and Smith[26] describe stages that individuals proceed through, but do not describe the information processing that takes place in those stages. Cowan[3] and Elstein, Shulman, and Sprafka,[5] on the other hand, present both a stage description and a description of the information processing that occurs in each stage. Getzels and Csikszentmihalyi[7] describe only the characteristics of the information processing used by individuals involved in defining artistic problems. Finally, but most importantly, each study suggests that problem formulation is performed in a different manner.

Most of the reviewed studies sought to explain the behavior of individuals involved in problem formulation. These examinations were based on what individuals do during the task. The focus on individual behavior is a potential difficulty

underlying these results. Individual behavior may vary greatly because of the difficult nature of problem formulation, the lack of normative procedures addressing the task, and the differences in individual capabilities. To circumscribe this problem, this paper takes a different approach. Rather than focus on what an individual does during problem formulation, the focus is on what must be done to successfully complete the task of problem formulation. The examination is independent of the individual. Thus, a theory on the task of problem formulation is developed. The next sections describe and develop such a theory..

3. Theory of Task

The goal of this study is to develop a model to facilitate understanding problem formulation behavior. Cognitive science advises that behavior can be understood at different levels. Simon[23] suggests that we do not need to understand the inner workings of a system to understand its behavior; rather, we can understand behavior by examining the outer environment and the interface between the outer and inner environments, and by making simplifying assumptions about the inner environment. The outer environment is the task faced by the system; it places constraints on behavior and dictates what the system must do to complete the task. The interface between outer and inner environments are the goals of the system. The inner environment is the behavior capabilities of the system, which put constraints on what the system can do. As explained by Simon,[24] if one wants to understand why an ant chooses a path while walking on a beach, one first needs to understand where the ant wants to go (its goal) and the obstacles it must maneuver around to reach that goal (its outer environment). Limitations to the ant's capabilities (its inner environment) also contribute to understanding its behavior (for example, why it goes around an obstacle rather than jump over it).

In problem formulation, the inner environment is the cognitive architecture of the individual. Thus, according to Simon,[23] we do not have to understand cognition to understand behavior. However, the cognitive architecture does provide constraints that must not be violated in the explanation of the individual's behavior. These constraints primarily concern limits on short-term memory and long-term memory capacities and other such operational constraints.[14]

Newell[13] suggests that there are three important levels for understanding behavior — the physical level, the symbol level, and the knowledge level. The physical level attempts to understand behavior by identifying how the physical system that performs the task operates. This level may be considered a theory of the hardware.[13] The symbol level attempts to understand behavior by identifying goals, knowledge used to achieve goals, and how the knowledge is manipulated to achieve goals. This level may be considered a theory of performing the task.[9] The knowledge level attempts to understand behavior by identifying the goals of the behavior, and how these goals are related in some meaningful manner. This level may be considered a theory of the task.[9] Each of this level of theory may be examined

independently. Theory can be developed at the knowledge level without considering the symbol or physical levels. The effort in this work is to develop an understanding of problem formulation at the knowledge level, or a theory of the task.

According to Newell's[13] knowledge level, behavior is a function of the system's[a] knowledge and goals. In other words, if two systems have the same knowledge and the same goals, they will behave in the same manner. The problem solving behavior of individuals differs because individuals have either different knowledge or different goals, not because their physical systems operate differently. Thus, Simon[22] is in accord with Newell,[13] the outer environment (knowledge) plus the interface (goals) determines behavior.

Anderson[2] also suggests that behavior can be understood by understanding the goal(s) of the behavior and the environment in which the behavior is to be performed. He suggests a six-step process to understand behavior at this level: (1) precisely specifying the goals of the cognitive system; (2) develop a formal model of the environment to which the system is adapted (this represents the system's knowledge); (3) make the minimal assumptions about computational limitations (the inner environment); (4) derive the optimal behavioral function, given items 1 through 3; (5) examine the empirical literature to see if the predictions of the behavioral function are confirmed; and (6) iterate through the previous steps if the predictions are off. The first three steps make up a theory of the task. These three steps are developed in the next section as well as the appropriate behavior of the individual, given the theory of the task developed for problem formulation.

4. A Model of Problem Formulation

4.1. *The goal of problem formulation*

According to Smith,[26p.965] key elements of a problem include: "... the gap between preferences and reality, the importance attached to remedying this gap, and the expected difficulty of doing so." A problem is a conceptual entity used to allocate attention.[25] This conceptual entity, the statement of the problem, is more appropriately considered a goal of the problem formulation task than an aspect of the outer environment. The outer environment (real world plus individual's knowledge) provides information that aids in identifying and defining a problem, but does not include the problem itself.

Smith's[26] definition is an important conceptualization of what the process of problem formulation should produce. This provides a useful beginning for understanding the overall goal of the problem formulation process. However, it lacks the ability to distinguish between behavior that effectively formulates the problem and behavior that does not effectively formulate the problem. Effective formulation generates a description of a problem that, when solved, will eliminate all the symptoms produced by the problem. This does not mean that there is only one problem

[a]Typically, the system is a human being or a computer.

formulation (the correct problem formulation) that will eliminate the symptoms. There may be many different problem formulations (or none) that, when solved, effectively remedy the situation. Thus, we consider the overall goal of problem formulation as the development of an *appropriate* problem formulation. This goal of problem formulation forms the basis of our development of a theory of the task. A formal statement of the goal of problem formulation is:

> *The goal of problem formulation is to identify elements of the problem situation that can be manipulated (during solution) such that undesirable characteristics (symptoms) of the situation are eliminated.*

This conceptualization of the goal of problem formulation is important for at least two reasons. First, the goal suggests a standard for task completion. The problem, when solved, should address all undesirable characteristics of the environment. Therefore, in theory, the best problem formulation is one that addresses all the symptoms identified in the problem situation. One problem formulation is more appropriate if it addresses more of the symptoms than another formulation. Second, the goal indicates that a problem formulation should, to some extent, suggest the action that needs to be taken. Identifying elements of the problem situation that can effect undesirable characteristics of the environment suggests that some type of action must be directed toward these elements. This definition of the product of problem formulation forces the development of a problem description beyond identifying symptoms of the problem. Both Smith[26] and Pounds[21] suggest that the primary component of the problem is only the gap between what is real and what is desired, thus allowing symptoms to be identified as problems. For example, sales may be 20% lower than desired. This is a gap between real and desired and could be considered the problem. However, a more appropriate problem formulation could be that the price of the product is too high. This identifies elements of the situation that may be manipulated to eliminate the symptom. Furthermore, Nutt[18,p.52] suggests that many signals (symptoms) that capture management attention are "... symptoms of other concerns, misleading, or more urgent than important."

4.2. *Structure of the problem formulation environment*

The structure of the problem formulation environment is critically important because it determines much of the behavior associated with the formulation of a problem. The model of the environment developed here borrows heavily from the field of medical diagnosis. The medical model of problem solving suggests that the environment consists of three distinct but related entities — symptoms, pathology, and etiology. The symptoms are the indicators and observable manifestations of a problem. In medicine, the desire to relieve the symptoms initiates problem solving behavior. The pathology is the malfunction of a specific organ or element of the individual's body, resulting in the development of symptoms. Finally, the

etiology is the cause of the pathology; the specific reason that the organ or element malfunctioned and the symptoms emerged. In medical problem solving, treatment (solution) of a problem may proceed at one, two, or all three levels; the symptoms may be relieved, the pathology may be repaired, or the etiology may be eliminated. Each level of treatment results in a more permanent solution to the problem [Boar, 1993].

In business problem formulation, as in medical problem solving, symptoms are the observable manifestations of a problem. Symptoms represent a divergence between the desired state and the real state of the world, which needs to be corrected. It is likely that symptoms exist in both the problem formulator's memory and the outside world because, to be a symptom, an element of the real world must be compared to information on the desired world. In business problem formulation, pathology is any element of the environment that is functioning improperly. These elements have a particular state (or value) at a given point in time. The state of any element can change over time and may be manipulated to instigate such a state change. Pathology is important to problem formulation because it represents one component of the outer environment that may be controlled or manipulated to eliminate symptoms.

Finally, in business problem formulation, etiology represents the cause of any undesirable change in the state of an element in the system that produces symptoms, indicating a problem is present. Etiology may include everything from improper manipulation of the components of the environment to outside influences changing the desired state of the element.

The formal definition of the problem formulation environment is represented graphically in Fig. 1. The problem formulation environment includes the set of possible **symptoms** that occur with probability $P(s_i)$, the set of possible **pathologies**, or malfunctioning components of the system, that occur with probability $P(p_j)$, and the set of possible **etiologies**, or causes, that occur with probability $P(e_k)$. Of

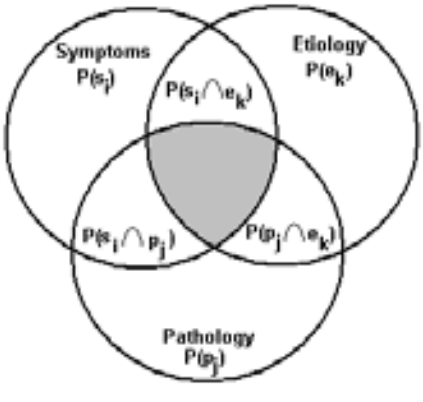

Fig. 1. Structure of the environment.

particular importance in the structure of the environment are the intersections of symptoms and pathologies, pathologies and etiologies, and symptoms and etiologies. These intersections represent the probability that a symptom and a pathology occur together, the probability that a pathology and an etiology occur together, and the probability that a symptom and an etiology occur together ($P(s_i \cap p_j)$, $P(p_j \cap e_k)$ and $P(s_i \cap e_k)$, respectively).

The intersection of symptom, pathology, and etiology is not a major factor in the environment because of the limitations placed on the rational problem formulation system. This is discussed in more detail later in the text.

To illustrate this conceptualization of the problem formulation environment, the problem described by Kepner and Tregoe[10] to illustrate their problem analysis technique is examined using the problem diagnosis model formulated above. "The Case of the Blackened Filament" describes a problem in a plant that makes plastic filament for textiles. In this case, a plant operator noticed that between 3:52 and 4:03 am, blackened filament was produced at a single machine in the plant (the symptom). The foreman considered three possible pathologies: (1) something was wrong with the machine, (2) something was wrong with the raw materials, or (3) something was wrong with the acid bath used to harden the filaments. The raw materials and acid bath were eliminated as possible pathologies after the foreman reasoned that if these items were in a dysfunctional state, all machines would be affected. In terms of the model, $P(s_i \cap p_j)$, the probabilities of the intersection of the symptom (blackened filament) and each of the pathologies (raw material or acid bath) were low. After eliminating pathologies 2 and 3, effort focused on identifying an etiology that would cause the machine to produce blackened filaments. Two etiologies were considered: (1) carbon entering the machine via the air exhaust system due to soot from boilers, or (2) carbon entering the machine due to soot from a locomotive in the switching yard. Further investigation determined that boiler soot was exhausted at 12:00 am and a locomotive was in the switching yard between 3:30 and 4:00 am. Therefore, the cause, or etiology, of the problem with the machine was determined to be soot from the locomotive. In terms of the model, it was determined that $P(s_i \cap e_k)$ for boiler soot was low while $P(s_i \cap e_k)$ for locomotive soot was high.

The problem formulation environment described above and in Fig. 1 represents the milieu in which the system must operate and adapt. To formulate a problem, the system must identify symptoms and relate them to their pathology and etiology. A rational approach to problem formulation in this environment is discussed below.

4.3. *Computational limitations*

Describing a rational approach to problem formulation requires incorporating the limitations of the system processing information in the environment. The computational limitations of the human cognitive system addressing a problem formulation task do not differ markedly from the limitations that apply to any cognitive task.

The model proposed here relies on the computational limitations developed by Simon (1981): (1) thinking is serial in nature, (2) only a few bits of information can be processed at one time, (3) information being processed must be held in short-term memory, and (4) short-term memory has limited capacity and contents may change rapidly.

4.4. *A rational approach to problem formulation*

Any behavior in problem formulation must have as its objective the goal of problem formulation described above — to identify elements of the problem situation that can be manipulated such that undesirable characteristics of the situation are eliminated. In the proposed problem formulation environment, this means identifying the pathology and etiology that produce the symptoms of interest. However, a rational approach implies that the cost of the behavior must be weighed against the benefits of the outcome. If the costs outweigh the benefits, the system should not perform the behavior.[2] Therefore, the behavior of the rational system in problem formulation will seek to maximize potential net benefit. Thus, in determining the problem formulation steps (levels of analysis) to be performed, the system should seek to maximize the expected value of the problem formulation minus the costs of the analysis of the environment. This may be expressed in the following equation:

$$\text{MAX:} \quad \sum \Sigma P(f_{im}) v_i - \Sigma C_m$$

$P(f_{im})$ is the probability that the problem formulation developed will permanently (relatively) eliminate the undesirable element (symptom s_i) of the problem situation[b] after successful completion of problem formulation step m. V_i is the value of eliminating the symptom. The value of eliminating symptoms may be assessed in various ways, ranging from real dollar cost to reputation of the problem solver. ΣC_m is the sum of the costs incurred at each level of analysis completed. Costs may range from real dollar costs expended in the investigation, to opportunity costs due to the lack of attention, to other potentially beneficial areas. Figure 2 lists the important mathematical conventions for this discussion.

To properly formulate the problem, the system should compute the probability that etiology e_k will be observed, given that pathology p_j and symptom s_i have been observed for all symptoms, pathologies, and etiologies in the environment (compute $P(e_k \backslash p_j, s_i)$ for all i, j and k). The etiology with the highest probability would then be selected as the problem formulation. In other words, the system should select the cause (etiology) that has the highest probability of occurring, given the symptoms and pathologies observed in the problem formulation environment. However, the previously identified limitations on the human problem solving system

[b]A problem formulation in and of itself cannot eliminate symptoms. A solution must be developed to address the problem formulation. For this analysis, we assume that if the problem is formulated correctly, an adequate solution will be developed with this assumption, the problem quickly becomes intractable.

i	indexes symptoms
j	indexes pathologies
k	indexes etiologies
m	indexes steps in problem formulation
$P(s_i)$	the probability that symptom s_i will occur
$P(p_j)$	the probability that pathology p_j will occur
$P(e_k)$	the probability that etiology e_k will occur
$P(p_j \backslash s_i)$	the probability that pathology p_j will occur given that symptom s_i has occurred
$P(e_k \backslash p_j)$	the probability that etiology e_k will occur given that pathology p_j has occurred
$P(e_k \backslash s_i)$	the probability that etiology e_k will occur given that symptom s_i has occurred
$P(f_{im})$	the probability that symptom s_i will be eliminated after problem formulation step m
v_i	value of associated with eliminating symptom s_i
c_m	cost of analysis for step c_m

Fig. 2. Mathematical description of environment.

preclude the ability to perform this calculation. The computational limitations of the human problem solving system suggest that behavior in problem formulation must be serial in nature. Therefore, the problem formulation system must take one step at a time. Each step taken will likely result in an increase in $P(f_i)$, making the expected value rise, as well as an increase in ΣC_m. Therefore, a rational system will continue to take steps to the ultimate solution as long as each step is expected to have a net positive value.[2] In other words, the next step in the solution should be taken when $(\Sigma P(f_i)v_i)_{m+1} - (\Sigma P(f_i)v_i)_m > C_{m+1}$. This means the rational problem formulation has a hierarchy of goals to achieve: (1) attain the overall goal of problem formulation, (2) maximize the expected value of the problem formulation effort, and (3) take problem formulation steps that are expected to have a net positive value.

The steps a rational problem formulation system takes to achieve the overall goal are interminably linked to the secondary and tertiary goals of rational problem formulation as well as the computational limitations of the system. The serial nature of the system and the limited information storage capacity suggest that problem formulation must proceed as a series of distinct steps. Moreover, each step potentially must increase the likelihood of developing an effective problem formulation

because additional analysis adds to the total cost of the effort. Therefore, a rational approach to problem formulation will start with efforts that have a low probability of success, but also have a relatively low cost. The rational approach to problem formulation is organized in this manner and is described in the following paragraphs.

The first step in the analysis is to identify the symptoms and evaluate their importance. Evaluating their importance may provide direction for focusing further analysis and selecting the appropriate problem formulation. The importance of a symptom is a surrogate for the value associated with relieving that symptom. Symptoms being the observable manifestation of a problem makes this step relatively low cost. However, the probability of considering a symptom as the problem will lead to eliminating that symptom is also very low. At this level of analysis, the probability of success $P(f_i)$ is assumed to be near zero unless the pathology and etiology of the symptom are no longer significant factors in the manifestation of the symptom. If problem formulation were to end at this point, the result would be that the symptom(s) would be considered the problem and solutions would focus on addressing the symptoms.

The second step in the analysis is to identify pathologies in the environment. The cost of this level of analysis is greater than step one because malfunctioning entities are not always directly observable, and it may take some investigation to identify the pathologies. However, the probability of success also is higher at this step. Considering the pathology as the problem, and thus directing the problem **solving** system to correct the dysfunction in an element is more likely to lead to eliminating the symptom permanently than is addressing the symptom alone.

The third step in the analysis is to determine the relationship between symptoms and pathology. The cost of this analysis can be significantly higher than the previous two levels because it may require investigation. The relationship between the symptom(s) and the pathology is measured by $P(p_j \backslash s_i)$, the probability of observing pathology p_j given symptom s_i. The determination of $P(p_j \backslash s_i)$ leads to a decision point where the rational system will select one of the following courses of action. If $P(p_j \backslash s_i)$ is high, the decision is whether to advance to the next step in problem formulation or to conclude that pathology p_j is the problem to be addressed. If $P(p_j \backslash s_i)$ is low, indicating that there is not a strong relationship between the symptom and the pathology, the system may either iterate through earlier steps (if the cost is low enough or the benefit high enough), or discontinue the effort without developing a strong problem formulation. A decision to discontinue problem formulation effort will result in the selection of the problem formulation as the pathology associated with the highest value on $P(p_j \backslash s_i)$. $P(f)$ is considered to be higher than the previous two steps because now there is information linking the pathology to the symptom.

The fourth step in the analysis is to identify possible etiologies for the previously identified pathologies. In other words, the system must identify possible factors that may be contributing to, or causing, the malfunction(s) identified in step 2. The

cost of this analysis is relatively high. Causes may not be readily observable. Often they occur infrequently and randomly, producing the dysfunctional state and then discontinuing. However, the probability of success is also likely to be higher because of the increased knowledge of the problem situation.

The fifth step in the analysis is to determine the relationship between pathology and etiology. This step is similar to step 3. The focus of the investigation is to determine the probability of observing etiology e_k given pathology p_j. The determination of this value also leads to a decision point. If $P(e_k \backslash p_j)$ is high, then problem formulation is concluded successfully with the determination that pathology p_j and etiology e_k must be addressed to eliminate the symptoms. If $P(e_k \backslash p_j)$ is low, the rational system may either iterate through earlier steps (however, the expected cost of this analysis now will be higher) or terminate the effort (choosing an earlier formulation as the problem).

The final step in the analysis is to determine the relationship between symptom and etiology. This step is also similar to step 3. The focus of the investigation is to determine the probability of observing etiology e_k given symptom s_i ($P(e_k \backslash s_i)$). The determination of this value again leads to a decision point. If $P(e_k \backslash s_i)$ is high, then problem formulation is concluded successfully with the determination that etiology e_k must be addressed to eliminate the symptoms. If $P(e_k \backslash s_i)$ is low, the rational system may either iterate through earlier steps (again with a higher cost of analysis), or terminate the effort (choosing a problem formulation developed at an earlier step).

4.5. *Model implications*

The rational approach to problem formulation presented in this study consists of a series of discrete steps. Successful completion of each step increases the likelihood that an appropriate problem formulation will be developed. However, each step also adds to the cost of the problem formulation effort. If a step cannot be completed, the problem formulation is selected from the set of problems developed in earlier steps. A step may not be completed due to either the problem formulation system being unable to acquire the appropriate information or the step being assessed at too high a cost for the potential benefit. This description of rational problem formulation behavior has interesting implications.

First, the perceived relationships between symptoms, pathology and etiology ($P(p_j \backslash s_i)$, $P(e_k \backslash p_j)$, and $P(e_k \backslash s_i)$) may be based on anecdotal, experiential, theoretical, or empirical evidence. The relationships may be causal or correlational explanations of how these factors are associated with one another. These relationships are key to developing an effective problem formulation because they identify how the observed symptoms came to be. Relationships may be determined through investigation into the problem situation or drawn from memory as knowledge about experiential or theoretical relationships between factors and outcomes.

Second, the cost of determining the relationships between symptoms, pathology, and etiology varies depending on the problem formulation system's knowledge. An individual with extensive experience in the problem environment may "know" any or all of the relationships ($P(p_j \backslash s_i)$, $P(e_k \backslash p_j)$, and $P(e_k \backslash s_i)$). This knowledge effectively reduces the cost of the step used to determine the relationship to near zero. The knowledge may also make the individual's behavior appear to be less than rational as he/she moves to later steps in the process without obviously completing earlier steps.

Third, all problem formulations do not need to include pathology and etiology. If the relationship is determined to be zero, there is no reason to include that component of the environment in the problem formulation. For example, you are driving down a road and notice that your car is difficult to steer and a loud bump-a-bump-a-bump sound is coming from the driver's side of the auto (the symptoms). You pull over and discover a blown front tire (the pathology). You realize that the old muffler on the road you tried to dodge a few miles back must have hit the tire (the etiology). While there is an identifiable etiology, to relieve the symptoms you do not go back and move the muffler out of the road — you change the tire (or address the pathology). Conversely, problem formulation may require more than three levels of analysis. In other words, symptom etiology may have an etiology that may need to be explored for effective problem formulation, and that etiology may have an associated etiology, etc.

Finally, a novice in the problem domain may not be able to complete later steps due to a lack of knowledge, even with adequate resources. The novice also may demonstrate much iteration through the steps as he/she tries to link symptoms, pathologies and etiologies through a trial and error effort.

5. Investigation

The model of the problem formulation tasks suggests that individuals should perform the tasks in the following steps:

(1) Identify and evaluate symptoms.
(2) Identify possible pathologies.
(3) Evaluate the relationship(s) between the symptoms and pathologies.
(4) Identify possible etiologies.
(5) Evaluate the relationship(s) between the pathologies and etiologies.
(6) Evaluate the relationship(s) between the symptoms and etiologies.
(7) Select a problem formulation.

The model further suggests that each step is more costly to perform than the preceding steps, and the process stops if the cost to perform a step is higher than the potential benefit of correctly formulating the problem. Knowledge is a key factor in determining the cost of a given step, thus individuals with relevant knowledge in a problem formulation domain will have a lower cost for each succeeding step than individuals without relevant knowledge.

To examine the proposed model's efficacy in explaining the behavior observed in problem formation, data was collected on the information processing operations used by novices and experts formulating a problem.

5.1. *The experiment*

Individuals were presented a problem formulation task in commercial loan sales. The subjects included 10 novices and 10 experts in the commercial loan sales domain. Novice subjects were MBA students with an average of less than 3 years of work experience and 0.8 years of experience in the loan sales domain. Experienced subjects were working loan officers with an average of 18.4 years of work experience and 18.2 years of experience in the loan sales domain. Each subject group consisted of eight males and two females. The experimental sessions were held individually with each subject. Each session began with instructions on producing verbal protocols. The subject then engaged in a training task to get experience performing the task while producing a verbal protocol. After the training was completed, the subjects performed the problem formulation task, which was a half-page description of a situation. This description was the only information provided to the subjects. A verbal protocol was recorded of the individuals performing the tasks.

Protocols were transcribed and coded by two raters, one of whom was an author of the paper. Sets of phrases in the protocols were grouped into verbalizations that represented a single problem solving sub-goal. The sub-goals used in this investigation, based on a model of problem solving used by Pechtel (1985), were Representation, Generation, Analysis, Evaluation, Choice, and Meta-Problem Solving. These processes, as applied to the current study, are presented in Table 1. Raters achieved an 83% level of agreement. Discrepancies in the ratings were

Table 1. Information processing sub-goals.

Problem Formulation Process	Description
Representation	In this sub-goal, the individual creates an internal image of the problem situation with a focus on the symptoms presented in the case.
Generation	In this sub-goal, the individual generates issues, pathologies, or etiologies not presented in the case.
Analysis	In this sub-goal, the individual examines relationships between information presented in the case and knowledge stored in memory.
Evaluation	In this sub-goal, the individual judges the relevance or applicability of symptoms, pathologies, or etiologies
Choice	In this sub-goal, the individual selects or eliminates, as important, a symptom, pathology, or etiology.
Meta-Problem Solving	In this sub-goal, the individual considers how to approach the task.

discussed and resolved. Any Generation sub-goal identified in the first coding was then examined to determine if the generation effort produced a pathology, etiology, or additional symptom. However, distinguishing between these items proved to be too difficult for the coders to reach an acceptable level of agreement. Therefore, no analysis was done on this dimension of the model.

5.2. *Analysis*

The small data set precludes statistical analysis. The analysis therefore focused on descriptive statistics based on the number and type of sub-goals used by the subjects during task execution. Six descriptive statistics were developed: (1) The average number of information processing sub-goals used to complete the problem formation, (2) the percentage of each type of information processing sub-goal used to formulate the problem, (3) the percent of subjects that used a specific information processing sub-goal (except meta-problem solving) as their first sub-goal, (4) the percent of subjects that used each information processing sub-goal (except meta-problem solving), (5) the percent of the case completed when each type of sub-goal was first used and (6) the average number of series of uses of an information processing sub-goal (for example, if an individual used the representation sub-goal three times, followed by the analysis sub-goal, and then representation again, this would represent one analysis series and two representation series). The results of these analyses are presented in Tables 2, 3 and 4. The first read of the case is not included in these results because it is the same for all subjects.

Table 2. Average number of sub-goals used.

Subject Type	Average Number of Sub-Goals Used
Experienced	33.1
Novice	48.5

Table 3. Allocation of time to different information processing sub-goals.

	Percentage Use in Formulation Process	
Problem Solving Sub-Goal	Experienced	Novice
Representation	30.9%	54.0%
Generation	34.1%	20.5%
Analysis	16.1%	16.7%
Evaluation	2.0%	0.8%
Choice	9.9%	2.1%
Meta-Problem Solving	7.2%	6.8%

Table 4. Order of use of information processing sub-goals.

Problem Solving Sub-Goal	Percent of First Use by Subject		Percent of Subjects Using a Sub-Goal		Percent of Case Completion at First Use of Sub-Goal		Average Number of Series	
	Expert	Novice	Expert	Novice	Expert	Novice	Expert	Novice
Representation	20%	80%	90%	100%	16.03%	7.00%	3.0	6.5
Generation	30%	20%	100%	100%	14.93%	31.93%	4.1	5.5
Analysis	50%	0	90%	100%	19.64%	23.59%	3.3	4.9
Evaluation	0	0	60%	50%	45.01%	65.21%	0.8	0.7
Choice	0	0	40%	60%	72.97%	98.63%	0.5	0.6

Inexperienced (or novice) subjects spent more time (number of sub-goals is used as a surrogate for time) formulating the problem than experienced subjects. They began their problem formulation by focusing on the symptoms presented in the case. They also spent much more time overall on the symptoms, a much smaller amount of time generating new issues, pathologies, or etiologies, and a much lower percent of their effort on evaluation. Inexperienced subjects expended nearly one-third of their total effort before beginning to generate information beyond what was presented in the case. Evaluation of symptoms, pathologies and etiologies did not begin until they expended nearly two-thirds of their overall effort. Determining the importance of a symptom, pathology or etiology did not come until the subject was almost done with the task. This indicates that selection or elimination of factors was primarily the selection of a final problem formulation. Novice subjects generally followed a process of focusing on the symptoms, analyzing the symptoms, generating new information, evaluating the new and old information and finally selecting the problem formulation. After these subjects moved beyond the case data (representation sub-goals), they tended to jump back and forth between different sub-goals more than experienced subjects did.

In contrast, experienced subjects began their problem formulation by analyzing case data. However, this result is less robust than for inexperienced subjects. Many experienced subjects also began by generating new issues, pathologies, and etiologies. Experienced subjects began to use the generation and analysis sub-goals before they expended 20% of their effort, and they spent only a little more effort on evaluating information than inexperienced subjects. However, they began using this sub-goal earlier in their overall effort. Selecting or eliminating symptoms, pathologies, and etiologies played a greater role in experienced subjects' efforts, and began earlier in the process, indicating that the sole use of this sub-goal was not primarily to select a final problem formulation. Experienced subjects presented a much less distinct process than inexperienced subjects, generally beginning with analysis or generation and then moving to evaluation and choice sub-goals.

5.3. *Discussion*

These results suggest some support for the proposed model. Individuals with more knowledge about the situation were able to spend more time on later steps in the problem formulation model. Inexperienced subjects spent the bulk of their time on the first step of the model — identifying and evaluating symptoms. Over 70% of their effort was with the Representation and Analysis sub-goals, whereas experienced subjects spent less than 50% of their effort with these sub-goals. Additionally, over 50% of the inexperienced subjects' effort focused purely on identifying symptoms (representation), which represents only a part of the first step. Experienced individuals focused more on evaluating those symptoms (analysis) than did inexperienced individuals. These results suggest that the model may need to divide the first step into two distinct steps — symptom identification and symptom evaluation.

Identifying pathologies and etiologies played a much larger role in the effort of experienced subjects. On average, they began this process earlier and did more of it. The inability of the coders to adequately distinguish between new symptoms, pathologies, and etiologies weakens the support of this analysis for the sequence presented in the model. However, it does support the model's predictions, that identifying these items precedes evaluating the items, and that knowledge will facilitate these operations and make them less costly to perform. This also supports the model's supposition that later steps are more costly to perform because without prior knowledge and no additional information available, inexperienced subjects did not perform as many of the later steps.

6. Conclusion

Past research in problem formulation has not led to a definitive understanding of how individuals perform problem formulation. This past research has recognized that the type of problem is important because of its implication for behavior. The importance of the distinction of problem type lies in the realization that the knowledge (or experience) in the area of the individual formulating the problem will influence his/her behavior, thus making a comparison between individuals, across problem types, difficult at best. This is evidenced by the differing behaviors of experienced and inexperienced subjects in the empirical investigation. However, by considering problem type more generally as the structure of the environment, this research proposes an approach to problem type that is generalizable across domains.

The model of problem diagnosis developed here recognizes that regardless of domain, all problem formulation activity should proceed from identifying symptoms to identifying the malfunctioning bodies that cause symptoms to identifying the causes of the malfunction. This approach suggests that a rational approach to problem formulation also will consider the expected net value of each step before each activity. This model of problem formulation is a standard by which specific problem formulation behavior can be understood. Given knowledge of the specific task

and the knowledge of the individual performing the task, it enables the prediction of the steps an individual will take in any problem formulation activity and the prediction of the effect that experience (or knowledge) will have on the observed behavior. The model also provides a description of the steps an individual should take in any problem formulation activity.

This research is limited in that it lacks strong empirical validation. Future research needs to substantiate the model and demonstrate its efficacy in predicting problem formulation behavior. Its usefulness for training individuals to effectively formulate problems must also be demonstrated. However, this research is an important first step in developing a cohesive look at understanding problem formulation.

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Answer key

Exercise 1

1. C
2. B
3. C
4. E
5. A

Exercise 2

a)

1. C
2. A
3. B
4. E
5. F
6. D

b)

This study examines problem formulation by focusing on the characteristics of the task rather than on an individual performing the task.

Exercise 3

1. growth
2. information
3. technologies
4. performance
5. procedures
6. classification
7. interface
8. solution

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Abstract: With the rapid **(classification/growth/integration)** of the Internet, how to get information from this huge **(information/integration/solution)** space becomes an even more important problem. In this paper, An Intelligence Chinese Document Semantic Indexing System; ICDSIS, is proposed. Some new **(classifications/technologies/systems)** are integrated in ICDSIS to obtain good **(development/analysis/performance)**. ICDSIS is composed of four key **(procedures/technologies/solutions)**. A parallel, distributed and configurable Spider is used for information gathering; a multi-hierarchy document **(classification/distribution/division)** approach combining the information gain initially processes gathered web documents; a swarm intelligence based document clustering method is used for information organization; a concept-based retrieval **(space/interface/face**) is applied for user interactive retrieval. ICDSIS is an all-sided **(data/solution/ documentation)** for information retrieval on the Internet.

Keywords: Information processing; document classification; document clustering; semantic indexing; concept space

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INTELLIGENCE CHINESE DOCUMENT SEMANTIC INDEXING SYSTEM

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With the rapid growth of the Internet, how to get information from this huge information space becomes an even more important problem. In this paper, An Intelligence Chinese Document Semantic Indexing System; ICDSIS, is proposed. Some new technologies are integrated in ICDSIS to obtain good performance. ICDSIS is composed of four key procedures. A parallel, distributed and configurable Spider is used for information gather; a multi-hierarchy document classification approach combining the information gain initially processes gathered web documents; a swarm intelligence based document clustering method is used for information organization; a concept-based retrieval interface is applied for user interactive retrieval. ICDSIS is an all-sided solution for information retrieval on the Internet.

Keywords: Information processing; document classification; document clustering; semantic indexing; concept space.

1. Introduction

Large quantities of textual data available, for example, on the Internet, pose a continuing challenge to applications that help users in making sense of the data. Search engines specialize in locating specific documents in answer to well-defined information requests. Furthermore, when the answers sought relate to a set of documents instead of a single document, or when unexpected patterns or trends should be identified, the information need is better served by methods enabling a combination of visualization and interactive exploration. In data exploration, the purpose is to assist the user in familiarizing herself with a large collection of data, for example, by visualizing aspects of the data collection and by enabling browsing and navigation in the data space in some meaningful way.

We describe here a new approach to automatic text classifying, clustering, indexing and retrieval. It is designed to overcome a fundamental problem that plagues existing retrieval techniques that try to match words of queries with words of documents. The problem is that users want to retrieve on the basis of conceptual content, and individual words provide unreliable evidence about the conceptual

topic or meaning of a document. There are usually many ways to express a given concept, so the literal terms in a user's query may not match those of a relevant document. In addition, most words have multiple meanings, so terms in a user's query will literally match terms in documents that are not of interest to the user. The proposed approach tries to overcome the deficiencies of term matching retrieval by treating the unreliability of observed term document association data as a statistical problem. We assume there is some underlying latent semantic structure in the data that is partially obscured by the randomness of word choice with respect to retrieval. We use statistical techniques to estimate this latent structure, and get rid of the obscuring "noise". A description of terms and documents based on the latent semantic structure is used for indexing and retrieval. "Semantic structure" here means the correlation structure in the way in which individual words appear in documents; "semantic" implies only the fact that terms in a document may be taken as referents to the document itself or to its topic. In different contexts or when used by different people the same term (e.g. "chip") takes on varying referential significance. We take a large matrix of term document association data and construct a "semantic" space wherein terms and documents that are closely associated are placed near one another. Thus, the use of a term in a search query does not necessarily mean that a document containing or labeled by the same term is of interest. Singular value decomposition allows the arrangement of space to reflect the major associative patterns in the data, and ignore the smaller, less important influences. As a result, terms that did not actually appear in a document may still end up close to the document, if that is consistent with the major patterns of association in the data. Position in space then serves as a new kind of semantic indexing, and retrieval proceeds by using the terms in a query to identify a point in space, and documents in its neighborhood are returned to the user.

The rest of this paper is organized as follows. Section 2 reviews related works. Section 3 introduces the functions of ICDSIS. A spider is introduced in Sec. 4. Section 5 introduces the document classifier. In Sec. 6, we introduce document clustering method used in ICDSIS. Next, Sec. 7 presents an intelligence retrieval interface; organization of concept space is also described in this section. Finally, conclusions are given in Sec. 8.

2. Related Work

A challenge of current information retrieval methods is that the words searchers often use are not the same as those by which the information they seek has been indexed. There are actually two sides to the issue; we will call them broadly synonymy and polysemy. We use synonymy in a very general sense to describe the fact that there are many ways to refer to the same object. Users in different contexts or with different needs, knowledge, or linguistic habits will describe the same information using different terms. The prevalence of synonyms tends to decrease the "recall" performance of retrieval systems. By polysemy, we refer to the general

fact that most words have more than one distinct meaning. Polysemy is one factor underlying poor "precision".

For solving these problems many works have been done around the world since ninths in the last century. In the Neural Network Research Centre, Helsinki University of Technology during 1995–2000 as part of a project called WEBSOM has been carried out, led by Academician Teuvo Kohonen. The work was mainly enhanced by the Academy of Finland with funds directed to research in the Neural Networks Research Centre. In the WEBSOM method, the self organizing map (SOM) algorithm is used to automatically organize very large and high dimensional collections of text documents onto two-dimensional map displays. The map forms a document landscape where similar documents appear close to each other at points of the regular map grid. The landscape can be labeled with automatically identified descriptive words that convey properties of each area and also act as landmarks during exploration. With the help of an HTML-based interactive tool the ordered landscape can be used in browsing the document collection and in performing searches on the map. An organized map describes an overview of an unknown document collection, helping the user in familiarizing herself with the domain. Map displays that are already familiar can be used as visual frames of reference for conveying properties of unknown text items. Static, thematically arranged document landscapes provide meaningful backgrounds for dynamic visualizations of, for example, time related properties of the data. Search results can be visualized in the context of related documents. Experiments on document collections of various sizes, text types, and languages show that the WEBSOM method is scalable and generally applicable. Preliminary results in a text retrieval experiment indicate that even when the additional value provided by the visualization is disregarded the document maps perform at least comparably with more conventional retrieval methods. No part of the publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the author. In addition to the introduction above, Dieter Merkl and Andreas Rauber also use SOM for research application like the LabelSOM method. In this way, the Maps are easier to understand than before because they are labelled by the keywords. Other means based SOM like GHSOM (Growing Hierarchical Self-Organizing Map), etc. are also included.

An automatic indexing and concept classification approach to a multilingual (Chinese and English) bibliographic database is presented by H. Chen. He introduced a multi-linear term-phrasing technique to extract concept descriptors (terms or keywords) from a Chinese-English bibliographic database. A *concept space* of related descriptors was then generated using a co-occurrence analysis technique. Like a man-made thesaurus, the system-generated concept space can be used to generate additional semantically-relevant terms for search. For concept classification and clustering, a variant of a Hopfield neural network was developed to cluster similar concept descriptors and to generate a small number of concept groups to

represent (summarize) the subject matter of the database. The *concept space* approach to information classification and retrieval has been adopted by the authors in other scientific databases and business applications, but multilingual information retrieval presents a unique challenge.

Chinese documents are difficult to process. And Chinese documents is mainly about concept abstracting. In other words, it forms a one-hierarchic relationship between the document and concept. Also there are papers which describe automatic index generation. We combine SWARM clustering and K-means clustering to establish the concept space. We adopt the bottom up way to build up the space of concept. It is meaningful that we firstly classify the web pages obtained from internet into some domains, and then we cluster the web pages that belong to each domain. Such would evade subjective warp caused by the departure between document and level in the top down way. Also, we can adjust the parameter to make the hierarchy flexible enough for use. There is a problem that is not mentioned in the above papers, i.e., that SOM will arouse some classes larger than we could imagine. For the experiment in Ref. 10, the number of document samples is 100. Thus, it cannot locate the problem because the sample is not large enough. But when processing massive documents, we will pay more attention to this matter. If we ignore this matter, it will cause unimaginable result. In this paper, we present a new efficient method to solve this problem.

3. System Description

ICDSIS gets documents from Internet and organizes these documents by combining directory structure with semantic index automatically for improving the accuracy and recall of retrieval and characterizing the semantic of retrieval results. Figure 1 gives the workflow in ICDSIS. The documents collected by spider are processed by text analyzer including parsing and extracting the informative words for classification, concept clustering, semantic index generating and so on. Text classifier learned knowledge from pre-labeled documents and then classified the newly documents. An innovative and multi-layer classification model is used. With the increase of Internet documents, the volumes of some directors become larger. To decrease the search space for retrieval by directory, we provide a document Clustering algorithm based on Swarm Intelligence and k-Means: CSIM. Different from general clustering algorithm, CSIM, after clustering documents, gives the class description for each cluster and may be clustered further. By building concept semantic space, ICDSIS can broaden or locate what they want most by pressing few key words. Users may retrieve the Internet documents in two ways: Directory or Key words. By using the directory, we not only can browse all documents belonging to some directory, but also gives the association concepts with the class concept. By using key words, user only input part of the key words, and ICDSIS will return its association concepts and documents related to these words. Meanwhile, user may also filter some documents by setting the documents' class.

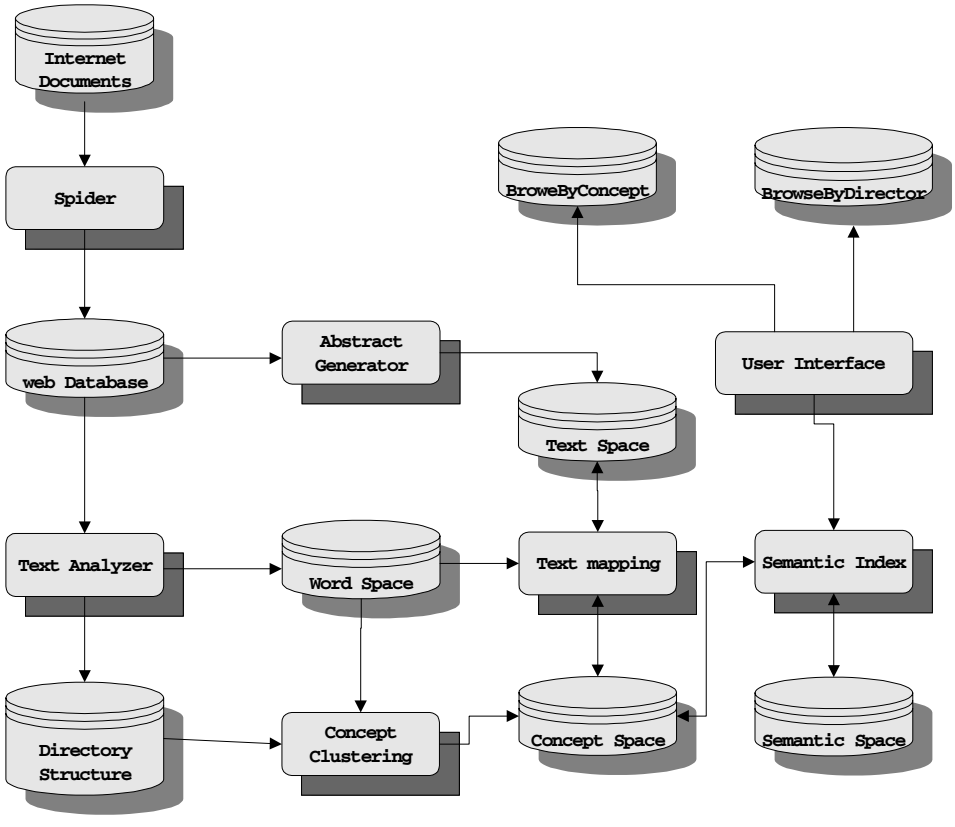

Fig. 1. Architecture of ICDSIS.

One of the fundamental components of ICDSIS is the automatic document collector. The main task performed by this component is the automatic gathering of Web documents, which are usually stored locally for further processing. Many researches have been done on documents collecting. Most of them are used in search engines and implemented in normal ways. Few of them have intelligence. Namely, many collectors only fetch documents from Web without filtering and estimation. There may have more redundancy with documents and pages. It is necessary to do more work on document collector, to improve its efficiency and quality. There are two main components, URL manager and Spiders. URL manager is a management center for URL tasks. It takes charge of fetching, storing, distributing and coordinating URL tasks. On the one hand, URL manager fetches URLs from URL database into the task queue and distributes them to spider. On the other hand, URL agent receives new URLs from spider, then coordinates and saves them into the URL database. Thus, the URL database will be updated. Spider starts its work after receiving URL tasks from URL manager. It fetches web pages according to URL and parses their hyperlinks. Then it sends these new URLs to URL manager

and requests for new tasks. Many parallel and distributed spiders can be employed in this system.

The frequently used approaches in text classification allow all classes to share a single classifier or assign each class a classifier. And all classes are in the same hierarchy, i.e. in the same "flattened" class space. When the set of classes is large, not only will it cost much time to construct class models, but also it will have to match all the class models to assign proper classes to new documents. To overcome this problem, we propose an approach of multi-hierarchy text classification based on VSM, i.e. all classes are organized as a tree according to some given hierarchical relations. The basic insight supporting our approach is that classes that are attached to the same node have a lot more in common with each other than classes elsewhere, so that the models of these classes will be based on a small set of features.

Document clustering has long been employed as an important information retrieval technique. In ICDSIS, document clustering is used to overcome the problem of having long lists of ranked documents returned by a query. Documents relating to a certain topic will be clustered together. It will help users in locating interesting document set and searching interesting documents more easily. Both pre-retrieval clustering and post-retrieval clustering are frequently used. One is to perform clustering off-line. Another is to perform clustering after getting a long list of retrieved documents, i.e. on-line. Obviously, post-retrieval clustering has more rigid requirement on the respect of speed than pre-retrieval clustering. In this system, post-retrieval clustering is used after document classification. We propose a document Clustering algorithm based on Swarm Intelligence and k-Means — CSIM. CSIM combines swarm intelligence with k-means clustering technique.

In traditional document retrieval mode, search engine return a cluster of documents containing the words in the queries. However, for most situations, the retrieved documents were overwhelmed and many retrieved documents were irrelevant to what does the searcher really wanted. On the other hand, despite this overwhelmed document set, there are still some relevant documents to be omitted. This happens mainly because the searchers of a domain especially the novice searchers cannot express what they need precisely. How to help the searchers to express their meanings more precisely and how to help the searchers to find the documents they need more quickly is a challenge to computer scientists. And it can improve the competitiveness of search engine as well. Concept space is one means to overcome these problems. The main purpose of using concept space is to overcome problems of information overload and vocabulary differences. With the assistance of concept space, system could help the searchers to find the most relevant terms and retrieve most relevant documents by using these terms. Here, we use HowNet[33] to generate Chinese concept space. HowNet is an online common-sense knowledge base — so we have to extract the relations between concepts first. These relations include hypernym, part, attribute, member etc. In our system, we incorporate these two methods to generate concept space. We use Chen's method to generate the concept space of specific domain and use HowNet to generate the concept of general domain.

4. Spider: Information Gather Agent

Since web servers can only handle a few tens of hits per second at most, it will slow down a server if we open many connections with the server. Also, it will reduce the efficiency of collecting pages. It is very important to distribute URLs to each spider properly. We split all URLs that are crawling into 500 queues based on a hash of their server name. This causes all URLs from a given server to go into the same queue. The URL manager get an URL from each queue at a time and distribute it to a spider, moving to the next queue for each URL. This makes sure a given server is hit only once for every 500 URLs which are opened.

Spider is another key component of information gathering. It starts its work after receiving URL tasks from the URL manager. After fetches web pages according to URL and parses their hyperlinks, it sends these new URLs to URL manager and requests for new tasks. Many parallel and distributed spiders can be employed in this system.

Generally, there are two strategies to search the web, depth-first search and breadth-first search. The strategy of depth-first search can bring a preferable distributing of documents and it is easy to find the structure of documents. The strategy of breadth-first search can reach a sound result of pages, but it is difficult to go deeply into Web server. Najork[21] had proved by experiments that breadth-first search yields high-quality pages early. Although there are other strategies such as fish search,[22] best first search,[23] and so on, we adopt breath-first search strategy because it is suitable for vast general search. Inner hyperlinks and outer hyperlinks are distinguished in our approach.

The following are features of distributed web spider.

(1) Parallel and distributed

Since each spider is an agent, it can finish its work solely. We can dispatch many spiders to work at the same time. Parallel working of multi-agent can improve the efficiency of collecting pages. A collecting server can run more than one hundred spiders at a time. After a spider open a connection to an URL, it will take some time for the spider to wait for a response. So, other spiders can do the work at the same time. On the other hand, this system can distribute tasks to several servers. A server acts as manager, others only run spider on them. All spiders on different servers communicate with the Facilitator server. This can be regarded as a distributed Web spider system. Thus, we can fully use resources of each server's CPU time and network's bandwidth.

(2) Configurable

In this system, each spider may have different capabilities. They can search web in a given IP range, or a given site type, such as edu, org, com, etc. Also we can appoint a spider to search the special web servers whose name looks like sports or news. Thus, a spider can work with purpose and save more time. Furthermore, a

spider can run periodically or in a given schedule. Moreover, a spider can filter web pages by site type, keywords, and document model.

5. Text Classification: Information Initial Processing

After the web pages are crawled by Spiders, they will be classified automatically. It is based on Chinese word segmentation. Most of the approaches on text classification adopt the classical Vector Space Model (VSM). In this model, the content of a document is formalized as a dot of the multi-dimension space and represented by a vector. Then we can decide the corresponding classes of the given vector by calculating and comparing the distances among the vectors. The frequently used document representation in VSM is the so-called TF.IDF-vector representation,[24] i.e. the calculation of term weight is mainly based on term frequency and inverse document frequency. In order to deal with the limitation of TF.IDF, we adopt an improved approach named TF.IDF.IG by combining the information gain from Information Theory. The approach is validated to be feasible and effective by experiments. Furthermore, an approach of multi-hierarchy text classification based on VSM is applied.

5.1. *The improvement on the formula of calculating term weight*

To calculate term weight, the TF·IDF approach consider two factors: TF (term frequency) and IDF (inverse document frequency). And the formula is:

$$W_{ik} = \frac{tf_{ik} \times \log(N/n_k + 0.01)}{\sqrt{\sum_{k=1}^{m}(tf_{ik} \times \log(N/n_k + 0.01))^2}} \tag{1}$$

where f_{ik} is the frequency of the occurrence of the term T_k in the document D_i, W_{ik} is the corresponding term weight, $k = 1, 2, \ldots, m$ (m is the number of terms).

Formula (1) has some limitations. For example, some terms, which are unhelpful for document content identification but the term frequencies are almost equivalent, will be considered as feature terms. This is because although the TF·IDF approach takes the distribution of the terms in the collection into account, it does not consider the proportion of the distribution.

To deal with these limitations, we introduce the concept of information gain from information theory, i.e. the document collection D is regarded as an information source according to some probability distribution, and the amount of information provided by one term (the importance of the term) in text classification can be obtained by considering the information gain between the information entropy of document collection and the conditional entropy of the term. Only that can we combine this amount of the information into the formula of calculating term weight.

The amount of information of term T_k can be calculated using the following formula: $IG_k = H(D) - H(D/T_k)$, where $H(D)$ is the entropy of the document collection D: $H(D) = -\sum_{d_i \in D} p(d_i) \times \log_2 P(d_i)$, $H(D/T_k)$ is the conditional entropy of term T_k: $H(D|T_k) = -\sum_{d_i \in D} P(d_i|T_k) \times \log_2 P(d_i|T_k)$, $P(d_i)$ is the conditional

probability of the document d_i: $P(d_i) = \frac{\text{wordfreq}(d_i)}{\sum_i \text{wordfreq}(d_i)}$, where wordfreq($d_i$) is the sum of all the term frequencies in d_i. Then formula (1) can be revised as follows:

$$W_{ik} = \frac{tf_{ik} \times \log(N/n_k + 0.01) \times IG_k}{\sqrt{\sum_{k=1}^{m}(tf_{ik})^2 \times [\log(N/n_k + 0.01) \times IG_k]^2}}. \quad (2)$$

5.2. *Multi-hierarchy text classification*

The frequently used approaches in text classification allow all classes to share a single classifier or assign each class a classifier. And all classes are in the same hierarchy, i.e. in the same "flattened" class space. When the set of classes is large, not only it will cost much time to construct class models, but it will also have to match among all the class models to assign the proper classes to new documents.

To overcome this problem, we propose an approach of multi-hierarchy text classification based on VSM, i.e. all classes are organized as a tree according to some given hierarchical relations. The basic insight supporting our approach is that classes that are attached to the same node have a lot more in common with each other than classes elsewhere, so the models of these classes will be based on a small set of features.

5.2.1. *Constructing class models*

We can construct class models by feature selection after training the documents classified by hand corresponding to the classification hierarchy. It is the basis of automatic classification. Each class model is represented by vector, including the feature terms of this class and their corresponding weights.

In the selection of feature terms, we synthesize two factors — term frequency and term concentration. The measure in consideration of term frequency think that the more times one term appears in the documents belonging to the same class, the more possible this term will be a feature term. The measure in consideration of term concentration think that the feature terms of a certain class should concentrate in the documents of this class and not be prevalent in the whole collection. In addition, the feature sets should not be too large in real applications, and the terms whose weights under a certain threshold value should be set aside. Otherwise, the processing speed of real systems will slow down significantly.

5.2.2. *Automatic classification*

Automatic classification is to classify large number of new documents by computer. At first, one new document is represented with a normalized vector, including the terms in this document and their corresponding weights. The calculation of term weigh in this part considers two factors — term frequency and term position. Then one top-down matching process is hierarchically performed from the root node of the tree until the proper subclass is found corresponding to a leaf node.

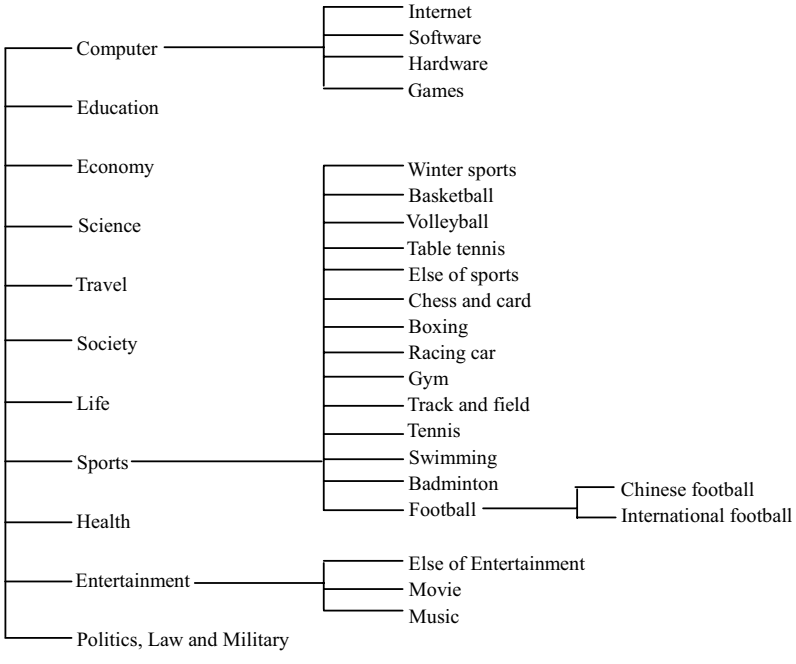

Fig. 2. Class architecture.

5.3. *Experimental results*

Our lab has developed a system about text classification for a corporation. The main idea is described as follows. Firstly, the class architecture is designed for the need of the corporation. Then the class models are constructed by training the documents classified by hand corresponding to the classification hierarchy. Next, the text contents are extracted from the web pages crawled by Spiders. Furthermore, the text contents are analyzed after word segmentation. Finally, the web pages are assigned the proper class using the automatic classification algorithm. The ideal performance of classification has been achieved after several times of revision.

In the test phase, we collect 21,430 documents downloaded from some famous web sites in China such as SINA, and FM365 as training set. The corporation collects 11,062 documents as testing set. There are 34 classes. The class architecture is illustrated in Fig. 2, and the experiment results are shown in Table 1. We will further research on the classification Precision if the web page is assigned the best N classes. Most details can be seen in Ref. 25.

6. Text Clustering: Semantic Information Organization

Numerous document clustering algorithms appear in the literature, such as Hierarchical Agglomerative Clustering (HAC) algorithms, k-means algorithm, Self-Organizing Map algorithms, etc. HAC algorithms are rather slow when applied to

Table 1. The classification Precision.

Class	Precision	Class	Precision	Class	Precision
Internet	69.23%	Winter sports	60.89%	Tennis	81.81%
Software	81.66%	Basketball	98.83%	Swimming	95.4%
Hardware	78.57%	Volleyball	81.66%	Badminton	85.34%
Games	95.23%	Table tennis	69.76%	Chinese Football	90.0%
Education	83.76%	Else of sports	54.78%	International Football	83.67%
Economy	76.08%	Chess and card	80.0%	Health	92.3%
Science	83.56%	Boxing	98.22%	Else of Entertainment	90.69%
Travel	93.45%	Racing car	96.07%	Movie	83.96%
Society	83.9%	Gym	93.9%	Music	79.67%
Life	91.76%	Track and field	87.14%	Politics, Law and Military	84.75%

large document collections. Mistakenly merges also affect their clustering quality. Another class of algorithms is the partition algorithms. The k-means algorithm is well known for their fast, linear time complexity. However, some crucial parameters need to be set in advance. Some approaches are applied to find proper initial cluster number and centroids.

Buckshot and Fractionation[26] are also linear time algorithms. Fractionation is an approximation of HAC, where the search for the two closest clusters is performed locally (among a subset of the clusters), not globally. Buckshot is a k-means algorithm where the initial cluster cancroids are not chosen at random but created by applying HAC clustering to a sample of the documents of the collection. Self-Organizing feature Map (SOM) which is one of the model-based methods is used in WEBSOM system.[27] But SOM is hampered by long processing times. For instance, Multi-layered Self-organizing Feature Maps (M-SOM) needs recursive procedure of generating self-organizing map.

We propose a document Clustering algorithm based on Swarm Intelligence and k-Means — CSIM. Swarm Intelligence is defined as any attempt to design algorithms or distributed problem-solving devices inspired by the collective behavior of the social insect colonies and other animal societies.[28] CSIM combines swarm intelligence with k-means clustering technique. It is a two-phase process. Firstly, an initial set of clusters is formed by swarm intelligence-based on clustering method which is derived from a basic model interpreting ant colony organization of cemeteries. Secondly, an iterative partitioning phase is employed to further optimize the results. The main idea of swarm intelligence-based clustering method is that data objects are initially projected onto a plane at random. The artificial ants then perform random walks on the plane and pick up or drop projected data items with a probability which is converted from swarm similarity within a local region by probability conversion function. Clusters are visually formed on the plane by the collective actions of the ant colony in the absence of central controls. It is also applied in document clustering by vector space model. Self-organizing clusters are formed by this method. The number of clusters is also adaptively acquired. Moreover, it is insensitive to the outliers and the order of input. It obviously offsets the weakness of

partitioning method and shortens the iterative times in the second phase. Actually, the swarm intelligence-based clustering method can be applied independently. But on the second phase, the outliers which are single points on the ant-work plane are converged on the nearest neighbor clusters and the clusters which are piled too close to collect correctly on the plane by chance are also split. K-means clustering phase softens the chanciness of the swarm intelligence based method which is originated from a probabilistic model.

A description of the clustering algorithm is shown in Ref. 29. Here is an example illustrating the function of the clustering process. In Fig. 3, women football is the retrieval words. Three clustering patterns are shown on the left column. Documents belong to these patterns are shown on the right column of the three figures respectively. It is better than the keywords retrieval model. Using that model, those documents which contain the words of women football are listed together.

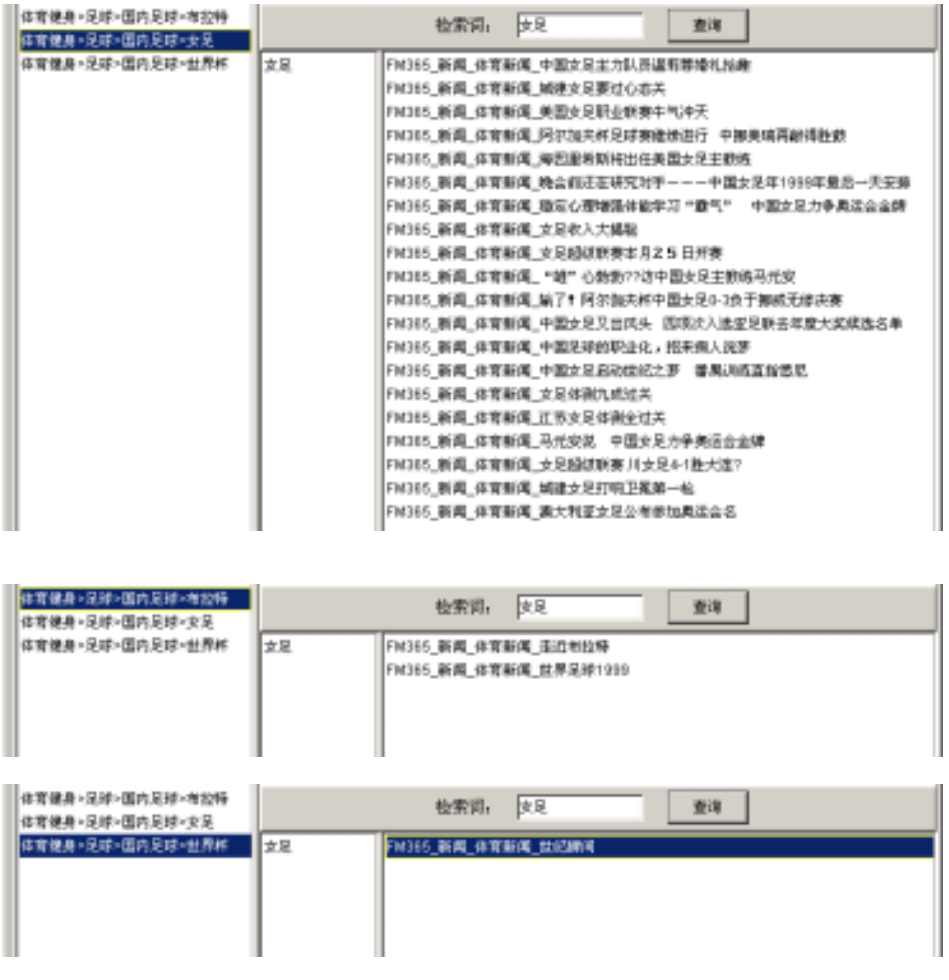

Fig. 3. The result of document clustering.

7. Searcher: Information Retrieval with Association

In the following sections, we will describe how to generate the concept space and how to use the concept space to facilitate querying and information retrieving.

7.1. *Concept space generation using co-occurrence analysis*

Now we will introduce how to generate the concept space of specific domain automatically. Before generating the concept space, we must identify the concepts of that domain. For scientific literature, its concepts were relatively stable, and there are existing thesauruses to be adopted by the system. However, for news, the concepts were volatile, so we have no existing thesauruses. And it is impossible to generate the thesaurus manually. We have to extract the concepts from the document automatically. By using the following formulae, we could compute the information gain of each term for classification.

$$InfGain(F) = P(F) \sum_i P(\psi_i \mid F) \log \frac{P(\psi_i \mid F)}{P(\psi_i)} + P(\bar{F}) \sum_i P(\psi_i \mid \bar{F}) \log \frac{P(\psi_i \mid \bar{F})}{P(\Psi_i)}$$

where F is a term; $P(F)$ is the probability of that term F occurred; $^-$ means that term F does not occur; $P(\psi_i)$ is the probability of the ith class value; $P(\psi_i \mid F)$ is the conditional probability of the ith class value given that word F occurred.

If $InfGain(F) > \omega$, we choose term F as the concept. Although the thesaurus generated by this method is not as thorough and precise as the thesaurus generated manually in scientific literature, it is an acceptable thesaurus. This is not an ideal method but a feasible one.

After we have recognized the concept of a class, we could generate the concept space of that class automatically. Here, we adopt Chen's method which uses co-occurrence analysis and Hopfield net.[30,31] Now, we will introduce this method briefly.

In this method, using co-occurrence analysis technology, we compute the term association weight between two terms T_j and T_k:

$$ClusterWeight(T_j, T_k) = \frac{\sum_{i=1}^{n} d_{ijk}}{\sum_{i=1}^{n} d_{ij}} \times Weighting\ Factor(T_k)\,.$$

Notice that this is an asymmetric function, i.e. $ClusterWeight(T_j, T_k)$ is different from $ClusterWeight(T_k, T_j)$. Each term of this function are computed as follow:

$$d_{ij} = tf_{ij} \times \log\left(\frac{N}{df_j} \times w_j\right)$$

where tf_{ij} is the number of occurrences of term j in document i; df_j is the number of documents in a collection of N documents; w_j is the length of term j.

$$d_{ij} = tf_{ijk} \times \log\left(\frac{N}{df_{jk}} \times w_j\right)$$

where tf_{ijk} is the smaller number of occurrences of term j and term k in document i, df_{jk} is the number of documents in which term j and k occurs.

$$\textit{Weighting Factor}(T_k) = \frac{\log N/df_k}{\log N}\,.$$

After we have computed the asymmetric association between terms, we could activate related terms in response to user's input. This process was accomplished by a single-layered Hopfield network. Each term was treated as a neuron, and the association weight was assigned to the network as the synaptic weight between nodes. At time 0, the outputs of nodes corresponding users input terms $\mu_i(0)$ were assigned to 1, output of other nodes were assigned to 0. After the initialization phase, we repeat the following iteration until convergence.

$$\mu_j(t+1) = f_s\left[\sum_{i=0}^{n-1} t_{ij}\mu_i(t)\right]$$

$$f_s(\text{net}_j) = \frac{1}{1+\exp[\frac{-(\text{net}_j-\theta_j)}{\theta_0}]}$$

where f_s is the SIGMOID function, $\text{net}_j = \sum_{i=0}^{n-1} t_{ij}\mu_i(t)$.

7.2. *Concept space generation using HowNet*

We can generate concept space by using existing HowNet. HowNet is an online common-sense knowledge base unveiling inter-conceptual relations and inter-attribute relations of concepts as connoted in lexicons of the Chinese and their English equivalents.[33] Each concept in HowNet is defined by sameness. In HowNet, a simmes refers to the smallest basic semantic unit that cannot be reduced further. According to the definitions of concepts and the relation between sememes, we could extract the relations between concepts. These relations include hypernym, hyponym, synonym, antonym, part-whole, attribute-host, etc. We only use some of these relations, and we give different weight to different relation.

$$w_{\text{synonym}} = 0.9, w_{\text{member}} = 0.7, w_{\text{part}} = 0.4, w_{\text{hypernym}} = 0.2, w_{\text{attribute}} = 0.2$$

If user has selected a term, its activation spreads following this equation.

$$A_i = A_i + \frac{1}{n}\sum_{j=1}^{n} A_j \times W_{ij}\,, \quad \text{if } A_i > 1,\ A_i = 1\,.$$

If A_i is greater than a threshold value, this node is activated and the activation spreads. Otherwise, it is not activated. If the number of activated nodes is greater than an expected value, activation stops spreading.

7.3. *Query*

First, we ask the user to select a specific domain. The query was restricted in a specific domain. Then, we ask the user to input a keyword. System returns all the documents which contain the keyword. At the meantime, using the concept space generated automatically and using HowNet system could prompt the user with related words as well. And by matching the keyword with the classes, we could return the related classes too. Figure 4 shows the process of querying.

We could learn from this figure that traditional keyword querying system could give two additional optional choices to refine query. The first one is that using the result generated by clustering user could specify his query in a specific class which could reduce the size of returned documents. The second one is that using concept

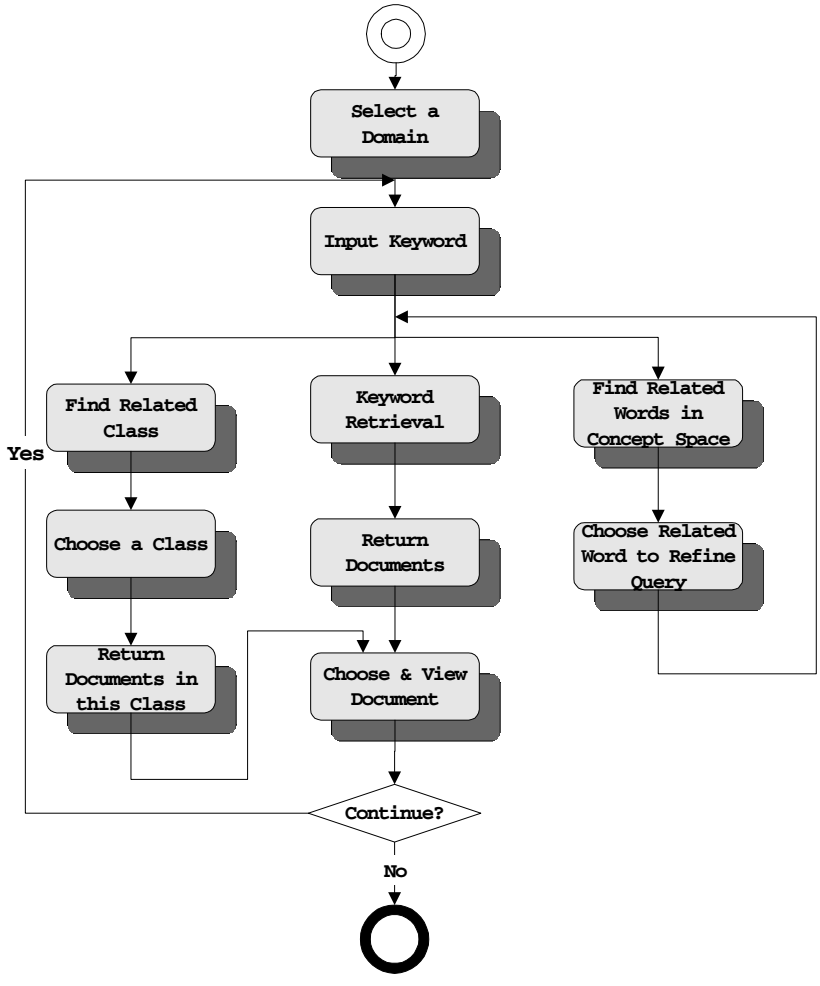

Fig. 4. Process of querying.

space system could help the user to express what he wants more precisely. He could choose the right word in a prompted word list as well. By using these two means, we could increase the usability of our system.

8. Conclusion

In this paper, an all-sided solution for information retrieval on the Internet (ICDSIS) is proposed. ICDSIS covers all procedures of information retrieval on the internet, i.e. information gathering, information organization and information querying. Some new technologies for document classification and clustering are adopted in ICDSIS. Experimental results show that these methods applied to ICDSIS are efficient.

Concept search is a trend for information retrieval. ICDSIS partially realized a concept-associated search by efficient information organization. Some methods applied in ICDSIS are not well mature and need to further improve. Moreover, ICDSIS can work more perfectly if improvements are made on the aspect of system integration. For example, although there are differences between feature selection for document classification and clustering, some procedures are still similar. They can be processed only once. Metadata is also an important topic of concern in ICDSIS.

Acknowledgment

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5. Extensive reading

Available online at: http://www.ascusc.org/jcmc/vol5/issue3/Steinfield.html
Retrieved 28 August 2004

Extensive reading:

What are the main phases that computer-mediated marketing has gone through?

JCMC 5 (3) March 2000

Computer Mediated Markets: An Introduction and Preliminary Test of Market Structure Impacts

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Table of Contents

Abstract

Electronic commerce may influence the way in which goods are traded between businesses. Many believe that Internet-based business-to-business e-commerce will reduce the extent to which firms buying goods and services are "locked in" to a single supplier. Using a secondary analysis of data collected in late 1996 on firms' use of electronic networks for transactions, we empirically test the effects of Internet use on buyer lock-in. Results are weak, but suggest that using the Internet rather than proprietary computer networks in connecting with external trading partners appears to lessen a buying firm's dependence on its primary supplier. The Internet seems to be especially valuable in allowing small firms to connect to external constituents.

Introduction

Many researchers have written about the potential of Internet-based electronic commerce to alter the structure of markets in virtually all industries (e.g. Bailey and Bakos, 1997; Bakos, 1997; 1998; Brynjolfsson and Smith, 1999; Sarkar, Butler and Steinfield, 1995; Smith, Bailey and Brynjolfsson, 1999; Steinfield, Kraut and Plummer, 1995, Wigand and Benjamin, 1995). They have concentrated on two areas: the relationship between buyers and sellers, and the role of intermediaries in the production and distribution chain. These discussions have grown out of earlier debates about the role of information technology and electronic communication networks on inter-firm relations and the cost of transactions between firms (e.g. Bakos, 1991; Bakos and Treacy, 1986; Malone, Yates and Benjamin, 1987; Porter and Millar, 1985; Steinfield and Caby, 1993; Steinfield, Caby and Vialle, 1993; Streeter, Kraut, Lucas and Caby, 1996). The argument is that using inter-organizational computer networks results in lower

transaction costs, which makes it easier for firms to find new suppliers and to access new markets. According to this reasoning, the Internet is continuing a trend in which interorganizational networks are stimulating the rise of new electronic marketplaces. These new marketplaces are characterized by strong price competition and greater choice for buyers (Bakos, 1997; 1998; Smith, Bailey and Brynjolfsson, 1999; The Economist, February 26, 2000; The New York Times, January 18, 2000). At the same time, the Internet enables the producers of goods and services to develop more direct relationships with their buyers, bypassing most former intermediaries (Wigand and Benjamin, 1995, Choi, Stahl and Whinston, 1997).

Many of the articles in this special issue, however, illustrate that the effects of the Internet on market structures are complex and varied, and not yet well understood. Most of the authors emphasize the increasing, rather than decreasing, role for traditional and new intermediaries on the Internet, providing the downstream services that firms require to make their goods and services more available to consumers (Adelaar, this issue; Klein and Selz, this issue; Palmer, Bailey and Smith, this issue; Schmitz, this issue; Scott, this issue). It now seems safe to conclude that electronic commerce results in significant new opportunities for providers of intermediary services, and that producers of goods who prematurely seek to bypass existing and new digital intermediaries are engaging in risky business (The Economist, June 26, 1999; The Economist, February 26, 2000, The OECD, 1999). For this reason, we do not dwell on the topic of intermediaries in electronic markets in this article.

Less clear, however, is how the Internet affects upstream business-to-business relationships, primarily in the context of producer-supplier linkages. Hence, in this article, our primary question is whether electronic commerce over the Internet is associated with more or less "lock-in" in relationships between buyer and seller firms. We present the rationale and briefly review early evidence about how interorganizational computer networks influence the extent to which buyers are locked into relationships with suppliers. We then provide an empirical test using a secondary analysis of data on electronic exchanges in four industries, concentrating on how the Internet differs from other types of interorganizational networks in commerce. Early research suggested that electronic commerce encouraged the growth of more tightly coupled electronic linkages between business buyers and sellers (Bakos and Brynjollfson, 1997; Kraut, Steinfield, Chan, Butler and Hoag, 1998), and promotes what some are calling "sticky" transactions that keep buyers locked-in (Shapiro and Varian, 1998; Smith et al., 1999). However, because the Internet provides a standards-based technology for electronic commerce, it may reduce the need for firms to invest narrowly in doing business with a specific trading partner. Hence, the Internet may "unstick" these closed trading relationships. In addition, given the Internet's lower costs relative to earlier proprietary networks, these effects may extend to smaller firms who previously could not afford to engage in network-based transactions unless supplied by a

controlling trading partner (Steinfield et al., 1995). Consistent with this reasoning, we've seen a number of new business-to-business exchanges in the past several years, in several different industries, such as steel (Metalsite.com, E-Steel.com) and chemical production (Chemdex.com and E-Chemicals.com) (The New York Times, January 18, 2000;). New Web-based exchanges, referred to as business-to-business portals, are in development in the automotive sector, aviation and many other industries as well (The New York Times, March 16, 2000). A crucial feature of these exchanges is that they are open to many buyers and sellers in an industry.

Transaction Costs, Electronic Markets, and The Internet: A Brief Review

In the latter half of the 1980s, researchers interested in the implications of interorganizational computer networks focused their attention on how such networks reduced the costs of coordination among firms. An influential and early articulation of the emerging theory in this area came from Malone, Yates and Benjamin (1987). Using notions from transaction cost economics (Williamson, 1975), Malone et al (1987) emphasized how electronic linkages between firms could have quite different effects on firms' make versus buy decisions. According to the transaction cost literature, under certain market conditions firms become vulnerable to opportunistic behavior, and as a result choose to make rather than buy needed assets. That is, they choose hierarchical governance rather than market mechanisms to coordinate production. They are more likely to make rather than buy when assets are highly specific, so that there are few suppliers, or when uncertainties and information asymmetries make it difficult for buying firms to develop adequate contracts (Williamson, 1975). Data networks that extend beyond the firm could help, Malone and colleagues argued, in two distinct, but nearly opposite ways. They contended that, in some cases, data networks would be used to integrate tightly the production systems of firms together, binding firms into what they termed electronic hierarchies. Such interfirm relationships permit efficient outsourcing of important activities, without sacrificing control. In other cases, as industries develop more standardized ways of describing products and supporting electronic transactions, networks would have quite a different effect. They could support the creation of electronic markets that perform brokerage functions, thereby efficiently linking buyers and sellers together by reducing their search costs. Examples of the day included the rapid emergence of airline reservation systems and real estate multiple listing services.

In those years, most interorganizational networks were still based upon proprietary systems running over expensive leased telecommunications circuits (Steinfield et al, 1995). As a result, highly specific

investments were required to join a network. The hardware and software needed to connect to one supplier or customer would not necessarily work with another. Such technology costs created barriers to exit, and raised users' costs of switching to new suppliers once a network was established. Indeed, information systems theorists pointed out the strategic nature of these systems, particularly for supplier-provided networks that could be used to lock-in buyers (Bakos and Treacy, 1986). Malone and colleagues (1987) felt that pressures towards standardization would lower networking costs, ultimately forcing single supplier networks to open up to other suppliers. Market-based transactions would then dominate over more hierarchical network-based transactions, since the marketplace would encourage more efficient suppliers. Economic analyses further suggested that by reducing buyer search costs, emerging interorganizational networks would empower buyers to find lower cost suppliers, reducing supplier power and ultimately lowering prices (Bakos, 1991).

Most of the early research on market structure effects tended to focus on a few widely cited cases, rather than on broad-based empirical data (Steinfield et al., 1995). The few empirical studies tended to find that interorganizational data networks promoted more tightly coupled relations among firms (see Kraut et al., 1998 for a review). Some found a "move to the middle" occurring, with firms opting for neither market nor hierarchy, but something in between (Clemons, Reddi and Row, 1993). They were reducing their number of suppliers despite the lower costs of coordinating with the market. Bakos and Brynjolfsson (1997) explained this by emphasizing the need to account for non-contractible investments, such as improving quality, information sharing and innovation, that firms must make when conducting business electronically. Kraut et al. (1998) suggest that pre-existing social relations between buyers and sellers may lead firms to develop first the capability for electronic transactions with trusted and established suppliers. Indeed, their data suggest that electronic networks are more likely to be associated with increased producer-supplier integration, and reduced outsourcing.

A critical difference in today's e-commerce environment is the transition from proprietary to open networks (Steinfield et al., 1995). In an open network, costs to join a network are reduced, as are buyer search costs. At a minimum, the lower costs to join an electronic commerce network should enable smaller firms with less resources to benefit. Some evidence from an earlier open data network - the Minitel in France - suggests that lower costs do enable smaller firms to gain from electronic transactions with their suppliers and customers (Streeter et al., 1996). However, Streeter et al. (1996) also found that in the general population of firms in both the U.S and France, there were size effects on network use, regardless of the availability of a low cost public data network. Despite the low cost of hardware and software, there is ample evidence that resources are related to firms' abilities to innovate with technology (Tornatsky and Klein, 1982).

In addition to potentially enabling smaller firms to use network-based transactions, the openness of the Internet implies that alternative suppliers for needed goods and services can be more easily found. Hence, in an environment like the Internet, supplier-led markets are easily circumvented by third-party market makers or buyer-led consortia (Bakos, 1997, 1998). Indeed, as noted above, in many industries, new intermediaries are rapidly organizing such business-to-business market exchanges (New York Times, January 18, 2000). These new exchanges are characterized by strong network externalities which create incentives to include rather than exclude more suppliers and buyers. This does not necessarily spell the end of durable buyer-seller relationships. Streeter et al. (1996) examined buyer-seller relations on Minitel, an earlier open data network used in France. They found that such relationships were longer lasting for Minitel users, and surmised that lock-in might still occur due to the competitive advantages derived from having access to buyer purchase histories. This permitted more targeted offers and added value for buyers, while creating a barrier to switching to a new supplier. Today, the same arguments for the "stickiness" of transactions are now appearing with regard to e-commerce on the web (Shapiro and Varian, 1998; Smith et al, 1999; Brynjolffson and Smith, 1999). Hence, it is important to look anew at the effects of e-commerce over the Internet on market structure. Is it tightening the bonds between existing buyers and sellers, creating opportunities for more lock-in effects, or strengthening the hand of buyers, and encouraging firms to seek out the suppliers who best match required prices and features with each new purchase?

A Preliminary Empirical Test

To shed some further light on this question, we undertook a secondary analysis of data we collected in the fall of 1996 and reported in Kraut et al. (1998). The original study focused on the effect of electronic networks on outsourcing. A national sample of 250 firms in four industries provided information about purchases of selected inputs from suppliers, their relationship with their primary supplier, and their use of data networks and other coordination mechanisms to support transactions (see Kraut et al. 1998 for a full description of the sample and research methods). We first examine the question the of whether the lower cost access to the Internet has indeed "leveled the playing field," and therefore eliminated the effect of firm resources on the use of electronic transactions between a buying firm and its suppliers. If resources do matter, we would expect to find that:

o H1: the greater a firm's resources, the more it uses the Internet for business purposes.

Our second and third hypotheses focus more specifically on the possible influences of Internet use on firms' relationships with their major suppliers. If the electronic markets arguments are correct, we should find that:

o H2: greater Internet use is associated with increased connections to various external constituents.

o H3: greater Internet use is associated with reduced "lock-in" with suppliers.

Sample

The original Kraut et al (1998) study used telephone interviews with managers in charge of acquiring key inputs in each of the sampled industries. The four industries, selected to represent diverse product areas (information products and services as well as manufactured goods) included apparel and pharmaceutical production, magazine publishing, and advertising. Firms were sampled from the Dun and Bradstreet database based on their 4 digit SIC code, with some additional firm demographic data also provided. Firms in the U.S. with at least 20 employees in these industries listed in the April, 1996 Dun and Bradstreet data base were ranked by number of employees, and a stratified sample of large, medium, and small firms (relative to each industry) was selected from each third of the size distribution.

Earlier case studies had helped to identify four key raw materials necessary for production in each of the industries. Managers responded to a series of questions about the specificity of the input, the relationship they had with their primary supplier, and the extent to which they used electronic networks and personal relationships to coordinate their transactions with the supplier. They also indicated the extent to which their firm used the Internet for a variety of purposes. Since the original study focused on inhouse versus outsourced production, suppliers could be either internal divisions of the interviewed firm or external. For this secondary analysis, we only focus on those cases where the suppliers are external firms, since it provides a better test of whether relations are becoming more market-like and less locked in (see Table 1 for the distribution across industries included in this study). We then analyzed what types of firms were using the Internet and for what purposes, and then explored whether Internet use was associated with various measures of external access and "lock-in."

Industry	N
Advertising	45
Pharmaceutical Production	48
Magazine Publishing	53
Apparel Manufacturing	40

Table1. Sample Size and Industry

Measures

Total sales and *number of employees* were provided by the Dun and Bradstreet database. In the original Kraut et al study, these two measures proved to be highly correlated, and were combined into a standardized and logged scale of firm size (alpha=.91).[1] The firm size measure is used here in later analyses Table 2 shows summary statistics for all variables used in the study.

Variables	Mean	Standard Dev.
Total sales	2.09 e8	1.38 e9
Total employees	940.49	6362.30
Degree to which required inputs are asset specific	1.76	0.77
Network use with major supplier [1]	1.99	1.34
Internet use [2]	0.30	0.29
Extent of employee access to firm by computer network [1]	3.12	1.44
Extent of external constituent access to firm by computer network [1]	2.37	1.15
Extent of general public access to firm by computer network [1]	1.83	1.28
Proportion of input acquired from supplier (in %)	50.32	31.15
Number of years doing business with supplier	12.84	21.94
Extent of investment in specific equipment to trade with supplier [1]	2.10	1.30
Extent to which trade with supplier requires specific knowledge [1]	3.72	0.91
[1] Scale ranges from 1 = lowest level to 5= highest level [2] Scale ranges from 0 = lowest level to 1 = highest level		

Table 2: Summary Statistics For Variables Used in Analyses

We included a measure of asset specificity from the Kraut et al (1998) survey in order to examine the extent to which lock-in is caused by this issue. The *generic vs. specific object* scale measured the extent

to which the production input acquired from suppliers was specific to the respondent firm, or was more of a commodity that could be used by any firm in the industry. This scale assessed the extent to which respondents agreed on a 5-point Likert scale with four statements, (e.g., "My firm is the only one that uses the [input], " (reversed), and "The [input] we get from this supplier is fairly standard for the industry") (alpha=.64).

We measured two types of network use, as well as the extent to which various constituents had access to the firm via computer networks. *Network use with a major supplier* (E-link) measures the reported importance of "any type of computer communication that allows you to exchange information" with a major supplier. Respondents indicated how important E-link was in six separate stages in the process of acquiring a key production input, including: 1) searching for and selecting a supplier; 2) developing the specifications of the key input; 3) negotiating the terms of the acquisition such as price, delivery date, and so on; 4) ordering the input; 5) monitoring the quality of the good or service; and 6) fixing problems after the order. The composite scale had a high reliability in the Kraut et al (1998) study (alpha = .94). Note that these connections could be via proprietary connections or public networks, like the Internet. To distinguish the importance of using the Internet over and above the general use of computer networks, we created an index from a series questions that asked whether or not the firm used the Internet for six different business purposes: 1) production of a key product; 2) electronic mail communication; 3) placing and receiving orders; 4) sending and receiving invoices; 5) providing product or service information to customers; and 6) electronic funds transfer (alpha=.79). For a comparison, the original survey also asked how much firms used any sort of network for the same six purposes. Figure 1 depicts this comparison, and highlights that, at least as late as the fall of 1996, the main uses of the Internet were still for email and to supply product information, even though firms were using other data-networks for more transaction-oriented purposes.

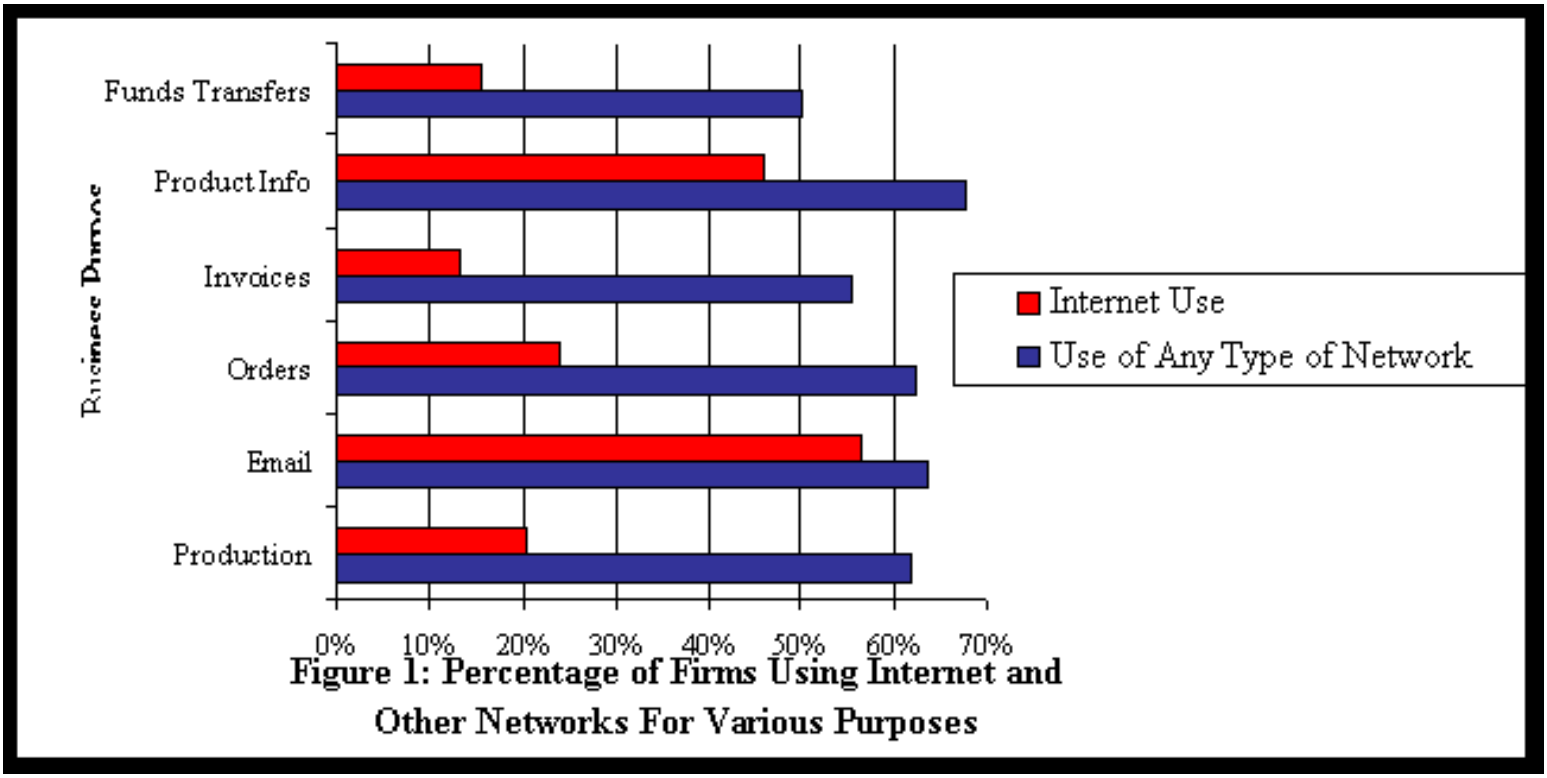

Figure 1: Percentage of Firms Using Internet and Other Networks For Various Purposes

Our measure of *external constituent access via computer networks* was derived from a set of six items that asked "how frequently do the following groups access computers in your company or communicate with your company electronically." The groups include: 1) employees located at the same sites as the computers; 2) employees at other sites who connect to the computers remotely; 3) customers; 4) suppliers; 5) other companies with whom the firm works; and 6) the general public. The responses range from 1 (never) to 5 (very often). These items were factor analyzed, and two factors emerged with eigenvalues greater than one. The four items representing external constituent access loaded together on the first factor (see Table 3). External constituents include suppliers, other firms, customers and the general public. Employees include local and remote employees. These groupings have high face validity, and for later analyses, we created a scale for external constituent access by taking the average score across the three high loading items (alpha=.75).

	FACTORS	
Items[1]	External Constituents	Employees
Customer Access to Firm By Computer Networks	**0.65**	-0.42
Supplier Access to Firm By Computer Networks	**0.71**	0.37
Other Company Access to Firm By Computer Networks	**0.78**	0.26
General Public Access to Firm By Computer Networks	**0.73**	-0.14
Local Employee Access to Firm By Computer Networks	-0.01	**0.90**
Remote Employee Access to Firm By Computer Networks	0.44	**0.71**
[1] Response scale ranged from a minimum of 1 to a maximum of 5.		

Table 3: Rotated Factor Loadings for Access to Firm By Computer Network Items

Four different indicators of the extent to which firms had a "locked-in" relationship with their supplier were measured in the original Kraut et al (1998) survey. These included the *percent of the needed input acquired from the supplier*, the *length of time doing business with the supplier*, the extent of firm *investments in specific hardware and software* in order to do business with the supplier, and the extent of **firm investments in specific knowledge** in order to do business with the supplier. The first two are single item measures, while the later two combined two items that asked on 5 point scales whether doing business with the supplier required specialized equipment (alpha=.81) or knowledge (alpha=.67).

Results

We use a series of multiple regression analyses to test the three hypotheses. In each regression, we controlled for variations in Internet use among the four industries by including a set of industry dummy variables. We also included firm size to control for the potential influence of having greater resources available for networking activities. The extent to which required inputs were specific to the buyer was also entered into regressions where the extent of lock-in was the dependent variable. Additionally, the extent to which firms report having network-based interactions with their major supplier was entered into each regression. This enabled us to see if the reported Internet use had effects over and above any prior proprietary network use, as the electronic market hypotheses predict.

H1 posits that firms with greater resources will make more use of the Internet for business purposes.

Table 4 shows the regression of firm size, along with dummy variables for industry and our measure of network use with the major supplier (E-link). Contrary to much of the early expectations about the Internet, firm size was a significant predictor of Internet use. This suggests that even though the Internet is open, there are still enough costs associated with its use that firm resources matter. There were some industry differences, with greater Internet use in the information industries (publishing and advertising) than in manufacturing. Interestingly, there was no relationship between the use of electronic networks for transactions with a firm's major supplier and Internet use. This suggests that, at least in late 1996, the Internet was used in very different ways than the proprietary networks that firms relied on for transactions with their suppliers. Our earlier figure showing little use of the Internet for transactions supports this view.

Dependent Variable	**Internet Use**	
Independent Variables	**Std beta**	**Prob> |t|**
Industry dummies: Advertising	**.25**	**.05**
Pharmaceutical	-.01	ns
Publishing	**.42**	**.0001**
Firm Size	**.20**	**.05**
Importance of Electronic Links With Supplier	.12	ns
R-Square	**.21**	
Adj R-Square	**.19**	
N	**150**	

Table 4: Regression Predicting Internet Use

Our second hypothesis proposed that use of the Internet would be associated with greater access to the firm by a variety of external constituents, since the Internet's openness and shared costs make connections to any outside entity lower in cost and the same for all. This, of course, is the underlying mechanism that permits the firm to access a wider range of suppliers, and ultimately reduce lock-in. Regression results here offer fairly strong support for this hypothesis, but with some very interesting qualifications (Table 5). The more firms relied on network links with their major supplier, the more external constituents such as suppliers, other business partners, customers and the public, accessed the firms by computer networks. This is basically true almost by definition, but, note that as firms used the Internet more, external access was increased over and above the increases due to their specific supplier network links. This result suggests that the Internet did open firms up to greater access by their external constituents.

However, the interaction between the Internet use and firm size is especially noteworthy (Figure 2). Smaller firms were more likely to experience greater external constituent access with increased use of the Internet, while there was actually lower external constituent access for the larger firms who went on the Internet. This suggests that among larger firms, the Internet served different purposes. At least in 1996, the Internet had not replaced the use of other types of interorganizational networking by large firms to connect electronically with external constituents. On the other hand, smaller firms appeared to be using the Internet as a surrogate for proprietary network links, and for them, the Internet increased their accessibility to external constituents.

Dependent Variables	External Constituent Access	
Independent Variables	**Std beta**	**Prob > |t|**
Industry dummies:		
Advertising	.15	ns
Pharmaceutical	-.01	ns
Publishing	.15	ns
Firm Size	.10	ns
Importance of Electronic Links With Supplier (E-link)	**.34**	**.0001**
Internet Use	**.21**	**.05**
Interaction of E-link to Supplier and Internet Use	-.08	ns
Interaction of E-link to Supplier and Size	.11	ns
Interaction of Internet Use and Size	**-.18**	**.05**
R-Square	**.28**	
Adj R-Square	**.24**	
N	**150**	

Table 5: Regressions Predicting Access to Firm By Computer Network

Table 5. Regressions Predicting Access to Firm by Computer Network

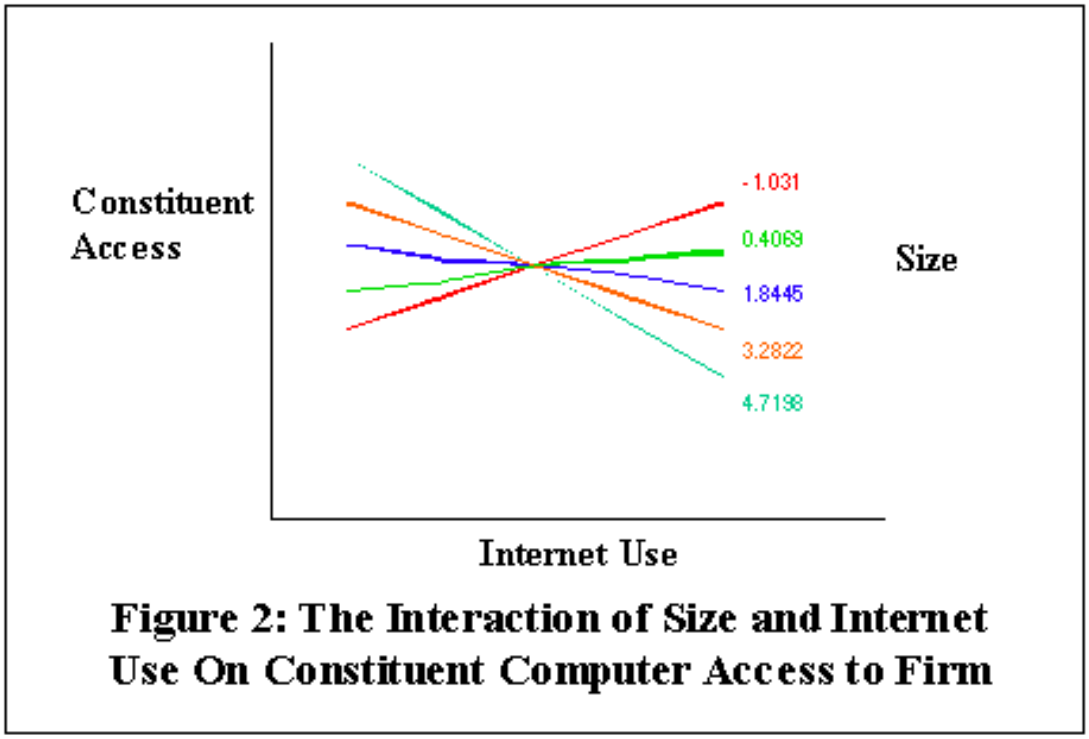

Figure 2: The Interaction of Size and Internet Use On Constituent Computer Access to Firm

Our third hypothesis proposed that Internet use would be associated with reduced lock-in with suppliers. We had four measures that tapped different aspects of lock-in: the proportion of the needed input purchased from a firm's primary supplier, the numbers of years the firm had been doing business with their primary supplier, the extent to which the firm had made specific investments in hardware or software to work with their primary supplier, and the extent to which working with their primary supplier required specific knowledge from the firm. Regression analyses offered weak and somewhat mixed support for this hypothesis (Table 6). Firms who had electronic connections with their primary suppliers were more likely to have made specific investments in equipment and knowledge, which suggests that such network use was associated with more lock-in. Using the Internet was unrelated to these measures of lock-in. However, the interaction effect on the proportion of the input acquired from the primary supplier reveals interesting network effects (Figure 3). When firms that relied more on any electronic links to their major suppliers also used the Internet more, they bought *less* of the needed input from those particular suppliers. This result suggests that increased Internet use reduced dependence on suppliers, but only for firms that had already been engaging in electronic transactions to purchase needed inputs. This result is suggestive of an important market structure effect of the Internet: It appears to reduce lock-in, but only among those firms that already consider electronic transactions with their main supplier to be important.

Dependent Variables	Percent Purchased from Supplier		Years Buying from Supplier		Investment in Specific Equipment		Investment in Specific Knowledge	
Independent Variables	**Std beta**	**Prob> |t|**	**Std beta**	**Prob > |t|**	**Std beta**	**Prob> |t|**	**Std beta**	**Prob> |t|**
Industry dummies: Advertising	-.02	ns	-.13	ns	.04	ns	-.11	ns
Pharmaceutical	.09	ns	-.17	.10	-.01	ns	-.14	ns
Publishing	**.28**	**.05**	-.06	ns	.15	ns	-.11	ns
Firm Size	-.09	ns	**.31**	**.001**	-.03	ns	-.07	ns
Input Asset Specificity	.03	ns	-.16	ns	.03	ns	-.04	ns
Importance of Electronic Links With Supplier	-.11	ns	-.10	ns	**.49**	**.0001**	**.32**	**.001**
Internet Use	-.11	ns	.10	ns	.03	ns	-.06	ns
Interaction of E-link to Supplier and Internet Use	**-.19**	**.05**	-.07	ns	.08	ns	.03	ns
Interaction of E-link to Supplier and Size	.04	ns	-.18	.10	-.10	ns	.07	ns
Interaction of Internet Use and Size	-.06	ns	-.08	ns	.03	ns	.03	ns
R-Square	**.18**		**.15**		**.27**		**.11**	
Adj R-Square	**.11**		**.08**		**.22**		**.05**	
N	**141**		**150**		**150**		**150**	

Table 6: Regression Predicting Indices of Lock-in

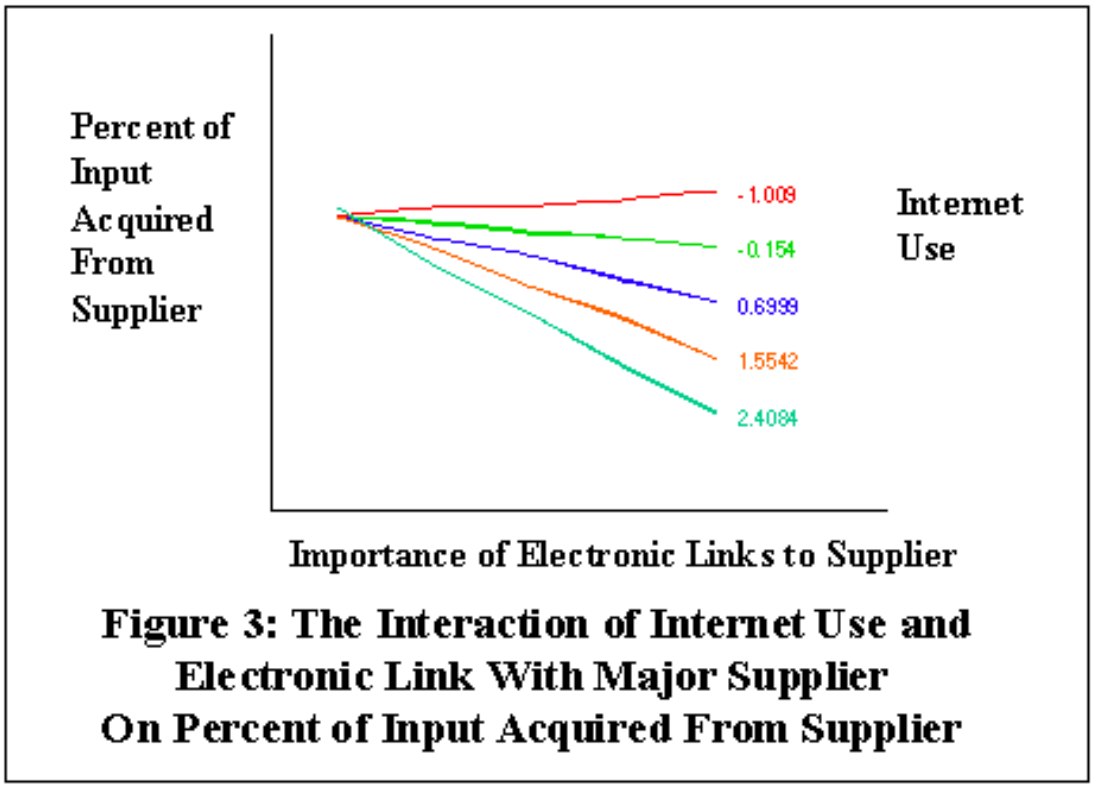

Figure 3: The Interaction of Internet Use and Electronic Link With Major Supplier On Percent of Input Acquired From Supplier

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Discussion and Conclusions

Our secondary analysis of the Kraut et al (1998) data has provided mixed support for the expectation derived from transaction cost economics that the Internet will influence market structure by limiting supplier power and reducing lock-in. Internet use was related to increased computer-based access to a firm from external constituents. We also found some evidence for an Internet effect on a direct measure of lock-in, i.e., the proportion of a needed input that is purchased from a firm's major supplier, but only for firms that already relied on network-based transactions with their major supplier. We found no evidence that using the Internet reduces the supplier-specific assets needed to do business with suppliers.

The analyses did reveal, however, that a number of the influences of network use were moderated in some way by the size of the firm. Larger firms used the Internet more. In contrast, smaller firms with greater use of the Internet were more likely than larger firms to experience increased access from external constituents.

One interpretation of these findings is that, like other technological innovations, the Internet requires

resources to gain from its use, and therefore larger firms do use it more (Tornatsky and Klein, 1982). But in this study, larger firms did not use the Internet to give greater computer access to external constituents, perhaps because they were already using electronic connections with their major suppliers. It would appear that the primary use of the Internet was for providing product information, not for executing transactions. Presumably, larger firms had access to more secure network connections for transactions, and, in 1996 at least, were not willing to trust the Internet for these purposes. On the contrary, resource-constrained smaller firms might have turned to the Internet because it did offer an affordable means of electronically networking with their external constituents. Such Internet use does appear to have reduced lock-in, —as indicated in the proportion of inputs acquired, with key suppliers, but only for those firms that were already conducting electronic transactions with their suppliers in the first place.

As a final note, our analysis has to be considered tentative, given the state of Internet use at the time data were collected. In late 1996, although there were already clear trends towards business use of the Internet and several important business-to-business initiatives, such as CommerceNet, it may simply have been too early for notable market structure effects to appear. The tendencies we see in our data may be the early signs of influences in the same direction, or they may be simply holdover effects from pre-Internet networking approaches. Clearly, the new growth in business-to-business portals over the past year signifies important market structure impacts. New research that explicitly examines the way in which these new portals operate to structure the relationships between buyers and sellers is now needed. Are portals, for example, only used by firms to identify a relevant trading partner, with whom they then develop a longer term relationship? Or are portals turning the procurement process across many industries largely into a spot market structure? Who is benefiting from such electronic marketplaces? Does firm size still enable either buyers or sellers to extract greater benefit from such electronic market exchanges, or is the power of larger players reduced? Answers to such questions can help shape business practice and information technology policy in the coming years as the Internet matures as a venue for conducting business.

Footnotes

[1] Since we are using the same data as the Kraut et al (1998) study, when we use their scales, we provide the original reliability alphas that they reported.

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Chapter 4

Technical correspondance

Objectives :

- Free Reading
- Comprehension: Differentiating between Main Ideas and Supporting Details
- Understanding Affixation and Roots Word Formation
- Corresponding with a Journal
- Extensive Reading

Time Now :

sec1

1. Reading

Available online at: http://www.ascusc.org/jcmc/vol6/issue4/
Retrieved 28 August 2004

Annenberg School for Communication

Journal of Computer-Mediated Communication

July 2001 Margaret McLaughlin and Sheizaf Rafaeli, Editors

Volume Six, Issue Four HEALTH AND THE NEW MEDIA
Special Issue Editor, Pamela Whitten, Michigan State University

In this issue:

The E-Health Market

The best chance for success in the delivery of online health care and services may exist through the combination of a traditional business with a physical site and a convenient Web presence, a "click and mortar" paradigm.

Online Credibility

Millions of Americans use the Internet as a resource for health information. Medical professionals do not author an extensive amount of online health information, which means that people who are ill may not get the information they need to obtain proper care. One way to begin addressing this problem is to assess perceptions of credibility about information found online.

Behavioral E-Health

Barriers to psychotherapy online include lack of guidelines, screening tools, treatment protocols, and security. Psychotherapists are advised to proceed cautiously, yet steadily, in utilizing new media.

Pediatric Telemedicine

Telemedicine will have many pediatric applications over the next five years and beyond, providing services and information to families. The authors describe how pediatricians who provided telemedicine services between a university medical center and an urban school district perceived technology use and patient relationships in the telemedicine program.

E-Health in Singapore

Wreless, integrated computer telephony, speech recognition, digital TV, and collaborative tools enhance physician-patient communication as well as access to health related transactions online. The authors evaluate the impact on Singapore healthcare.

Telehospice

In 2000, a bi-state telehospice project was launched in Michigan and Kansas, designed to provide end-of-life services to hospice patients and their caregivers. The authors report that hospice providers are cautiously enthusiastic about telehospice, but initially skeptical about comparable quality to traditional visits. Patients and caregivers using telehospice, on the other hand, are uniformly positive and wish to see increased utilization within their own care plans.

Telepsychiatry

Analyses of 43 psychiatric interviews with 14 different patients using an interactive videoconferencing system reveal that the telecommunications link compared favorably to face-to-face encounters in assessments by physicians and patients, although there were drawbacks.

2. Comprehension Check

- Reading
- Language

Reading

Exercise 1

Read this web page on "health and the new media", then select the statement that best expresses the main idea of each paragraph.

1. **Online credibility**

   @. U.S. Internet users find enough information for proper health care online.
   A. U.S. Internet users do not find enough information for proper health care online.
   B. U.S. Internet users perceive health care information available online incredible.
   C. There's a problem of credibility between Internet users and health information online.

2. **Pediatric telemedicine**

   @. Pediatricians' perceptions of technology use and patient relationships in a telemedicine program.
   A. In the coming years, telemedicine will have many important pediatric applications.
   B. Pediatricians providing telemedicine services need to be aware of the patients' relationships in the program.
   C. Technology has always had a role in providing pediatric information for families.

3. **Telehospice**

   @. Unlike hospice providers, telehospice caregivers and patients are satisfied with the services.

   A. The purpose of the project is to offer end-of-life services for both patients and caregivers.

   B. Telehospice services were initially comparable to traditional hospice visits.

   C. The authors are both enthusiastic and sceptical about telehospice services.

Exercise 2

Answer the following questions based on information in the web page.

1. T/F e-health commerce is dependent on a mixture of factors not solely technology.
2. T/F There are more than four barriers to introducing psychotherapy online.
3. T/F Singapore is among the countries benefiting from sophisticated technology in health services.
4. T/F There are positive as well as less positive aspects for using the new media in telepsychiatry.

Exercise 3

Fill in the table with the appropriate form of the word.

Verb	Noun	-ED form
……	……	**perceived**
assess	……	……
……	**treatment**	……
……	……	**encountered**
advise	……	……

……	……	**increased**
integrate	……	……
……	……	**recognized**

2. Comprehension Check

- Reading
- Language

Language

Available online at: http://www.writing.eng.vt.edu/exercises/grammar4.html
Retrieved 28 August 2004

Each of the following paragraphs has four mistakes in grammar, punctuation, or usage. Possible mistakes are as follows: run-on, fragment, subject-verb disagreement, wrong word, missing comma, undesired comma, colon error, unclear pronoun reference, and possessive error. In order of mistakes through the paragraph, click on the word(s) or punctuation that causes the mistake. Corresponding information for this exercise can be found in **The Craft of Editing** (denoted *CE*) and **The Craft of Scientific Writing** (denoted *CSW*). To make this exercise even more challenging, remove the underlining-of-links option from your browser's list of preferences.

Paragraph #1

A greenhouse is a glass building **used** to grow plants. A greenhouse has transparent glass **that** allows the sunlight to pass **through, but** does not allow the heat inside to escape. The same **affect** occurs on the earth. The **suns** radiation passes through the atmosphere to heat the earth's surface. When **heated**, **the earth's** surface produces infrared **radiation, which** has a longer wavelength than that of sunlight. This infrared radiation rises into the atmosphere where **gases, such** as carbon dioxide, **prevents** the infrared radiation from escaping into space. The concentrations of these **gases which** are called greenhouse gases, control how much infrared radiation escapes. The retained radiation heats the earth's

atmosphere, thus keeping the planet warm.

Give up?

A greenhouse is a glass building **used** to grow plants. A greenhouse has transparent glass **that** allows the sunlight to pass **through, but** does not allow the heat inside to escape. The same effect occurs on the earth. The **suns** radiation passes through the atmosphere to heat the earth's surface. When **heated, the earth's** surface produces infrared **radiation, which** has a longer wavelength than that of sunlight. This infrared radiation rises into the atmosphere where **gases, such** as carbon dioxide, **prevents** the infrared radiation from escaping into space. The concentrations of these **gases which** are called greenhouse gases, **control** how much infrared radiation escapes. The retained radiation heats the earth's **atmosphere, thus keeping the planet warm.**

Give up?

A greenhouse is a glass building **used** to grow plants. A greenhouse has transparent glass **that** allows the sunlight to pass **through, but** does not allow the heat inside to escape. The same effect occurs on the earth. The sun's radiation passes through the atmosphere to heat the earth's surface. When **heated, the earth's** surface produces infrared **radiation, which** has a longer wavelength than that of sunlight. This infrared radiation rises into the atmosphere where **gases, such** as carbon dioxide, **prevents** the infrared radiation from escaping into space. The concentrations of these **gases which** are called greenhouse gases, **control** how much infrared radiation escapes. The retained radiation heats the earth's **atmosphere, thus keeping the planet warm.**

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Paragraph #2

During the last century, the concentrations of greenhouse gases **have increased** substantially [Holman, 1985]. Scientists believe that **further** increases could cause excess warming of the **earth's** climate. Moreover, many scientists believe this warming could produce side **effects**. **For example, the changing of the earth's wind patterns.** These wind patterns control the amount of rain received in a particular area. If the greenhouse gases warm the **earth's** climate too much, areas that now receive plenty of rainfall could become **deserts, moreover,** some scientists speculate that additional increases in warming could cause another **effect, a rise** in the ocean levels ["Greenhouse," 1990]. How would this rise occur? An increase in global temperature would melt the polar ice **caps, thus emptying more water into the oceans. They** also predict that this ocean **rise, which** may be as high as **1 meter could** flood port cities and coastal lands.

Give up?

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Paragraph #3

The gas **that** contributes most to the greenhouse **effect, is** carbon dioxide [Houghton, 1990]. Carbon dioxide cannot be seen, **smelled,** or tasted. In fact, **its** not even considered a pollutant. Plants use carbon dioxide in combination with chlorophyll, water, and sunshine for **photosynthesis, which** is a process essential to life. Besides aiding in **photosynthesis, it** also absorbs the earth's radiation. This gas occurs naturally in the **atmosphere, however,** man has dramatically increased the concentration of carbon dioxide over the last twenty

years.

Give up?

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You have reached the end of this exercise.

Key to Advanced Exercises on Grammar, Punctuation, and Usage

1- Congratulations, you have found the paragraph's first mistake.

Discussion: wrong word (*CE,* page 97; *CSW,* page 269).

2- Congratulations, you have found the paragraph's second mistake.

Discussion: possessive mistake (*CE,* page 124; *CSW,* page 271; or **Strunk).**

3- ongratulations, you have found the paragraph's third mistake.

Discussion: subject-verb disagreement (*CE,* pages 131-132; *CSW,* page 259-260).

4- Congratulations, you have found the paragraph's final mistake.

Discussion: missing parenthetical comma (*CE,* pages 103-104; *CSW,* page 263).

2-1- Congratulations, you have found the paragraph's first mistake.

Discussion: not a complete sentence (*CE,* page 111).

2-2- Congratulations, you have found the paragraph's second mistake.

Discussion: run-on sentence (*CE,* page 129; *CSW,* page 258).

2-3- Congratulations, you have found the paragraph's third mistake.

Discussion: ambiguous pronoun reference (*CSW,* pages 93-94; or **Writing Center**).

2-4- Congratulations, you have found the paragraph's final mistake.

Discussion: missing parenthetical comma (*CE,* pages 103-104; *CSW,* page 263).

3-1- Congratulations, you have found the paragraph's first mistake.

Discussion: unwanted parenthetical comma (*CE,* pages 103-104; *CSW,* page 263).

3-2- Congratulations, you have found the paragraph's second mistake.

Discussion: incorrect usage (*CE,* page 117; *CSW,* page 271).

3-3- Congratulations, you have found the paragraph's third mistake.

Discussion: unclear pronoun reference (*CSW,* pages 93-94; or **Writing Center**).

3-4- Congratulations, you have found the paragraph's final mistake.

Discussion: run-on sentence (*CE,* page 129; *CSW,* page 258).

Retour

3. Language Study
Prefixes, Suffixes and Roots

Link to list of prefixes, suffixes and roots

Exercise 4

Word analysis can help you to guess the meanings of unfamiliar words. Use the information provided to give a description or definition of the following words.

1 *bi-* means *two*, so what is "bistate"?

……..

2. *tele-* means *far*, so what are "telehospice", "telepsychiatry", "telecommunication"?

……

3. *uni-* means *one*, so what is "uniformly"?

……

4. *-less* means *without*, so what does "wireless" mean?

……

Auto-evaluation

Exercise 5

Study the list of affixes, then do the exercises below.

1. Check the words where *in-* means *not*. Watch out; there are false negatives in this list.

Inject indefinite inactive integrative invisible

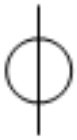
Invaluable inside insane inspect intensive

2. For each item, select the best definition of the italicized word or phrase, or answer the question

2.1. Which circle is *bisected* ?

a . 

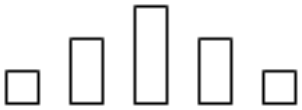
b . 

c . 

d . 

2.2. Which of the following designs is *asymmetric*?

a . 

b . 

c . 

d . 

2.3. He was interested in *anthropology*

a. the study of apes
b. the study of insects
c. the study of royalty
d. the study of humans

2.4. To apply to some universities, you must fill out the application form and include a short *autobiography.*

a. sample of your writing
b. account of four life written by you
c. list of courses you have taken
d. list of schools you have attended

2.5. The police officer used a *megaphone.*

a. a portable radio
b. a long stick
c. an instrument to make one's voiœ louder
d. a telephone in the car

2.6. Dr. Swanson has written articles about *interstellar* travel.

a. underwater
b. long-distance
c. high-speed
d. outer space

- Question 1
- Question 2

Exercise 6

Definitions of these words appear on *the right. Put the letter of the appropriate definition*

next to each word

1. --------- psychologist 2. --------- philanthropist 3. --------- ophisticated 4. --------- biochemist 5. --------- biology 6. --------- antibiotic	a. worldly-wise; knowing; finely experienced b. a substance capable of killing microorganisms c. the science of life or living marrer d. one who studies the chemistry of living things ' e. one who shows love for humanity by doing good works for society f. one who studies mental processes and behavior
 Auto-evaluation1	
7. --------- multi~olored 8. --------- asteroid 9. --------- periscope 10. ---------astronomer 11. --------- unilateral 12. --------- bilateral	a. starlike; shaped like a star. b. affectmg two sides or parties c. having many colors d. pertaining to, involving, or affecting only one side e. a scientific observer of the planets, stars, and outer space f. an optical instrument that allows a submarine to observe the surface *from* below the water
 Auto-evaluation2	

13. --------- cycle 14. --------- semicircle 15. --------- trilogy 16. --------- astrology 17. --------- ultraviolet 18. --------- ultranationalism	a. a recurring period of time in which certain events repeat them- selves in the Saille order and at the Saille intervals b. the study of the influence of the stars on human affairs c. excessive devotion to national interests as opposed to international ' considerations d. a series or group of three related dramas, operas, novels, etc. e. invisible rays of the spectrum lying beyond the violet end of the visible spectrum f. a half circle
 Auto-evaluation3	**(Exercise adapted from *Reader's Choice* by Slberstein, Dobson, and Clarke, 2002)**

Prefixes, Suffixes, and Roots

---

a-, an- without, lacking, not

ante- before

bene- good

bi- two

by- aside or apart from the common, secondary

circum- around

corn-, con-, col-, cor-, co- together, with

contra-, anti- against

de- down from, away

dia- through, across

epi- upon, over, outer

hyper- above, beyond, excessive

hypo- under, beneath, clown

in-, im-, il-, ir- in, into, on

in-, im-, il-, ir- not

-ced- go, move, yield

-chron- time

-corp- body

-cycle- circle

-derm- skin

-dic-, -dict- say, speak

-duc- lead

-fact-, -fect- make, do

-flect- bend

-gam- marriage

-geo- earth

-graph-, -gram- write, writing

-hetero- different, other

-homo- same

-hydr-, -hydro- water

-log-, -ology- speech, ward, study

inter- between

intro-, intra- within

micro- small

mis- wrong

mono- one, alone

multi- many

peri- around

poly- many

post- after

pre- before

re-, retro- back, again

semi- half, partly

sub-, suc-, sur-, sug-, sup-, sus- under

super- above, greater, better

syn-, sym-, syi- with, together

trans- across

tri- three

ultra- beyond, excessive, extreme

-man-, -manu- hand

-**mega**- great, large

-**mit-, -miss**- send

-**morph**- form, structure

-**mort**- death

-onym-, -nomen- name

-**ortho**- straight, correct

-**pathy**- feeling, disease

-**phil**- love

-**phon**- sound

-pod-, -ped- foot

-pon-, -pos- put, place

-**polis**- city

-**port**- carry

-**psych**- mind

-scrib-, -script- write

-sequ-, -secut- follow

-son- sound

uni- one

Stems

-anthro-, -anthropo- human

-arch- first, chief, leader

-aster-, -astro-, -stellar- star

-audi-, -audit- hear

-auto- self

-bio- life

-capit- head, chief

-spect- look at

-spir- breathe

-soph- wise

-tele- Far

-theo-, -the- god

-therm-, -thermo- heat

-yen-, -vene- come

-ver- true

-vid-, -vis- see

-voc-, -vok- cali

Suffixes

-able, -ible, -ble capable of, fit for

-ate to make

-er, -or one who

-fy to make

-ic, -al relating to, having the nature of

-ism action or practice, theory or doctrine

-ity condition, quality, state of being

-ize to make

-ness condition, quality, state of being

-ness condition, quality, state of being

-ous, -ious, -ose full of; having the qualities of

-tion, -arion condition, the act of

4. Writing

S Limam is a young Tunisian information technology researcher looking for an international publication of his article *"The Social construction of communication technology".* Correspondance with an international journal whether by email or letter is not always easy for him as he has to find the right words and the right letter format. Can you help him?

- Exercise 1
- Exercise 2
- Exercise 3
- Exercise 4

Exercise 1

After writing the first submission letter below, the organization of the diferent parts of the letter got mixed up. Can you put them back in order?

November 5, 2003

Professor S. Rafaeli

Department of Information Technology

The Annenberg School at USC

England

Dear Professor Steinberg,

Will you please consider the enclosed manuscript for publication

in the Journal of Computer-Mediated Communication.

Thank you.

Very truly yours,

S. Limam

Assistant Professor

Answer

Exercise 2

Unfortunately, his first submission was not successful. So here's his second submission to another journal. This time, he could not find some of the words for his letter. Choose words from the list to fill in his letter.

January 3,

2004

Professor M. McLaughlin

Dept. of Computer Research

Box 607 UMCH

University of Iowa

Iowa, 34256

Dear Professor McLaughlin

The…… **(1)** paper is …….. **(2)** for possible…….. **(3)** in Computer Research. Your …….. **(4)** will be greatly appreciated.

I have …….. **(5)** the original figures …….. **(6)** the review.

Sincerely yours,

S. Limam

Assistant Professor

List of words:

(a) withheld - **(b)** enclosed - **(c)** pending - **(d)** consideration - **(e)** submitted - **(f)** publication

Answer

Exercise 3

Four months have gone by, S. Limam did not receive a response from the journal. Here's

his letter asking the editor of the journal about his paper. Correct all punctuation and spelling mistakes in it.

april 2 2004

professor m. mcLaughlin

dept. of computer Research

box 607 UMCH

University of iowa

iowa, 34256

dear P McLaughlin

four months ago i submitted an article for publication in computer researche as I have not received a response I am interessted in obtaining information on the status of my paper i look forward to hearing from you at your earliest convenience

cordially

S Limam

Answer

Exercise 4

S. Limam has finally received an acceptance but some major changes are needed in his article. Here's his resubmission letter but the sentences are not in order. Rearrange the sentences from 1 to7 to get a coherent letter.

June 4, 2004

Professor M. McLaughlin
Dept. of Computer Research
Box 607 UMCH
University of Iowa
Iowa, 34256

Dear Professor McLaughlin and the reviewers

A. …….

in accordance with the comments of the reviewers, we have:

B. …….

ii) elaborated upon the meaning and influence of the "motor ability" parameter

C. …….

we hope that you will find this manuscript in order for publication

D. …….

thank you for the opportunity to revise this paper for resubmission

E. …….

i) clarified the goals and purposes of the device

F. …….

Thank you for you and the reviewer's consideration

G. …….

iii) inserted the omitted reference and corrected spelling errors

Sincerely,

S Limam

Answer

Answer key

Exercise 1

November 5, 2003

Professor S. Rafaeli
Department of Information Technology
The Annenberg School at USC
England

Dear Professor Steinberg,

Will you please consider the enclosed manuscript for publication in the Journal of Computer-Mediated Communication.

Thank you.

Very truly yours,

S. Limam
Assistant Professor

Answer key

Exercise 2

1. enclosed
2. submitted
3. publication
4. consideration
5. withheld
6. pending

Answer key

Exercise 3

April 2, 2004

Professor M. McLaughlin
Dept. of Computer Research
Box 607 UMCH
University of Iowa
Iowa, 34256

Dear Pr McLaughlin

Four months ago I submitted an article for publication in Computer Research. As I have not received a response, I am interested in obtaining information on the status of my paper. I look forward to hearing from you at your earliest convenience.

Cordially,

S. Limam

back

Answer key

Exercise 4

1. D
2. A
3. E
4. B
5. G
6. C
7. F

---

5. Extensive reading

Available online at: http://www.ascusc.org/jcmc/vol8/issue3/Oblak.html
Retrieved 28 August 2004

Extensive reading:
What are the main obstacles which discourage Internet users from more direct involvement in political life?

JCMC 8 (3) April 2003

Boundaries of Interactive Public Engagement: Political Institutions and Citizens in New Political Platforms

Tanja Oblak

University of Ljubljana, Slovenia

Abstract

Political participation essentially describes opportunities of private citizens to affect the

decision-making processes within different spheres of social life. From the citizens' perspective, the demand for greater political participation is usually related to the expectation of being able to influence the decisions taken by the government or the administrative systems more effectively (Fuchs, GuidoRossi, & Svensson, 1998, p. 324). Recently, this idea also became applifable to the new digital, interactive practices which have formed on the basis of the new computer or electronic networks. The realization of participatory potentials of new computer technologies is often presented and expected in the "images of electronic democracy" as a more direct democratic model (Barber, 1984; Budge, 1996; Grossman, 1995). In general, the more direct forms of democracy presuppose that a) computer technology is easy to use, accessible to all and interactive; b) that the usage of technology enriches a "good citizen" and that c) with the help of technology more active involvement in the decision-making process develops. This paper seeks to explain and to explore the possibilities for the revitalization of more interactive, more open political engagement. Computer-mediated communication is an excellent starting point for expanding and strengthening participation in political processes, but the solution is not in technology, as the reason for mostly negative answers to such dilemmas are not questions of "technological inadequacy". The problems and obstacles lie primarily in the politics that stimulate the use of technological potentials.

Introduction

Many authors agree that the development and expansion of the new form of 'electronic public sphere' or even the new form of 'electronic democracy' is mostly determined by the quality and effectiveness of new computer-mediated communication practices (Barber, 1984; Buchstein, 1997; Budge, 1996; Coleman, 1999; Grossman, 1995; Poster, 1997; Tsagarousianou, 1998; Wilhelm, 2001). Computer-mediated communication is seen as a promising tool, which enables the formation of communicative interaction on many different levels: interaction between citizens through formation of new interests groups, which do not

necessarily exist offline; interaction between citizens and other actors of civil society who already have established distinctive interest groups, and civil associations; and, finally, interaction between citizens and institutionalized political actors, representatives and members of the governmental elite. These new possibilities for social integration and recent popularization of computer-mediated communication have raised many issues with respect to the *changing role and new forms of political participation*. As the recent literature in the theory of democracy reveals (Barber, 1997; Budge, 1996; Grossman, 1995), expanding participation practices to include new digital, more interactive facilities, formed on the basis of the new information services and computer networks, challenges existing understandings of the idea of political participation itself.

Participation is, from a general perspective, a social process that may provide a bridge between the individual (citizen) and politics. According to Brezov?ek (1995, p. 202), participation is a process that combines four basic criteria: (1) individuals are included; (2) it is voluntary; (3) it refers to a specific activity, which is (4) directed towards influencing the government or authorities in general. Participation is thus a communication process in which individual citizens communicate their wishes to the representatives of political authorities (Brezov?ek, 1995, p. 199). It entails both horizontal and vertical dimensions; the horizontal level is expressed in the achieved level of political information, political interest, willingness and motivation to participate; the vertical, on the other hand, refers to immediate partaking in governmental activities and influence on political representatives. Political participation, therefore, essentially describes opportunities of private citizens to affect the decision-making processes within different spheres of social life.

It was Ithiel de Sola Pool who as early as the 1970s perceived the most important advantage of new technologies to lie in the fact that they may escape the limitations of existing means of interaction between citizens and politics: "Better communication technologies that create more efficient, more extensive, and more intensive interaction between public figures and their constituents may reduce the sense of alienation by making the public figures better able both to respond to their constituents and to influence them" (de Sola Pool, 1998, p. 298). With the general popularization of the Internet, similar positive expectations have developed: "Interactive information technology has the potential to become the twenty-first century's electronic version of the meeting place on the hill near the

Acropolis, where twenty-five hundred years ago Athenian citizens assembled to govern themselves" (Grossman, 1995, p. 49). Along with the implementation of new computer technologies within the existing political frameworks, it has been argued that new forms of political action are emerging (Barber, 1984; Grossman, 1995; Poster, 1997): "instead of a show of hands we have electronic polls, instead of a single meeting place, we have far-flung, interactive telecommunication networks that extend for thousands of miles, and in place of personal discussion and deliberation, we have call-ins, talk shows, faxes, online computer bulletin boards" (Grossman, 1995, p. 48). Judging from the rich practical experience with implementation of new communication technologies on the local and also on the national level (projects such as PEN in Santa Monica, Digital City in Amsterdam, IperBola in Bologna and Network Perikley in Athens), individual citizens are offered more effective and more accessible means to engage in participation on the horizontal as well as the vertical level.

The question, however, is to what extent have the characteristics, conditions and outcomes of participation been transformed or changed because of the introduction and explosive spread of new communication technologies? Compared to the classical forms of participation, the computer-mediated versions of political participation activity, which are enabled and realized with the help of new interactive computer networks, are more conditioned by *the interactive, two-way communication flows* that support a single participatory action. In this sense, the need for understanding political participation as primarily a communication process becomes even stronger. However, the problem arises when these new communication potentials of interactive computer technologies are neither fully explored nor used. Instead of contributing to the integration between civil actors, citizens and other groups within the sphere of political elite the 'new participation platforms' are limited and reduced to simple 'information places.' As a consequence, the processes of opinion exchange, public discussion or deliberation remains more random occurence than a common, expected and valued practice in this new political space.

This problem is important to explore in further detail because it has been argued that new communication technologies have inscribed new *participatory potentials*, which enable more direct, and thus less mediated relations between citizens and their governments. In general,

the supporters of more direct forms of political participation presuppose that: a) technology is easy to use, accessible to all and interactive; b) that the usage of technology enriches a 'good citizen' and that c) with the help of technology more active involvement in decision-making process develops. My purpose in this paper is to examine such assumptions and expectations and to explore their strength and realization based on empirical findings collected within the Slovenian context.

In general, data on political participation online, perceptions of the democratic potential of the Internet among its users, and their critical attitude stowards the limited interactivity of governmental Web sites clearly reveal the current gap between positive expectations on the one hand and practical limitations of these potentials on the other. However, such findings are at the same time limited to a specific empirical case study. The aim of this study, resulting from two Web surveys on political impacts of the Internet (RIS, 2001; SMIS, 2002) and content analysis of governmental Web sites (SMIS, 2002), is not to generalize the findings to a population of Slovenian Internet users. With the help of empirical studies, gathered elsewhere (Carter, 1999; Davis, 1999; Hale, Musso, & Weare, 1999; Nixon & Johansson, 1999), our purpose is to examine critically the important obstacles to the 'participatory potential of new communication technologies' in the hope that some new thesis might emerge to guide further research.

First, I give attention to the approach that largely contributed to the popularization of new communication technologies as new 'participatory tools.' Here, the conceptualization of the direct vision of teledemocracy is briefly presented. Following the three main assumptions on how the new communication technologies might affect political participation, specific expectations are examined in relation to recent empirical practices. With respect to the normalization of cyberspace thesis (Resnick, 1998), which emphasizes the growing importance of Web representations as the main structures in cyberspace, and its changing communicative nature as a consequence (Oblak, 2002), the understanding of a new political platform as used here is closely related to the *online presence of political institutions*. The explosion of institutional images online became the most dominant pattern of the dispersion of political institutions on the Internet. The question is to what extent the Slovenian governmental institutions use Web representations as a bridge to their citizens. The present paper argues that there are still substantial traces of technological determinism in the way

political institutions think of cyberspace. A more appropriate approach to these questions is, I suggest, not in the perception of what technology can do for us, but in finding out *what determines the specific use of the technological potential of CMC*.

Political Participation in Teledemocracy

There is no consensus about what kinds of effects communication technologies might have on the relationship between the state and its citizens. There are many answers to such dilemmas (see for example Oblak, 2001), but the question of differences or similarities between them far exceed the purpose of this text. Nevertheless, a brief look in the history of these several ideas suggests that one of the first scenarios that strongly emphasized and later also effectively popularized the participatory potential of new communication technologies began in the context of the so-called 'tele-democracy' project (Arterton, 1987; Baker, 1976; Becker, 1981; Toffler, 1980; Naisbitt 1982).

The period of "active promotion of the term teledemocracy" (Friedland, 1996, p. 187) goes back to the early 1980s in the USA[1], when increased participatory potential was seen as inviting participatory democracy" (Barber, 1984) or "plebiscitary democracy" (Becker, 1981). When authors thought about the effects of new technologies, they usually only discussed the participatory potential. Practical experiments, such as Berks Community Television (BCTV), Hawaii Televote, MINERVA and OPEN/net, which emphasized the participatory potential of communication technologies at that period (Arterton, 1987), reinforced the impression that most of these examples were connected through their search for new procedures through which individuals could achieve greater impact on political decisions. Technology was seen as a quick, effective, accessible link that provided a direct connection with the government to anyone at any given moment. The participatory image of 'teledemocracy' is finally referred to another trend of that period, that is, to the vision that the reshaping of participatory processes is about to happen simultaneously with the uses of

several tele-technologies.

The general imagery provided by these attempts is closely related to the expected possibilities supposedly enabled by information and communication technologies. "Interactive systems have a great potential for equalizing access to information, stimulating participatory debate across regions, and encouraging multichoice polling and voting informed by information, discussion, and debate. It suggests ways to overcome the problem of scale and to defeat technological complexity by putting technology to work for popular democratic ends" (Barber, 1984, p. 276). Central to this understanding is the *transformation of communication flows*:

The most focused and decisive discussions of all might take place in informed groups, but not, given the interactive electronic networks into which everyone would be linked, necessarily face-to-face groups. One could imagine (...) that discussion and comment would flow upwards, downwards, sideways and beyond the boundaries of the political unit in which voting would take place. Far from an isolated individual sitting in front of a screen and pressing a button to vote, interactive communication could take place in the office or in the street as well as in the home, and it could link groups as well as individuals (Budge, 1996, p. 186).

Most importantly, the idea of new communication change attempts to *reform the role of citizens* within political process:

Citizens not only will be able to select those who govern them, as they always have, but increasingly they also will be able to participate directly in making the laws and policies by which they are governed. Through the use of increasingly sophisticated two-way digital broadband telecommunication networks, members of the public are gaining a seat of their own at the table of political power (Grossman, 1995, p. 4).

The three most representative authors who continued to point out the participative potential of new communication technologies in these last few years were Barber (1984), who was motivated by the search for 'strong democracy;' Grossman (1995), who sought to reaffirm the legacy of older traditions with his 'electronic republic;' and Budge (1996), who tried to

secure new conditions for a participatory democracy. Although their approaches to the impact of new technologies on democratic changes have been slightly different, they all may be characterized by their advocacy of 'direct' (Budge, 1996; see also Wilhelm, 2000) electronic democracy.

Grossman, formely the president of the Public Broadcasting System, is known as a more popular writer (Bimber, 1998; Davis, 1999). This perception is based on his rather uncritical conceptualization of the role of communication technologies in political processes. He argues, for instance: "In kitchens, living rooms, dens, bedrooms, and workplaces throughout the nation, citizens have begun to apply such electronic devices to political purposes, giving those who use them a degree of empowerment they never had before" (Grossman, 1995, p. 147). Grossman's main thesis concerning the shift to an 'electronic republic' is related to his idea about the 'third transformation' of democracy, portrayed as a return to the antique model of direct democracy. In other words, "in the electronic republic, public service telecommunications should become the centerpiece for responsible civic deliberation - the electronic public sphere - the equivalent of the ancient gathering place for the citizens of Athens on the hill called Pnyx" (Grossman, 1995, p. 215). Because of the rise of new communication technologies, according to Budge, it is now much more reasonable to counter many earlier criticisms of the participatory model. The arguments against these positions usually focused on their assumed plebiscitarian, immediate scheme of acting and also on the limits of their institutionalization. But with new communicative potential a new, more optimistic chapter in the development of a direct system of government is claimed to be emerging (Budge, 1996, p. 73).

Although each of the three authors presented here is inclined to favor a specific theoretical background, which results in different images of 'electronic democracy,' some of the characteristics overlap. Their common theoretical assumptions can be summarized with respect to the main subject of change and effects of communication technologies. There is a tendency in all three accounts to consider direct democracy as related to citizens rather than to political organizations. Also, when the authors address the role of communication technologies, they all suppose that interactive communication channels amplify the voice of the citizenry.

An Ideal Citizen: Informed and Interested in Political Involvement

The vision of electronic political participation as the forum for a more direct form of democracy assumes the existence of an ideal citizen, who seeks political information frequently, who is concerned about political issues and problems, and who is willing to express his or her opinions on a wide range of issues (see Grossman, 1995). Starting with the finding that "the ancient Greeks invested major resources and much time and effort to encourage what they called the public spirit in their republics" (1995, p. 239), Grossman argues for a cultivation of the 'good citizen.' In this respect he states that we need new ways of stimulating citizens for public participation. Communication technologies seem to be effective tools for citizens to select governors and participate in the formation of laws and policies. Interactive technology offers access to information, it seems, which is necessary for participation in decision-making. By enabling immediate insight into governmental work and into decisions made by other political institutions, an informed electoral body can be the result.

Davis' comment on such expectations is extremely negative. In his opinion, such an ideal citizen is more rare than commonplace. Most voters, much less most citizens, do not spend significant amounts of time collecting information about politics (Davis, 1999, p. 179). In addition, many authors argue that the Internet, which today is the most popular computer network, is mostly attractive to those media consumers who constitute the more politically active part of the population and who are already more interested in political issues. Hill and Hughes' (1996, p. 38) analysis of the differences between the Internet user and Internet activist, for instance, shows that Internet activists engage much more in information-seeking online and that they utilize a wider variety of other online sources then other Internet users. The mere existence of communication technologies, therefore, does not necessarily increase the level of political information between citizens.

Regardless of these skeptical comments, it is difficult to discount the idea that the Internet

with its several functions and services is not an effective tool for providing citizens with civic and political information. The information process is not limited just to Web presentations of several politically relevant institutions. A number of political actors also use other Internet application, of which the most popular is e-mail. The majority of US Governmental offices that receive e-mail report that they send an automated reply via e-mail promising a fuller reply via postal mail (Carter, 1999, p. 113). On the other hand, most information on institutional Web pages is also presented in easily accessible formats. Browsing through the websites of political institutions and searching for information enables more inclusive, more active and creative selection and reception of information than through the classical mass media.

At this point it may be valuable to explore in more detail to what extent these different political practices are used and are common for Slovenian Internet users. This section relies on empirical findings culled from the project 'Research on Internet in Slovenia' (RIS). This is a long-term project organized by the Centre for Methodology and Informatics at the Faculty of Social Science in Ljubljana and, since 1996, supervised by Vasja Vehovar. For the purpose of this paper, the results from a Web survey, conducted from July to September 2001, are used (RIS, 2001). The survey attracted almost 15,000 responses.[2] It was divided into two main parts: a general set of questions and 13 specific theme issues that were randomly accessible to respondents. Participants in the survey could choose between themes such as erotic, e-commerce, pharmacy, media, mobile phones, attitude towards Internet, politics, computer science, Web marketing, privacy and lifestyle. Almost all Internet users in Slovenia (450,000) were invited to participate in the survey. Due to the high response rate, the general results are quite representative of the population of users, but in some cases the data are merely informative and should not be generalized to the entire population of the Slovenian Internet users.

Judging from the data found among those Slovenian Internet users who selected a set of questions about the political impact of the Internet, it is possible to conclude that political participation online is extensive but in a limited sense (see Table 1). [3] Apart from visiting Web pages of political institutions (84% of respondents), searching official documents (80%), and participating in opinion polls (73%) all the other political actions are, on average,

not very common. Comparing them with other forms of participation that are obviously at the higher end of the participation ladder - making contacts with politicians through e-mail (40% of respondents), signing petitions (40%), or participating in computer-mediated political discussions (37%) - it becomes clear that these are the actions that demand far more active engagement. Actually, all *the dominant forms resemble the mediated forms of political activity that are usually extended through the classical mass media*. In this sense, they are given 'from the outside' and thus implicate the more passive form of political conduct, while for the other practices this is not necessarily true. It has been argued elsewhere (Gauntlett, 2000; Resnick, 1996) that in some respects browsing Web sites corresponds to the experiences we have with more 'traditional' mass media.

Did you ever ... by using the Internet?	**No, never**	**Yes, once or more often**	**Mean value**	**n**
Visit the Web page of any political institution (political party, Ministry, Parliament)	16%	84%	2.54	126
Search an official document (law or law proposal, political program)	20%	80%	2.48	126
Participate in online poll or survey on political issues	27%	73%	2.27	126
Write an e-mail message to the media (newspaper, radio, television)	54%	46%	1.76	126

Write and e-mail to a politician or political institution	60%	40%	1.63	126
Sign a petition or a letter of support	60%	40%	1.63	125
Participate in a discussion on a political issue	63%	37%	1.63	126

Table 1. Mean values and percentages for indicators of the variable "political activity through Internet."

Source: RIS (August, 2001) [4]

But the idea of civic education entails much more effort than just searching for and receiving information. As Hale, Musso and Weare (1999, p. 105) note, civic education must inspire individuals with ideas of a commonwealth, a sense of the common good and civic responsibility. In order to achieve this, citizens should be involved in activities that require confrontation with difficult value choices and also with the consequences of these choices. It is certain that the Internet offers support during two-way mediated communication processes, but to provide deliberative and recursive communication between citizens and government is a much more difficult engagement than simple provision of information.

However, through computer-mediated communication, whether in the form of e-mail or discussion fora, *the distance between the governing elite and the citizenry is shrinking*. The emergence of the World Wide Web established a new picture of political actors within the net, representing their own political programs, proposals and concrete decisions, thus enabling better information and more direct access to their work. Additionally, the interactive nature of computer-mediated communication enables the creation of new discussion fora, where individuals can exchange their opinions and listen to the views of others. The Internet could therefore reduce the cost of communication between two political spheres, between the state, on the one hand, and civil society and citizens, on the other. Access to many decision-makers is more open and potentially more direct. Questioning the extent of users' willingness to act politically through the Internet in these new political platforms should take

into account the diversity of several possible activities which new communication technologies enable. Moreover, what is important to explore is what meaning users attach to different processes in which they participate; how do they perceive the probable effects? This is especially important if we suppose that attitudes towards new, concrete possibilities in cyberspace can consequently also determine decisions about how often one should act, communicate or discuss using this new political platform.

Do you think that nowadays, with the existence of the Internet, it is easier to... n=123	**1 No, not at all easier**	**2**	**3**	**4**	**5 Yes, definitely easier**	**Mean value**
come to know the opinions of others	4.1	4.9	12.2	35.0	43.9	4.10
find people with similar interests	4.9	9.8	14.6	35.0	35.8	3.87
express your own opinions	6.5	10.6	13.0	29.3	40.7	3.87
join in professional debates	8.1	8.1	19.5	36.6	27.6	3.67
receive information from public institutions	27.4	18.5	21.8	16.1	16.1	2.75
make contacts with politicians (MPs, government, majors)	29.8	28.2	21.0	12.9	8.1	2.41

Do you think that nowadays, with the existence of the Internet, it is easier to... n=123	**1 No, not at all effective**	**2**	**3**	**4**	**5 Extremely effective**	**Mean value**
organise a group of like-minded	4.1	13.9	28.7	28.7	24.6	3.56
gather signed petitions	8.1	20.3	30.9	20.3	20.3	3.24
charity	4.1	21.1	36.6	23.6	14.6	3.24
propagate political aims	10.7	32.8	27.9	18.9	9.8	2.84
organise a mass protest	13.8	30.1	19.5	18.7	17.9	2.97

Table 2. Percentages and mean values for indicators of the variable "perception of democratic character of the Internet." Source: RIS (August 2001) [5]

Internet users generally regard the democratic potential of the Internet with extreme optimism. They make particularly positive judgements about the possibilities of getting to know the opinions of others, of finding people with similar interests and of expressing their own opinions. The most complicated aspect for them is, surprisingly, coming in contact with politicians, receiving information from political institutions and organizing a protest. Political action in the form of protest is perhaps difficult to imagine online, at least from the perspective of an average Internet user. But the other two - making contacts with politicians and receiving information from political institutions - judging from several practical experiences (Coleman, Taylor, & van de Donk, 1999) - should not be so difficult to achieve, at least from the technological point of view. Nevertheless, Internet users perceive them to be less accessible and more difficult. Their own experiences with interactions with political

actors within cyberspace apparently have achieved little success. As Richard argues, "without ensuring that administrations are adapted to this new environment of links and nodes, governments cannot expect to take an active role in a structure increasingly described as the model for a healthy civil society" (Richard, 1999, p. 85). The readiness to accept and respond to the rapid expansion of computer-mediated communication within the political sphere should be optimal in order to achieve and realize the potential of computer technologies.

Accessibility, Simplicity, and Interactivity of Technology

The second assumption about the participatory potential of new communication technology is strongly related to its main characteristics: simple to use, interactive, and generally easily accessed. According to Budge, the development of new electronic forms of communication brought favorable conditions for the principles of direct democracy to flower: "the phone-in, the televised debate, the casting of mass votes after debate, all opened up discussions to strata of the population which would never have got a look-in at Athens" (1996, p. 27). "Direct popular participation in debate and voting is rendered not just possible, but easy by the electronic media" (Budge, 1996, p. 28). Mass access enabled by these technologies and the means of direct response offered by their use could significantly expand the realm of participation, which is presently limited.

Assuming the interactivity and general accessibility of communication technologies, authors try to avoid one of the sharpest critiques usually addressed to the idea of immediacy - namely the existing physical, spatial and temporal, limitations of modern societies, which do not permit simultaneous presence or participation of all citizens in the process of decision-making. Budge for instance states:

Public policy can be discussed and voted upon by everyone linked in an interactive communications net....This destroys the killer argument habitually used to knock direct

democracy on the head, that it is just not practical in modern mass societies to bring citizens together to discuss public policy. The existence of electronic communications means that physical proximity is no longer required. Mass discussion can be carried on interactively even when individuals are widely separated (Budge, 1996, p. 1).

Barber similarly claims that interactive systems embody immense potential for "equalizing access to information, stimulating participatory debate across regions, and encouraging polling and voting informed by information, discussion, and debate" (1984, p. 276).

It is clear that one of the most stimulating technological features of computer networks is their inherent logic of interactivity. However, as Hacker comments with reference to the White House e-mail project (Hacker, 1996), it soon becomes clear that many Internet practices are far from interactive. "Sending e-mail notes to President Clinton is not interactive. Nor is getting a form letter stating that the President is glad to hear from you. Receiving a personal note (or other forms of message) in which answers are given to questions and responses are made directly to assertions is interactive" (Hacker, 1996, p. 227).

The problem probably arises from the common equation of computer-mediated communication with interactivity. [6] In this sense it is often overlooked that computer-mediated communication combines a set of different communication practices expressed within several contexts of a public or private nature (?kerlep, 1998). But interactivity, on the other hand, implies active and inclusive two-way communication. Applied to new political platforms in cyberspace, this means that communicators should work together, asking questions and giving answers, formulating proposals and solutions and implementing policies and actions.

As many online experiences reveal, the interactive climate is uncommon, both within the sphere of civil society and also in the realm between citizens and the state. There are many parliamentary or political party Web sites which still, intentionally or not, fail to include the possibility of discussing political issues between citizens and representatives. This is a practice embodied at both national and local levels. An analysis of Californian municipal Web pages, for instance, showed that these sites are particularly thin from the standpoint of

horizontal communications: only 2.6% provide chat rooms, and only 9.3% have electronic bulletin boards (Hale, Musso, & Weare, 1999, p. 111). The research experiences in other European countries and their emerging political spheres in cyberspace are not dissimilar. The recent research of Nixon and Johannson (1999, p. 142), for the purposes of comparison, has demonstrated that political parties in the Netherlands and Sweden rarely understand the Internet as a new information realm, which could supplement or replace the role and significance of more traditional mass media. Instead, political parties in these countries use the Internet mostly as a platform for internal communication flow - for activities within a specific political party. While so-called chat rooms provide a possibility for democratic interchange of ideas, the problem is the value that a particular party places on such content: "Chat rooms are often 'ordinary members' exchanging ideas between themselves, and not a bottom-up flow informing the policy members. The leadership/party officials do engage in discussion via the net, but this tends to be on special occasions that are time-limited and, generally, have the leader responding to carefully pre-selected points or questions" (Nixon & Johannson, 1999, p. 148). The hierarchical inner structure of dominance within a certain political party is therefore not changed in cyberspace, but is primarily reproduced. Instead of co-operation between the dispersed membership, control is becoming a key feature of the use of new technology within political parties. Additionally, the analysis of political party Web pages provided by Nixon and Johannson shows that the information offered is usually either too basic or too complex. Estimation of the degree of interactivity on specific political party pages was also quite low; participation in chat rooms for citizens was offered by just two parties out of twelve.[7]

A good indication of the extent to which communication technologies are seen as important is the presentation and dispersion of political institutions on the Internet; this is how "a state shows its technological development and its openness for cyberspace visitors" (Purcell, 1999, p. 16). Purcell's own analysis of the web pages of some Slovenian political institutions, important environmental and tourist agencies, and also of economic institutions reveals that the Web is used as a place for lobbying other international institutions; institutions offer only access to information and services to home users (Purcell, 1999, p. 56).

The Slovene Government, for example, has its own website, which is designed by the Public Relations and Media Office. On its introduction page, visitors are welcomed by the following text: "With this website the Government wishes to improve the information flow between the Government and the public, and to open its activities to the widest audience of Internet users. There are government press releases and other information given by ministers and government services on current government projects and events, issued daily." [8] The central decision-making institution perceives the Internet potential simply as an opportunity for improving information. It says nothing about improving communication flow with citizens. The Slovene Government online is focused on presenting its work, ideas, and different proposals to the interested public. The aim, therefore, is not to discuss issues or dilemmas, not even to pose new questions. The Internet is used merely as a one- to-many medium, created for Internet audiences who may be searching for new information. These comments can be reasonably confirmed with recent results of a content analysis of governmental Web pages. The data presented here display just a part of a large research project on governmental Web pages, which was conducted by CATI agency in cooperation with Profano company and Faculty of Social Sciences (January, 2002). The content analysis covered all 14 Web sites of Slovenian Ministries[9] but due to the small number of analyzed pages, the data presented here are just descriptive. Nevertheless, it could be argued that the data reflect the image of dominant practices in this emerging political platform very well.

	Present	**Not present**
Presentation of officials	14 100%	0 0%
Contacts with governmental office and officials through telephone, letter or fax	13 93%	1 7%
Information about the function of certain official	13 93%	1 7%
Access to official documents	13 93%	1 7%

Latest news	11 79%	3 21%
Contacts with governmental office and officials through e-mail	10 71%	4 29%
Links to other similar governmental offices	10 71%	4 29%
Information for public	10 71%	4 29%
Links to other similar offices within EU	8 57%	6 43%
Access to the archive of governmental office	4 29%	10 71%
Access to the governmental meeting records	3 21%	11 79%
Direct contact with a specific governmental office	3 21%	11 79%
Access to the governmental decisions	2 14%	12 86%
Information about the office hours	1 7%	13 93%

Table 3. Type of content and interactive potential on Ministries Web pages (January 2002). Source: Analysis of governmental Web pages (SMIS, January 2002)

As the data suggest, the Web pages represent a place for institutional self-presentation rather than for presentation of opinion, discussion and exchange with site visitors. The majority of ministries have pages on the Web in order to transmit something - information, news, or public messages - and only a minority are prepared to receive something. Even in the informational sense the pages are rather limited in value. Only a small number of Web pages enable access to governmental meeting records; even more limited is the access to governmental decisions. Judging from the practices and possibilities revealed thus far, it

would be difficult to conclude that civil access to political representatives and decision-makers is increasing. The general advantage of computer-mediated communication compared to the other existing forms of political participation remains, in this sense, limited.

A more detailed examination into the nature of the interactive places on institutional Web pages shows that just three ministries have implemented more direct, two-way and interactive practices.[10] Among them are three different forms of participation: a moderated discussion forum with detailed description of a selected topic on which opinions can be expressed; a simple, unstructured chat room; and opinion polls or surveys on different public issues where visitors can cast their votes.

The characteristics and nature of the political platform that is revealed through the Web pages of political institutions are further reflected in the 'minds of the users,' namely, in their attitudes and opinions. The initial data on the satisfaction of Internet users with the image of political institutions online were collected in the RIS project (2001) previously mentioned. In general, the data indicate quite critical assessments of the way political institutions use and implement the potential of the Internet. For instance, the data suggest that 68% of Internet users agree that *".... institutions very poorly realize the potential that the Internet is offering for making contacts with citizens;"* a similar majority of Internet users (66%) argue that *"... politicians do not give enough attention to the opinions and questions, received from their citizens through the Internet."* Additionally, the same survey shows the limited potential power citizens perceive with this new political platform: 74% of users disagree with the statement *"because of the Internet citizens have greater impact on political decisions."*

This evident dissatisfaction of Internet users with the effectiveness of the political climate online supports the need for further research. In the survey on the attitudes of Internet users toward governmental Web sites (SMIS, 2002) attention was especially paid to those users who already had experiences with institutional Web pages.[11] The purpose of the survey was to explore opinions about the main functions of institutional Web presentations and the perception of the political image online.

Judging from answers given, it can be concluded that the recent political platform has a relatively low reputation. Some 59% of the respondents think that *"governmental Web sites*

do not enable an active civil participation in the democratic process of decision-making;" further, 46% of respondents doubt that governmental Web pages contribute to greater trust between citizens and government. Relatively more support was given to the idea that Web pages offer more direct access to public governmental information, although a third (34%) of the respondents disagreed with this position. But, in sum, the most critical assessment was given to the potential for public response and information feedback on institutional Web pages - 52% of respondents agreed that governmental Web pages do not perform this function successfully.

The answers given to a set of questions about the interactive nature of political Web pages should, therefore, not be very surprising. The great majority of respondents (65%) missed a place where they can express their opinions on public issues or problems. For this reason, it is logical that 58% of Web visitors disagreed with the statement that *"the Web pages give enough room to discussions between citizens and governmental officials."* As demonstrated, the absence of discussion places, in the eyes of Internet users, is reflected at many different levels. And, regarding the image of institutional political platforms, it reflects the situation as practiced. The expected interactive nature of potential action which could form within this new political place is quite removed from the actual experience.

Another specific characteristic of institutionalized Web presentations in the Slovenian political online platform is the evident diversity and lack of a common concept. "Instead of a common portrait, there is a great confusion" was one of the comments concerning the Web presentation of the Ministry Offices (*Delo*, 11 August, 2001). The quality of a particular online image depends mostly on the Minister's wishes and the personal initiatives of ministerial offices responsible for Web presentation. Such diversity, of which another main cause is the varying financial support for new Web presentations and their reconstruction within ministries, renders much more difficult the recognition of online political institutions, their work, staff and specific policies. Although the Slovenian cabinet now has a new Ministry for Information Society, it is obvious that after a year of work it has not developed a coherent public image online.

Conclusions

By way of introduction to the conclusions of this paper the central issues are repeated here. First, the current presentation of the main political institutions online suggests that the institutional actors have already made their place in cyberspace and, as such, they are opening themselves to potential visitors. According to the data, the average Internet user visits these Web pages very often, in order to search for information on political issues or to find the documents of public nature. In this sense, the existing political platform performs an important role - political institutions are transparently presented to citizens who now have easier, faster and above all more open access to useful political information. The recent political platform is, therefore, determined by its informational aspect.

Less encouraging is the second finding this paper presents: the climate of existing political platforms does not offer much more than 'visibility of information,' but Internet users still perceive the promising advantages of the Internet in a positive manner; namely, Internet users are perfectly aware that this is a space where opinion exchange can be efficient, where it is possible to get acquainted with the opinions of others, and where dialogue becomes the principal mechanism of exchange. However, as the analysis of concrete practices shows, this potential remain only that.

The question, which we tried to address throughout the whole text, was this: to what extent does the Internet - as a new communication medium - enrich, extend and possibly democratize the circumstances and conditions for political participation? In the theoretical sense, we started from those ideas that acknowledged the participatory potential of new communication technologies relatively early. However, the very recent visions of 'digital democracy' pose similar questions (Hague & Loader, 1999): how do we use communication technologies to have more informed citizens? To what extent can new technologies stimulate and improve political participation and citizen involvement in political decision-making?

As the data presented show, this kind of question generally misses the real problem: the solution is not in technology, as the reason for mostly negative answers to such dilemmas are not questions of 'technological inadequacy.' The problems and obstacles lie primarily in the politics that stimulate the use of technological potential. Slovenian Internet users are confident in the democratic potential of the Internet, but at the practical level, intensive users rarely participate actively online.

The political role of the Internet, at least within the Slovenian context, is reduced to the realization of two political functions: access to political information and access to public opinion polls. The institutional political Web pages offer access to information about their work, but these pages fail to include interactive possibilities whereby citizens can discuss political issues with representatives of political power. Web sites are mostly generated for institutional self-promotion and are less often intended to engage citizens with the representatives of politics.

The central findings presented here go hand in hand with an argument that is stated in more recent theories of computer-mediated communication (Gauntlett, 2000; Toulouse & Luke, 1998), emphasizing the effects of present day 'massification' of the Internet, which expanded immensely after the rapid development and spread of the Web. The logic of Web representation is in its core opposed to the logic of dialogic, two-way and interactive forms of computer-mediated communication, such as Usenet conferences, Internet Relay Chat or mailing lists. Searching for information, service providers or entertainment through the Web does not require the kind of active personal involvement which is associated with engagement in specialized discussion groups. In this sense, it is often argued (Resnick, 1998; Gauntlett, 2000) that the Internet population today more resembles the passive audience of the classical mass media than the expected ideal vision of an engaged, informed and active citizenry.

It would be only partially correct, however, to conclude that the main reasons for the unkept promises of citizen participatory are the result of limitations that originate from the 'conservative' presentations of political institutions. It would be more fruitful to explore the specifics of Web representations in comparison to those characteristic of classic media. One

should not forget that new forms of Web representation which are emerging in cyberspace have an integral role in the constitution of the electronic public sphere (Oblak, 2002). Through their particular forms they provide enormous opportunity for interested users, citizens, individuals, and institutions to participate in this sphere; and as the data in this article demonstrate, visiting such Web pages and searching for official information on them is currently one of the most widespread forms of political activity on the Internet. But in order to fulfill the conditions that are necessary for a public sphere in which knowledge is shared and opinion is formed, Web sites should provide useful links to chat rooms, electronic conferences and other interactive fora. An intriguing dilemma in this sense becomes the question of the 'suitable' or 'encouraging' content that would stimulate greater citizen involvement in political life on the Web.

Another important factor in attempts to implement participatory and communication resources of the new computer technologies involves the external conditions and characteristics of the social context. Here, I refer to the general receptiveness to and readiness to participate in the processes of expressing opinions and initiatives, of making political decisions; the level of interest in political affairs of individual citizens; the readiness of citizens to invest personal resources like time and money; and technological and information literacy. The study of the implementation of parliamentary Websites in different countries, conducted by Taylor and Burt (1999), offers considerable insight into much more constructive circumstances, especially in relation to the support for active citizenship. [12] According to the criteria suggested by Taylor and Burt (1999, p. 148), several parliamentary Websites explain how the citizen might best contribute to the development and formation of public policy. The majority of these sites contain some information on the parliamentary timetable, and access to the records of parliamentary meetings is also available, sometimes even with the help of a key word search facility. On the basis of these findings one conclusion would be that "Web sites are often providing extensive facilities that can enable citizens to visit and exit at will, using the (virtual) parliament more completely that has ever been possible in the days when parliaments existed only at the physical level" (Taylor & Burt, 1999, p. 154). Various possibilities for a revitalization of the existing democratic processes therefore exist, but the question remains as to what extent these possibilities and facilities are being effectively achieved.

Footnotes

1. It overlaps with the period in which debate concerning the relation between communication technologies and democracy was dominated by two broader, and, in terms of later scholarly thought, quite influential ideas; conceptually, they can be divided into accounts of electronic democracy as a supplement to representative democracy and electronic democracy as a form of direct democracy.

2. With respect to the sample, 12,000 respondents participated in the Web survey (62% men and 38% women). Half of the sample (50%) was between 18 and 50 years old, 38% of respondents were more than 50, and 12% were younger than 18. More than a third (36%) were employed in the private sector, 24% were students, 16% worked in public services, and 10% were students; the rest were either self-employed or without occupation. More than a third of the respondents (37%) finished high school, 13% had higher education, and just 7% of respondents had an elementary school education. Six percent of the respondents had an M.A. or Ph.D , and 12% of the respondents had not finished their schooling yet. On average, the interview lasted from 10 to 20 minutes. Each participant first responded to a set of general questions about the use of the Internet, followed by the set of demographic items. In the next stage, the respondents randomly evaluated Web sites from a sample of 150 foreign and Slovene sites. After that a specific set of questions was targeted to a single respondent. The specific issue was randomly selected according to the answers given to the first set of general questions. Due to the complex and large questionnaire (more than 2,000 questions) it should be acknowledged that specific contents were randomly selected, so that the respondents could not answer a whole set of questions.

3. The data given here represent just a small percentage of the Internet users who participated in the Web survey - in August only 126 respondents (out of 4,015) selected to answer a set of questions about the impacts of the Internet on the political life. It is therefore not the aim to generalize the results presented here to the whole population of Slovenian

Internet users. Rather, it is more appropriate to view them as a case study upon which a new hypothesis for further research could develop. However, it is reasonable to add at this point that very similar results have been already found in some other pilot research projects within the Slovenian context.

4. Table 1 displays percentages and mean values of indicators for political participation through the Internet. Here, we were asking about the individual's experiences with political activities on the Internet. Respondents (n=126) could choose between three different answers (never, once, more than once), so the minimum value for each item was 1 and the maximum 3.

5. The user's perception of the democratic potential of Internet was measured with two interrelated questions: a) Do you think that nowadays with the existence of Internet it is easier to...? and b) How effective do you think are the following activities if conducted through Internet?. The respondents could choose one answer on a scale ranging from 1 to 5, expressing either their agreement with the item or their disagreement.

6. For an interesting discussion on the multidimensionality of the concept of "interactivity" see Jensen (1999), where he discusses the differences between interaction as a concept in sociology, communication studies and informatics.

7. Analysis of Canadian political parties evaluated by Cross again does not reveal any more interesting findings. On the contrary, the data indicate that the interest of voters or other occasional visitors to political Web pages for public participation is extremely low (Cross, 1998).

8. The text is located at http://www.gov.si/vrs/ang/core-prva-ang.html.

9. In the first step the research was focused on institutional transparency on the working level and on their organizational structure; in the next step, official documents and the transmission of information about the governmental working process were analyzed. In the last step attention was given to the interactivity of Web pages. According to these research aims, a specific coding system was developed to analyze the content of the selected Websites.

10. The analysis showed that only three Ministries offered a mechanism on their Web pages for interactive activity between the governmental office and users. Although these possibilities are open to all visitors, which means that no prior registration is needed, it is still possible to argue that the access to them is difficult even for experienced Internet users.

11. This web survey was a part of the analysis of Governmental Web pages and it was conducted in January 2002 on a small number of 103 very heavy Internet users.
12. In analyzing selected Websites from many countries, researchers looked for specific features such as: a) the extent to which public participation in policy formation and feedback was being encouraged on the site; b) provision of timetables for current parliamentary debates and opportunities within them for citizen involvement; c) development of discussion fora on selected parliamentary topics; d) the ease with which public policy and legislative documents can be accessed from the site and e) the availability of any form of voting facility (see Taylor & Burt, 1999, p. 147-148).

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Chapter 5

Research results

Objectives :

- Free Reading
- Reading for Content
- Expressing Scientific Functions(location, time, point of view…)
- Summarizing Research Results
- Extensive Reading

Time Now:

Mme
Nebila DHIEB-HENIA

1. Reading

Available online at: http://www.ascusc.org/jcmc/vol6/issue3/
Retrieved 28 August 2004

April 2001 Margaret McLaughlin and Sheizaf Rafaeli, Editors

Annenberg School for Communication

Volume Six, Issue Three

In this issue:

Do online stores encourage shopaholics? How do people negotiate those awkward opening moments in a chat room? What's the key to Web site survival? What can log files tell us about site design? The authors tackle these and other questions in our latest issue

Unregulated Online Buying

Features that may have encouraged or discouraged unregulated buying were identified at popular electronic commerce sites. Many features may have disrupted accurate self-observation and fostered advantageous social comparisons with other excessive shoppers.

Web Log Analysis

Identification of types of Web server logs, client

Web Site Survival

Longitudinal studies of Web sites can not only trace the history of specific sites but can also provide some guidelines that might help start-up Web sites improve their chances for survival in the ever-changing Web landscape.

Web-Based Surveys

Web surveys can capture data about a respondent's answering process. Based on this data, at least seven response patterns are observable. This paper describes these seven response patterns in a typology of response behaviors.

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logs, types and uses of log data, and issues associated with the validity of these data are enumerated. The authors explain how sources of use-based data can be triangulated to assess Web design.

DVI and Learning

The authors report on student perceptions of a simulated distance learning environment created with Distributed Tutored Video Instruction.

IRC Openings

Anglais technique

This study explores how users open dyadic interpersonal interactions on Internet Relay Chat. The authors report that turn coordination in the channel entry phase is often ambiguous and has the potential to disrupt relationship development.

Mme
Nebila DHIEB-HENIA

2. Comprehension Check

- Reading
- Word Choice (Basic)

Reading : Anticipating text content

> It is useful to anticipate text content to prepare for reading. Anticipating text content means to generate ideas you think the author will develop based on certain textual (titles, subtitles…)and non-textual (illustrations, question marks..) clues.

This editorial page of *The Journal of Computer-Mediated Communication* does not give enough information about the contents of the articles. See if you can do Exercises 1, 2, and 3 by reading the page just **ONCE**. Count the number of answers you can already find, then read again and finish the exercises.

- Exercise 1
- Exercise 2
- Exercise 3

Exercise 1

Check the statements you think are plausible ideas for the articles in this web page.

1. Many Internet features have encouraged people become shopaholics.
2. Gaining and comparing information from different sources is called triangulation.
3. Web log analysis may help to evaluate site design.
4. Many people become excessive shoppers without knowing.

5. Only longitudinal studies can trace specific sites history.
6. Web site survival is dependent on its capacity to change.
7. Newly-born web-sites can benefit from these longitudinal studies.
8. Response behavior can be studied through web surveys.
9. The most difficult part in a chatting session is the beginning.
10. Opening moments in a chat room are most of the time awkward and ambiguous.
11. Students' viewpoints concerning distance learning are invaluable.

Auto-evaluation

Exercise 2

Express differently the following compounds.

1. A simulated distance learning environment

……

2. Start-up web sites

……

3. An ever-changing web landscape

……

Auto-evaluation

Exercise 3

Match verbs List A that go together with nouns from List B.

A	B
1.encourage	a.data
2.trace	b.server logs
3.identify	c.a question
4.assess	d.history
5.tackle	e.web design
6.provide	f.guidelines
7.triangulate	g.behavior
8.observe	h.buying

Answers

1……. 2…….. 3……..... 4……..... 5…….. 6……..... 7…… 8……....

Did you find it difficult to do this exercise? If so, go to word choice .

Auto-evaluation

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2. Comprehension Check

- Reading
- Word Choice (Basic)

Available online at: http://www.me.vt.edu/writing/
Retrieved 28 August 2004

Word Choice (Basic)

Click on the correct usage in the sentences below. Corresponding information for this exercise can be found in *The Craft of Editing* (denoted *CE*) and *The Craft of Scientific Writing* (denoted *CSW*). Note: In the general preferences of your browser, please do not underline links and do not override this document's choice of font colors.

1. We produced a small (amount, number) of automobiles this year, even (fewer, less) than last year.
2. We produced a small number of automobiles this year, even (fewer, less) than last year.
3. The serum had serious side (affects, effects).
4. Every 250 years, Pluto completes (its, it's) orbit about the sun.
5. When a photon in that energy range strikes the atom, the atom (looses, loses) one of its outer electrons.
6. The talk centered (around, on) the (principal, principle) of virtual work.
7. The talk centered on the (principal, principle) of virtual work.

8. This report discusses how the eruption (affected, effected) the surrounding terrain.

9. Last year, Japan (lead, led) the world in automobile sales.

10. We then sent the broken part to John Brooks, (who, whom) the laser group had recommended.

11. Reduced weight was the (principal, principle) reason for choosing aluminum.

12. Neither the engineers (nor, or) the technicians were hurt in the blaze.

13. All the bombings involved explosives (that / , which) contained the chemicals PETN and RDX.

14. All the bombings involved Semtex (that / , which) contains the chemicals PETN and RDX.

15. To treat a bite from the puff adder, select the anti-venom serum (, which counteracts the adder's poison. / that counteracts the adder's poison.)

16. (Hopefully, / It is hoped that) the antibodies will destroy the cancer cells.

You have reached the end of this exercise.

Last updated 9/01
http://www.me.vt.edu/writing/

Key to Word Choice (Basic)

#1. Congratulations, you have answered correctly.

Exercise: We produced a small (amount/ **number**) of automobiles this year, even (fewer/ less) than last year.

Discussion: The word "number" is appropriate because the sentence refers to a quantity that can be counted (for more information, see page 270 in *CSW* or page 109 in *CE*).

#2. Congratulations, you have answered correctly.

Exercise: We produced a small number of automobiles this year, even (**fewer**/less) than last year.

Discussion: The word "fewer" is appropriate because the sentence refers to a quantity that can be counted (for more information, see page 270 in *CSW* or page 109 in *CE*).

#3. Congratulations, you have answered correctly.

Exercise: The serum had serious side (affects/ **effects**).

Discussion: See page 269 in *CSW* or page 97 in *CE*.

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#4. Congratulations, you have answered correctly.

Exercise: Every 250 years, Pluto completes (**its**/it's) orbit about the sun.

Discussion: See page 271 in *CSW* or page 117 in *CE*.

#5. Congratulations, you have answered correctly.

Exercise: When a photon in that energy range strikes the atom, the atom (looses, **loses**) one of its outer electrons.

Discussion: The verb "lose" means to part with or to miss from one's possession. The word "loose" is generally used as an adjective, meaning not rigidly fastened. When used as a verb, "loose" means to let loose and implies a conscious act, something an electron does not perform.

#6. Congratulations, you have answered correctly.

Exercise: The talk centered (around/ **on**) the (principal/principle) of virtual work.

Discussion: See page 269 in *CSW* or page 102 in *CE*.

#7. Congratulations, you have answered correctly.

Exercise: The talk centered on the (principal/ **principle**) of virtual work.

Discussion: See page 272 in *CSW* or page 124 in *CE*.

#8. Congratulations, you have answered correctly.

Exercise: This report discusses how the eruption (**affected**/effected) the surrounding terrain.

Discussion: See page 269 in *CSW* or page 124 in *CE*.

#9. Congratulations, you have answered correctly.

Exercise: Last year, Japan (lead/ **led**) the world in automobile sales.

Discussion: The word "led" is the past tense of the verb "to lead" (see page 118 in *CE*).

#10. Congratulations, you have answered correctly.

Exercise: We then sent the broken part to John Brooks, (who/ **whom**) the laser group had recommended.

Discussion: The word "who" is used for the subject of the dependent clause; "whom" is used for the direct object, indirect object, or object of a preposition in the dependent clause. See pages 140-141 in *CE*.

#11. Congratulations, you have answered correctly.

Exercise: Reduced weight was the (**principal**/principle) reason for choosing aluminum.

Discussion: See page 272 in *CSW* or page 124 in *CE*.

#12. Congratulations, you have answered correctly.

Exercise: Neither the engineers (**nor**/or) the technicians were hurt in the blaze.

Discussion: The convention is that "neither" goes with "nor" and that "either" goes with "or."

#13. Congratulations, you have answered correctly.

Exercise: All the bombings involved explosives (**that** / , which) contained the chemicals PETN and RDX.

Discussion: See page 272 in *CSW* or page 134 in *CE*.

#14. Congratulations, you have answered correctly.

Exercise: All the bombings involved Semtex (that / **, which**) contains the chemicals PETN and RDX.

Discussion: See page 272 in *CSW* or page 134 in *CE*.

#15. Trick question--the answer depends on the meaning of the sentence.

Exercise: To treat a bite from the puff adder, select the anti-venom serum (, which counteracts the adder's poison / that counteracts the adder's poison).

Discussion: The answer depends on the situation. If there is only one anti-venom serum and the information about counteracting the adder's poison is additional information for the reader's knowledge, then use the "which" clause. If there are several anti-venom serums and the information about counteracting the adder's poison identifies which serum to select, then use the "that" clause. See page 272 in *CSW* or page 134 in *CE*.

#16. Congratulations, you have answered correctly.

Exercise: (Hopefully, / **It is hoped that**) the antibodies will destroy the cancer cells.

Discussion: The word *hopefully* means in a manner full of hope, not it is hoped that. A correct use would be as follows: "We looked hopefully to the courts for a ruling on the contract dispute." See page 115 in *CE*.

back

Mme
Nebila DHIEB-HENIA

Name : First name :

Check the statements you think are plausible ideas for the articles in this web page.

- ☐ Many Internet features have encouraged people to become shopaholics.
- ☐ Gaining and comparing information from different sources is called triangulation
- ☐ Web log analysis may help to evaluate site design.
- ☐ Many people become excessive shoppers without knowing.
- ☐ Only longitudinal studies can trace specific sites history.
- ☐ Web site survival is dependent on its capacity to change.
- ☐ Newly-born web-sites can benefit from these longitudinal studies.
- ☐ Response behavior can be studied through web surveys.
- ☐ The most difficult part in a chatting session is the beginning.
- ☐ Opening moments in a chat room are most of the time awkward and ambiguous.
- ☐ Students' viewpoints concerning distance learning are invaluable.

Finished !

See the correction : correction without solutions - correction with solutions

EXERCISE 2

By Dr Nebila DHIEB-HENIA

Express differently the following compounds.

Start Quiz

Answer key

Exercise 1

1, 2, 3, 7, 8, 9, 10, 11

Exercise 2

1. A learning environment from distance which is simulated
2. Web sites which have just stated up
3. A web landscape which is constantly changing

Exercise 3

1h 2d 3b 4e 5c 6f 7a 8g

---

3. Expressing technical and scientific functions: Location, time, process and means, and point of view

---

Study the following lists of expressions indicating location, time, process and means, and point of view, then translate into English the sentences in Exercise 1.

- Location and direction
- Time
- Process and means
- Point of view

1. Location and direction

located at……..	= localise a
lie……	= se trouve
to the left …..to the right	= a gauche……a droite
in the center	= au centre
above	= au dessus de
north of	= au nord de
to the north, northward	= vers le nord
in decreasing, increasing order	= en ordre decroissant, croissant
halfway around…	= a mi-distance de
within a radius of	= dans un rayon de 8 metres
…through the vicinity of	= passer a proximité de

extend far beyond….	= vont bien au-delà de…
clockwise….anticlockwise…	= dans le sens d'une montre, dans le sens inverse d'une montre
displaced from…by…	= decalé de…par…

2. Time

more than 25 years ago	= Il y a plus de 25 ans
last February….	= En fevrier dernier
once…	= autrefois
by the second millennium BC…	= dès le second millénaire avant Jesus-Christ..
…a 27-month moratorium…in the late 1960s	= une interruption de 27 mois…
in the early 1970s	= vers la fin des années 60…
meanwhile	= au début des années 70
have so far failed	= pendant ce temps
over the millenia	= n'ont pas reussi jusqu'ici
more recently, we have studied…	= au cours des millénaires
it has long been known that..	= plus récemment nous avons étudié
in the past four years..	= on sait depuis longtemps que…
during the past three decades	= durant ces quatre dernières années…= au cours des trente dernières…
over the past decades	

since, since then	=au cours des dernières decennies
in the years ahead	= depuis
10 years have passed since	= dans les annèes a venir
by the end of the century	= dix ans se sont ecoulés depuis
by that time,…will have	= d'ici la fin du siècle
in the long run	= d'ici là…auront
	= a long terme

3. Process and means

Process	
in the course of the project…	= au cours du projet
the process by which	= le processus par lequel
to proceed	= se poursuivre, progresser
currently in progress	= en cours actuellement
ongoing work	= travail en cours
in the making	= en cours de fabrication
X is/are now being developed	= on est en train de mettre au point X
X is currently being studied	= X est etudié actuellement
in trying to…	= en essayant de

by adopting…	= en adoptant..
when undertaking…	= en effectuant…
after making…	= après avoir…
a method for reducing…	= une methode visant a réduire…
this is equivalent to…ing	= cela equivaut à…
rather than…ing	= plutôt que ….
Means	
thanks to. with the help of, with the aid of	grâce
by means of .	au moyen de..
in the same way	de façon similaire
in tracing…	en cherchant l'origine…
as to how	quant à

4. Point of view

in view of	= du fait de..
in view of the fact that…	= etant donné que…
from a psychological view…	= du point de vue psychologique
…must be viewed as..	= doit etre considéré comme..
technically speaking..	= d'un point de vue technique..
given..	= etant donnée
given that	= etant donné que
in some respects	= d'une certaine façon
with respect to	= par rapport a
according to	= d'aprés
…, for their part,…	= …, quant à eux,…
in light of	= vu
from a historical perspective	= dans une perspective historique
by western standards	= selon les critères occidentaux
by the standards of	= d'aprés les normes ..
by virtue of hindsight,	= rétrospectivement,
on the ground(s) that	= en arguant du fait que
on the basis of	= d'aprés
…du point de vue de..	= …in terms of…
with regard to	= pour ce qui est de

regardless of	= quelle que soit..
regardless of what….	= indépendamment de ce qui
.. in the sense that..	= ..dans la mesure où..

Exercise

Translate the following sentences into English.

1- D'aprés les articles publiées, ce système resemble à un verre de spins (spin glass).

Submit Reset

2- Ces resultats preléminaires constituent la base du travail de recherche en cours .

Submit Reset

3- Il n'est pas difficile de faire des erreurs de calcul en effectuant les transformations.

Submit Reset

4- Grace à la transformée de Fourier, il est maintenant possible de resoudre l'equation de chaleur.

Submit Reset

5- Au total, il entre dans ces equations plus de 50 variables.

Submit Reset

6- Dans une perspective relativement différente, Jones a étudié la dynamique spaciale du e-commerce.

Submit Reset

7- Du fait de leurs avantages, ces techniques de detection à distance devraient etre riche de promesses tant pour les applications scientifiques qu'economiques.

Submit Reset

8- On sait depuis longtemps que les ordinateurs pouvaient faire ces calculs à cette vitesse-là.

Submit Reset

EXERCISE

By Dr Nebila DHIEB-HENIA

Translate the following sentences into English.

Start Quiz

4. Writing: summarizing research results

Results: the relationship between the text and the graphics

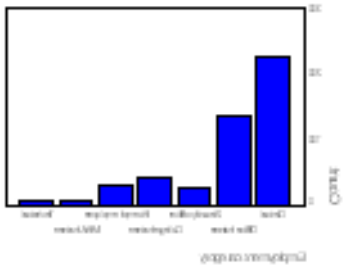
In a scientific and technical document, the graphic representation is an essential part of the document and not a mere illustration. The information carried by the graphic representation may add, complement, supplement, rephrase information given in textual form. Therefore, it is important to:

- locate wihin the written text the specific part that refers to the illustration.

- Define the relationship/ gap between the information given in a linear way by the text and the one given by the graphics.

Exercise 1: Types of graphics

Match each definition with the suitable type of representation.

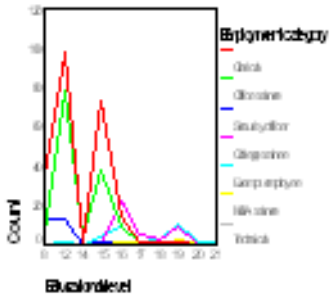


1. We can express figures in diagram form using blocks of appropriate lengths to represent each number representing a number. This type of diagram is called a histogram (……)

A

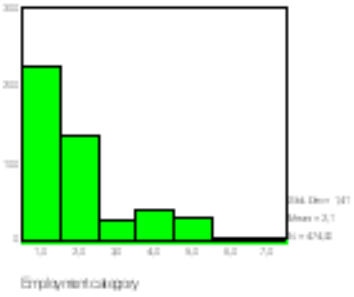
2. Sometimes blocks represent different categories of information and can also be called bars, that is why it is called a bar chart (…….)..

B



3. Another way of representing statistical data is by drawing a circle containing sectors, each representing part of the data N. Such a representation is called a pie chart (…….)..

C



4. In vertical-line graphs, we can join the vertical line with straight lines. This enables us to view the differences in heights more vividly. Such a graph is called a jaggedline graph (…….)..

D

Auto-evaluation

Exercise 2

Figure A below is taken from an article entitled *"Commercial Scenarios for the Web: Opportunities and Challenges".*

Study the graph carefully then cross (X) all the statements that can be considered as **main ideas** or **valid conclusions** from the graph.

sec4

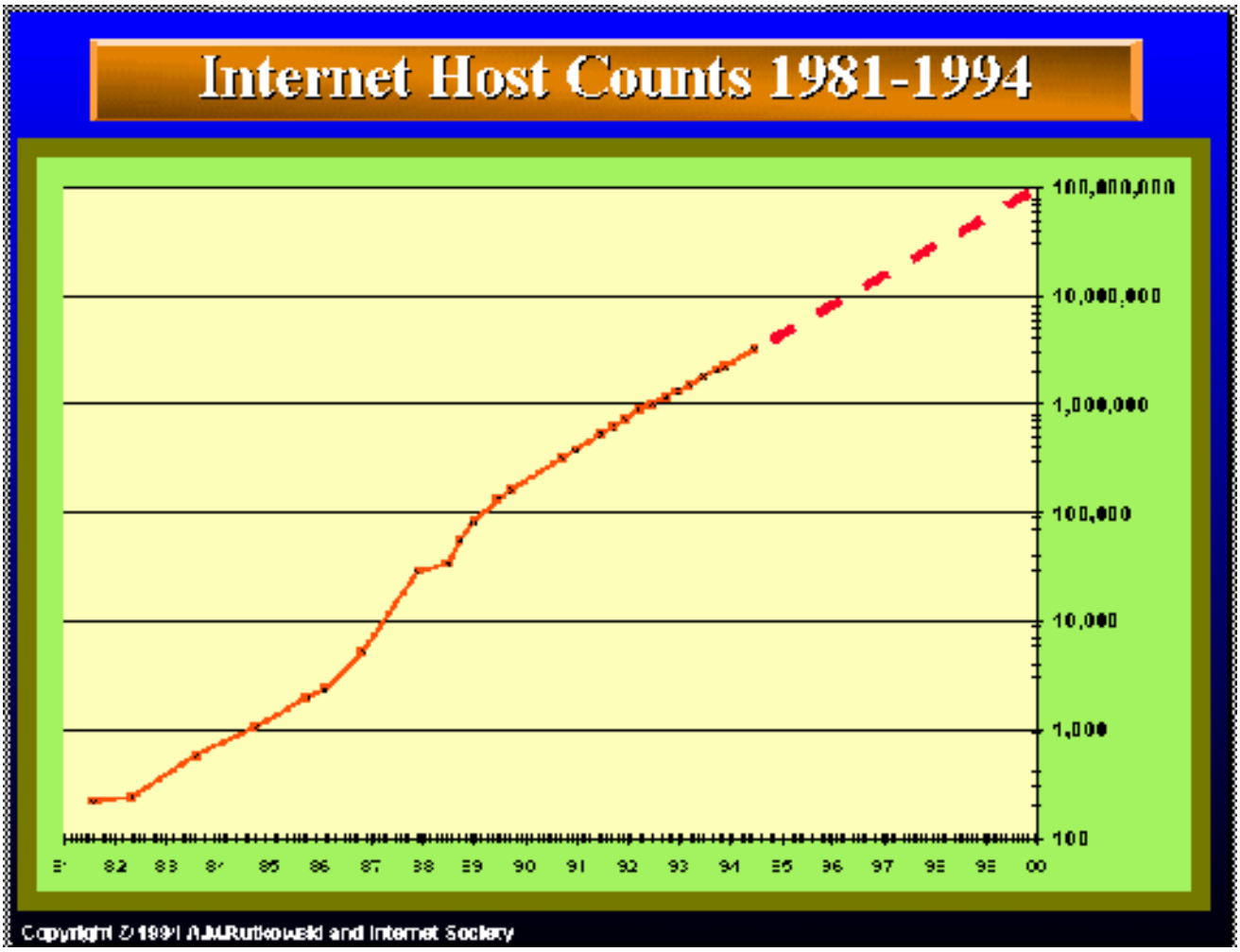


Fig. A

The World Wide Web: Background - Internet Host Growth

1. The growth in Internet hosts has dramatically increased from 1981 to 1994.
2. As of July, 1995 there were 6.64 million host computers on the Internet (**Network Wizards, 1995**). This number has been approximately doubling annually since 1981.
3. In January, 1989, there were 213 networks in the United States and 34 networks connected to the Internet outside the U.S.
4. The growth in Internet-connected networks is impressive.
5. This figure indicates the size and growth of the Internet and the World Wide Web.
6. The source shows that 2.37 million are international hosts connected to the Internet, representing 150 countries.
7. The Web grew a staggering 1758% in 1994 alone and doubles in size roughly every two to three months

Auto-evaluation

Exercise 3

Fill in the blanks with words from the list to complete these paragraphs commenting on the table.

List of words:

ranking, underestimate, obtained, indexed, note, suggest, higher, impressive

World Wide Web Growth

Growth in Web sites is even more (1)**.....** than that of Internet;. More than 23,000 Web sites were found by the **Web Wanderer** in July, 1995 (Gray, 1995). Lottor (1995) estimates that there are over 80,000 Web servers on the Internet and that this is likely an (2)**.....** by as much as 20 percent. In the table below, we show the growth in Web servers since Mosaic was introduced. These numbers, (3)**.....** from Gray (1995), also underestimate the true number of servers since the estimation problems that plague host measurement, including "bogus" addresses and firewalls, also occur for server measurement.

Month/Year	Nmber of Hosts
Jun 1993	130
Dec 1993	623
Jun 1994	1265
Dec 1994	11576
Jan 1995	12000
April 1995	15768
July 1995	23000+

In terms of content served up by these Web sites, the popular search engine **Lycos** (4)**.....** 8.54 million unique URLs as of October 7, 1995. Statistics show that Web traffic (on the NSFNET backbone) now dominates Net activity (Anderson, 1995).

In April, 1995 (**Merit Network, Inc., 1995**), the Web accounted for 21.4% of total packet traffic and 26.25% of total byte traffic, (5)**.....** first among all networks on the Internet. Ftp service ranked second with 14.02% of packet traffic and 21.53% of bytes.

News (nntp) ranked third in packets (8.12%) and bytes (8.66%) and telnet ranked fourth in packets (7.5%) and seventh in bytes (2.5%). But (6) **.....** that many ftp and news requests are now issued through the Web, so that Web traffic over the backbone is actually even (7)**.....** than these figures (8) **.....**.

ranking
underestimate
obtained
indexed
note
suggest
higher
impressive

Auto-evaluation

Exercise 4

Study the following hypotheses and figure taken from a paper entitled "Measuring the Acceptance of Electronic Marketplaces: A Study Based on a Used-car Trading Site" , then complete Tasks 1 , 2 and 3.

1. Hypothesis Group 1 (positive correlation):

The greater the database quality (H1s/d) and the readiness to use (H2s/d), and the better the intermediation service (H3s/d) and the actual transformation rate (H4s/d), the greater the acceptance of the electronic marketplace.

sec4

2. Hypothesis Group 2 (negative correlation):

The higher the intermediation costs (H5s/d), the lower the acceptance of an electronic marketplace

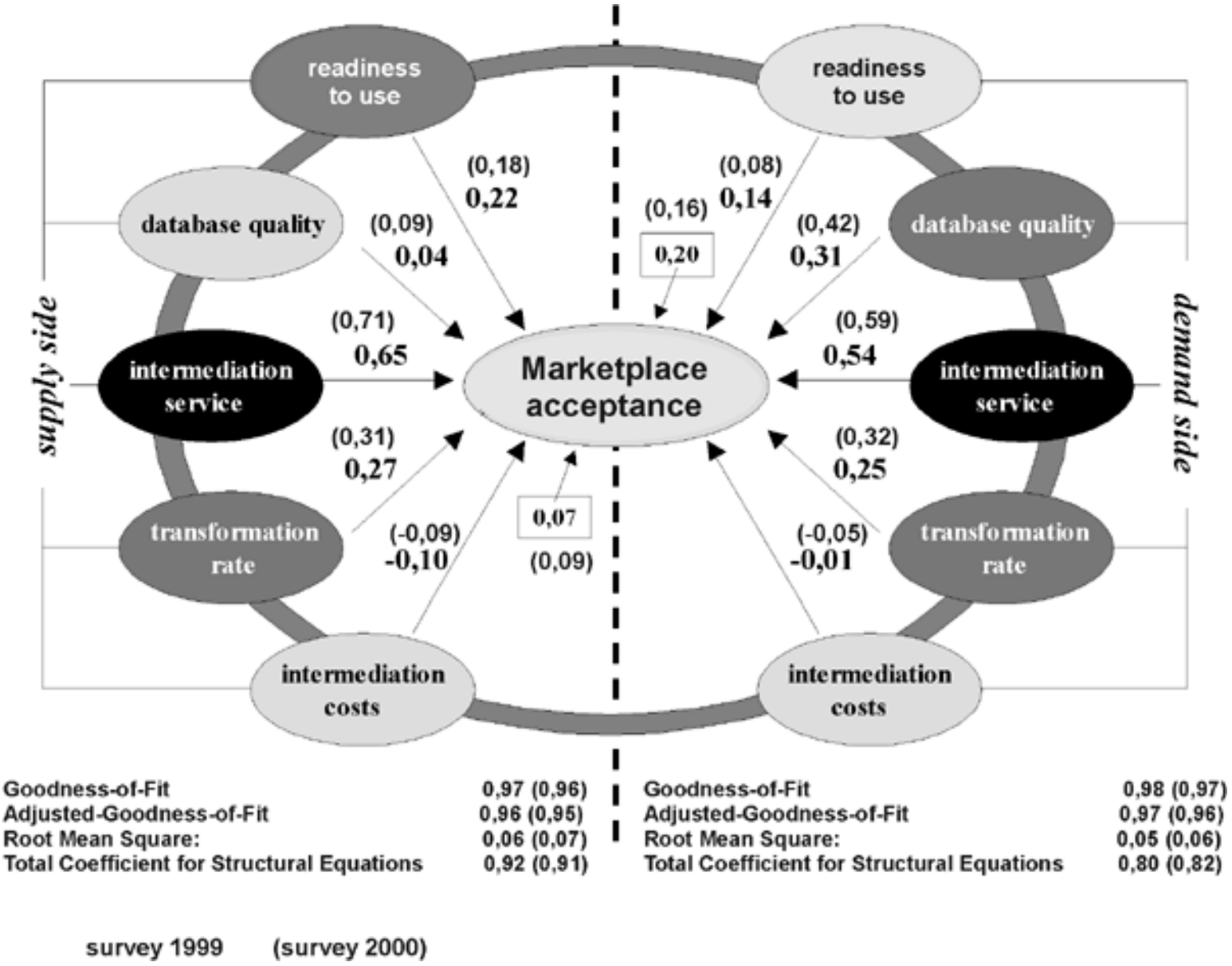


Fig 3: Structure model results from the LISREL calculations

Task 1

Fill in this summary of the results with the suitable word among the options.

Following the bilateral approach of supply and demand side, the fully standardized results of the LISREL model for the 'supply side' **(accepted/showed/noticed)** that the acceptance of an electronic marketplace can be very nicely **(examplified/showed/illustrated)** with the generated constructs. In a first step, the directions of effect of the hypotheses (sign of the path coefficients) were **(identifed/confirmed/illustrated)** in all cases. Looking at the intensity of the effects, it

becomes clear that the 1999 ‘intermediation service’ construct with a path coefficient of 0.65 (2000: 0.71) had the strongest **(analysis/impact/conclusion)** on the assessment of electronic marketplace acceptance. Consequently, the supplier’s key criterion for market acceptance was the market’s ability to provide buyers with an authentic purchase interest (qualitative assignment). **(unlike/in addition/apart from)**, ‘actual transformation’ (1999: 0.27; 2000: 0.31) and ‘readiness to use’ (1999: 0.22; 2000: 0.18) had a relatively strong influence on the acceptance of electronic marketplaces. **(by contrast/inspite of/furthermore)**, ‘database quality’ only had minimal influence. This can **(may be/probably/likely)** be explained by the fact that most suppliers do not really care how many buyers are active on the market (quantitative characteristic) as long as there is one who is willing to buy their product.

In general, the global quality criteria of the LISREL model for the ‘supply side’ can be **(specialized/characterized/defined)** as very good (Backhaus et al., 1998). The quality-of-fit index (source variance) was **(97%/96%/95%)** (2000: 96%), adjusted quality-of-fit INDEX (source variance with consideration given to degrees of freedom) was 96% (2000: 95%) and the root-mean-square index (measure of the variances not explained on average) was only 6% (2000: 7%), which are all very good **(values/marks/numbers)**, so it is safe to assume that the explanations of the initial situation provided by the data are reliable. The quality criterion for the explanation of the total structural equations of the marketing model was also very good at 92% (2000: 91%) (total coefficient for structural equations). The **(procedure/data/value)** also provide a good explanation of the central ‘marketplace acceptance’ construct from the supply side’s point of view with values of 93% (2000: 91%) (THETA-Value = 0.07 and 0.09). The illustration in **Figure B** provides a summary of the results.

Auto-evaluation

Task 2

1- Do you think the summary of the results, as shown in Fig. B, is complete? Justify your answer.

Task 3

2- If you answered 'No' for Question 1, write 4 sentences illustrating the missing information.

Previous

Exercise 1: Types of graphics

Matching exercise
Match each definition with the suitable type of representation.

Check

Exercise 2

---

1. the growth in Internet hosts has dramatically increased from 1981 to 1994.

- a. True.
- b. False.

2. As of July, 1995 there were 6.64 million host computers on the Internet (**Network Wizards, 1995**). This number has been approximately doubling annually since 1981.

- a. True.
- b. False.

3. In January, 1989, there were 213 networks in the United States and 34 networks connected to the Internet outside the U.S.

- a. True.
- b. False.

4. The growth in Internet-connected networks is impressive.

- a. True.
- b. False.

5. This figure indicates the size and growth of the Internet and the World Wide Web.

- a. True.
- b. False.

6. The source shows that 2.37 million are international hosts connected to the Internet, representing 150 countries.

- a. True.
- b. False.

7. the Web grew a staggering 1758% in 1994 alone and doubles in size roughly every two to three months

- a. True.
- b. False.

Résultats

Key to results

Exercise 1

1. D
2. A
3. B
4. C

Exercise 2

1. F
2. T
3. T
4. F (may be true but this is not shown by the figure)
5. T
6. F (because this is not shown by the figure)
7. T

Exercise 3

1. impressive
2. underestimate
3. obtained
4. indexed
5. ranking
6. note
7. higher
8. suggest

Exercise 4

Task 1

1. **Showed**
2. **Illustrated**
3. **Confirmed**
4. **Impact**
5. **in addition**
6. **by contrast**
7. **probably**
8. **characterized**
9. **97%**
10. **values**
11. **data**

Task 2

No, because the results summarise only "the supply side". "The demand side" is missing.

Task 3

1. The directions of effect in the presumed hypotheses (sign of the path coefficients) were also confirmed in "the demand side" as well.
2. it is clear that the 1999 ‘intermediation service' construct had the strongest influence on the assessment of electronic marketplace acceptance for the buyers.
3. In contrast to the supply side, the buyers rated the number of sellers or offers on the marketplace as an important criterion.
4. The global quality criteria of the LISREL model for the ‘demand side' can also be characterized as good **.**

5. Extensive reading: "Using the news"

Available online at: http://www.ascusc.org/jcmc/vol2/issue4/jones.html
Retrieved 28 August 2004

Extensive reading:	What is the important finding of this study? Is it in harmony with previous expectations?

Using the News:
An Examination of the Value and Use of News Sources in CMC

Steve Jones

Department of Communication

University of Tulsa

Table of Contents

Abstract

This study examines one facet of the penetration of personal computers into everyday life. It seeks to discover how members of a Usenet newsgroup value and use news sources. Electronic news sources predominated. An important finding is that media use was not tied to the user's local geographic. The study raises several questions for future research: What are the rhetorical dimensions of media use in electronic communities? How might our understanding of readers and communities be affected by new patterns of media use in electronic communities?

Introduction

The dichotomy between mass society and community permeates the discourse concerning mass media and mass culture. A significant thread in that discourse concerns the transformation of mass society into tightly-knit communities by way of electronic communication. Carey (1989) finds this to be "an increasingly prevalent and popular brand of the futurist ethos, one that identifies...computers and information with a new birth of community". An important element in the futurist ethos is the penetration of personal computers and their concomitant communication technologies into everyday life. And it is equally as possible that computer-mediated communication will separate participants and content by way of compartmentalizing messages and users, as well as disinhibiting users, thus leading to heightened interpersonal (computer-mediated) conflict, thereby playing a role in the death of community.

This study examines one facet of the penetration of personal computers into everyday life. It seeks to discover how members of a Usenet newsgroup value and use news sources. At a time when the news media are making efforts to have an online presence, and communication service providers are working to bring online services to consumers, an important area of study is the nature of news in the context of computer-mediated communication (CMC).

This study of media use in soc.culture.yugoslavia brings together ideas from two separate research strands: the study of media use, and the study of new communication forms. The most

developed tradition of media use research relates media use to community ties. The Minnesota community research program (Tichenor, Donohue and Olien, 1980 and 1970; Donohue, Tichenor and Olien, 1975; Olien Donohue and Tichenor, 1978) concluded that "strong community ties are major forces leading to reading the local newspaper" (Tichenor et al., 1980: 57), though subsequent studies showed fewer direct ties (Stamm, 1985). The Minnesota research tells us about how communities use the media. They offer one account of how media are linked to communities. It also investigated how mass media are used as means of social control by powerful elites in the community. In the research cited definitions of community play a lesser role than the news media, and in some instances (most notably Tichenor et al., 1980) community goes undefined. A new type of community, an electronic, or virtual community has been forecast, and one can see some form of it in the variety of computer networks (Internet, Usenet) and electronic on-line services (CompuServe, America Online) now available (Jones, 1995). In regard to this study, definition of community as "a variable of social relations...a complex of ideas and sentiments" (Calhoun, 1980: 107) is most appropriate.

Another thread in media use research is related to the choices people make when faced with an array of media to use for their own communication (Fulk, Steinfield, Schmitz and Power, 1987). As Baym (1995: 162) notes in the context of another newsgroup,

the ways in which people have appropriated the commercial and noncommercial networks demonstrate that CMC not only lends itself to social uses but is, in fact, a site for an unusual amount of social creativity.

(See also Rice and Love (1987) for discussion of creativity.)

New communication forms problematize the concept of "media use." In previous research, such as Tichenor's, "media use" is largely considered "reading," and that activity is tied mostly to newspapers. CMC users have appropriated news sources for their own purposes. Schweitzer (1991) includes in media use other media consumption activities, such as television viewing. Delener and Neelankavil (1990) consider media consumption behaviors solely on the basis of time spent attending to a particular medium.

Indeed, there is something profoundly alienating about traditional definitions of media use.

Though they may provide opportunities for measurement of audience activity related to the media, they paint, overall, a generally passive picture of the consumer, leaving out the active processes of meaning-making in which people engage. It is necessary to consider media use a particularly active process in electronic contexts, in part because CMC provides hypertext-like discourse and also because traditional media (newspapers, television, etc.) are fodder for conversation and discourse via CMC (one glimpse at Usenet provides ample evidence). As Rogers (1986) claims, computer-mediated communication is distinctively interactive when compared to traditional media. Thus, to put it another way, media content becomes part of CMC content, and "readership" is not nearly as interesting an issue as is authorship based, in turn, on readership.

In essence, media users in an electronic community choose to redistribute (or "re-author") news stories. A study of personal computer owners and media use showed that "adopters of new information technologies do not necessarily give up more traditional communication media in order to adopt the new communication forms" (Schweitzer, 1991: 689). Since a wide variety of electronic news sources are available to computer users, including the AP, UPI, Reuters news wire, as well as *USA Today* 's Decisionline, will members of an electronic community predominantly use electronic news sources? It is important to discover what news sources matter to network users. What are the implications of changes in users' valuation of news and its redistribution?

Jeffres, Dobos and Lee (1988) made some effort at answering a similar question, as related to television and, again, only as regards the consumption of a media text. If media use is redefined to include the consumption *and* production of texts, and those activities occur on a worldwide scale thanks to the Internet and Usenet, how does this use of news affect our ideas about media use and community ties?

The Newsgroup

The group studied is soc.culture.yugoslavia on Usenet. The reasons for the selection of soc.

culture.yugoslavia are several. First, it is a group mired in conflict, mirroring the wars in the former country of Yugoslavia. The electronic messages that were captured from the group for this study were collected daily between June 1991 and July 1992, during a time of escalation in the ethnic wars there. Group members would therefore be likely to desire more information about the status of the war, especially since until June, 1992 when the war commanded international attention, coverage was relatively sparse.

Since reporting of that conflict had been limited, information about the situation in the former Yugoslavia was often passed from person to person, or from one person to many, electronically. Its passage, by way of citation and comment, reflects the attitudes toward media, and related information sources among community members.

For instance, postings of news stories can precipitate antagonistic discussions of both individual bias and media bias. One typical exchange was initiated after a letter to the Toronto *Globe and Mail* was published in early 1993. A portion of that letter was posted to the newsgroup:

The blanket condemnation of the Serbian nation and the misrepresentation of the Serbian position would not be so deeply trenched in the media if people like my friend were not so willing to endorse any position or stereotype, as long as it ostensibly leads to peace. An unreflective and sensational press--the electronic media in particular--has provided a well-meaning public with simplistic solutions to a complex situation. The person who posted this message claimed the letter "explains rather well Serbian position" [sic].

However, the ensuing exchange in message threads related to that posting focused on media representations of the sides in the war, typified by comments like this one:

I have seen plenty of new stories about Serbs civilians being victimized. But please, Bosnian Serbs are not the main victims, unless CNN, ABC, NBC have it all wrong.

What is particularly interesting about these postings is that they point to an active readership making clear its constructions. In that regard, soc.culture.yugoslavia is a site at which to view how audiences interpret media.

Newsgroup Content

A total of 6,192 electronic messages were collected from the soc.culture.yugoslavia group on Usenet during the period June 1991 to July 1992. Although some messages were duplicated, first sent and perhaps re-sent to confirm delivery, only original, and not duplicate, messages were analyzed. Some messages were sent from other groups by way of "cross-posting," a form of sending one message to multiple groups. Cross-posted messages were included in the analysis as they were considered part of the discourse on soc.culture.yugoslavia. While there is the possibility that some messages were misrouted by the numerous computers in the Usenet chain and are missing from this analysis, the chances of this are very slim. It is likely that few messages suffered such a fate, and since all messages were analyzed and no form of sampling was involved, any such loss should be acceptable. Duplicate messages created by group members unsure of how to use Usenet software were discarded.

A content analysis of soc.culture.yugoslavia messages was undertaken following methods established by Krippendorf (1980), Holsti (1969), and Rosengren (1981). The procedure followed was to capture messages in ASCII text form on an IBM-PC. Each message was read to determine whether or not it contained reference to a news source. In all, 6,087 messages were analyzed; 1,120 messages mentioned a news source. These 1,120 messages were then coded using the following categories: news source name; news source type (print, broadcast, electronic); news source location; message sender location (determined from the sender's electronic mail address). Each message that contained mention of a news source, information directly attributed to a news source (paraphrased or quoted), or text re-posted directly from a news source was coded. A news source was defined as any institutionalized, mass-mediated source of information. The news source was coded once for each message in which it was mentioned. If a news source was mentioned multiple times in a message it was only coded once. If a message posted in the newsgroup quoted a previous poster's message referencing a news source, the quoting in the second message was not considered a new instance of a news source mention. The content analysis was performed by the author.

The 1,120 messages analyzed were posted by 131 individuals. A check of all messages analyzed revealed that 211 individuals contributed messages to the newsgroup. Since it is possible to hold more than one electronic mail address, it is also possible that these numbers are inflated. It should also be noted at the outset that members of this particular group are part of a larger social group of business people, academicians, independent scholars, college and university students, and computer professionals who use computer network services. Nevertheless, since what is of interest is media use situated in electronic discourse, the number and type of individuals should not be a primary concern, though study of group members may be of interest for future research. Since this study uses content manifest in posted messages, it is important to remember that it reflects media use among those who post messages, and not among those who read the newsgroup without posting their own messages. It is also important to note that the posters set the discourse agenda for the (presumably) larger audience of "lurkers" (that is, those who read the newsgroup but do not themselves post messages).

Results

An analysis of news sources mentioned in messages on soc.culture.yugoslavia showed that *Vreme*, an electronic digest of a Belgrade, Serbia-based periodical, led all sources with 141 messages in which it was mentioned, representing 12.59 percent of total news sources mentioned (Figure 1). *Vreme* is available to those with Internet access, and copies of some of the stories from it were regularly posted on the newsgroup.

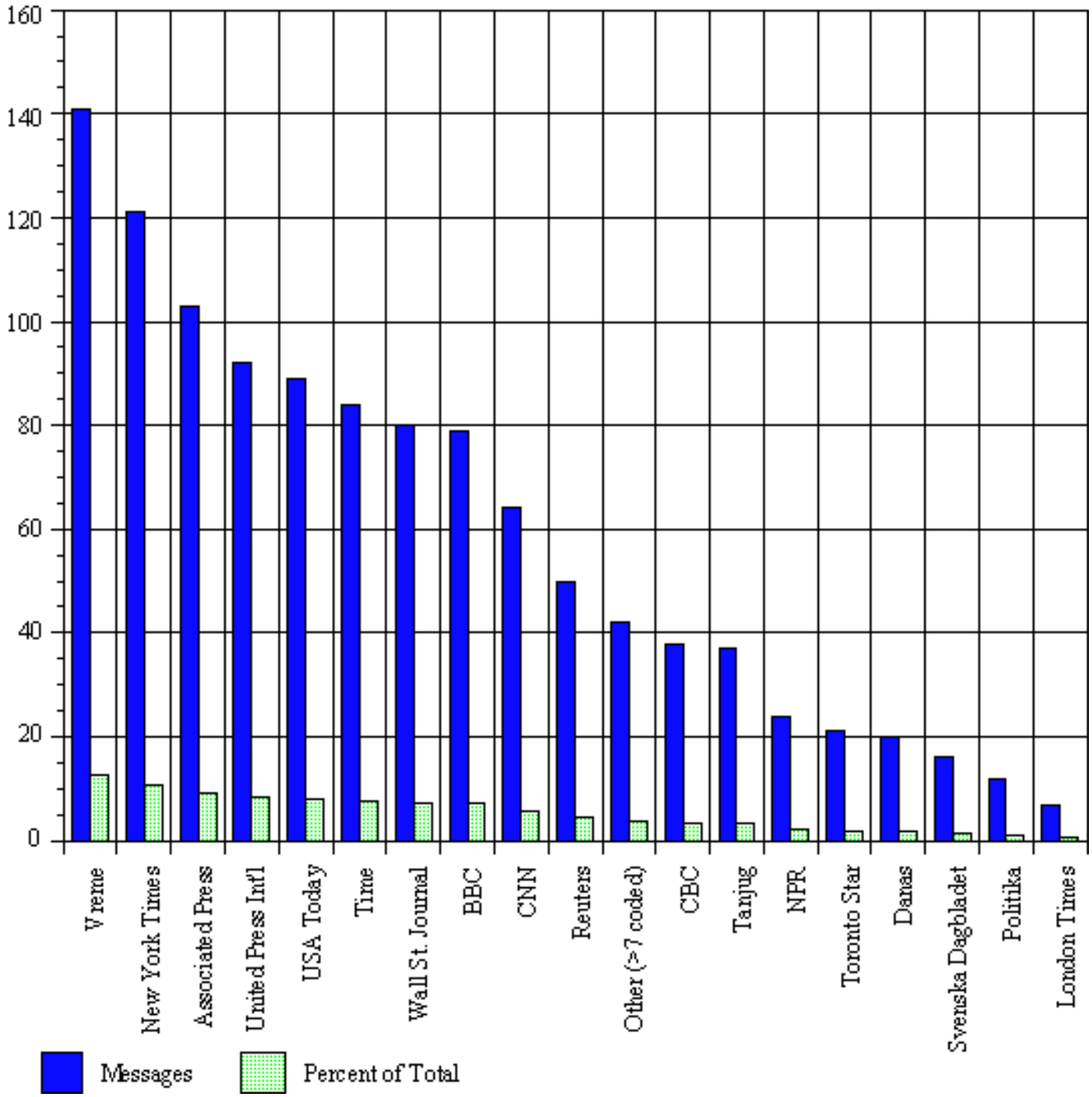
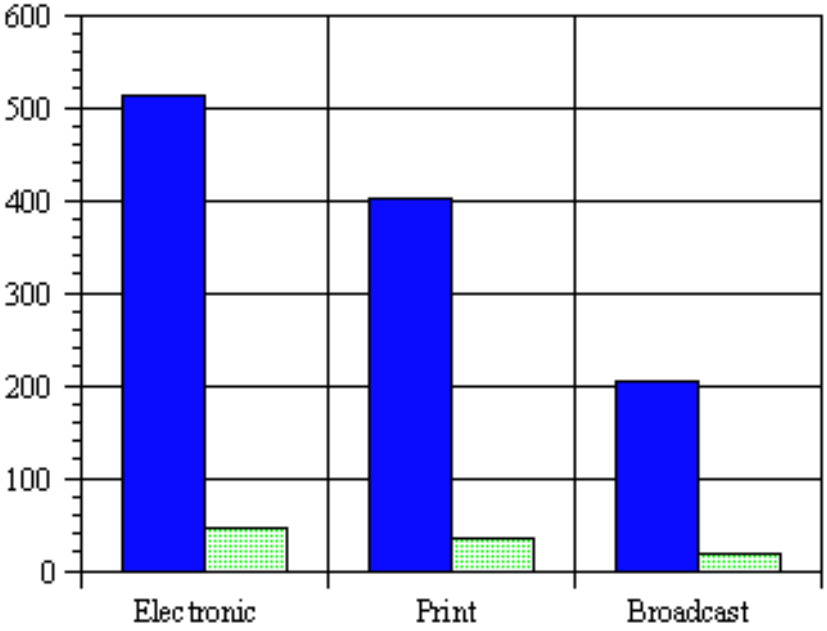


Figure 1. News sources.

An aggregated analysis of news sources illustrated in Figure 2 showed that electronic news sources predominated among those mentioned on soc.culture.yugoslavia (46%), followed by print news sources (36%) and, lastly, broadcast news sources (18%).



News Source Type	n	%
Electronic	512.00	45.71
Print	403.00	35.98
Broadcast	205.00	18.30
TOTAL	1120.00	99.99

Figure 2. Types of news sources.

In light of the electronic nature of the newsgroup this spread is not surprising. It does point, however, to a heavy, or at least heavier, use of electronic news sources like news wires available on the Internet or other BBSs. This finding supplements Schweitzer's (1991: 689) assertion that personal computer use "did not lead to radical changes in use of traditional news media" because it shows that, while users did not abandon traditional media, they did adopt new media as news sources. Although Schweitzer based his claim on analysis of readership surveys and not on analysis of news sources mentioned in, say, conversation, rendering comparisons problematic, these findings do point to a change in use of traditional news media.

Further analysis broke down the location, or geographic origin, of news sources mentioned. A comparison with message sender location reveals that most news sources mentioned originated in US "media centers" (New York and Washington). Most (just over two-thirds) of the individuals posting messages mentioning news sources are based in the US as well. However, upon closer examination it is clear that there is little similar connection between message sender location and news source location, and a further breakdown of message senders by state reveals that news sources are not linked to geographic location of the message sender. The analysis of messages with news sources mentioned demonstrated no significant correlation ($r = .021$) between message sender location and news source location.

Newsgroup users

A questionnaire was posted to the newsgroup in November, 1993, initially in an effort to gain demographic information about its users once data had been collected for content analysis. 128 responses were received. It is difficult to discern a "response rate" in this instance, insofar as the questionnaire was publicly posted. Information that has since been compiled about many newsgroups is not available for the time during which the questionnaire was posted on soc. culture.yugoslavia. Moreover, though the questionnaire was posted well after the sample of messages was taken for the previous section of this study, it is believed that the high proportion of nonstudents among posters means that user turnover was infrequent. Given the general availability of the Internet, and hence Usenet, to primarily academic communities at the time of the survey, results should be approached cautiously.

From the questionnaire responses a random sample of 14 respondents was chosen for on-line interviews. It was at this point that attitudes toward news sources and their usefulness became most clear. Most of the respondents interviewed stated that the Internet had become a major news source in its own right. One respondent, for instance, said, "I really appreciate the electronic mail sources for news," in reference to being able to reach *USA Today*, and that "the Usenet newsgroups are a second source of news." Another respondent stated that he would not know very much about events in the former Yugoslavia were it not for Usenet. Still another stated that Usenet is useful because it "digestifies" news reports, often including ones unavailable locally (via newsstands or subscription) to many people. This can account, too, for the high number of messages with reference to *Vreme* and other electronic news sources.

Making clear their critical reading of the news and newsgroup, all 14 respondents believed that the media were biased in their coverage of the war. They also believed that those posting messages to the newsgroup that contained stories from traditional news sources were doing so less to inform the newsgroup but rather to use the traditional stories to convince others that their arguments were correct.

Perhaps indicative of the predominance of PhDs among the newsgroup's posters, some respondents were critical of objectivity itself, as expressed by one user who identified himself as a poster: "If a source appears objective, that only means that it best approximates the reader's opinions or else the average viewpoint of all the other sources the reader sees." For this user the mass media were reinforcers of already-held beliefs.

Another respondent said that the newsgroup "helps to cross-check information from different sources." One respondent's comment typified those of the others who believed that by having access to wire service reports they thus had access to a more objective news source than if they had to rely on those reports as edited and altered by local media.

Discussion

It is possible that the predominance of electronic news sources stems simply from the relative ease with which their text can be captured by a computer and redistributed to other users and communities, as opposed to the (relatively) laborious process of transcribing a broadcast news story or a newspaper story. But the nature of data used in this study, made manifest in discourse, may nevertheless provide a more profound and penetrating measure of media use than the type of self-reports generated from questionnaires and surveys in traditional media use studies. Moreover, the mention of particular news sources in the newsgroup points to their value (whether positive or negative) and tells us about which news sources were worthy of mention.

In the case of the Usenet newsgroup soc.culture.yugoslavia there is both a local aspect to media use as it has been defined in earlier studies (Tichenor et al., 1980) and evidence of desire for nonlocal media, particularly insofar as it appeared that users believed that wire services were more objective than local media. There is thus a tension between desire for knowledge of local "angles" other than ones available to newsgroup users in their own local (geographic) region and a desire for more objective news stories.

Tichenor et al. (1980), Stamm (1985), and Schweitzer (1991) that did not examine media use in CMC groups. And, in what may be the most important finding, we have evidence of cosmopolitan media "elites" (Rogers, 1962). Tichenor et al. (1980) also find that media "elites" are implicated in information flow in communities, though they defined those "elites" as community leaders and news professionals. In the case of soc.culture.yugoslavia it may be argued that posters are community leaders and lurkers community members, but the ability to join the information flow is unrestricted, and thus lurkers may at any time "cross over" to become posters, a highly unlikely scenario in traditional media use studies.

As a *Times-Mirror* survey showed, "computer-users tend to read more newspapers, books and magazines than others" (Davis, 1994: 24) and indeed there seemed to be quite an appetite among newsgroup users for news and information. It is absolutely imperative to note that these same users are not simply "consuming" news but are engaging in its critical analysis as well as passing it along as part of their own postings, often in service of their own opinions. Consequently, they fit the description of an "interpretive community" actively constructing meaning (Lindlof, 1989). Interestingly, during that process, few breaches of Usenet standards of conduct (McLaughlin et al., 1995) are found, even when particularly vehement criticism of a posting occurred. Indeed, "flame wars" (MacKinnon, 1995: 129-130) were largely absent. Tichenor et al. (1980) also investigated the use of mass media by powerful elites, and in particular noted that:

A large portion of the information available...depends on an information delivery system which reflects the pluralistic organization and vested interests of the society in which it exists. Information appears to be generated and disseminated as a result of joint activity of professionals within the mass media channels and professionals who have advocacy functions for interdependent special interest groups (p. 15).

One of the ways to interpret newsgroup user interest in varied forms of information is to "break through" this form of "joint activity" and engage in media activity of their own. Interestingly, this action leads to the type of "social control" Tichenor et al. identify, as each user utilizes news and news sources to express and augment their opinions. However, given the nature of CMC, and the "personae" (MacKinnon, 1995) created on Usenet, the exchanges in the newsgroup critical of news sources, messages, and so forth, provide a kind of dialogue for which traditional

social control paradigms, which focus on the "one-way" quality of news media, do not account.

It is possible that the news sources represented in this newsgroup are simply ones of sufficient international stature to be of interest to the group. However, how would one then explain the absence of newspapers like the *Washington Post* and *L.A. Times*, or the absence of the three U. S. broadcast networks? One would indeed expect major international newspapers to have greater representation, and yet they do not. It is apparent that members of the newsgroup made greater use of electronic news sources like *Vreme* and directly accessible wire services over other news sources. Newsgroup users posted little if any news from local sources such as newspapers in their hometowns.

These findings provide a basis for the assertion that local media are unimportant to readers except for reporting of local news. The heavy use of electronic news sources like the wire services may mean that members of this community have an understanding of how news "works," that is, they use their computer access to bypass local sources to get straight to "the" source, say, the Associated Press.

Second, and more importantly, community members use news sources to provide a foundation for their own arguments and opinions expressed within the discourse in the news group. Consequently, the most useful sources are the ones that seem most unbiased, such as the wire services themselves (since those sources most often feature stories filed directly by reporters in the field). Jensen (1991) argues that American social thought is "concerned about `modern' public opinion being formed by the mass media, [deemed to be] an untrustworthy, self-serving source" (p. 77). In this instance, it is individuals who may be using the media in a self-serving fashion to support and elevate their own opinions.

One might as well have expected to find news sources from areas where there is a substantial population of Yugoslav immigrants, as there is in Germany, or in U.S. cities like Cleveland, Pittsburgh, and Chicago. Nothing was found in this study to support such an expectation. An immigrant press, or at least one sensitive to immigrants in its area, seems unimportant to this electronic community, and yet the immigrant press is claimed to have "established more personal, helpful ties with (its) communities than did the majority press" (Reed, 1990: 77). What happened to such ties in this newsgroup?

Conclusion

This study raises several questions for future research: What are the rhetorical dimensions of media use in electronic communities? How might our understanding of readers and communities be affected by new patterns of media use in electronic communities? Future research should also employ readership surveys in an attempt to understand readership patterns and to better collect demographic information.

What is particularly interesting about these findings is that they run counter to claims that the media of communication eviscerate history. Clifford Christians (1976) notes that Jacques Ellul wrote:

...the unrelenting flow of news inebriates human memory, a loss Ellul laments...."There is no politics where there is no grasp of the past, where there is no continuity, where there is no analysis of errors or capacity to understand the present through that analysis and in that continuity." Man aids in that evaporation and consequent weakening of his political order by driving events into oblivion, that is, actively forgetting for the sake of maintaining sanity (p. 13).

Those posting to soc.culture.yugoslavia are tinged with a deep sense of continuity with past Usenet exchanges, and postings often included quotes and replies several messages back in a thread. Though one can filter messages on particular topics or from particular senders using "kill files" (MacKinnon, 1995), message threads can continue for weeks, months, even years.

One of the consequences of the externalization of memory (Ong, 1982) in such a public (and print-based) fashion as this is that one's words do not evaporate. As Aycock and Buchignani (1995: 223-224) note:

Interpersonal discourses confer upon the individuals who engage in them an immediate sense of authorship and authority.... Print-based discourses delimit texts that are forever fixed in place and identified with a specified author or authors.... Computer-based discourses partakes of

some of the characteristics of interpersonal and print-based discourses...

Like Aycock and Buchignani, who found some evidence of authority being questioned, critical readership is evident among those who posted to soc.culture.yugoslavia. However, such critical readership is tempered by authorship that is often uncritical, and it is that tension between readership and authorship in soc.culture.yugoslavia that fuels both the need for information and, ultimately, discourse within the newsgroup.

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Chapter 6

Technical Reports

Objectives :

- Free Reading
- Comprehension: content reading and guessing word meaning
- Expressing technical and scientific functions (Purpose, clarification…)
- Writing: memos and reports
- Extensive reading

Time Now:

1. Reading

Available online at: http://www.ascusc.org/jcmc/vol7/issue4/
Retrieved 28 August 2004

Journal of Computer-Mediated Communication

7(4) July 2002 Margaret McLaughlin and Sheizaf Rafaeli, Editors

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In this issue:

Isolates on the Net?

In contrast to the speculation about the social isolate's benefiting the most from Internet social communication, the authors suggest that it is the person with a large social network and frequent/ intimate social communication who is more likely to use the medium for social purposes.

Made to Order (Online)

Mass customization, the involvement of the

Career Sites on the Web

The argument that individual job seekers could use the revolutionary properties of the Internet to enhance their labor market power was a manifestation of a particular set of economic conditions during the dot-com bubble, a short-lived period in which employers competed with one another for skilled employees.

Language Choice Online

The dominance of English on the Internet in the medium's early years caused great consternation about a possible threat to local languages and cultures. Though the hegemony of English online has since weakened, there is still concern about how English and other languages interact online.

Interactive Writing

Conceptual development occurs through processes such as problem-solving, discussion,

customer in the design, production, or delivery process before the actual sales transactions, using technology to limit the cost, is a strategy that businesses are experimenting with to provide customers with exactly the product they want, at the time they want it.

and practical experience, mediated through social interactions within particular settings and for specific purposes. Contemporary educators have argued that well-designed online conferencing environments fostering interactive writing may be particularly suited to provide socio-cognitive support for learning.

2. Comprehension Check

- Reading
- Word Choice (Advanced)

Reading

- Exercise 1
- Exercise 2

Exercise 1: Reading for content

Read the web page carefully just once, then answer the following questions.

1- Who benefits most from the Internet social communication?

Submit Reset

2- What does mass customisation consist of?

Submit Reset

3- Could job seekers still use the Internet to improve their chances to get a job?

Submit Reset

4- What was the possible threat for the early dominance of English online?

Submit Reset

5- Why do educators believe that online conferencing may be useful to learn writing?

Submit Reset

Exercise 2 : Guessing the meaning of words from context

Fill in the blanks with words from the box below. The use of the words in the text may help you to find the nearest meaning.

1- ….the **actual** sales transactions = ……

2- ….use the revolutionary **properties** = ……

3- ….to **enhance** their labor market power = ……

4- ….the dot-com **bubble** = ……

5- …the **hegemony** of English = ……

6- …. **contemporary** educators = ……

7- ….may be particularly **well** - **suited** to.. = ……

8- ….to provide sociocognitive **support** … = ……

9- ….environments **fostering** interactive writing = ……

List of words:

help - encouraging - modern - characteristics - reinforce - dominance - appropriate - real - revolution

Auto-evaluation

2. Comprehension Check

- Reading
- Word Choice (Advanced)

Word Choice (Advanced)

Click on the correct usage in the sentences below. Corresponding information for this exercise can be found in *The Craft of Editing* (denoted *CE*) and *The Craft of Scientific Writing* (denoted *CSW*). Note: In the general preferences of your browser, please do not underline links and do not override this document's choice of font colors.

1. During the past decade, our division has made (continuous, continual) improvements to the automobile's exhaust system .
2. Using geothermal energy does not pollute the environment (as, like) the burning of fossil fuels does.
3. The new material is (composed, comprised) of plastic and iodine.
4. From the den, the male wolf ventured much (farther, further) than the female.
5. John is (adverse, averse) to that type of solution.
6. The truss had spans of 210 feet and was (more than, over) 20 feet deep.
7. The values of the transfer coefficients were lowered (because of, due to) outgassing.

8. The (enormity, enormousness) of the solar receiver's tower surprised the visiting officials.

9. Compared (to, with) molten salt, liquid sodium is a much more dangerous heat transfer fluid.

10. The turbulence values of that report were different (from, than) the results of ours.

11. The new antidote made the patients feel (nauseated, nauseous).

12. Thank you for the job offer. I am (anxious, eager) to begin work next month.

13. The fourth design option was (rather unique, unique, very unique).

14. Chicken is (healthful, healthy) to eat.

Available online at: http://www.me.vt.edu/writing/exercises/
Retrieved 28 August 2004

Last updated 2/99

http://www.me.vt.edu/writing/exercises/

http://ae3.cen.uiuc.edu/writing/exercises/

Key to Word Choice 2

1- Congratulations, you have answered correctly.

Exercise: During the past decade, our division has made (continuous, **continual**) improvements to the automobile's exhaust system.

Discussion: If the team were to make "continuous" improvements on the exhaust system over the past decade, then they would be making those improvements day and night without interruption for sleep or food. Such a scenario is highly unlikely. For that reason, the correct word choice is "continual." For more information, see page 269.

2- Congratulations, you have answered correctly.

Exercise: Using geothermal energy does not pollute the environment (**as** /like) the burning of fossil fuels does.

Discussion: The word "as" is appropriate because a clause, rather than a phrase, follows (for more information, see page 271).

3- Congratulations, you have answered correctly.

Exercise: The new material is (**composed** /comprised) of plastic and iodine.

Discussion: See page 269.

4- Congratulations, you have answered correctly.

Exercise: From the den, the male wolf ventured much (**farther** /further) than the female.

Discussion: See page 270.

5- Congratulations, you have answered correctly .

Exercise: John is (adverse/ **averse**) to that type of solution.

Discussion: The word "averse" means "unwilling"; "adverse" means "unfavorable."

6- Congratulations, you have answered correctly .

Exercise: The truss had spans of 210 feet and was (**more than** /over) 20 feet deep.

Discussion: Use "greater than" or "more than" when referring to quantity. Otherwise, confusion could result because "over" is often used to indicate position.

7- Congratulations, you have answered correctly .

Exercise: The values of the transfer coefficients were lowered (**because of** /due to) outgassing.

Discussion: Strictly speaking, "due" is not a preposition and therefore cannot introduce a prepositional phrase. However, "due" can certainly act as an adjective followed by the preposition "to," as in the following sentence: "The temperature increase is due to global warming." If you are unsure of whether "due" is acting as an adjective followed by the preposition "to," then use "because of."

8- Congratulations, you have answered correctly.

Exercise: The (enormity/ **enormousness**) of the solar receiver's tower surprised the visiting officials.

Discussion: The word "enormousness" refers to a great size; the word "enormity" means "horror."

9- Congratulations, you have answered correctly.

Exercise: Compared (to/ **with**) molten salt, liquid sodium is a much more dangerous heat transfer fluid.

Discussion: You compare things of the same class "with" each other and things of different classes "to" each other. For instance, you compare three automobiles **with** each on the criteria of performance, cost, and safety, but Freud compared the ego and the id **to** a horse and his rider.

10- Congratulations, you have answered correctly.

Exercise: The turbulence values of that report were different (**from** /than) the results of ours.

Discussion: Use "different from"--the word "than" requires a comparative such as "higher" or "less."

11- Congratulations, you have answered correctly .

Exercise: The new antidote made the patients feel (**nauseated** /nauseous).

Discussion: The word "nauseated" means feeling sick to one's stomach, while the word "nauseous" means causing one to feel sick to one's stomach. For that reason, you would write that "the patients were nauseated," and that "the acrid odors were nauseous."

12- Congratulations, you have answered correctly .

Exercise: Thank you for the job offer. I am (anxious, **eager**) to begin work next month.

Discussion: The word "anxious" means to expect with anxiety, while the word "eager" means to expect with enthusiam. While the new hire in the example might feel anxiety about the new job, he or she most likely intends to convey the feeling of enthusiasm to the employer. Therefore, "eager" is the appropriate choice in this situation.

13- Congratulations, you have answered correctly .

Exercise: The fourth design option was (rather unique/ **unique** /very unique).

Discussion: See page 272.

14- Congratulations, you have answered correctly.

Exercise: Chicken is (**healthful** /healthy) to eat.

Discussion: The word "healthy" means in a state of good health. This meaning does not apply here--chances are that the chicken is dead. The appropriate word is "healthful," which means promoting good health.

---

3. Expressing technical and scientific functions: Purpose, clarification, classification, and consequence

---

Study the following lists of expressions indicating purpose, clarification, classification, and consequence, then translate into English the sentences in Exercise 1.

- Purpose
- Clarification
- Classification
- Consequence

Purpose

designed to	= destiné à
designed for	= est conçu pour
to aim at	= s'adresser à
to aim to	= viser à
intended to	= vise à
with the view to	= dans le but de
with an eye to	= dans la perspective de
X is meant to..	= X est censé…
aims/ goals/ objectives/ purposes	= buts/ objectifs
for the purpose of	= en vue de..

to this end	= a cet effet
to justify..	= pour justifier
in order to	= pour
so as to…	= afin de…
for the hypothesis to stand….	= pour que l'hypothèse soit démontré..
In an attempt to..	= dans le but de…
X seeks to…	= X cherche à

Clarification

for simplicity	= pour simplifier
without going into further details	= sans entrer dans les détails
X is most easily found by…	= la façon la plus simple de trouver/déterminer X…
it may be more convenient to…	= il pourra être plus commode de choisir…
merely…	= simplement
this facilitates…	= ceci facilite
this simplifies	= cela simplifie
to clarify	= clarifier
clearly, …	= de toute évidence

clearly indicates..	= indique clairement..
unequivocally	= sans équivoque
concisely	= de manière très concise
highlight	= souligner
X sheds light	= X a permis d'éclairer

Classification

categorize X in	= Ranger X dans…
belong to X	= appartient à, relève de X
distinguish	= distinguer
distinguish between	= faire la distinction entre
2 kinds of	= 2 sortes de
classify	= classer
split into x categories/families…	= ranger en x catégories/familles
among the most…..is/are	= parmi les plus…on trouve..
made up of	= constituer
consist of	= se compose de

include/comprise	= comprendre
break into	= se subdiviser en
break down	= se séparer en
is divided into	= se divise en
to sort…into	= trier en
partitioning into	= division en
to piece together	= reconstituer

Consequence

therefore	= donc
thereby	= par la même
accordingly, hence	= ainsi
as a result	= en conséquence
X result from	= avoir pour origine
the result being	= ce qui donne
it follows that	
follow from	= découle de
give rise to	= engendrer

lead to/to bring about	= engendrer, se traduire par
lead to	= mener à
contributes to	= contribue à
x is such as to..	= x va jusqu'à
providing/provided (that)	= pourvu que
due to/owing to	= à cause de
on account of	= en raison de

Exercise 1

1- Il n'est donc pas surprenant que les failles se propagent encore à la surface.

Submit Reset

2- Les estimations pour les versions à deux dimensions de ce problème découlent directement du développement des sections 3 et 4.

Submit Reset

3- Cette situation peut engendrer un environnement multiculturel.

Submit Reset

4- Cette simulation vise à trouver l'effet du commerce en ligne sur les utilisateurs d'Internet.

Submit Reset

5- Les quatre types de processeurs les plus courants comprennent…….

Submit Reset

6- Ainsi, une comparaison indique clairement que l'utilisation des nouveaux moyens techniques peuvent influencer …

Submit Reset

7- L'experience fut faite dans le but d'encourager ce type de méthodes.

Submit Reset

8- Les spécialistes classent les centaines de combinaisons différentes de polymères selon leurs propriétés physiques. Les chimistes les rangent en deux grandes familles.

sec3

Submit Reset

key to express

---

1. It is **therefore** not surprising that the faults are still propagating to the surface.
2. Estimates for the two-dimentional version of this problem **follow** directly **from** the development in section 3 and 4.
3. This situation can **give** rise **to** a multicultural environment.
4. This simulation *is* **intended to** study the impact of online commerce on Internet users.
5. The four most common types of processors **include** …
6. **Therefore** , a comparison **clearly indicates** that the use of new technological tools (means) could influence….
7. The experiment was carried out **with a view to** encourage such methods.
8. Specialists **classify** the hundreds of different blends of polymer **by** their physical properties. Chemists **split** them **into** two main families.

Answer key

Exercise 1

1. Persons with a large social network and frequent/intimate social communication. (or something similar in your own words)
2. The involvement of the customer in the design, production, or delivery process before the actual sales transactions. (or something similar in your own words)
3. No, because the author uses the past tense "was", and says it was "short-lived".
4. killing other language/disappearance of local languages
5. because it fosters interactive writing: encourages problem-solving, discussion, and practical experience.

Exercise 2

1. real
2. characteristics
3. reinforce
4. revolution
5. dominance
6. modern
7. appropriate
8. help
9. encouraging

For more exercises on vocabulary click here

4. Writing: Memos and reports

---

1. What is a memo?
2. Why do engineers and scientists write memos and reports?
3. What are some of the characteristics of memos ? and reports ?

- Sample Memo 1: Format
- Sample Memo 2
- Sample Memo 3

Sample Memo 1: Format

Company Name
Company Address
Date of Memo

To: Recipient of Memo
From: Writer of Memo *Writer's Initials**
Subject: Title of Memo in Initial Capitals

Kfjkjfgfjgjgojgofgofjgfgjkfofogfogfgofgfjgofjgjfgjfmvmvkvmkfio gur9t9gfjvjvjclmvjjfjgfgoffgojjjjlj;;lfgggffgf;k;kpygfkl,vvzsfow-roto0i0kgbkgpfgpg0t0gfp;v,;vbl,mmg'akl,vbmghogkoi0p;,lgotkoko
Attachments.

Copy to:
Name to Receive Copy
Name to Receive Copy

*Initials should be written in ink

Exercise 1

This is a memo from business. Read it and imagine you are the Divisional Personnel Manager to whom the memo is addressed. Then discuss these questions.

1. What do you think the Managing Director's aims were in writing the memo?
2. What are you expected to do as a result of reading the memo?

Auto-evaluation

Sample Memo 2

From : The managing Director
To : Division Personnel Manager
Subject : Clocking-in Machines
Date : 27/4/99

There have been a number of comments about the amount of time being wasted with extended lunch breaks in our company. I do not want to sound as though I am against breaks, in principle; indeed our personnel consultants have emphasized how important and efficiency-promoting such regular interruptions can be if you want an effective and motivated office staff. But, we must keep a check on working hours and clocking-in machines for office staff do exist. We can expect a little opposition to the idea if we are not careful. You can never be sure how the office staff will react. They might well take it badly. In any case, we're thinking of putting in clocking-in machines for all clerical grades; please send me a report.

Exercise 2

Compare the previous memo with the following one. Answer these questions:

1. In which memo did the Managing Director make his intentions clear?
2. Which memo do you prefer? State why.

Auto-evaluation

Sample Memo 3

From: the Managing Director	**For**	**Please**
	ACTION	**DISPLAY**
To : Personnel Managers	**COMMENT**	**FILE**
	INFORMATION	**RETURN**
Date : 27 April 1999	**DISCUSSION**	**PASS TO**

Subject: Installation of clocking-in machines

The Board is thinking of installing an automatic clocking-in system in the offices of each division. Before we do this we need to know:

1. How the arrangements concerning breaks, especially lunch breaks, have been working.
2. How many machines we would need.
3. Whether time now lost through bad time-keeping would be saved.

Can you provide us with your views on:

- how the staff will react to the idea

- how we can deal with the union on the matter

If possible, I would like to receive your report before the next Board Meeting on 1 June.

Exercise 3

Your Managing Director has asked you in a memo to investigate the health and safety provisions in your company's offices and to make recommendations for improvement.

These are the notes that you've made. Draft a report to your MD by expanding the notes into paragraphs.

Health and safety issues considered during past year

- Studied all reports of job-related illnesses, e.g. colds and 'office bugs'
- A number of cases of symptoms of Repetitive Strain Injury (RSI) reported by company physiotherapist.
- Had meeting with union reps and office managers about what to do.

Recommendations/ proposals

1. clearly display safety regulations in canteen and main offices.
2. new staff need informing about safety regulations and policy, e.g. on taking frequent breaks from the screen
3. office staff need training on how to position themselves, their chairs, desks, and equipment
4. department committee on helth and safety to be responsible for instructing new staff on procedures for handling office equipment and for securing electronic/mechanical machinery
5. ventilation and air-filtering systems in offices need regular maintenance
6. union suggested replacement of sub-standard furniture and equipment, especially:

- old-fashioned screens- cause eyesight problems
- carefully check office lighting – staff complaints of headaches after work/ lighting large part of problem; bright lights should not reflect on the screen
- essential to have chairs with full back support- many staff complaints of backache.

Start as given:

To: Ms Renoir, Managing Director
From: (your name)

Date:

Office health and safety provisions

As requested by the Managing Director on 30 March 1999, I have investigated the problems which have been raised concerning office health and safety……

Auto-evaluation

Answer key

Memos

1. **What is a memo?**

A memo = short of memorandum (pl. memoranda): A written note or communication, especially in business between people working for the same organization. (Oxford Advanced Learner's dictionary)

2. **Why do engineers and scientists use memos?**
   - to make requests
   - to give announcements
   - to communicate reports

3. **What are some of the characteristics of memos?**
   - Request or announcement memos: are read quickly. For such memos, get to the point in the first paragraph--the first sentence, if possible. In other words, state what you want up front. In the format suggested here, you should single space your memos and use a serif typeface. Skip a line between paragraphs. The following link shows this format in a pdf display.
   - In memos that make requests or announcements, keep the sentence lengths and paragraph lengths relatively short. Sentences should average fewer than twenty words, and paragraphs should average fewer than seven lines. Also, keep the total memo length to under one page, if possible.
   - Sometimes companies use memos to communicate short reports (two pages or more). For these types of memos, the format changes, as shown in the following example. For instance, you often include illustrations, attach

appendices, and break the memo's text into sections. If references arise in the memo, you include a list at the end. In memos that act as reports, the style changes as well. For instance, the sentences and paragraphs are typically longer than in memos that simply provide announcements or make requests.

- For all types of memos, space your memo on the page so that it does not crowd the top. Also, send copies to anyone whose name you mention in the memo or who would be directly affected by the memo. Finally, remember that final paragraphs of memos that make requests or announcements should tell readers what you want them to do or what you will do for them.

It is important in any writing and particularly in scientific and technical writing to be clear about the aims and purposes of your writing. Readers can make sense of what you are saying if you are: **Accurate** , **clear** , **precise** , and **concise** .

and reports?

Reports

New International Business English
Cambridge University Press 1996

How to write a report?

Assemble the material

1. Collect all relevant material –notes, documents…

Plan the report

2. Consider the purpose of your report: who is it for? Why does he/she want it, how will he/she use it?
3. State the aim and emphasis of the report briefly.
4. Decide what information is important and what is relevant.

5. Arrange the points of information in a logical sequence and in order of importance. Make rough notes.
6. Draft a working plan on a separate sheet of paper.
7. Decide where you might need illustrations or diagrams

Draft the report

8. Write the introduction: state the subject, state the purpose, and summarize your findings.
9. Write the body of your report.
10. Write the conclusion (and recommendations)
11. Summarize the report in a sentence.

Edit the report

12. Examine the draft, does it do what the report is expected to do?
13. Check your grammar, spelling, punctuation and style.
14. Read the text aloud to yourself, or better, to someone else.
15. Check your illustrations.
16. Finally, if possible, let someone qualified to give constructive look at your draft.

Key to Exercises

Exercise 1

1. Not clear. Wasting time in the company? Installing clocking-in machines?
2. Send a report. About wasting time? About installing the new machines?

Exercise 2

1. Memo 4
2. Memo 4 is definitely better: clear layout (presentation), clear purpose, to the point, concise and precise.

Exercise 3

To : Ms Renoir, Managing Director

Date :

From : (your name)

Office Health and safety provisions

As requested by the Managing Director on 27 April 1999, I have investigated the problems, which have been raised concerning office health and safety.

A study was made of all job-related illnesses during the past year. For examplem it was found that a number of cases of symptoms of Repetitive Strain injury (RSI) had been reported by the company physiothrapist. Meetings were held with union representatives and office managers to discuss what could be done.

Proposals

1. The safety regulations should be clearly displayed in the company's canteen and main offices.
2. Newly appointed staff should be made aware of the company's safety regulations and policy. In particular, they should be advised to take frequent breaks from the screen.
3. It is necessary to teach office staff how to position themselves, their chairs, desks, and equipment.
4. It should be the responsibility of the departmental committee on health and safety to instruct new staff on procedures for handling office equipment and for securing electronic and mechanical machinery.
5. It was further noted that ventilation and air-filtering systems in offices require regular maintenance.
6. The union suggested that sub-standard furniture and equipment should be replaced. In particular:
    a. Old-fashioned screens should be replaced – they are known to cause eyesight problems.
    b. Office lighting should be carefully checked. Staff have complained of headaches after work; lighting is a large part of the problem. An important point to emphasize is that bright light should not reflect on the screen.
    c. Chairs with full back supports are essential. Many staff have complained of backache.

5. Extensive reading

Available online at: http://www.ascusc.org/jcmc/vol6/issue1/Eastin.html
Retrieved 28 August 2004

Extensive reading:

- What is the methodology used by the author to investigate the issue of self-efficacy?
- What is the sample population? What are the measures used to assess self-efficacy and stress?
- Do you think the sample is representative, and the instruments reliable?

JCMC 6 (1) September 2000

Message Board

Internet Self-Efficacy and the Psychology of the Digital Divide.

Matthew S. Eastin

Robert LaRose

Department of Telecommunication
Michigan State University

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Abstract

Internet self-efficacy, or the belief in one's capabilities to organize and execute courses of Internet actions required to produce given attainments, is a potentially important factor in efforts to close the digital divide that separates experienced Internet users from novices. Prior research on Internet self-efficacy has been limited to examining specific task performance and narrow behavioral domains rather than overall attainments in relation to general Internet use, and has not yielded evidence of reliability and construct validity. Survey data were collected to develop a reliable operational measure of Internet self-efficacy and to examine its construct validity. An eight-item Internet self-efficacy scale developed for the present study was found to be reliable and internally consistent. Prior Internet experience, outcome expectancies and Internet use were significantly and positively correlated to Internet self-efficacy judgments. Internet stress and self-disparagement were negatively related to Internet self-efficacy. A path analysis model was tested within the theoretical framework of social cognitive theory (Bandura (1997).

Introduction

The digital divide that separates predominantly white, middle-class Internet users from predominantly minority, lower-income non-users has attracted the attention of both policy makers (NTIA, 1999) and social scientists (Hoffman & Novak, 1998), is undoubtedly one of the most important social equity issues facing the information society (Benton Foundation, 1999; Hoffman, Novak, & Slosser, 2000), and is international in scope (Van Dijk & Hacker, 2000). The digital divide has been conceptualized primarily in terms of patterns of race and class discrimination that are reflected in unequal access to computers and the Internet. While the importance of class and ethnicity cannot be denied, all novice Internet users face psychological as well as socio-economic and racial barriers. New Internet users

are less comfortable using the Internet, are less satisfied with their Internet skills and are more likely to encounter stress-inducing problem situations (GVU, 1999, q11, q101, q102). Uncertainty about how to get started and the perception that computers are too complicated are nearly as important as cost and lack of access as barriers to getting started on the Internet (Katz & Aspden, 1996).

Complexity, knowledge barriers to initial Internet adoption, and comfort and satisfaction issues faced by new users may be construed as self-efficacy deficits. Self-efficacy is the belief "in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). People who have little confidence in their ability to use the Internet, who are dissatisfied with their Internet skills or who are uncomfortable using the Internet may be said to have weak self-efficacy beliefs. Those with low self-efficacy should be less likely to perform related behaviors in the future (Bandura, 1982), in this case, adopt and use the Internet, than those with high degrees of self-efficacy.

Within social cognitive theory (Bandura, 1982; 1997) self-efficacy is a form of self-evaluation that influences decisions about what behaviors to undertake, the amount of effort and persistence put forth when faced with obstacles, and finally, the mastery of the behavior. Self-efficacy is not a measure of skill; rather, it reflects what individuals believe they can do with the skills they possess. For example, in discussing computer self-efficacy, Compeau and Higgins (1995) distinguished between component skills such as formatting disks and booting up the computer and behaviors individuals can accomplish with such skills, such as using software to analyze data. Thus, Internet self-efficacy focuses on what a person believes he or she can accomplish online now or in the future. It does not refer to a person's skill at performing specific Internet-related tasks, such as writing HTML, using a browser, or transferring files, for example. Instead, it assesses a person's judgment of his or her ability to apply Internet skills in a more encompassing mode, such as finding information or troubleshooting search problems.

The relationship between self-efficacy and personal computer use is perhaps intuitively obvious. Personal computers represent a complex and somewhat troublesome technology, requiring considerable skill and extensive training to operate successfully. Self-efficacy is essential to overcome the fear many novice users experience. Compeau and Higgins (1995) empirically verified the relationship between computer self-efficacy and computer use. Staples, Hulland, and Higgins (1998) found that those with high levels of self-efficacy in remote computing situations were more productive and satisfied, and better able to cope when working remotely.

The Internet requires development of a further set of skills that, to the novice user, at least, may be daunting. These include establishing and maintaining a stable Internet connection, learning how to navigate on the Internet, and searching it for relevant information. Internet self-efficacy may be distinguished from computer self-efficacy as the belief that one can successfully perform a distinct set of behaviors required to establish, maintain and utilize effectively the Internet over and above basic personal computer skills.

Social cognitive theory offers an alternative to socio-economic explanations of the Digital Divide (e.g., Hoffman, et al., 2000; NTIA, 1999); the latter are less

convincing now that personal computer prices have fallen to the levels of VCRs and Internet services to the level of cable television subscriptions, expenditures that over half of US households manage. "Don't want it" rivals cost as a factor explaining non-use of the Internet in minority equipped with computers (NTIA, 1999), suggesting that users must experience the benefits of the Internet for themselves to close the Digital Divide. This realization, the formation of positive outcome expectations in social cognitive terms, occurs only if Internet use persists long enough for the benefits to become apparent. For that to happen, self-efficacy beliefs must first be established.

Early research on Internet self-efficacy focused on the performance of specific tasks such as entering World-Wide Web addresses, creating folders and bookmarks, mailing pages, using File Transfer Protocol (FTP) and telnet, constructing a hypertext index, and moving bookmarks (Nahl, 1996, 1997). Ren (1999) reported a measure of self-efficacy specific to searching for government information sources. Results were consistent with previous self-efficacy literature, with self-efficacy perceptions positively related to task performance (Nahl, 1996, 1997) and the amount of use (Ren, 1999).

The prior studies did not yield a measure of self-efficacy suitable for studying overall Internet usage, and rerpoted no information about reliability and validity. In Nahl (1997), scale items confounded distinct behaviors; a single item asked about e-mail, hypertext mark-up language (HTML) scripting, telnet, and file transfer protocol. Nahl's measure referred to specific subsidiary tasks (e.g., creating bookmarks) instead of overall attainments (e.g., obtaining useful information) and thus did not properly reflect the constructive definition of self-efficacy. Ren (1999) operationalized self-efficacy in a manner more consistent with its conceptual definition (e.g., search the Internet by yourself), but a single item measure was employed so its reliability could not be determined. Ren's measure applied to a specific behavioral domain (i.e., seeking government information) rather than overall Internet use, limiting its future application.

In an effort to further understand psychological aspects of the Digital Divide, the present study builds on past research to develop a new measure of Internet self-efficacy. It assesses reliability and analyzes the construct validity of Internet self-efficacy by comparing it to measures of other constructs thought to be positively related, negative related or unrelated on theoretical grounds (Anastasi, 1988).

Hypotheses

Prior experience is an antecedent of self-efficacy (Lewis, 1985). For example, math skills are needed in computer programming and math skills and number of math courses taken play an important role in an individual's judgments about his or her programming ability (Bandura, 1977; Oliver & Shapiro 1993). Prior experience with the Internet hones related skills and should be positively related to Internet self-efficacy.

H1: *Internet self-efficacy will be positively correlated with prior Internet experience*.

Self-efficacy judgments are in turn related to outcome expectations. Outcome expectations are estimates that a behavior will produce particular outcomes (Oliver & Shapiro, 1993) but depend upon how well one thinks her or she can perform the behavior (Bandura, 1977). Oliver and Shapiro (1993) found that the stronger a person's self-efficacy beliefs, the more likely he or she was to try to achieve the desired outcome. In the present context this means that Internet self-efficacy should be positively related to the expectation of positive outcomes of Internet use, such as meeting new people on the Internet.

Compeau & Higgins (1995) found that computer self-efficacy influenced expectations about the future outcomes of computer use such as job performance and personal accomplishment. In terms of the Internet, social outcomes would derive from social encounters on-line. Personal outcomes are what we can achieve personally through using the Internet, such as being entertained or obtaining information. Internet self-efficacy should be positively related to positive outcome expectations.

H2: *Internet self-efficacy will be positively related to expected positive outcomes of Internet use*.

Past research on computer self-efficacy indicated a significant positive relationship between computer efficacy and computer usage (Burkhart & Brass, 1990; Compeau & Higgins, 1995; Compeau & Higgins, 1999; Oliver & Shapiro, 1993). Internet use and Internet self-efficacy should also be directly related since we are more likely to attempt and persist in behaviors that we feel capable of performing.

H3: *Internet self-efficacy will be positively related to Internet use*.

The amount of stress a person feels performing a task is negatively related to self-efficacy (Bandura, 1977). Individuals experienced an increase in stress when attempting to perform behaviors they didn't feel confident performing (Stumpf, Brief, & Hartman, 1989). As stress increased, efficacy beliefs decreased due to self-doubt and emotional arousal when performing the behavior (Oliver & Shapiro, 1993). Performing a task successfully increased self-efficacy and decreased stress; conversely, failure or difficulty experienced in performing a task decreased self-efficacy and increased stress (Hancock, 1990).

Stress encountered while using the Internet can be understood in terms of the number of stressors encountered while online. Having trouble getting on the Internet or having the computer freeze up are common examples. When such problems are encountered they lower expectations about successful interactions with the Internet in the future. As the number of stressors encountered online increase, perceptions of success decrease and self-efficacy along with it.

H4: *Internet stress will be negatively correlated with Internet self-efficacy*.

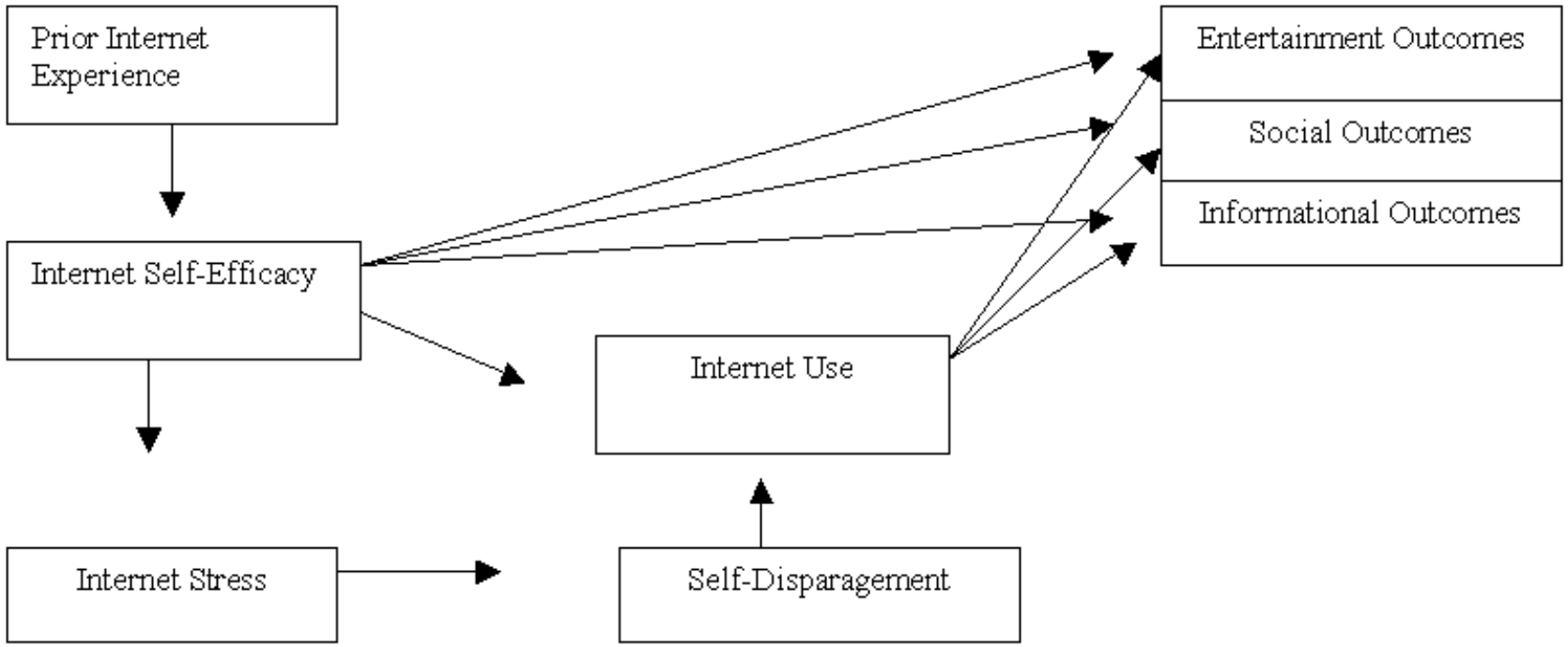
Self-efficacy is one type of self-monitoring mechanism, but there are others. Self-disparagement occurs when an individual judges his or her performances as

inferior to other performances. Self-disparaging people misrepresent their performance attainments or distort their recollection of past events as negative experiences (Bandura, 1977; Bandura, 1997). Self-disparaging people are depression-prone and typically dwell on their failures as evidence of their personal deficiencies while attributing their successes to external factors. In contrast, individuals with a high sense of efficacy accept success as an indication of their ability and attribute failure to external causes. Based on this relationship:

H5: *Self-efficacy will be negatively related to self-disparagement*.

The hypothesized relationships also fit into a causally ordered theoretical framework. Self-efficacy beliefs are continually re-formed based on experience. Internet users therefore continually modify their Internet self-efficacy beliefs based on their experiences online. Using Internet self-efficacy as an antecedent to use (Bandura, 1997), the following relationships between Internet self -efficacy, Internet use, social, informational, and entertainment outcomes, and online stressors is proposed. While increased levels of self-efficacy increase Internet use, both self-efficacy and Internet use increase perceived social, informational, and entertainment outcome expectancies. Furthermore, while increased levels of self-efficacy will decrease perceptions of Internet stress, perceptions of stress will increase feeling of self-disparagement, and thus, decrease use.

Figure 1 Initial Path Model



Finally, to complete the construct validity argument, Internet self-efficacy should be unrelated to theoretically distinct concepts. It is conceptually important to distinguish self-efficacy from general measures of psychological well-being since a competing hypothesis would be that self-efficacy merely reflects a generally positive outlook on life, feeling good about oneself and one's social environment. Therefore, Internet self-efficacy should not be related to such general indicators of psychological well being such as depression, loneliness, perceived social support and general life stress.

H6: *Internet self-efficacy will be unrelated to depression, loneliness, perceived social support and life stress*.

Methods

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Participants

The participants were 171 undergraduate students from an introductory communication class at a large Midwestern university. A convenience sample was deemed appropriate for the purposes of scale construction and validation since college students are a population with wide variation in Internet experience, including both heavy Internet users and many novice users. Of those who participated in the survey, 35 percent were freshman, 22 percent were sophomores, 18 percent were juniors, and 25 percent were seniors. Of these, 60 percent were male, 40 percent were female, and the mean age was 21 years old.

Questionnaires were administered in class at two separate times to maximize participation in the survey. Respondents picked up the questionnaire on the first day of class each week and returned it the second day of class that same week. Respondents were offered extra credit for participating in the study. An alternattive form of extra credit was provided for those who chose not to participate.

Self-efficacy Scale Development

Items for the Internet self-efficacy scale were suggested by Compeau and Higgins (1995), the GVU 10th survey (GVU, 1999), and Nahl (1996). Items from these scales were adapted to the conceptual definition of Internet self-efficacy by phrasing them as individuals' judgments of their ability to use the Internet to produce overall attainments, as opposed to accomplishing specific sub-tasks. An eight-item measure of Internet self-efficacy was developed. A Likert-type agree-disagree scale was used to assess the participants' confidence that they could use the Internet in each of the ways specified, where 7 corresponded to "strongly agree" and 1 to "strongly disagree." Confirmatory Factor Analysis (CFA) was conducted on the eight items to assess internal consistency and factor loadings using program PACKAGE (Hunter & Gerbing, 1982).

Substantial factor loadings and a standardized Cronbach alpha of .93 were obtained (Table 1), indicating internal consistency. Each of the scale items, factor loadings, means, and standard deviations can be found in Table 1.

Table 1
Factor Loadings of the Internet Self-Efficacy Scale

Scale Item	Factor Loadings	Mean(SD)
I feel confident…		
1 …understanding terms/words relating to Internet hardware.	.86	5.05(1.83)
2 … understanding terms/words relating to Internet software.	.91	4.94(1.78)
3 … describing functions of Internet hardware.	.93	4.63(1.85)
4 … trouble shooting Internet problems.	.85	4.14(1.86)
5 … explaining why a task will not run on the Internet.	.81	3.87(1.72)
6 … using the Internet to gather data.	.65	5.47(1.46)
7 … confident learning advanced skills within a specific Internet program.	.79	4.62(1.83)
8 … turning to an on-line discussion group when help is needed.	.60	3.39(1.89)
Standardized Alpha = .93		

Operational Measures

First, *Previous Internet Experience* was measured with one item ranging from less than two months (scored 1) to over 24 months (scored 5). Borrowing from Charney & Greenberg (in press), three *outcome expectancy constructs* measuring social and personal (including entertainment and information) outcome expectancies were created. The five-item Social Outcome (a= .86) scale assessed the perceived likelihood of developing relationships over the Internet.[1] A four-item Personal Entertainment Outcome (a = .87) scale measured the likelihood finding entertainment on the Internet.[2] The six-item Personal Information Outcome (a = .83) measure assessed the likelihood of finding immediate information on the Internet.[3] For each of these measures, the likelihood (rated as very likely (7) to very unlikely (1)) of an expected outcome was multiplied by the corresponding evaluation of that outcome (rated very good (+3) to very bad (-3)), following the expectancy-value formulation recommended by Ajzen and Fishbein (1980).

Internet Stress was a four-item measure (a = .61) developed for this study from previous work evaluating Internet frustrations (Charney & Greenberg, in press) and problems encountered on the Internet (GVU, 1999). Respondents were asked to rate their likelihood of experiencing each type of stressful Internet behavior (e.g., trouble getting on the Internet)[4] on a seven-point scale that ranged from very likely (7) to very unlikely (1). *Self -disparagement* consisted of three Likert-type items rated from strongly agree (7) to strongly disagree (1) (a= .71).[5] This measure assessed self-perceptions of Internet- related performance.

Internet Use was measured with four items. Two items, ranging from no use (1) to more than five hours of use (5) assessed Internet use on a typical weekend and weekday, respectively. One item scored, from 0 to 7, assessed the number of days the respondent went online during a typical week; and one item ranging from no hours (1) to over 20 hours (7) assessed time spent surfing during a typical week.

Life Stresses were measured with 49 items drawn from the Kanner, Coyne, Schafer, and Lazarus (1981) Hassles Scale (a = .93). Subjects reported on the frequency with which they had encountered the daily life stresses (e.g., car maintenance, crime) in the previous month, on a four-point scale (None, Somewhat severe, Moderately severe, Extremely severe). Depression was measured with the 20-item Center for Epidemiological Studies Depression (CES-D) scale (Radloff, 1977) (a= .91). The 20-item UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980) was used to assess general *loneliness* (a= .90). Finally, sixteen (out of 40) representative items from the Interpersonal Support Evaluation List[6] (Cohen, et al., 1985, a = .81) were used as a measure of *social support*.

Analyses

Zero order correlations were used to test each of the hypothesized relationships. LISREL 8.3 was used to test the proposed path model (Jöreskog & Sörbom, 2000). .

Results

A matrix of Pearson product-moment correlation coefficients is shown in Table 2. Hypothesis 1 was supported. Internet self- efficacy had a significant relationship to prior Internet experience (r = .36, p < .01). Social outcome expectations (r = .36, p < .01), personal information outcome expectations (r = .31, p < .01), and personal entertainment outcome expectations (r = .32, p < .01) were also found to be significantly related to Internet self-efficacy, supporting Hypothesis 2. Internet self-efficacy was also significantly related to Internet use (r = .63, p < .01). Both Internet stress (r = -.25, p < .01) and self-disparagement (r = -.61, p < .01) exhibited a significant negative relationship to Internet self-efficacy, supporting hypotheses 4 and 5, respectively. In summary, Internet stress and self-

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disparagement were negatively related to efficacy beliefs, while prior Internet experience, outcome expectancies and Internet use were significantly and positively correlated to Internet self-efficacy judgments.

Finally, Hypothesis 6 was supported. Life hassles (r = -.06, p = .381), depression (r = -.12, p = .122), loneliness (r = -.06, p = .418) and perceived social support (r = .09, p = .240) were not related to Internet self-efficacy (Table 2).

Table 2. Pearson Product-Moment Correlation Coefficients

	1	2	3	4	5	6	7	8	9	10	11	12	Mean	SD
1 Internet Self-Efficacy													36.11	11.76
2 Internet Experience	.36**												4.66	.67
3 Social Outcome Expectancy	.35**	.26**											13.02	24.84
4 Personal Information Outcome Expectancy	.31**	.25**	.15										58.19	41.49
5 Personal Entertainment Outcome Expectancy	.32**	.13	.40**	.55**									31.23	27.37
6 Internet Use	.63**	.22**	.43**	.32**	.46**								14.21	4.31
7 Internet Stress	-.25**	-.12	-.10**	-.10	-.09	-.18*							14.73	4.76
8 Self Disparagement	-.61**	-.33**	-.25**	-.24**	-.25**	-.48**	.33**						9.29	4.24
9 Life Stress	-.06	-.11	.01	.04	-.14	-.03	.29**	-.03					85.01	19.61
10 Depression	-.12	-.18*	.00	-.19	-.11	-.02	.23**	.00	.43**				35.71	9.79
11 Loneliness	-.06	-.15	.02	-.24**	-.22**	.03	.22**	.01	.45**	.63**			35.83	9.76

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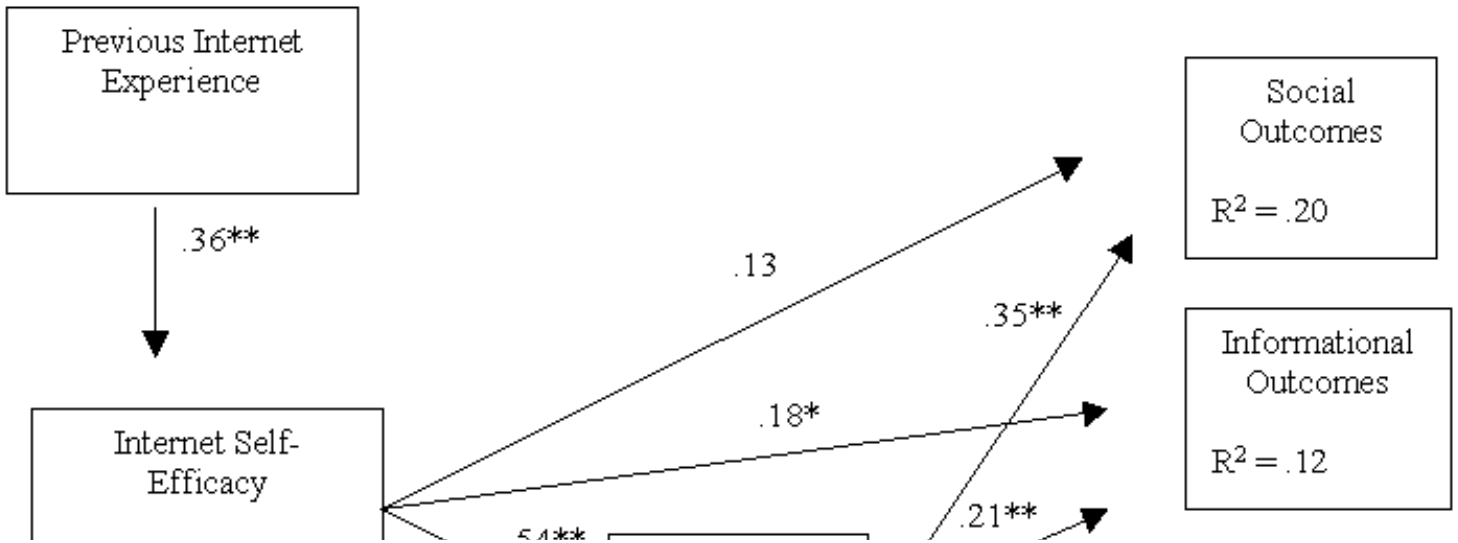
12 Social Support	.09	.15	-.14	.13	.28	-.04	-.20**	-.27**	-.36**	-.58**	-.64**		13.50	2.84

** $p < .001$ $p < .05$

The initial model which specified the development of self-efficacy through use and outcome expectations was not consistent with the data ($c^2(17) = 78.94$, $p < .001$). A revised model shown in Figure 2 was found to be consistent with the data ($c^2(7) = 13.27$, $p > .05$). In it, prior experience was related to Internet self-efficacy (ß = .36) which in turn was related to use (ß = .54), self disparagement (ß = -.61) as well as social (ß = .13) and informational (ß = .18) outcome expectancies. Use was related to both social (ß = .35) and informational (ß = .21) outcome expectations and self-disparagement (ß = - .15).

The predictive power of this model is indicated by the **R^2** statistics shown in Figure 2. From this model, 13 percent of the variance in Internet self-efficacy was explained. Further, 41 percent of the variance in Internet use was explained, while 20 percent and 12 percent of the variance was explained in social and informational outcome expectancies, respectively. Thirty-seven percent of the variance in self-disparagement was explained.

Figure 2 Final Path Model



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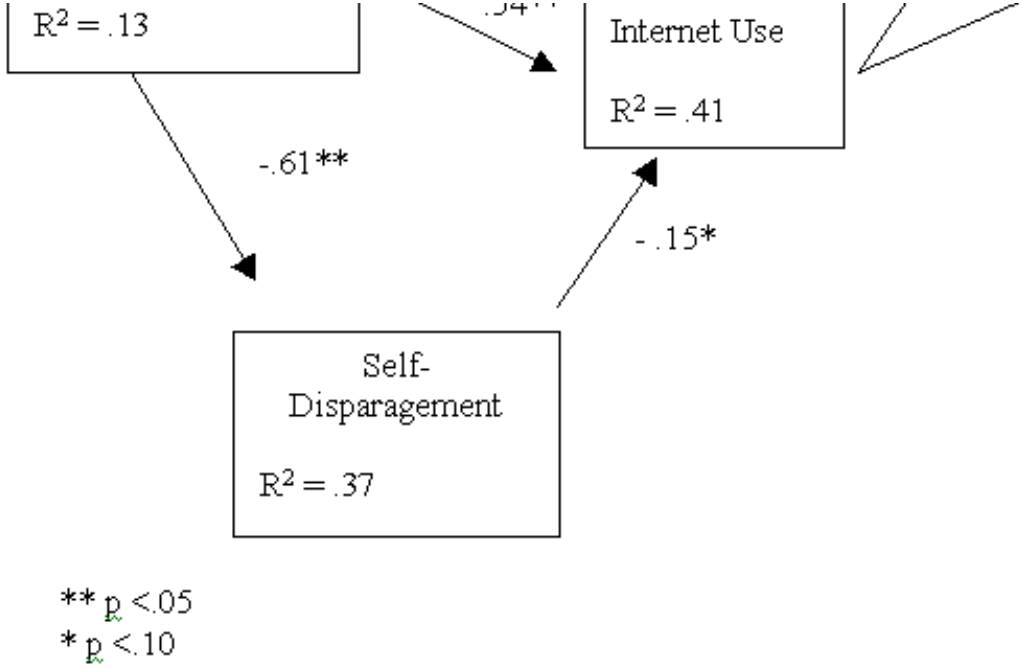

Discussion

Overall, there was consistent evidence of the construct validity of Internet self- efficacy. Internet self-efficacy was positively correlated to Internet usage, prior Internet experience, and outcome expectancies, as Social Cognitive theory suggests it should be, and negatively correlated with measures it should be inversely related to, such as Internet stress and self-disparagement. Internet self-efficacy was also unrelated to measures of general psychological well-being, including depression, loneliness, perceived social support and life stress, ruling out the competing hypothesis that self-efficacy merely reflects a generally positive outlook.

Prior Internet experience was the strongest predictor of Internet self-efficacy. Up to two years' experience may be required to achieve sufficient self-efficacy. Prior research showed that new users who had been on the Internet for two years or less encountered more stressful problems online and were also less satisfied with their Internet skills than veteran users (GVU, 1999). In the present research there was also a demarcation at the two-year point, Internet self-efficacy was much lower in the first two years than later (t= -2.37, p < .027). .

The path model (see Figure 2) supported a theoretical model constructed from Bandura, (1997). The model demonstrated that Internet use was directly affected by self-efficacy judgments. Usage and self-efficacy subsequently increased outcome expectations.

However, while self-efficacy was found to affect outcome expectations directly, the relationships were not as powerful as those found with usage. The specificity of the Internet self-efficacy measure could be at issue. The measure included only single items representing the achievement of social or informational outcomes on the Internet, such as using it to gather data or to obtain help from a discussion group. It appears that the ability to obtain these types of outcome expectancies through the Internet is something that gradually develops over time (Pew Research Center, 2000), so Internet self-efficacy specific to relationship formation and management may play a role in its attainment.

Likewise, there were no items in the self-efficacy measure referring to the use of the Internet for entertainment purposes. It also may be that the entertainment outcomes of the Internet are so easily attained that they do not require special skills, so that no mediation through self-efficacy is required. That said, the relationship between Internet self-efficacy and Internet outcome expectancies has provided researchers with new areas from which to begin validating and expanding this self-efficacy measure.

The expected relationship among self-efficacy, Internet stress, self-disparagement and Internet use was not observed. The revised model presented self-disparagement as an antecedent to Internet use. Given the low reliability obtained for Internet stress , researchers should continue to explore this relationship as presented in Figure 1.

For Future Research

Further research should explore self-efficacy measures specific to achieving particular types of outcomes through the use of the Internet. The importance of distinguishing general and task-specific self-efficacy has been discussed with respect to computer usage (Marakas, Yi & Johnson, 1998) and can be expected to be an important issue in Internet-related studies as well. Social cognitive theory also distinguishes coping self- efficacy, or beliefs in one's ability to deal with specific stress-inducing problems. In this case, these would be the various technical (e.g., inability to establish a connection) and socio-technical (e.g., receiving unwanted e-mail) difficulties that result from Internet use. The process of initially establishing Internet access, whether through one's own computer or a public access node, is also a distinct skill set that is beyond the scope of the Internet self-efficacy measure developed in the present study.

Future research should investigate the interplay among Internet self-efficacy, stress and on-line support. Social support should relieve stress (Cutrona & Russell, 1987). The amount of perceived and actual technical support available has been found to increase computer self- efficacy (Compeau & Higgins, 1995).

Social cognitive theory recognizes instances of reciprocal causation that cannot be assessed through one-time cross-sectional surveys. For example, perceived outcomes of behavior directly affect the future performance of behavior, so a reciprocal causation path from behavior to expected outcomes should be examined.

Likewise, the successful performance of a behavior should have a direct reciprocal effect on self-efficacy perceptions. Longitudinal research would supply the time series data needed to test predictive validity and the reciprocal causality that should exist between Internet self-efficacy and Internet use.

Internet Self-Efficacy and Closing the Digital Divide

Our measure and conceptualization of Internet self-efficacy should help guide future efforts to close the digital divide. Social cognitive theory suggests four mechanisms that can be used to formulate and understand intervention strategies. The sources of self-efficacy that should be investigated include enactive mastery, vicarious experience, verbal persuasion and physiological responses (Bandura, 1997; Oliver & Shapiro, 1993).

Enactive mastery, gained by reflecting upon one's own successful past performances, is by far the most powerful source of self-efficacy. Enactive mastery of complex behaviors such as Internet use can be bolstered by steadily building upon the successful attainment of subskills that are relatively easy to master. However, infrequent trips to standalone computer labs or short-term immersion courses are unlikely to be effective.

Vicarious experience gained by observing others as they master the Internet can be both positive and negative. Vicarious experience is generally thought to be less effective than direct (enactive) experience with one important exception: the observation of failure on the part of similar others can have a particularly devastating effect on self-efficacy judgments. So, when testing intervention strategies aimed as closing the digital divide, research should pair novice users with Internet experienced peer tutors (including on-line); this could be an effective method to increase Internet self-efficacy judgments and subsequent use. The common practices of holding group computer labs in educational settings and using the "buddy system" to share computer resources can have a negative effect on self-efficacy in populations where Internet skills are generally low. Here, observing the failures of peers is likely to discourage (i.e., decrease self-efficacy judgments) those struggling with Internet use and may also negatively affect those who have achieved early success. Individualized instruction would thus be preferable for new Internet users. Failing that, labs could be redesigned with partitions or staggered seating to restrict information about the failures of peers. Novice Internet users can also be persuaded to have greater self-efficacy through verbal feedback about their performance, if delivered by competent and credible evaluators. Feedback about the capability of the novice user is highly effective. However, verbal feedback must be constructive in order to increase self-efficacy. Telling new Internet users that they can succeed only through hard work or that they need to work harder is likely to lower self-efficacy in the long run since that conveys the message that the user must have been deficient to begin with to require such hard work to succeed.

Our alternative formulation of the digital divide problem is by no means intended to minimize the role played by race and class discrimination in creating unequal access to the Internet. Indeed, there are likely to be race and class differences in Internet self-efficacy as well. Research that examines the suggested intervention

strategies within specific ethnic and socioeconomic groups is needed. We hope that our self-efficacy conceptualization will alert reformers to the possibility that although providing computers and network connections eliminates the physical barriers to access, psychological barriers may still remain.

However, by vigorously publicizing the Digital Divide as an important social problem while simultaneously defining it in terms of race and class, there is the risk that deficient computer skills will come to be viewed as stereotypical of the groups that are presently below the divide. Social cognitive theory warns us that when this happens the stereotyped group tends to adopt the stereotype as a standard for their own self-comparisons (Bandura, 1997), lowering their self-efficacy and imposing a further psychological barrier to successful Internet use. Thus, as researchers attempt to uncover the underlying barriers influencing the divide, it might be more productive to conceptualize the divide in terms of the barriers shared by all novice users of the Internet.

Limitations

The validity of a construct cannot be established by a single study. Without longitudinal data it is hard to distinguish cause and effect ordering (Pedhazur, 1982) and the reciprocal causation mechanisms specified by social cognitive theory could not be examined. The convenience sample used restricts the generalizability of the results. Prior Internet experience was a single item measure and the Internet stress measure had a marginal level of internal consistency, calling into question the reliability of those results. Finally, only a single measure of Internet self-efficacy was employed. Construct validation procedures following the multi-trait multi-method approach (Anastasi, 1988) require the development and comparative analysis of multiple measurement methods using alternative approaches to self-efficacy measurement (Lee & Bobko, 1994).

Conclusion

The present study represents a further step in understanding the role that Internet self-efficacy plays in the use of the Internet. Finally, research suggested on the development of self-efficacy judgments (e.g., enactive mastery, vicarious experience, verbal persuasion and physiological responses) would help to further validate the Internet self-efficacy scale presented in this study as well as increase our overall understanding of Internet use.

Footnotes

1. Find companionship, meet new friends, maintain relationships, get in touch with people I know, and meet someone in person whom I met on the Internet.

2. Feel entertained; Find a way to pass time; Relieve boredom; Have fun.

3. Find current information like time, weather, stock prices and sports scores; Get information about products and services; Get immediate knowledge of big news events; Get information I can trust; Find information that is new to me; Encounter controversial information; Find information to complete a course assignment.

4. The other items were have trouble finding what I am looking for, have my computer freeze up, and get blocked by password protection

5. I feel my computer skills are inadequate; The things I can do on the Internet really don't amount to much; I can never accomplish what I want on the Internet.

6. Scored 1 for True and 0 for false with items indicating a lack of social support reflected. The items were: There is at least one person I know whose advice I really trust; There is really no one who can give me objective feedback about how I'm handling my problems; There is someone whom I feel comfortable going to for advice about sexual problems; I feel that there is no one with whom I can share my most private worries and fears; No one I know would throw a birthday party for me; There are several different people with whom I enjoy spending time; Most people I know don't enjoy the same things that I do; I feel that I'm on the fringe in my circle of friends; If I were sick and needed someone to drive me to the doctor, I would have trouble finding someone; There is no one I could call on if I needed to borrow a car for a few hours; If I needed a quick emergency loan of $100, there is someone could get it from; If I needed some help in moving to a new home, I would have a hard time finding someone to help me; In general, people don't have much confidence in me; Most of my friends are more successful at making changes in their lives than I am; I think that my friends feel that I'm not very good at helping them solve problems; I am closer to my friends than most other people.

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Chapter 7

Coherence II

Objectives :

- Free Reading
- Comprehension: reading for main ideas
- Expressing technical and scientific functions:(Comparing, opposing…)
- Writing: coherence II
- Extensive Reading

Time Now :

Mme
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1. Reading

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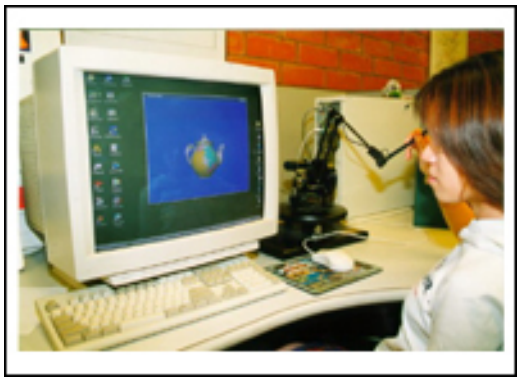

In this issue:

In Community We Trust

As e-commerce and virtual communities fundamentally change the way Americans do business and build relationships, how can people be assured of safety in unfamiliar cyber-spaces? The author argues that eBay is a community (of commerce), and that the rhetorical construction of "community" on the site provides a foundation for trust between users.

Mindscapes & Net CMC

B2B Electronic Commerce

The authors propose some ideas for stimulating and structuring interdisciplinary research on business-to-business electronic commerce. A 'commerce-centered' perspective is proposed grounded in concepts of commerce as a complex socio-economic institution. A framework is developed for assessing dynamics and impacts of electronic commerce in the value chains of products and services.

Stop Smoking on the Net

Computer-assisted interventions represent an innovative approach to adolescent smoking cessation that may offer advantages over traditional smoking interventions in providing adolescents with a variety of appropriate cessation-related activities, as well as tailored interactive feedback. Stomp Out Smokes (S.O.S.), an Internet-based information and support

Cyberspatial interactions potentially undermine normative cultural influences and permit multicultural or transcultural environments in which new codes extending from epistemological types become possible. Drawing upon Maruyama's theory, implications for an alternative to the homogenization of verbal communication, and potential elements of codes for universal understandings are considered.

Design of Web Surveys

Relatively little is known about standards for designing Web questionnaires. In order to achieve high data quality and also gain future cooperation of respondents, researchers have to create quality questionnaires that retain the respondent and provide fun and satisfaction. In this paper basic experiments that discuss these two issues are presented.

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system, was created to address the specific needs of adolescents who want to quit smoking.

Personal Web Pages

Personal home pages have been criticized as narcissistic and exhibitionistic, and praised as a means of self-disclosure and self-therapy. Yet self-presentation is often not their focal point. Home pages also address autodidactic, economic, housekeeping, or contact-oriented aims, making them attractive to diverse audiences.

Network Analysis of Usenet

This study examined the global structure of intercultural communication on a computer communication network. Extracted from a total of 232,479 discussion messages, a matrix of crossposted messages among 133 newsgroups over a year on the Usenet were analyzed to investigate structural patterns of communication flow.

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2. Comprehension Check

- Reading
- Verb Agreement and Tense

Reading

- Exercise 1
- Exercise 2
- Exercise 3
- Exercise 4
- Exercise 5
- Exercise 6

Exercise 1: Reading for main ideas

Read the text once, then answer these questions:

1. It will be difficult to build a relationship of trust online.

   ○ True
   ○ False

2. The idea of building a commerce community may prepare the ground for confidence and trust.

   ○ True
   ○ False

3. What kind of culture does computer-mediated communication promote?

Submit Reset

4. The Internet supports the idea of a homogenous kind of community.

- ○ True
- ○ False

5. What is the alternative to a homogenous kind of communication?

Submit Reset

6. Doing research online is still in its early steps.

- ○ True
- ○ False

7. Can you think of possible differences between a questionnaire in print and one online.
a) create quality questionnaires, and b) gain future cooperation of respondents

8. In paragraph 3 lines 9 and 10, the author says: "…experiments that discuss these two issues". What are these two issues?

a)

Submit Reset

b) [ ]

Submit Reset

9. What is the purpose of stimulating an interdisciplinary research on e-commerce?

[ ]

Submit Reset

10. Three are three advantages to online smoking interventions compared to traditional ones.

- ○ True
- ○ False

11. The main purpose of Personal Home Pages (PHP) is presenting oneself to different audiences.

- ○ True
- ○ False

Exercise 2 :

Fill in the blanks with information from paragraph 6.

- Criticisms directed to PHP:

a)…….. b)……

- Praise directed to PHP:

a)…… b)…… c)……

- The purpose of the study on network and usenet is……

Auto-evaluation

Exercise 3 :

Choose from the list of options the word that has the nearest meaning to:

1. Undermine (parg 2 L2):

   - ☐ to criticize
   - ☐ to make less effective
   - ☐ to ignore

   Submit Reset

2. Grounded (parg 4 L 6):

   - ☐ rooted
   - ☐ involved
   - ☐ centered

   Submit Reset

3. Praised (parg 6 L3):

   - ☐ retained
   - ☐ admired
   - ☐ changed

Submit Reset

4.

Focal (parg 6 L 5):

- ☐ important
- ☐ central
- ☐ minor

Submit Reset

Exercise 4 :

Use your knowledge of affix/suffix word formation to explain the following words:

Exercise 5 :

Express differently these compounds:

- High data quality:

Submit Reset

- High quality data:

Submit Reset

- Cessation-related activities:

Submit Reset

- Smoker-related interactive feedback:

Submit Reset

Exercise 6 :

Find words in the text having these definitions:

…….one who admires and loves himself

…….one who likes to attract attention to himself

…….making a secret about oneself known/public

…….treatment given to oneself to improve a health problem

…….presenting oneself

Auto-evaluation

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2. Comprehension Check

- Reading
- Verb Agreement and Tense

Verb Agreement and Tense

Click on the correct verb in the sentences below. Corresponding information for this exercise can be found in *The Craft of Editing* (denoted *CE*) and *The Craft of Scientific Writing* (denoted *CSW*). Note: In the general preferences of your browser, please do not underline links and do not override this document's choice of font colors.

1. In the past three months, a new series of low-priced computers (has been released, have been released).

2. The insurance company hopes that neither the architect nor the construction firm (are held, is held) liable.

3. In the next section, the criteria for assessing each system (are given, is given).

4. To connect a temperature measurement circuit to the HC11 microcontroller, we added new hardware and developed new software. The added hardware controlled both the measurement and the display of the temperature. This hardware (included, includes) light emitting diodes that (attach, attached) to Port B.

5. To connect a temperature measurement circuit to the HC11 microcontroller, we added new hardware and developed new software. The added hardware controlled both the measurement and the display of the temperature. This hardware included light emitting diodes that (attach, attached) to Port B.

6. To connect a temperature measurement circuit to the HC11 microcontroller, we added new hardware and developed new software. The added hardware controlled both the measurement and the display of the temperature. This hardware included light emitting diodes that attached to Port B. Figure 1 (showed , shows) a schematic of this hardware.

7. **Conclusion.** This report (has presented , presented , presents) a design of a temperature measurement circuit for the HC11 microcontroller.

Available online at: http://www.writing.eng.vt.edu/exercises/usage2.html
Retrieved 28 August 2004

Key to Verb Agreement and Tense

Congratulations, you have answered #1 correctly.

Exercise: In the past three months, a new series of low-priced computers (**has been released** , have been released).

Discussion: Because the subject "series" is singular in this sentence, the correct verb is "has."

Congratulations, you have answered #2 correctly.

Exercise: The insurance company hopes that neither the architect nor the construction firm (are held, **is held**) liable.

Discussion: With a "neither/nor" construction of the subject, the number of the noun closest to the verb determines the number of the verb. In this case, because the noun "firm" is singular, the verb is singular.

Congratulations, you have answered #3 correctly.

Exercise: In the next section, the criteria for assessing each system (**are given,** is given).

Discussion: The noun "criteria" is plural.

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Congratulations, you have answered #4 correctly.

Exercise: To connect a temperature measurement circuit to the HC11 microcontroller, we added new hardware and developed new software. The added hardware controlled both the measurement and the display of the temperature. This hardware (**included** , includes) light emitting diodes that (attach, attached) to Port B.

Discussion: In the first two sentences, the author has adopted a reference frame in which the circuit existed in the past. Therefore, for the rest of the document, that reference frame must be maintained. In reports that document the completion of a project, engineers and scientists usually adopt a reference frame that exists after the experiment or design has been disassembled. In progress reports, engineers and scientists usually adopt a reference frame in which the experiment or design still exists.

Congratulations, you have answered #5 correctly .

Exercise: To connect a temperature measurement circuit to the HC11 microcontroller, we added new hardware and developed new software. The added hardware controlled both the measurement and the display of the temperature. This hardware included light emitting diodes that (attach, **attached**) to Port B.

Discussion: In the first two sentences, the author has adopted a reference frame in which the circuit existed in the past. Therefore, for the rest of the document, that reference frame must be maintained. In reports that document the completion of a project, engineers and scientists usually adopt a reference frame that exists after the experiment or design has been disassembled. In progress reports, engineers and scientists usually adopt a reference frame in which the experiment or design still exists.

Congratulations, you have answered #6 correctly.

Exercise: To connect a temperature measurement circuit to the HC11 microcontroller, we added new hardware and developed new software. The added hardware controlled both the measurement and the display of the temperature. This hardware included light emitting diodes that attached to Port B. Figure 1 (showed, **shows**) a schematic of this hardware.

Discussion: Present tense is used here because the figure continues to show the readers a schematic of the hardware, even though the actual hardware has been disassembled. Such a use of present tense in the same paragraph that contains verbs in the past tense is not a tense error because the *reference frame* for the document remains constant.

Congratulations, you have answered #7 correctly.

Exercise: **Conclusion.** This report (has presented , presented, presents) a design of a temperature measurement circuit for the HC11 microcontroller.

Discussion: The present perfect tense is used here because most of the "presenting" has occurred in the past, but some "presenting" still remains. Note that in the "Introduction" of this report the tense choice for this sentence would be the present tense.

Answer key

Exercise 1

1. F
2. T
3. multicultural / transcultural
4. F
5. heterogenous (≠ homogenous) community
6. T
7. free answers
8. a) create quality questionnaires, and b) gain future cooperation of respondents
9. develop a framework for assessing dynamics and impact of electronic commerce in the value chains of products and services
10. F
11. F

Exercise 2

- Criticisms directed to PHP:

a) **narcissistic** b) **exhibitionist**

- Praise directed to PHP:

a) **self-disclosure** b) **self-therapy** c) **self-presentation**

- The purpose of the study on network and usenet is **to investigate structural patterns of communication flow**

Exercise 3

1. to make less effective

2. rooted
3. admired
4. central

Exercise 4

1. transcultural
2. multicultural
3. homogenisation
4. autodidactic

Exercise 5

- a high quality of data

- data of high quality

- activities related to cessate (stop) smoking

- interactive feedback related to the smoker

Exercise 6

narcissistic

exhibitionist

self-disclosure

self-therapy

self-presentation

3. Expressing technical and scientific functions: Comparing, opposing, and objecting

---

Study the following expressions for comparing, opposing, and objecting then translate the sentences in Exercise 1 into English.

1. Comparing

When compared to	En comparaison avec
Compared with	X est confronté à
It is comparable with	X est comparable a/au
By comparison	en comparaison
For the purposes of comparison	dans un but de comparaison
Virtually identical with	pratiquement identique à
much lighter	beaucoup plus léger
somewhat greater than	un peu plus grande que
It is as though	c'est comme si
This is equivalent to/tantamount to V+ing	ceci revient à
Like that of	comparable a celui
Is more akin to	Ressemble davantage à
likewise	Il est de même
unlike	Contrairement à
similarly	De manière analogue
in much the same way	De façon très semblable

2. Opposing

However/nonetheless	Toutefois
Yet	Cependant
Nevertheless	Néanmoins
On the contrary	Au contraire
Conversely	Réciproquement
In contrast,	En revanche
In contrast to x	Par comparaison à x
X versus Y	X en opposition au
Contrast with	Diffère de
X differs from Y in that	X diffère de Y dans la mesure ou…
In spite of x/ despite	Malgré x
In spite of the fact that…	En dépit du fait que
Whereas	Tandis que
While	Alors que
Although	Bien que
As opposed to	Par opposition à/au
X is reversed	X est inverse

3. Objecting

A major criticism of	Une des critiques principales
However, two difficulties arise	Toutefois, deus difficultés apparaissent
A criticism we would raise is…	Une critique que l'ont pourrait faire est…
X makes no allowance for…	X ne tient pas compte de…
although……..,exceptions are recognized	Bien que…….,on connaît certaines exceptions
although……., it is irrelevant for….	Bien que……, elle n'est pas pertinente pour..
A host of objections	Toute une série d'objections

X provides an inappropriate illustration	X offre une illustration inexacte
X fails to take into account …	X est incapable de rendre compte de….
The greatest failing is…	La plus grande lacune est…..
This result casts some doubt upon…a second problem is……that seriously bias the results	Ce résultat met en doute …. Le deuxième problème est….qui introduit un biais dans les résultats

Exercise 1 : Translate into English

1. Face à ce projet simpliste, toute une série d'objections viendront à l'esprit de tout ingénieur travaillant sur cette question.
2. Les données mettent en doute la pertinence de ce modèle.
3. Ce qui nuit le plus au modèle d'ajustement par les coûts techniques est le fait que le temps requis pour réaliser des projets d'investissement n'est pas court par rapport au cycle économique.
4. Le deuxième problème est qu'il peut y avoir des erreurs de mesure qui introduisent un biais dans les calculs.
5. Les chiffres de ce travail sont toutefois intéressants même s'ils ne s'appuient que sur un petit échantillon.
6. En dépit du fait que le taux de croissance augmente, la population reste faible.
7. Les caractéristiques de la configuration en couleur diffèrent de se qu'elles sont en noir et blanc.
8. Les résultats numériques ont été confrontes à une série de donnes expérimentales.

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key to express 7

1. A whole host of objections to this oversimplified scheme will occur to every working engineer

   ……..…….

2. The data cast some doubt upon the adequacy of the model

   ……..…….

3. Most destructive of all to the adjustment cost technology model is the finding that the time required to complete investment projects is not short relative to the business cycle.

   ……..…….

4. The second problem is that there may measurement errors that seriously bias the calculations

   ……..…….

5. The values of this work are nevertheless interesting even though they are based on a small sample

   ……..…….

6. Inspite of the fact that the rate of growth accelerates, the population remains small.

   ……..…….

7. The characteristics of the colour configuration differ from that in black and white
8. numerical results were compared with a set of experimental data

4. Writing: Coherence (Advanced level)

These sentences are taken from the introduction of an article on the relationship between different types of media and whether they are being replaced by the Internet.

The author's argument is that there is no viable reason to think that the Internet will displace newspaper reading.

Re-arrange the sentences then the paragraphs in such a way as to make his point clear.

Exercise 1 : Re-arrange the sentences in each paragraph

Paragraph A

…… Research also shows that children have preconceptions and motivation that influence how they use a particular medium and how much mental effort they will put into processing information (Beentjes, 1989; Beentjes & van der Voort, 1993; Cennamo, 1993; Cennamo, Savenye & Smith, 1991; Cohen & Salomon, 1979; Salomon, 1983a, 1983b, 1984; Salomon & Gardner, 1986; Salomon & Leigh, 1984).

…… It is not surprising that parents and teachers encourage newspaper reading. In fact, early displacement studies are concerned about television's influence on the habit of reading of books, newspapers, and magazines (Neuman, 1991).

…… Furthermore, reading newspapers is generally considered a positive habit, which can help in honing language skills and acquiring knowledge about the world.

…… For example, children may consider print as "harder" and are more willing to invest mental effort in dealing with printed information, and as a result, learn more (Beentjes & van der Voort, 1993; Cohen & Salomon, 1979; Salomon, 1983a, 1983b, 1984; Salomon & Leigh, 1984).

Paragraph B

……. In fact, the reverse may be true.

……. We therefore do not have a good reason to believe that the Internet will displace newspaper reading.

Paragraph C

……. Indeed, individuals can read newspapers at home, but they can also do that on the bus, in the park, at the mall and many other places.

……. The print newspaper is mostly an information source; yet, the amount of information it carries pales by comparison to the Internet.

……. Although the technology is interactive and allows the Internet to be accessed at various places, it is not as flexible and cheap compared to the newspaper.

……. If we look at functional similarity alone, it seems that newspaper will fail to compete with the Internet. However, the use of the newspaper and the Internet does not necessarily share the same physical space.

Exercise 2 : Re-arrange the paragraphs

The order of paragraphs is: ……. ……. …….

Answer key

These sentences are taken from the introduction of an article on the relationship between different types of media, and whether they are being replaced by the Internet.

The author's argument is that there is no viable reason to think that the Internet will displace newspaper reading.

Re-arrange the sentences then the paragraphs in such a way as to make his point clear.

Paragraph A

……3…… Research also shows that children have preconceptions and motivation that influence how they use a particular medium and how much mental effort they will put into processing information (Beentjes, 1989; Beentjes & van der Voort, 1993; Cennamo, 1993; Cennamo, Savenye & Smith, 1991; Cohen & Salomon, 1979; Salomon, 1983a, 1983b, 1984; Salomon & Gardner, 1986; Salomon & Leigh, 1984).

……2…… It is not surprising that parents and teachers encourage newspaper reading. In fact, early displacement studies are concerned about television's influence on the habit of reading of books, newspapers, and magazines (Neuman, 1991).

……1…… Furthermore, reading newspapers is generally considered a positive habit, which can help in honing language skills and acquiring knowledge about the world.

……4…… For example, children may consider print as "harder" and are more willing to invest mental effort in dealing with printed information, and as a result, learn more (Beentjes & van der Voort, 1993; Cohen & Salomon, 1979; Salomon, 1983a, 1983b, 1984; Salomon & Leigh, 1984).

Paragraph B

……2…… We therefore do not have a good reason to believe that the Internet will displace newspaper reading.

……1…… In fact, the reverse may be true.

Paragraph C

……3…… Indeed, individuals can read newspapers at home, but they can also do that on the bus, in the park, at the mall and many other places.

……1…… The print newspaper is mostly an information source; yet, the amount of information it carries pales by comparison to the Internet.

……4…… Although the technology is interactive and allows the Internet to be accessed at various places, it is not as flexible and cheap compared to the newspaper.

……2…… If we look at functional similarity alone, it seems that newspaper will fail to compete with the Internet. However, the use of the newspaper and the Internet does not necessarily share the same physical space.

The order of paragraphs is: …C…….. ……B…. ……A……..

Look at the final essay :

The print newspaper is mostly an information source; yet, the amount of information it carries pales by comparison to the Internet. If we look at functional similarity alone, it seems that newspaper will fail to compete with the Internet. However, the use of the newspaper and the Internet does not necessarily share the same physical space. Indeed, individuals can read newspapers at home, but they can also do that on the bus, in the park, at the mall and many other places. Although the technology is interactive and allows the Internet to be accessed at various places, it is not as flexible and cheap compared to the newspaper.

Furthermore, reading newspapers is generally considered a positive habit, which can help in honing language skills and acquiring knowledge about the world. It is not surprising that parents and teachers encourage newspaper reading. In fact, early displacement studies are concerned about television's influence on the habit of reading of books, newspapers, and magazines (Neuman, 1991). Research also shows that children have preconceptions and motivation that influence how they use a particular medium and how much mental effort they will put into processing information (Beentjes, 1989; Beentjes & van der Voort, 1993; Cennamo, 1993; Cennamo, Savenye & Smith, 1991; Cohen & Salomon, 1979; Salomon, 1983a, 1983b, 1984; Salomon & Gardner, 1986; Salomon & Leigh, 1984). For example, children may consider print as "harder" and are more willing to invest mental effort in dealing with printed information, and as a result, learn more (Beentjes & van der Voort, 1993; Cohen & Salomon, 1979; Salomon, 1983a, 1983b, 1984; Salomon & Leigh, 1984).

We therefore do not have a good reason to believe that the Internet will displace newspaper reading. In fact, the reverse may be true.

The order of paragraphs is:

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Close

5. Extensive reading

What are the possble applications of this research?

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Message Board

Measuring the Acceptance of Electronic Marketplaces: A Study Based on a Used-car Trading Site

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Abstract

Electronic marketplaces act as intermediaries between supply and demand. Such forums are often organized by a central operator and are a common form of electronic commerce. The operators are independent entrepreneurs who are competing against one another for business. Their objective is to win over users for their own marketplace in order to generate fees by matching buyers and sellers. This is only possible when the marketplace design is ‘acceptable’ to the users. Using data from an empirical study, the present article analyzes criteria which marketplace users considered important in determining their acceptance of an electronic marketplace. The data were collected from the users (buyers and sellers) of a used-car trading site.

Introduction

The role of electronic marketplaces is to act as an intermediary between supply and demand (Sarkar, Butler & Steinfield, 1996; Schmid, 1993). Using a simplified classification, it is possible to distinguish between two general types of marketplaces on the World Wide Web (Bailey/ Bakos, 1997): markets with and markets without a central operator who brokers the transactions between buyer and seller. Markets without a central operator are merely electronic trading forums. They feature a thematic listing (links) of potential trading partners but do not offer the buyer any concrete buying opportunities (Bakos, 1991). The result is a so-called electronic shopping mall or market community, which provides consumers with a catalog of suppliers in a specific product field. In marketplaces with a central operator, the organizer or broker intervenes directly in the market process. The operator gathers product offerings and buyer wishes and matches this information within its database according to defined co-ordination criteria (Chircu & Kauffman, 1999). This proactive intermediation service between supplier and customer is offered as an entrepreneurial product. The result is an online auction or electronic marketplace that facilitates transactions for certain items (Whinston, Stahl & Cho, 1997). The aim of an auction is specifically to offer an object to as many bidders as possible in order to raise the price. In the case of electronic marketplaces, in contrast, there are mostly many sellers and many buyers simultaneously facing one another.

Operators of electronic marketplaces offer a co-ordination service for economic transactions on the WWW as economically independent entrepreneurs (Schmitz, 2000). The existing resources

in computer technology really do make it possible for them to assume the role of proactive market managers (Malone, Yates & Benjamin, 1987). Not only do they determine the rules of trade under which the business transactions take place (Schmid, 1997), they also collect requests for transactions from both market actors and attempts to match these using criteria of efficiency and effectiveness. The added value, which ultimately forms the basis for the fee the operator collects from both market participants, is made up of the increased market transparency for the buyers and the greater efficiency of the intermediation for the sellers (Kollmann, 1999a).

Acceptance as a Competitive Criterion for Marketplace Operators

The marketplaces of the central operators are furthermore in direct competition with one another. Their goal is to win over suppliers and customers for their own intermediation platform and to match buyers and sellers for a fee (Kollmann, 1999b). This is only possible when the marketplace design is ‘acceptable’ to the users. Acceptance is seen here as a construct which reflects the marketplace user’s belief in the ability of an electronic marketplace to match the needs of supply and demand successfully. The present article analyzes criteria which were important for the acceptance of an electronic marketplace from the standpoint of the marketplace users (buyers and sellers). These criteria can be used as the basis for a marketing concept designed to attract new participants to a marketplace. For that reason, the distinctive characteristics of electronic intermediation will be discussed in the following section. Subsequently, they will be incorporated into a model for the measurement of marketplace acceptance. The ensuing acceptance model will then be verified using data from a survey of users of an electronic marketplace specializing in used cars.

Basis of a Measure of Acceptance of Electronic Marketplaces

When examining market acceptance for an enterprise organized as an electronic marketplace, there are two distinctive characteristics which are of import: a tripolar participation structure and a derivative service aspect. The tripolar participation structure refers to the triangular transaction configuration (Figure 1). In contrast to a traditional exchange of goods between two parties (Alderson & Martin, 1965), a third partner intervenes here in the bilateral exchange relationship between buyer and seller. In this configuration all parties (seller/buyer/marketplace operator) are in direct contact with each other and the goods or services can only be exchanged when all

three parties participate in the transaction (Figure 1). The third partner in the exchange, the marketplace operator, does not transform the exchanged goods or services. The operator simply provides an information channel which is requisite to the conclusion of the transaction and which reduces the costs of this transaction (Lee & Clark, 1996). Acceptance is thus determined by three market players with opposing optimization criteria (needs structures). Whereas supply and demand are attempting to optimize the design of the individual transaction, with the supplier acting to increase revenue and the demander personal benefit, the marketplace operator is seeking to optimize his profits as a function of the fees charged for matching the transaction partners. The acceptance of an ‘electronic marketplace’ enterprise, therefore, depends on two client groups, the demand side and the supply side, with disparate objectives (bilateral acceptance aspect).

The derivative service aspect describes a situation in which a good (in this case the intermediation service provided by the marketplace operator) does not result in direct, but rather an indirect utility, which first arises after use has been made of an interactive relationship within a communication system (Farrell & Saloner, 1985; Katz & Shapiro, 1985; Wiese, 1990). The derived benefit to the person using the good increases with the quantity and intensity of use of the other participants (Weiber, 1992). Typical examples of goods with direct network externalities are all types of telecommunications and information systems in which the benefit to each subscriber increases when another subscriber enters the system, since the existing network is expanded. Another consequence of this externality is that the benefit derived from a marketplace not only depends on the readiness to provide a service and the performance of the operator but also on the readiness to use the service and the performance of the operator’s clients, i.e. on the buyers and sellers themselves. The marketplace operator cannot act as a mediator unless requests or offers are made for a product on the operator's site (Figure 1). Furthermore, the operator's success will increase with the number of requests and offers that exist on the site. The ‘electronic marketplace’ is thus dependent on the readiness of others to participate in it (acceptance) and, regardless of that readiness, does not provide a primary service (slavish acceptance aspect). An example should clarify these relationships:

The operator of AutoScout24 has been running this used-car site since 1997. Sellers enter their cars into the database and the operator mediates between buyers and sellers on the basis of the search data entered by the buyers. On average there are approximately 180,000 cars in the

database, making AutoScout24 one of the largest marketplaces in this field in Europe. Around 2,500,000 users access the site every month to look for a car or to put a car up for sale. The marketplace only exists online and only deals with the information on the cars in the database (e. g. technical data, photographs, test reports). It is not possible to inspect the vehicles before intermediation takes place since there is no central car park or the like where the cars in the database can be put on display. It is a matter of structuring the object related information, not the real physical objects. AutoScout24 itself thus does not obtain an ownership interest in the objects.

The functional method of the electronic marketplace is thus as simple as may be imagined: A seller has the possibility of specifying a used car via an interactive entry module and to place this directly in the marketplace database. The marketplace operator is then commissioned to perform mediation (slavish acceptance aspect). Demanders have the choice of either searching in the database themselves or have the marketplace operator search by entering their search wish (activity of the market channel). Objects are then offered by this channel that fit the search criteria, but alternatives to the wishes initially given are also offered. On the other side the operator also informs sellers about the search wishes of demanders. The electronic marketplace AutoScout24 thus supports marketing on the seller side and on the buyer side ensures a certain level of market transparency. An actual transaction is only made, however, when both customer groups are satisfied with the results of the mediation (bilateral acceptance aspect). AutoScout24 is thus in competition with other marketplaces specifically on the German-speaking WWW that also offer a point of contact for the used-car trade (e.g. faircar, autocity, autoweb, mobile etc.), but also with real mediation institutions (e.g. newspapers). It is clear that in this kind of object mediation, other mediation mechanisms besides that of price apply. Other limiting conditions apply here than those in pure auctions (Lee, 1997).

Problems Related to the Electronic Mediation of Transactions

The tripolar participation structure (seller, buyer and marketplace operator) and the derivative service aspect complicate the acceptance issue. This can be illustrated with the following real-life situation. This practical example is based on an electronic real-estate marketplace with numerous houses/apartments for rent in its database, a good number of daily users looking for an apartment and thus the real opportunity of a transaction's being mediated. There are three typical acceptance problems which can arise in this constellation:

· Problem 1: The site lists 250 apartments for rent in neighborhood X but does not have 250 people looking for an apartment in neighborhood X since the users prefer to live in neighborhood A. Consequence: The database volume is insufficient for a match and primarily the suppliers are disappointed with the marketplace (focus on supply).

· Problem 2: The site lists 250 people looking for an apartment in neighborhood Y but does not list 250 places for rent in neighborhood Y. Rather, it only lists apartments in neighborhood C. Consequence: The database volume is insufficient for a match and primarily the demanders are disappointed with the marketplace (focus on demand).

· Problem 3: The site lists 250 apartments for rent in neighborhood X and has 250 people looking for an apartment in neighborhood X but none of these match because all apartment seekers want a balcony and none of the apartments has one. Consequence: The quality of the database is too poor for a match and both the suppliers and seekers are disappointed with the marketplace (focus on intermediation).

The result is a two-sided acceptance problem for the marketplace operators which (cf. supra) which can be structured into four problem zones of quantitative and qualitative nature (Kollmann, 1998a). The main quantitative aspects are:

1. Chicken and Egg Problem

The mutual interactive relationships in electronic marketplaces are the cause of the ‘chicken and egg’ problem (Durand, 1983; Earston, 1980), otherwise referred to as the ‘vicious circle’. The ‘chicken and egg’ problem can be summed up as follows: If there are not enough suppliers, or if the acceptance of the offered items is too low, no buyers will use the marketplace. If the acceptance of the buyers is too low, suppliers will not use the marketplace. This dilemma is one barrier to the acceptance of the ‘electronic marketplace’ institution.

2. Critical Mass Problem

The installed basis, i.e. the number of users already present in a marketplace, determines the utility of the marketplace for new users since a greater number of users also increases the number of potential transactions (Farrell & Saloner, 1986). The larger the installed basis, the larger the derivative utility (cf. supra) for the marketplace participants. Once a certain number of

users has been exceeded and the derivative utility has accordingly passed a certain level, it can be expected that the users will also accept the marketplace in the future and the number of new participants entering the marketplace will grow faster. The minimum number of users required before a marketplace "...can develop a sufficient usage for a long-term application for a user circle is referred to as critical mass" (Weiber, 1992).

From the standpoint of the marketplace operator, this creates the situation of a double critical mass. What is more, both masses exist in a mutually dependent relationship. For the supplier, a certain number of demanders of a certain quality must be present to make the marketplace attractive to him. At the same time, a certain number of suppliers with certain characteristics must exist before buyers will enter the marketplace. In addition, there are the qualitative aspects of the problem:

3. ‘Quality of Intermediation’ Problem

The number of market participants alone, whether on the supply or demand side, does not yet allow any conclusions about the quality of the matched transaction partners or how well their needs can be satisfied with regard to the transaction items. It still remains to be seen, therefore, how the quality expectations of both parties are met by the marketplace. That is why a close match between what people are looking for and what is being offered plays an important role in this context.

4. ‘Quality of Business Deal’ Problem

Owing to the virtual nature of an electronic marketplace, it is not possible to inspect the items up for sale. After the marketplace operator has fulfilled the role of middleman between buyer and seller, i.e. after the preselection process for the items which were of interest to them is complete, the buyer still has to visit the seller to view the actual item. The ‘reality gap’ which can arise should the item not live up to the expectations created by the description on the electronic marketplace will have a negative impact on the electronic marketplace.

Based on the marketing problems described above, as seen from the standpoint of the marketplace operator, an initial concept for measuring user acceptance (by both suppliers and demanders) of electronic marketplaces has been developed.

Methods

The issue of user acceptance invites the question: Which indicators are of what significance for the acceptance of an electronic marketplace? The answer to this question can be used to develop a marketing concept which should identify the relevant aspects of a communication strategy for marketplace operators. This could help improve the acceptance of one's own marketplace by increasing the number and loyalty of buyers and sellers at a site. The question remains, though, how to measure the acceptance of a marketplace on which a central agent is merely responsible for information intermediation without any knowledge of the items in reality? A fitting instrument for this context has yet to be discussed in the economics journals. Up until now, the discussion has dealt mainly with the definition of the phenomenon per se and limited itself to the suggestion that the acceptance of an electronic marketplace should be determined from the standpoint of the marketplace user. One reason for this lack of attention is surely the fact that marketing experts have considered electronic marketplaces, as they do bricks-and-mortar marketplaces, merely to be another sales channel. Before an appropriate yardstick for acceptance can be found, therefore, it is necessary to develop a new causal model to define the acceptance of an electronic marketplace from the standpoint of the user. These findings can then form the basis of a general marketing concept for the operators.

An analysis of potential indicators which could describe the acceptance of electronic marketplaces, which can be described in general terms as intermediation institutions, is not only of theoretical interest, but owing to the growing number of such sites on the WWW, also of great practical interest (Wigand & Benjamin, 1996). In light of the theoretical problems of electronic marketplace acceptance (cf. supra), two central objectives were pursued in this study:

1. Identification of central indicators for electronic marketplace acceptance from the standpoint of the marketplace participants.

2. Verification of the ensuing multivariate models for measuring the electronic marketplace acceptance as relevant for the supply and demand sides.

The first step in the procedure chosen to bring us closer to the complex idea of 'marketplace acceptance' was to create a basis of understanding on which the first indicators were developed (Homburg & Giering, 1996). Based on an examination of the relevant literature, discussions with

the management of various electronic marketplace sites on the Internet were carried out. The results were incorporated in a pre-test done with operators of electronic marketplaces on the German-language WWW in March/April 1997. The return rate was aceptable, with 37 of the 127 questionnaires being sent back (Kollmann, 1998b). The results of the survey (e.g. problem specifications of the definition of success construct and indicators) and the further theoretical considerations (Kollmann 1998a, 1999a, 1999b) resulted in an acceptance model for electronic marketplaces which will be described in greater detail in this article.

Structure of the Acceptance Model

The general tenor of the answers given by the marketplace operators in the pre-test was that an electronic marketplace is successful in practice when it brings together supply and demand at the information level in a cost-efficient and user-friendly atmosphere which guarantees a better chance of a real transaction being concluded than is the case on a competing intermediation institution. If the marketplace is successful in doing this, it is also acceptable to the users. It was in this context that the influencing factors were derived and the theoretical model constructed. It should provide an explanation for how the decision to participate in an electronic marketplace, which is based on subjective criteria, is made. The central construct being discussed here, namely ‘marketplace acceptance’, can consequently be seen as a synonym for the decision to participate in a market, which thus ensures the marketplace’s success. This allows the formulation of the following definition (result of the survey of marketplace operators, see above):

· Marketplace acceptance, from the viewpoint of the marketplace participant, reflects the subjectively perceived ability of the ‘electronic marketplace’ or its operator to adequately match supply and demand.

Examples of positive acceptance would be the first-time use of a site’s services or the repeated use thereof. Negative acceptance would lead to the decision not to use a site’s services or cause a participant to leave the marketplace.

Owing to the tripolar participation structure of electronic marketplaces, the influencing factors must be determined from the standpoint of two customer groups (supply and demand side). In accordance with the above description of the acceptance issue, the demand side will be looking at the number and quality of the suppliers and their items. Of further importance to them will be

the conditions for accessing the database and their ability to make their search criteria clear to the marketplace operator. By contrast, the supply side will be more interested in the number and quality of the purchasers in the marketplace and the conditions under which they can enter items into the database. Getting good value for their money will be of relevance to both the supply and demand sides. They will be comparing the costs for using the service with the results offered by the marketplace operator. Furthermore, the distinctive nature of electronic intermediation and the inherent concentration on the information level will condition the question of the real consequence of intermediation; in other words, is the information on the marketplace in a position to generate a real sale?

The next step was to use the influencing factors identified above to develop theoretical constructs. Each construct reflected a group of influencing factors. Subsequently, certain hypotheses were tested in an empirical study to determine their link to ‘marketplace acceptance’. The ‘readiness to use’ construct includes search mask appearance and the ease of data input when searching for a product (demand side; H1d) or when posting an item for sale (supply side; H1s). The ‘database quality’ construct, from the supplier’s point of view (H2s), stands for the number and quality of the information requests by the demand side. A general estimate only could be made here, because the determining of a 'critical mass' was made on a purely subjective basis. Further to this the search is oriented on individual cases (the right demander) and not on the total selection. For the product seekers (H2d), it stands for the type, number and quality of the items in the database. Here too it is not the total available 'critical mass' that is in focus, but the specific individual case (the right car). The ‘intermediation service’ construct (H3d/s) describes the manner in which the transaction partners are matched and the closeness of the match to their initial search parameters. The ‘actual transformation’ construct (H4a/n) refers to the transformation of the mediated information into a real transaction, the ultimate measure of the intermediation institution. Finally, the ‘intermediation costs’ construct (H5d/s) reflects the expenses incurred by the market participants for using the services provided by the marketplace operator. It includes the costs of both the accessing the marketplace (e.g. communication costs) and the site’s user fees. These costs represent only a portion of the total transaction costs, however, (Giaglis, Klein, & O'Keefe, 1999; Malone & Rockart, 1992). The reason is that in the real transaction of business (e.g. real inspection of or provision of the car) additional costs will be incurred. Since these cannot be charged to the marketplace only those costs are examined that result directly from electronic mediation. The term ‘intermediation costs’

is thus used instead of 'transaction costs'. The role played by these constructs in determining the central marketplace value was examined in this study. The correlations, which can be positive or negative, can be expressed in the following hypotheses:

· Hypothesis Group 1 (positive correlation):
The greater the database quality (H1s/d) and the readiness to use (H2s/d), and the better the intermediation service (H3s/d) and the actual transformation rate (H4s/d), the greater the acceptance of the electronic marketplace.

· Hypothesis Group 2 (negative correlation):
The higher the intermediation costs (H5s/d), the lower the acceptance of an electronic marketplace.

These correlations in themselves are in no way surprising. Of greater importance is the weighting or significance of the individual constructs in determining the overall acceptance.

Background of the Data Collection

The empirical basis for testing the hypotheses was provided by two online surveys done with the users of AutoScout24 in May/June 1999 and March/April 2000. The automotive industry in particular and its system of dealers (real intermediary) is influenced by the appearance of electronic marketplaces (virtual intermediary) (Klein & Selz, 2000). Each survey was carried out over a period of four weeks. A button with a link to the survey was installed on the AutoScout homepage. The users were asked to share their general opinion of electronic marketplaces. A filter question was used to split up the buyer and seller groups. After all unusable responses had been eliminated, the 1999 survey produced data records for 821 buyers and 115 sellers. The 2000 survey, which was filled in by 1,322 buyers and 473 sellers, used exactly the same questionnaire and was performed to check and confirm the acceptance model. In spite of the relatively large number of data records, it is still necessary to question the representativeness of the results since all respondents came from the ‘online user’ group and the survey only pertained to one specific topic (cars). Nonetheless, the results can be seen as a first indication of the validity of the acceptance model.

The hypothetical constructs were operationalized within the survey using a multiple item concept

which employed a six-point forced rating scale (no evasive option was provided). The items were selected to reflect the hypothetical construct and described the concepts behind the constructs. The questions were formulated as personal statements to reduce the risk of misunderstanding and to help the respondents identify with the issue. The answers given were an expression of agreement or disagreement with the statements on the questionnaire (e.g. "A clearly designed homepage is important to me"). As a result, the respondents were incited to call up their ‘self-images’ and to describe these using the items on the questionnaire (Fisseni, 1990). The agreement or disagreement was expressed by clicking on the appropriate point of the graphical rating scale on the online questionnaire. This method placed a greater value on the subjective perception of the subjects. In this context, the overall hypothetical construct ‘marketplace acceptance’ was also recorded using global personal statements as a combination of all evaluation values (e.g. "I believe that I have an overall positive opinion of electronic marketplaces").

The description of the model makes it clear that, with regard to the presumed correlations, it not a question of the connections between the measured variables but between the hypothetical constructs which cannot be directly observed themselves. As a result, a causal analysis is required to verify empirically the underlying hypotheses in their entirety. Hence, the survey data were analyzed using the LISREL approach of structural equation or causal analysis (Jöreskog & Sörbom 1988). Before the procedure was applied, an analysis was performed (normal distribution, univariate check, reliability and validity) to verify whether the question chosen to operationalize the hypothetical variables represented the theoretical constructs in an appropriate manner. This is the case, for example, when the measuring item showed a correlation of > 0.7 (good) or > 0.6 (satisfactory) with the underlying construct (Backhaus et al., 1998). The items which fulfilled this criterion and which were used in the LISREL analysis are shown in Figure 2. After the correlation matrix was created, the ULS method was chosen as the iterative estimate procedure since not all measured items displayed a normal distribution.

Construct	Measuring Item	Correlation (*) 1999 / 2000
Readiness to use (demand side)	• Clear page layout • Ease of search • Help options • Ease of navigating site	0.77 / 0.75 0.73 / 0.74 0.81 / 0.79 0.86 / 0.79
Readiness to use (supply side)	• Clear page layout • Ease of placing an ad • Ease of navigating site	0.88 / 0.85 0.77 / 0.81 0.73 / 0.75
Database Quality (demand side)	• Total number of items in database • Number of hits per search • Description depth of items • Quality of items for sale	0.64 / 0.71 0.88 / 0.76 0.91 / 0.89 0.70 / 0.73
Database quality (supply side)	• Total number of buyers on marketplace • Searches in own item group • Number of matches for own item	0.92 / 0.90 0.93 / 0.91 0.68 / 0.74
Intermediation Service (demand side)	• Closeness of match: search results and criteria • Completeness of information on item • Opportunity to contact seller	0.95 / 0.91 0.66 / 0.72 0.67 / 0.71
Intermediation Service (supply side)	• Speed of intermediation • Closeness of match: actual and sought item • Quality/authenticity of buyer interest	0.86 / 0.86 0.87 / 0.86 0.87 / 0.83
Actual Transformation (demand side)	• Actual availability of items • Objective degree of correspondence between real item and electronic information • Confirmation of subjective expectations with regard to item/seller upon inspection/meeting	0.72 / 0.69 0.65 / 0.71 0.67 / 0.69
Actual Transformation (supply side)	• Actual visit of potential client • Correspondence of electronically mediated partner to real potential client • Degree of conformity between electronic expectations of the buyer and the real item	0.92 / 0.87 0.72 / 0.76 0.91 / 0.89
Intermediation Costs (demand side)	• Costs for using the database (variable) • Commission for successful mediation (success) • Fees for general participation (fixed)	0.94 / 0.94 0.66 / 0.76 0.68 / 0.75
Intermediation Costs (supply side)	• Costs for placing ad in database (variable) • Commission for successful mediation (success) • Fees for general participation (fixed)	0.84 / 0.83 0.73 / 0.73 0.64 / 0.65
Marketplace Acceptance	• Summary Evaluation • Overall Satisfaction • Positive Overall Impression	0.78 / 0.79 (d) 0.85 / 0.85 (s) 0.74 / 0.75 (d) 0.61 / 0.71 (s) 0.70 / 0.74 (d) 0.66 / 0.73 (s)

* The closer this figure is to "1", the better the representation of the construct by the measuring item.

(d) demand side (s) supply side

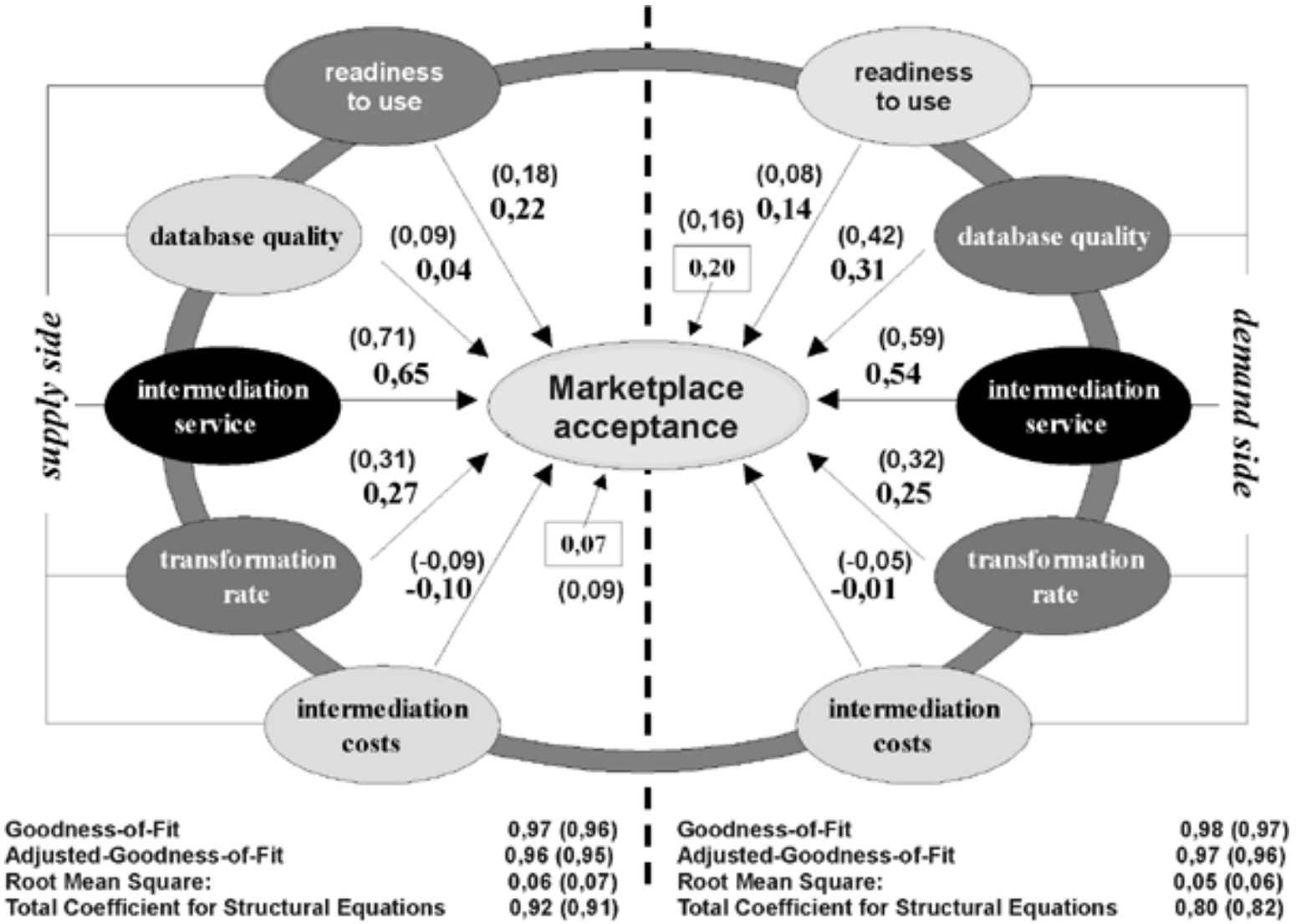
Fig 2: Operationalization and degree of proximity to theoretical constructs

RESULTS

Following the bilateral approach of supply and demand side, the fully standardized results of the LISREL model for the ‘supply side’ showed that the acceptance of an electronic marketplace can be very nicely illustrated with the generated constructs. In a first step, the directions of effect of the hypotheses (sign of the path coefficients) were confirmed in all cases. Looking at the intensity of the effects, it becomes clear that the 1999 ‘intermediation service’ construct with a path coefficient of 0.65 (2000: 0.71) had the strongest impact on the assessment of electronic marketplace acceptance. Consequently, the supplier’s key criterion for market acceptance was the market’s ability to provide buyers with an authentic purchase interest (qualitative assignment). In addition, ‘actual transformation’ (1999: 0.27; 2000: 0.31) and ‘readiness to use’ (1999: 0.22; 2000: 0.18) had a relatively strong influence on the acceptance of electronic marketplaces. By contrast, ‘database quality’ only had minimal influence. This can probably be explained by the fact that most suppliers do not really care how many buyers are active on the market (quantitative characteristic) as long as there is one who is willing to buy their product.

In general, the global quality criteria of the LISREL model for the ‘supply side’ can be characterized as very good (Backhaus et al., 1998). The quality-of-fit index (source variance) was 97% (2000: 96%), adjusted quality-of-fit INDEX (source variance with consideration given to degrees of freedom) was 96% (2000: 95%) and the root-mean-square index (measure of the variances not explained on average) was only 6% (2000: 7%), which are all very good values, so it is safe to assume that the explanations of the initial situation provided by the data are reliable. The quality criterion for the explanation of the total structural equations of the marketing model was also very good at 92% (2000: 91%) (total coefficient for structural equations). The data also provide a good explanation of the central ‘marketplace acceptance’ construct from the supply side’s point of view with values of 93% (2000: 91%) (THETA-Value = 0.07 and 0.09). The illustration in Figure 3 provides a summary of the results.

The LISREL model for the ‘demand side’ was also able to portray the ‘marketplace acceptance’ and the constructs generated to explain it adequately. The directions of effect in the presumed hypotheses (sign of the path coefficients) were also confirmed in



all cases. The critical remark must be made here, though, that the negative correlations between costs and acceptance were next to naught. One explanation for this could be that having to pay for an Internet service is still perceived as an absolute ‘disqualifying’ criterion by participants on the demand side. With regard to the intensity of the other effects, though, it becomes clear, though, that the 1999 ‘intermediation service’ construct with a path coefficient of 0.54 (2000: 0.59) had the strongest influence on the assessment of electronic marketplace acceptance for the buyers as well. As opposed to real marketplaces on which the buyer must find the seller alone, the emphasis here is on a supplier's being identified by the electronic marketplace. In contrast to the supply side, however, the buyers rated the number of sellers or offers on the marketplace as an important criterion (1999: 0.31; 2000: 0.42). Most likely this reflects the desire to have more choices, with the logic being that a higher number of potential sellers means a better chance of finding the item one is looking for. As well, ‘actual transformation’ with a value of 0.25 (2000: 0.32) still had a relatively strong influence on the

acceptance of electronic marketplaces. In particular, the actual availability played an important role here.

Fig 3: Structure model results from the LISREL calculations

The global quality criteria of the LISREL model for the ‘demand side’ can also be characterized as good. The quality-of-fit index was 98% (2000: 97%), adjusted quality-of-fit was 97% (2000: 96%) and the root-mean-square index was only 5% (2000: 6%), all of which are very good. The quality criterion for the explanation of the overall structural equations of the marketing model can still be labeled good at 80% (2000: 82%) (total coefficient for structural equations). Finally, the data made it possible to explain the central ‘market acceptance’ construct to an extent of 80% (2000: 84%) all the same (THETA-Value = 0.20 and. 0.16). The illustration in Figure 3 also provides a visual summary of these results.

Overall, the empirical data gathered in the 2000 survey largely confirmed the results from the 1999 survey, making it safe to assume a high reliability and accuracy of the measurements (Peter, 1979). This assumption would appear justified considering the consistency of the results after the repeated measurements.

Discussion

The results of the empirical study have shown that electronic marketplace acceptance, at least in the case of autoscout24, can possibly be adequately measured with the model proposed in this article. The critical comment must be made, however, that only visitors to autoscout24 were questioned. A parallel questionnaire of visitors to other marketplaces for used goods or other objects (e.g. real property) was not made. It can therefore not be ruled out that the answers might be influenced by the experiences of other marketplaces. The results might also be different from marketplace to marketplace, because despite the relatively large number of those questioned, demographically different users are to be found there. Further, only online users were questioned, not those possible users of the marketplace who do not have Internet access. It must therefore be established that control groups that could verify the results are lacking in both online as well as the offline areas. In summary the need remains for further research for establishing the acceptance of electronic marketplaces. A survey of different marketplaces with

different trade goods could be made in a first phase. In addition offline surveys of potential users who use traditional mediation organs for example should be conducted, (e.g. newspaper advertisements). An objective of the current survey was thus to lay the first foundation for future activities. In particular the first indicators for practice, i.e. for the marketplace operators, may be offered as a result of the double confirmation of the statements made.

Hence, this could provide the operators of other electronic marketplaces with an instrument to verify the acceptance of their marketplaces from their clients' point of view. Should they be able to confirm a similar weighting of the individual factors with regard to the overall acceptance, the operators should pay special attention to the following points when putting together their individual marketing concept:

1.
Even if the 'readiness to use' is of lesser importance (e.g. clear page layout and good navigatability), the data show that ease of data input is more important for the sellers than the buyers. As a result, the marketplace operator should consider creating online interfaces which automate the posting of the ads by the supply side.

2.
The marketplace operator is best served by a two-pronged strategy when it comes to database quality. For the supply side, the operator must document and advertise the quality of the searches performed (e.g. their authenticity). Of particular relevance here is the acceptance problem of the intermediation quality. On the other hand, the operator should emphasize the number of items available in the database to attract more buyers, which raises the question of the chicken and egg problem and critical mass on the supply side.

3.
As expected, the intermediation service, i.e. the matching of supply and demand, is of key importance for both sides of the market. This service is the main determinant of the acceptance of an electronic marketplace and its operator. Consequently, offering this service should be the guiding principle for the marketplace operator in the role of entrepreneur. The electronic intermediation is the factor which makes the operator distinctive when compared to a real marketplace, and the matching success rate can be seen as a competitive criterion vis-à-vis other electronic intermediation platforms. The fact that both buyers and sellers use the

intermediation service provided by the marketplace operator underscores the tripolar structure illustrated here. The marketplace operator must ensure that the product criteria are clear, the product descriptions are complete and the product requests are authentic. It should also be possible for the buyer and seller to contact each other directly.

4.
The actual transformation, i.e. the transformation of the electronic intermediation into a real exchange of goods, also plays an important role for electronic marketplaces. Discrepancies between the electronic information and the items in reality are attributed in retrospect to the electronic marketplace, which has a negative impact on its image. This risk particularly depends on the quality of the information posted to the operator's database by both buyer and seller (externality or derivative service aspect). As a result, the marketplace operator must ensure that items being offered on the site fulfill certain objective quality criteria (e.g. MOT inspection) so that the seller's descriptions are not too far off the buyer's expectations. If expectations are not met, no transaction will occur, which impacts negatively on the real transaction rate, another communications instrument used by the marketplace operator to promote his site.

5.
The results obtained with regard to intermediation costs show clearly that buyers are currently not willing to pay for this type of service on the Internet. For this reason, the only financing option open to the marketplace operator are fees charged to the supply side (e.g. for each ad placed in the database).

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Chapter 8

Reports II

Objectives :

- Free Reading
- Comprehension: Making inferences
- Expressing technical and scientific functions:(Setting the context, illustrating)
- Writing: Reports II
- Extensive Reading

Time Now :

1. Reading

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Margaret McLaughlin and Sheizaf Rafaeli, Editors

An official publication of the **International Communication Association**
Susan Herring, Indiana University
Editor-Elect

Internet Research Tracings

Internet research has become a field in its own right in the social sciences, already boasting a number of peer-reviewed journals, book titles, and a scholarly society. The author contributes to this burgeoning field at a meta-methodological level by considering what is needed to achieve non-reductionist understandings of the Internet. He shows how Internet research perspectives draw upon various established media and technology research traditions.

WWW Apprehensiveness

Findings from a telephone survey of 204 respondents indicated that general WWW apprehensiveness was notably related to the amount of time the respondents spent online. Additionally, the findings indicated that general WWW apprehensiveness and the misuse of personal information were strongly related to participants' WWW purchasing apprehensiveness for commercial transactions, but the findings were inconsistent with the hypothesis that a need for interpersonal contact while shopping would also influence WWW purchasing apprehensiveness

Intimacy in CMC and FTF

The authors investigate the development of relational intimacy in CMC by comparing it to FTF interaction in a laboratory experiment. Zero-history dyads were asked to cooperate on low- and high-equivocality tasks over a series of three meetings. Relational intimacy increased over time, but a significant interaction with medium and subsequent analyses reveal that this was only true for the CMC condition. Task type also interacted with time, but it did not have a significant effect on relational intimacy, nor did it interact with medium.

Hispanic Web Shoppers

The Hispanic market in the U.S. offers promising and lucrative online business opportunities.Millions of Hispanic households and small businesses are using the Web. Still, little published research exists documenting the shopping preferences for buying from the Web by this growing segment of the U.S. population. Applying the product classification and perceived risk literature, the authors explore the Hispanic Web user's preferences for shopping from the Web.

'Ethos' at Playboy.com

Online groups have embraced the Web for its potential to connect them to users directly, but must now face increasing security problems, the lack of traditional gatekeeping controls, and a rapidly changing environment. Playboy has to confront not only these, but also its own unique exigencies to develop and maintain credibility with target audiences. Drawing upon classical conceptions of ethos and contemporary theories of identity, the author finds a large range of linguistic and non-linguistic techniques available for meeting these demands.

2. Comprehension Check

- Reading : Making inferences
- Possessives

Reading : Making inferences

link to def of inference

> An inference is a **logical deduction** or **conclusion** made based on certain clues in the text. An inference is an idea, which is not explicitly stated, but which the reader can find between the lines.
>
> e.g.: heavy smokers and drinkers run a fifteen times greater risk of developing cancer of the mouth and throat than nonsmokers and nondrinkers.
>
> Inference: people would probably be healthier if they did not drink and smoke too much.

- Exercise 1
- Exercise 2
- Exercise 3

Exercise 1:

Read the following web page, then put a check (v) next to all inferences.

Paragraph 1

……a) there is an apprehensiveness from the WWW.

…….b) the lack of a personal contact while shopping increases WWW apprehensiveness.

…….c) one of the author's hypotheses was not confirmed by the study.

…….d) apprehensiveness was partly linked to the cost of phone calls.

Paragraph 2

……..a) knowing the shopping preferences of Hispanic Internet users is a key element in e-business.

……..b) the Hispanic community is a profitable community in the U.S.

……c) so far, Hispanics have not been using the web for shopping.

……..d) research-based business in the Hispanic market will make a lot of profit in the future.

Paragraph 3

…….a) Internet research has lately gained credibility.

…….b) Internet research is only at its beginning

…….c) a non-reductionist understanding of the Internet involves showing how it is deeply embedded in different other research traditions.

……d) a non-reductionist understanding of the Internet means preventing its reduction to a mere tool of communication

Paragraph 5

……a) setting online groups presents both positive and negative aspects

……b) play boy is an online group

……c) online groups face both security and ethical problems

……d) classical conceptions of ethos are enough to meet the demands of the new medium

Exercise 2 :

Explain the following expressions :

- the misuse of personal information:……..

- a meta-methodological level:……..

- an interpersonal contact……..

Auto-evaluation

Exercise 3 :

Find words in the text having the following meaning :

2. Comprehension Check

- Reading : Making inferences
- Possessives

Possessives

Click on the correct possessive form in the sentences below. Corresponding information for this exercise can be found in *The Craft of Editing* (denoted *CE*) and *The Craft of Scientific Writing* (denoted *CSW*). Note: In the general preferences of your browser, please do not underline links and do not override this document's choice of font colors.

1. According the Department of Energy, if we were to set up an area of solar cells equal to 0.25 the area currently covered by our roads, these cells could supply our entire (nations / nation's / nations') electrical needs.

2. With a rear-facing child seat, the top of the seat and the (infants / infant's / infants') head will be in the deployment zone of the air bag.

3. When you receive my (boss / bosses / boss's / boss' / bosses') memo requesting your participation, please respond to her that your job description, as written, will not allow you to perform that type of work.

4. This section explains the function of each technique and describes (its / it's / its') advantages and disadvantages.

5. Since 1981, when the air traffic (controller's / controllers') strike occurred, the number of controllers decreased from 16,200 to 14,300 [Krasner, 1997].

Available online at: http://www.writing.eng.vt.edu/exercises/usage3.html
Retrieved 28 August 2004

Key to Possessives

1- Congratulations, you have answered correctly.

Exercise: According the Department of Energy, if we were to set up an area of solar cells equal to 0.25 the area currently covered by our roads, these cells could supply our entire (nations / **nation's** / nations') electrical needs.

Discussion: In general, to form the singular possessive of a noun, add *'s.*

2- Congratulations, you have answered correctly.

Exercise: With a rear-facing child seat, the top of the seat and the (infants / **infant's** / infants') head will be in the deployment zone of the air bag.

Discussion: In general, to form the singular possessive of a noun, add *'s.*

3- Congratulations, you have answered correctly.

Exercise: When you receive my (boss / bosses / **boss's** / boss' / bosses') memo requesting your participation, please respond to her that your job description, as written, will not allow you to perform that type of work.

Discussion: In general, to form the singular possessive of a noun, add *'s* . Occasionally, you will have a noun, such as "Moses" or "Mount St. Helens" with an s-sound ending such that addition of the possessive does not cause an extra *s* syllable in the pronunciation. In such

unusual cases, the singular possessive is formed by the addition of an apostrophe. Note that "boss" is *not* one of these cases. The possessive form adds an extra syllable and therefore *'s* .

4- Congratulations, you have answered correctly.

Exercise: This section explains the function of each technique and describes (**its** / it's / its') advantages and disadvantages.

Discussion: See page 271.

5- Congratulations, you have answered correctly .

Exercise: Since 1981, when the air traffic (controller's / **controllers'**) strike occurred, the number of controllers decreased from 16,200 to 14,300 [Krasner, 1997].

Discussion: In general, to form the possessive of a plural noun, simply add an apostrophe to the plural form.

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3. Expressing technical and scientific functions: Setting the context, illustrating, explaining, and rephrasing

---

Study the following expressions for setting the context, illustrating, explaining, and rephrasing, then translate the sentences in Exercise 1 into English.

- Setting the context
- Illustrating
- Explaining
- Rephrasing/precision

1. Setting the context

This paper outlines a method for…	Cet article expose une méthode pour…
The purpose of…is to illuminate/shed light on	….vise à éclairer…
This paper is an exercise in empirical analysis	cet article est un exercice d'analyse empirique
Our approach in this article is to…	dans cet article, notre démarche consiste à
In general terms the idea is…	L'idée générale est que….
The basic idea is that…	L'idée de base est de…
As matters stand,…	En l'état actuel des choses, ….
X provides a frame of reference for…	X constitue un cadre de référence pour…
….provide a possible guide for…	…constituer un cadre aidant a…
one important area is concerned with …	Un domaine important concerne..
a fundamental question in ….is….	L'une des questions fondamentales de…est..
this fact is at the heart of…	Ce fait est central dans….
the ideas of X have been widely used to…	On a beaucoup utilise les ides de X pour…
a number of proposals have been advanced to...	Un certain nombre d'ides ont été proposées pour…

2. Illustrating

As in the case of…	Comme c'est dans le cas pour…
As an example,	A titre d'exemple,
As an example of…	A titre d'illustration de…
…x is one such an example	…x en est an exemple
exemplified by	illustre par
as an illustration,	par exemple,
to illustrate	pour illustrer
in some cases….in other cases	dans certains cas…dans d'autres cas
in many instances	dans bien des cas
with the possible exception of…a	A l'exception peut être du…
a counterexample	un contre-exemple

3. Explaining

..x stems from…	X est du a
because….	Du fait de…
Since	Etant donne que
X are due to Y	Attribuer X a Y
X is due at least in part to	X s'explique du moins en partie par…

Owing to/ by virtue of	Du fait de
…lies in the fact that…	Réside dans le fait que…
find a plausible explanation for…	Trouver une explication plausible de…
a cause-and-effect relation	Une relation de cause a effet
is readily explained by..	S'explique aisément par…
x comes closest to explaining…	X rend le mieux compte de…
to account for	expliquer
attibutable to the fact that…ascribed to	attribue au fait/ que..
the reasoning behind	le raisonnement qui soutiens
the first clue to…is X	le premier indice de…est.X
unravel a mystery	élucider un mystère
shed light on/throw light on	expliquer/éclairer

4. Rephrasing/precision

In other words,	Autrement dit,
That is,	En d'autres termes,
In brief,	En somme,
Simply put,	Plus simplement,
For lack of a better term,	A défaut d'un terme plus adéquat,
Rather,	Plus exactement,
To put it more precisely	Pour être plus précis
Accurate to within 20%	Précis a 20% près
Inaccurate by a wide margin	Assez largement inexacte
…notably X..	..notamment X…
especially	tout particulièrement
…, namely…	…en particulier ..
in a strict sense,..	A strictement parler,..
by itself..	en soi,
regardless of	quelle que soit…
x is by no means…	x n'est en aucune manière

Exercise 1

1. Les téléspectateurs rendent déjà ce service dans bien des cas.
2. Comme c'est dans le cas pour les lacs de El Asnam, l'explication la plus simple c'est les séismes répètes.
3. Jusqu'ici les scientifiques n'ont pas réussi à trouver une explication plausible de la formation des anneaux (GB: arcs)
4. C'est le modèle de D. Laird qui rend le mieux compte des données.
5. A défaut d'un terme plus adéquat, nous utiliserons celui de hiérarchie.
6. Pour être plus précis, le vecteur décrivant le spin est aligne dans la même direction que celui qui décrit le mouvement.
7. Cet article expose une méthode calculatoire pour la construction d'un prototype.
8. L'idée de base est que la rétroaction (feed-back) constitue un cadre de référence pour comprendre….

key to express 8

---

1. In many instances , teleoperators are already doing this job.
2. As in the case of the El Asnam lakes, the simplest explanation is repetitive earthquakes.
3. Scientists have so far failed to come up with a plausible explanation for how the arcs are formed.
4. The model proposed by D. Laird comes closest to explaining the data.
5. For lack of a better term , we shall use hierarchy.
6. To put it more precisely , the vector that describes the spinis aligned in the same. direction as the vector that describes the movement.
7. This paper outlines a computational method for constructing a prototype.
8. The basis idea is that feedback provides a frame of reference to understand…

Answer key

Exercise 1

1-c) and d)

2- a) and d)

3- a) and d)

4- b)

Exercise 2

1. the wrong use of personal information
2. a level beyond the methodological one
3. a contact between persons

Exercise 3

Find words in the text having the following meaning:

1. purchasing
2. promising
3. lucrative
4. boasting
5. scholarly
6. exigencies
7. credibility
8. gatekeeping

4. Writing: Memos and reports (Advanced)

Exercise 1

Study the sample memo then answer the questions below it.

- Sample Memo 1: Format
- Sample Memo 2

Sample Memo 1: Format

Engineering Physics
University of Wisconsin
September 23, 1997

To: Professor Michael Alley

From: Cindy Reese *CTR*

Subject: Request to Research How Credit Was Awarded for the Discovery of Nuclear Fission

For my EPD 397 project, please grant me permission to study the way in which credit has been awarded for the discovery of nuclear fission. Although Otto Hahn received the 1946 Nobel Prize in Chemistry for the discovery, several people assert that Lise Meitner and Fritz Strassman should have also received credit. In my research, I will attempt to discern how credit should have been bestowed.

This topic meets the criteria for a successful topic in this course. First, I am interested in the topic. As a nuclear engineering student, I realize that the discovery of nuclear fission was perhaps the single most important discovery this century in my field. As a woman scientist, I am also deeply interested in the successes and challenges faced by other women scientists. A second

way in which this topic meets the criteria is that it can be quickly researched. A computer search in the library has revealed many sources available on this topic. Attached to this memo is a summary of one such source, *Lise Meitner: A Life in Physics* by Ruth Sime.

This topic also meets the third criterion for a successful topic in this course, namely, that it be technical. The fission of a uranium nuclear involves an understanding of both chemistry and physics principles. By focussing on this single discovery, I believe that I can achieve the fourth crierion for a successful topic: the achievement of depth. Finally, because the library system at the University of Wisconsin offers such a wide array of possible sources, including papers in German, and because many of these sources have been written for audiences more technical than my intended audience, I believe that I can create a project that is unique.

If you have any suggestions for modifying this topic, please let me know. With your permission, I will continue researching.

Attachment (1).

1. Who is the sender of the memo? And the receiver?
2. What kind of memo is it? What is its purpose?
3. Does the memo contain additional information? Where?
4. Do you think the writer of this memo will get satisfaction for her request? Justify your answer.

Exercise 2

Look at this rather confusing memo. What makes it difficult to follow?

Sample Memo 2

To : All members of staff
From: TWA
Date : 4 July 1999

As you know, one of the reasons for the introduction of laptops in Northern Branch was to provide us with feedback before we decide whether to provide laptops for staff in other departments. The Board has asked me to submit a report on your experiences by the end of this week. I talked to some of you informally about this last month. During my brief visit I noticed a group of people in the canteen playing some kind of computer game and I heard from a senior manager that he only used his for writing letters - a job for a secretary, surely? So that I can compile a full report, I would like everyone to let me know what they personally use their laptops for, what software they use and how long per day they spend actually using it. It would also be useful to find out how their laptop has not come up to expectations, and any unexpected uses they have found for their laptop, so that others can benefit from your experience.

TWA

Exercise 3

Redraft this memo to improve it. Follow these guiding questions :

- What is the subject of the memo?

- what is the purpose of the memo?

- What is/are the information the writer wants to know?

- Are there any additional details needed? (E.g. deadline for submitting information? How to submit information? Personally? By fax? By phone?…)

Exercise 4

In Exercise 2 your Managing Director has written in a memo asking for a report on the usefulness of laptop computers in your company. Write a report in answer to his request. See guidelines on how to write reports

Answer key

Exercise 1

1. Sender: Cindy Reese *CTR*
2. eceiver: Professor Michael Alley
3. A report memo (a memo in which a report is given)
4. Yes, in the attachments
5. Most probably yes. There are different reasons: the memo is clear, the piece of research she is proposing is well-supported by documents and facts, and the subject seems interesting enough.

Exercise 2

Sample Memo 2

To : All members of staff

From: TWA

Date : 4 July 1999

The board urgently requires feedback on our experience with laptops in Northern Branch. I need to know, for my report:

1. what you personally use your laptop for and your reasons for doing this. If you are doing work that was formerly done by other staff, please justify this.
2. what software you use. Please name the applications and version numbers.
3. how many hours per day you spend actually using it.
4. how your laptop has not come up to your expectations.

5. what unanticipated uses you have found for your laptop, that others may want to share.

Please FAX this information directly to me by 5 pm on Wednesday 7 December.

If you have any queries, please contact my assistant, Jane Williams, who will be visiting you onn Tuesday 6 December.

Hank you for your help.

TWA

Key to Exercises

Exercise 1

1. Sender: Cindy Reese *CTR*
   Receiver: Professor Michael Alley
2. A report memo (a memo in which a report is given)
3. Yes, in the attachments
4. Most probably yes. There are different reasons: the memo is clear, the piece of research she is proposing is well-supported by documents and facts, and the subject seems interesting enough.

Exercise 2

Free answers

Exercise 3

To : All members of staff

From: TWA

Date : 4 July 1999

The board urgently requires feedback on our experience with laptops in Northern Branch. I need to know, for my report:

1. what you personally use your laptop for and your reasons for doing this. If you are doing work that was formerly done by other staff, please justify this.
2. what software you use. Please name the applications and version numbers.
3. how many hours per day you spend actually using it.
4. how your laptop has not come up to your expectations.
5. what unanticipated uses you have found for your laptop, that others may want to share.

Please FAX this information directly to me by 5 pm on Wednesday 7 December.

If you have any queries, please contact my assistant, Jane Williams, who will be visiting you onn Tuesday 6 December.

Hank you for your help.

TWA

Exercise 4

Free answers

Answer key

Memos

1. **What is a memo?**

A memo = short of memorandum (pl. memoranda): A written note or communication, especially in business between people working for the same organization. (Oxford Advanced Learner's dictionary)

2. **Why do engineers and scientists use memos?**
   - to make requests
   - to give announcements
   - to communicate reports

3. **What are some of the characteristics of memos?**
   - Request or announcement memos: are read quickly. For such memos, get to the point in the first paragraph--the first sentence, if possible. In other words, state what you want up front. In the format suggested here, you should single space your memos and use a serif typeface. Skip a line between paragraphs. The following link shows this format in a pdf display.
   - In memos that make requests or announcements, keep the sentence lengths and paragraph lengths relatively short. Sentences should average fewer than twenty words, and paragraphs should average fewer than seven lines. Also, keep the total memo length to under one page, if possible.
   - Sometimes companies use memos to communicate short reports (two pages or more). For these types of memos, the format changes, as shown in the following example. For instance, you often include illustrations, attach

appendices, and break the memo's text into sections. If references arise in the memo, you include a list at the end. In memos that act as reports, the style changes as well. For instance, the sentences and paragraphs are typically longer than in memos that simply provide announcements or make requests.

- For all types of memos, space your memo on the page so that it does not crowd the top. Also, send copies to anyone whose name you mention in the memo or who would be directly affected by the memo. Finally, remember that final paragraphs of memos that make requests or announcements should tell readers what you want them to do or what you will do for them.

It is important in any writing and particularly in scientific and technical writing to be clear about the aims and purposes of your writing. Readers can make sense of what you are saying if you are: **Accurate** , **clear** , **precise** , and **concise** .

and reports?

Reports

New International Business English
Cambridge University Press 1996

How to write a report?

Assemble the material

1. Collect all relevant material –notes, documents…

Plan the report

2. Consider the purpose of your report: who is it for? Why does he/she want it, how will he/she use it?
3. State the aim and emphasis of the report briefly.
4. Decide what information is important and what is relevant.

5. Arrange the points of information in a logical sequence and in order of importance. Make rough notes.
6. Draft a working plan on a separate sheet of paper.
7. Decide where you might need illustrations or diagrams

Draft the report

8. Write the introduction: state the subject, state the purpose, and summarize your findings.
9. Write the body of your report.
10. Write the conclusion (and recommendations)
11. Summarize the report in a sentence.

Edit the report

12. Examine the draft, does it do what the report is expected to do?
13. Check your grammar, spelling, punctuation and style.
14. Read the text aloud to yourself, or better, to someone else.
15. Check your illustrations.
16. Finally, if possible, let someone qualified to give constructive look at your draft.

4. Writing: Memos and reports

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1. What is a memo?
2. Why do engineers and scientists write memos and reports?
3. What are some of the characteristics of memos ? and reports ?

- Sample Memo 1: Format
- Sample Memo 2
- Sample Memo 3

Sample Memo 1: Format

Company Name
Company Address
Date of Memo

To: Recipient of Memo
From: Writer of Memo *Writer's Initials**
Subject: Title of Memo in Initial Capitals

Kfjkjfgfjgjgojgofgofjgfgjkfofogfogfgofgfjgofjgjfgjfmvmvkvmkfio gur9t9gfjvjvjclmvjjfjgfgoffgojjjjlj;;lfgggffgf;k;kpygfkl,vvzsfow-roto0i0kgbkgpfgpg0t0gfp;v,;vbl,mmg'akl,vbmghogkoi0p;,lgotkoko
Attachments.

Copy to:
Name to Receive Copy
Name to Receive Copy

*Initials should be written in ink

Exercise 1

This is a memo from business. Read it and imagine you are the Divisional Personnel Manager to whom the memo is addressed. Then discuss these questions.

1. What do you think the Managing Director's aims were in writing the memo?
2. What are you expected to do as a result of reading the memo?

Auto-evaluation

Sample Memo 2

From : The managing Director
To : Division Personnel Manager
Subject : Clocking-in Machines
Date : 27/4/99

There have been a number of comments about the amount of time being wasted with extended lunch breaks in our company. I do not want to sound as though I am against breaks, in principle; indeed our personnel consultants have emphasized how important and efficiency-promoting such regular interruptions can be if you want an effective and motivated office staff. But, we must keep a check on working hours and clocking-in machines for office staff do exist. We can expect a little opposition to the idea if we are not careful. You can never be sure how the office staff will react. They might well take it badly. In any case, we're thinking of putting in clocking-in machines for all clerical grades; please send me a report.

Exercise 2

Compare the previous memo with the following one. Answer these questions:

1. In which memo did the Managing Director make his intentions clear?
2. Which memo do you prefer? State why.

Auto-evaluation

Sample Memo 3

From: the Managing Director	**For**	**Please**
	ACTION	**DISPLAY**
To : Personnel Managers	**COMMENT**	**FILE**
	INFORMATION	**RETURN**
Date : 27 April 1999	**DISCUSSION**	**PASS TO**

Subject: Installation of clocking-in machines

The Board is thinking of installing an automatic clocking-in system in the offices of each division. Before we do this we need to know:

1. How the arrangements concerning breaks, especially lunch breaks, have been working.
2. How many machines we would need.
3. Whether time now lost through bad time-keeping would be saved.

Can you provide us with your views on:

- how the staff will react to the idea

- how we can deal with the union on the matter

If possible, I would like to receive your report before the next Board Meeting on 1 June.

Exercise 3

Your Managing Director has asked you in a memo to investigate the health and safety provisions in your company's offices and to make recommendations for improvement.

These are the notes that you've made. Draft a report to your MD by expanding the notes into paragraphs.

Health and safety issues considered during past year

- Studied all reports of job-related illnesses, e.g. colds and 'office bugs'
- A number of cases of symptoms of Repetitive Strain Injury (RSI) reported by company physiotherapist.
- Had meeting with union reps and office managers about what to do.

Recommendations/ proposals

1. clearly display safety regulations in canteen and main offices.
2. new staff need informing about safety regulations and policy, e.g. on taking frequent breaks from the screen
3. office staff need training on how to position themselves, their chairs, desks, and equipment
4. department committee on helth and safety to be responsible for instructing new staff on procedures for handling office equipment and for securing electronic/mechanical machinery
5. ventilation and air-filtering systems in offices need regular maintenance
6. union suggested replacement of sub-standard furniture and equipment, especially:

- old-fashioned screens- cause eyesight problems
- carefully check office lighting – staff complaints of headaches after work/ lighting large part of problem; bright lights should not reflect on the screen
- essential to have chairs with full back support- many staff complaints of backache.

Start as given:

To: Ms Renoir, Managing Director
From: (your name)

Date:

Office health and safety provisions

As requested by the Managing Director on 30 March 1999, I have investigated the problems which have been raised concerning office health and safety……

Auto-evaluation

Key to Exercises

Exercise 1

1. Not clear. Wasting time in the company? Installing clocking-in machines?
2. Send a report. About wasting time? About installing the new machines?

Exercise 2

1. Memo 4
2. Memo 4 is definitely better: clear layout (presentation), clear purpose, to the point, concise and precise.

Exercise 3

To : Ms Renoir, Managing Director

Date :

From : (your name)

Office Health and safety provisions

As requested by the Managing Director on 27 April 1999, I have investigated the problems, which have been raised concerning office health and safety.

A study was made of all job-related illnesses during the past year. For examplem it was found that a number of cases of symptoms of Repetitive Strain injury (RSI) had been reported by the company physiothrapist. Meetings were held with union representatives and office managers to discuss what could be done.

Proposals

1. The safety regulations should be clearly displayed in the company's canteen and main offices.
2. Newly appointed staff should be made aware of the company's safety regulations and policy. In particular, they should be advised to take frequent breaks from the screen.
3. It is necessary to teach office staff how to position themselves, their chairs, desks, and equipment.
4. It should be the responsibility of the departmental committee on health and safety to instruct new staff on procedures for handling office equipment and for securing electronic and mechanical machinery.
5. It was further noted that ventilation and air-filtering systems in offices require regular maintenance.
6. The union suggested that sub-standard furniture and equipment should be replaced. In particular:
    a. Old-fashioned screens should be replaced – they are known to cause eyesight problems.
    b. Office lighting should be carefully checked. Staff have complained of headaches after work; lighting is a large part of the problem. An important point to emphasize is that bright light should not reflect on the screen.
    c. Chairs with full back supports are essential. Many staff have complained of backache.

5. Extensive reading

Available online at: http://www.ascusc.org/jcmc/vol7/issue1/Mitra.html
Retrieved 28 August 2004

Extensive reading:

What are the different kinds of spaces and how would Internet affect them?

JCMC 7 (1) October 2001

Message Board

From Cyber Space to Cybernetic Space: Rethinking the Relationship between Real and Virtual Spaces

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Abstract

The interaction between real and virtual spaces can be reconceptualized by mobilizing the notion of cybernetic space to signify the relationship between spaces, culture and identity in the synthetic space we tend to live in. The new metaphor can allow for a holistic examination of the Internet in popular culture.

Introduction

The entry of the Internet into the everyday lives of millions of people across the globe has begun to transform many different aspects of our material lived experience such as those of identity, community and interpersonal interaction. Some of the transformations have resulted because of the way in which Internet users are required to negotiate their relationship with the real and virtual spaces they now inhabit. In this essay, we examine the way in which the constructs of place and space are being reshaped as individuals and groups are compelled to spend time within cyberspace.[1]

As a starting point of this examination, we find it useful to review briefly the traditional ways in which the ideas of place and space have been constructed. We then suggest that we are now entering a cultural and technological era in which some of the essential elements of thinking about place, space and their relationship to who we are is being challenged by the increasing presence of the digital/virtual in our popular culture. Consequently, we propose a different way of thinking of this new space, giving it a new label - cybernetic space - that captures the modality of the space that is being created by the interaction of the real and virtual. We begin, however, with a discussion of some of the essential elements of the idea

of space as it has been constructed in popular and academic discourse.

The Idea of Space

Space as geography

Perhaps one of the most fundamental ways of thinking about space is embedded in the experience of being located in a particular spot on the earth, often knowing exactly where we are. At a most primordial level, we become cognizant of location by constantly seeking an answer to the question: Where am I? One's very existence can be threatened if s/he is unsure of the current spatial location on some real map that points out the areas of peril and areas of safety (Shapiro, 1997). The fundamental desire to ask the question about location has driven colonials to take elaborate steps to map the worlds they colonized. That drive has been refined with advanced technologies, as humans have increasingly been able to obtain sophisticated maps of the world with satellite technology and composite pictures of the globe.

This obsession with finding the exact coordinates of where one is geographically located is increasingly not only the interest of geographers and cartographers, but has now entered into the popular cultural experience. Witness, for instance, the way in which manufacturers are able to sell global positioning systems (GPS), with which we can carry around a little instrument that tells us exactly where we are on the globe (Spaans, 2000). In brief, location and geographic space is something that we are innately aware of. At the same time, maps also remind us of where we are not only in terms of latitudes and longitudes but also in terms of the way in which we have chosen to carve up the globe by well-defined political boundaries (King, 1996). For example, the African continent had all but three of its countries colonized by the West. Colonizers immediately drew maps and borders to designate territorial claims, resulting in a transplanted system of space as private property (Mutua, 1995).

Space as political boundaries

To know where one is on the earth not only creates a sense of certainty with respect to location, it also serves as a reminder that we are part of a large and complex system of classification where location is tied to political, social, religious, and ultimately, national categories (Wood, 1992). This classification, at its most macroscopic level, is the idea of the nation state (King, 1996). Fundamental to most political discourse is the recognition of the existence of the nation state, with well-defined and adequately protected geographic boundaries.

Space defined by political boundaries is thus a part of the popular cultural consciousness which eventually reminds us that we are Americans, or British or Nigerians precisely because we live our everyday lives within certain well-defined boundaries and carry with us official identity documents to legitimate our movements in and out of those spaces (Shapiro, 1997). These boundaries become acutely pertinent when an individual wants to cross them, for example to go through an immigration checkpoint without the required permissions. However, the existence of these boundaries has not curbed the desire of people to try and cross theme to occupy new spaces and places. The desire to explore and migrate is also fundamental to human existence. This drive adds another level of complexity to the way in which real life spaces are imagined and negotiated.

Space and movement

The relationship between space, nation and movement is a complex one. Controls, regulations and outright violence could be utilized to restrict indiscriminate movement of individuals across spatial boundaries. However, such controlling of spaces and fencing of boundaries do not curb movement (Campbell & Shapiro, 1999). As has been well demonstrated in America's inability to contain illegal immigration from the South, it is relatively difficult to stop people from moving from one space to another.

Movement of people between spaces can be triggered by several different reasons ranging, from fleeing from dangerous places to finding new opportunity. For the sake of convenience, most of such movements can be called a process of diaspora where individuals leave their place of origin to find a new place that they can occupy and call their own (Hom, 2000).

Such movements necessarily begin to transform the relationships that people have with their old and new spaces. The tension in the process of movement, for instance, can be understood in the terms proposed by Anderson (1983), the notion that nations are imagined communities, imagined around shared practices. When people move, they have to relinquish some shared practices and new citizenship requires the acquisition of a new set of practices.

In summary, it is possible to claim that some of the fundamental notions of place and identity are connected to physical location, national allegiance and the transformations of such allegiances when there is voluntary or involuntary movement from one physical location to another. The physical basis of thinking about space and place is an essential element in much of our popular and academic discourse, such as those about diaspora, immigration, nationhood and identity (Shapiro, 1996). When talking about the Internet as well, many such physical metaphors are carried over, for example reference to "information superhighway," "visiting a web site," or the label "cyberspace." The traditional way of thinking of space and place thus permeates the discussion of the Internet as well as impacting the way in which the Internet has entered the popular culture. In common parlance, as well as in political rhetoric, ideas such as that of cyberspace and information superhighway have given us a specific language with which to imagine and label the new "space." This acquisition of spatialized language has certainly transformed the way in which the discourse about the Internet has developed, ultimately shaping the nature of the Internet itself.

In this essay we raise the ancillary question: How has our dependence on the Internet transformed the notion of space and place? Now that the Internet has become a central player in popular culture, it is possible and necessary to begin to understand how the Internet might have began to transform the traditional notions of space. We attempt to answer the question by grounding it within the essential elements of thinking about space as discussed earlier. We then look at specific elements of the relationship between the Internet and the real spaces and the key consequences of the relationship. Eventually, we offer an alternative way of thinking about the space that is being created by the infiltration of the Internet in the real life we have been familiar with for a long time.

In many ways, the question raised here mirrors the concerns that have traditionally been raised about the way in which space is transformed by different technologies, and how the technologies too have to adapt to fit the new spaces. It is important to note that the notion of space is also related to the idea of presence and how technologies can transform the feeling of presence. Lombard and Ditton (1997) made the argument that different technologies offer different experiences of spatiality and presence and these experiences often are transformed with advances in technology. This issue of transformation is also hinted at in the work of Barbatsis and others (1999) when they rethink the way in which space as a metaphor is necessarily transformed in the realm of the digital. Indeed the arguments made by Barbatsis and her co-authors offer a point of departure to consider how the idea of &cyber& itself needs to be recast, as is done in this essay. Much like the position that was advanced by Acker in the first issue of the *Journal of Computer Mediated Communication*, we are developing the idea of merging the real and the virtual spaces that we constantly inhabit.

Internet and Space: Transforming Relationships

The elements of the transformation

The fact that people are spending more time in front of a computer monitor has begun to make computer users acutely aware of the way in which their "working space" is defined around computing devices and peripherals. Users of the Internet need to imagine and conceptualize the real life space that they must inhabit to be able to "live" in the cyberspace of the Internet. These spaces indeed become the defining parameters of the Internet and cyberspace. This relationship is exemplified in a somewhat fanciful definition of cyberspace that Benedikt has proposed:

Accessed through any computer linked to the system; a place, once place, limitless; entered equally from a basement in Vancouver, a boat in Port-au-Prince, a cab in New York, a garage in Texas City, an apartment in Rome, an office in Hong Kong, a bar in Kyoto, a café in Kinhasa, a laboratory on the Moon (Benedikt, 2000).

What is interesting to note here is that in trying to define the limitless place the author necessarily places the user of cyberspace in well-defined geographic spaces. The value of cyberspace within this definition lies precisely in the fact that it can be accessed from any place on earth. However, this ability itself begins to redefine the individual's relationship with real space. Indeed, if entering cyberspace becomes critical to one's existence then there will necessarily be consequent transformations of how one looks at real life: the value of a physical location is predicated upon its user-friendliness in allowing the "user" to enter the virtual. It is thus amusing to watch users gravitating towards electric outlets in airports to power up the laptop and use the wireless modem to connect to the Internet. The Internet is thus beginning to transform how we look at and design the real spaces we are forced to inhabit.

This notion of redesigning is also demonstrated in the plethora of "computer work station" advertisements that enter American homes with the Sunday newspapers. These advertisements are geared to providing a new form of home and office furnishing that will make the interaction between the computer and the human being more comfortable and "ergonomic" by providing creative solutions to storage of monitors, keyboards, the computer tower and all the other accessories that make it possible for a user to enter cyberspace. This tendency to transform spaces as well as the representation of the spaces has permeated to spaces such as airplanes, with airlines now advertising the ability to connect to the Internet, albeit through limited services, so that even when we might be moving from one geographic place to another we do not loose our connection to our usual virtual places. Airline seats are being wired to let us connect to the Internet even when we are thirty thousand feet above sea level.

In addition to new furniture designs and Internet-enabled airline seats, another outcome of the desire to redefine and redesign one's real life space is the way in which we are beginning to reengineer our everyday living spaces to gain easy access to the Internet. Witness, for instance, the way in which real life spaces are constantly being transformed to make sure there are ubiquitous and efficient access to the Internet. Universities are going through expensive restructuring to make classrooms wired so that students can easily plug

in and play on the Internet, sitting in any seat in any classroom. In a similar fashion, home design is undergoing transformation as new homes are wired for the net with Ethernet outlets being provided to complement the existing electrical, telephone and cable television outlets that are now standard in most homes. Although most new houses do not qualify as "smart homes," there is certainly a move towards rethinking how we define our lived real spaces to accommodate our desire and need to enter the virtual space of the Internet. The expansion of broadband technologies of cable modems has been accompanied by marketing of home networks where the key argument has been the ability to enter the virtual from anywhere in the home or workplace, and to do it even faster. At the more macroscopic level, some countries are offering free Internet service to anyone in the country who has a telephone subscription. In brief, there is an increasing trend to rethink how we construct the real spaces, and our relationship with real space, so that we can easily access the virtual place.

At the same time, the redefinition of the real space has been accompanied by a desire to free ourselves from the bondage of wired connections and bulky computers by the diffusion of wireless and handheld devices that help us to connect to the virtual space without being constantly tethered to real spaces. The language of advertisements for such Internet-enabled personal digital assistants and cell phones makes the fundamental argument that we can rethink our relationship with real space to better accommodate our existence in the virtual space. As imagined by Benedikt, advertisers claim precisely that technology must be designed in a way that real space does not become a deterrent to access to the virtual space.

In a recent advertisement for a personal digital assistant the copy claims, "take the Net with you. Simply amazing." The accompanying picture shows a person in a tropical paradise clearly not tethered to a computer in am office cubicle. In a similar fashion, an Internet-ready cell phone is shown for the advertisement of an online brokerage house where the copy argues, "even when you are on the move, you can manage your accounts, get market updates." Here too the fundamental claim is that the Internet and accompanying hardware will redefine what we can do from where we are physically. The notion of getting "lost" that was so fundamental to the way in which we have conceived of space is now passé, since

the real is there as if to facilitate entry into the virtual. Indeed, the threat of "being lost" is a central selling point for on-board navigation systems in luxury cars; they will always tell you where you are in real life because the car is connected to the virtual. Because of the seamless relationship between the real and the virtual, one never be physically lost again, at least in theory. The penetration of the virtual into the real is exemplified in the description of a new product called "cuff link" which "opens up new uses, like clothing-as-navigation device. This bike messenger's jacket displays a street map and tracks its wearer's progress via GPS (Hilner & Comer, 2001)."

There is a certain contradiction within this emerging relationship. The technologies are geared to provide us with constant reminders of where we are and then make that location irrelevant to who we are and what we can do. Thus a wireless phone advertisement reminds us that it does not matter where we are, but we can still be doing what we want to do, while a GPS advertisement for a handheld computer is geared to remind us where we are. The combination of the cell phone and the GPS thus tells us that we might know precisely where we are but choose to completely ignore the significance of the location. This contradiction can be partly understood when cyberspace is conceptualized as a discursive space (Mitra, 1999) where the key defining element of the space are the texts and discourses distributed in the rhizomatic computer network. Within such a discursive space the notion of boundary becomes irrelevant. The interconnected nature of the technology, with broadband connections in homes and offices, and fiber optic and satellite connections between widely distributed nodes, makes the discourses on the Internet available to anyone who has redesigned real space to gain net access. To be sure, this access requires minimal technological capital, but once that capital is available, users can immediately disconnect from the real space to enter the discursive world of cyberspace. At that moment of entry, the boundaries dissolve and real space recedes into a mere shell that needs to be occupied to reside in cyberspace. Consequently terms such as "business without boundaries" and "wide area networks" have become common parlance of the Internet where the limitations of the real space can be overcome seamlessly with clicks of the cursor. A little time on the World Wide Web (WWW) makes this process abundantly clear, where within seconds a user can move between texts that might reside in computers stretched across the globe while focusing on one single theme. As Negroponte (1995) pointed out, we have now moved from

the atom-based real space to the bit-based virtual space where the movement of bits is far more unrestricted than the more cumbersome transportation of atoms over great distances. Yet we remain fundamentally atom-based beings placed in an atom-based environment. Because of this we are constantly reminded of the contradictions inherent in living with one foot in the atom-based reality and another foot in the bit-based virtuality.

Another consequence of the schizophrenic existence is the way in which the significance of the political, geographic and national location, essential elements of real life, is problematized when an individual can enter the discursive cyberspace. Even with the technological limitations of the two-dimensional computer monitor, residents of cyberspace can begin to ask the question: what difference does real life location make in defining a particular experience? To some degree live television broadcasts opened up this question much earlier. Live sports telecasts and coverage of unfolding news calls into question the need to be "right there" when the event is happening. However, the Internet moves it away from the realm of the "mass" media to a more personalized realm of "being there" when a very personal event is happening. Consider, for instance, the explosion in live cameras in various places connected to the Internet. The web camera technology, first popularized by pornographic sites, soon caught on when other spaces, such as elementary school dining rooms, class rooms, and traffic intersections could be viewed from any Internet-connected computer, thus making the significance of real location of both the points in real space become relatively meaningless as the real spaces, which could be separated by thousands of miles, become seamlessly connected in cyberspace. As a consequence, we would argue, real space can become irrelevant in certain circumstances.

Consequences of the transformations

As the representations in popular culture begin to define cyberspace, its promises, and its relationship with real space, a set of tensions have began to develop about our relationship with the real and the people who surround us in real life. First, there has been some evidence that the infatuation with the virtual can indeed alter the relationship with the real. In a groundbreaking research from Carnegie Mellon University, it was claimed that increasing use of the Internet can lead to social isolation, psychological depression and a disconnect

with existing real relationships (Kraut, et. al., 1998). The findings of these researchers are not necessarily consistent with the promise of a "good life" via ubiquitous connectivity with the virtual world. The popular representations would have the user believe that connectivity will intrinsically improve the quality of life with such conveniences as chat rooms and instant messengers. Why then the isolation and depression reported in Carnegie Mellon study? Perhaps the missing piece of the puzzle is the way in which the new technologies expect us to privilege the virtual space over the real. As suggested earlier, there is a concerted effort to redesign our lived real spaces to release us from the lived space. Thus, it is possible to argue that entering the Internet is necessarily a process of rejecting the real spaces and all of the appendages that come with it.

Thinking of this relationship, Heim (1993) suggested that the idealized virtual reality and cyberspace would be able to take the user beyond the mundane "real" reality albeit programming within the virtual certain essential elements of the real, particularly the construct of care. In Heim's words, "care will always belong to human agents, but with the help of intelligent agents, care will weigh on us more lightly (Heim, 1993)." Perhaps that development of "intelligent agents" is further into the future, thus anchoring care solidly in the real spaces we occupy and not the virtual spaces we explore. Indeed, the notion of care offers a way to link the findings from the Carnegie Mellon study and the notion of real space, since the lack of care in the virtual could indeed be the reason for the isolation. What the virtual space allows is a simulation of care, which could lead to the psychological isolation eventually causing depression precisely because the Internet alters our relationships with the real lived world and space. The real spaces move into the background and the virtual becomes important. Yet, there we fail to find the "care" and acknowledgment fundamental to human existence. Indeed, as Hyde and Mitra (2000) point out, the notion of seeing a "face" and seeking acknowledgment is an essential element of human existence and our continued existence in the virtual is beginning to transform the emotional relationship with the real spaces, ultimately leading to some of the psychological impact that Kraut and others report.

A second consequence of the alteration of the relations between the real and virtual is the way in which the popular cultural discourse can privilege one space over the other. This is

not to say that the virtual necessarily takes precedence over the real, because there are enough arguments about resisting the desire to live in the virtual (Brook & Boal, 1995). However, there are equally convincing arguments to embrace the virtual and reject the real because the real space constructs monumental walls and boundaries discouraging interaction (see, e.g., Shaw, 1997). What emerges is a tension between the real and the virtual. The tension can eventually lead to questioning of the walls and boundaries of real space since they would continue to appear arbitrary and ideological while the cyberspace would appear to be more personalized and friendly. It does not, for instance, require a visa to travel between web sites of international art galleries while that would be impossible to do without a series of obstacles that will have to be crossed in real life. It costs little to obtain news from across the globe on various news sites, but that would be a challenge to do in real life without the expenditure of significant resources. Examples such as this begin to call into question the veracity of the relationship between the real spaces and the individual making that relationship somewhat limiting compared to the open ended potential of the broadening of space offered by the Internet.

At some point in the future, the debate about the preference of one space over another will have to be settled since the outcome can have significant political, social and cultural impact. The resolution will have to consider the way in which the spaces interact with one another without necessarily trying to establish which is more important or central to our existence within popular culture. Consider for instance, the way in which the arguments about pornography on the Internet have been wrought with problems of "enforcement" and "definition," where different countries have taken on different ways in which they have defined pornography and its availability on the Internet. What this debate, like many others, has demonstrated is the relationship between the real and the virtual, and the need to understand these together, as a new synthetic space, in order to begin to resolve some of the questions that come up simultaneously in the real and the virtual. In the next section we suggest a way to think about such a synthetic space.

Finding a New Space: Cybernetic Space

The interaction between cyberspace and real space opens up the possibility of creating new spaces that are synthetic spaces that did not exist before. Foucault had pointed out in discussing the notion of space and power that the relationships between spaces and "sites" are fundamental to the construction of place in any community and the exercise of power within the community. For instance, Foucault has argued, "we live inside a set of relations that delineates sites (1986, p.23)." Indeed, the emerging relationship between the real and virtual space is precisely at the point of opening up such relations that are creating new sites and spaces that can have their own intrinsic power because of the unique set of connections that are being established between the real and the virtual. Consider for instance, the global interest in e-business, where the "brick and mortar" institutions are being replaced by "virtual" institutions which might have no real existence at all. These institutions are indeed new spaces that have been carved out by global capitalists to mobilize the technology for their best benefit. At the same time, there are spaces such as collections of diasporic people who are creating their nations on the Net to find the points of commonality that real life spatial disruption might have disconnected (see, e.g., Mitra, 1997).

One component of the emergent relationship between real and cyber space is thus the creation of a new set of synthetic spaces that are stretched from the real to the virtual, both of which are critical to the emergence of what we call a "cybernetic space," drawing upon the traditional notion of cybernetics. Focusing primarily on technology, one of the central constructs of the idea of cybernetics was the analysis of a whole system within the context of a relationship between the parts that would make up the system. Cybernetics has been described as concerned with, "the analysis of 'whole' systems, their complexity of goals and hierarchies within contexts of perpetual change" (Watson & Hill, 1993). In many ways, the new spaces that are being carved out are indeed cybernetic spaces which need to be understood as whole systems that could have a strong cyber and real component where neither deserves to be privileged but both need to be examined together to understand how the combined space operates. Furthermore, in the original conceptualization of cybernetics by Weiner (1948), much was made of the idea of feedback and how one part of a system may control another. This is also what is happening with the new synthetic space that is beginning to emerge in the interaction of the real and the virtual.

The current fascination with examining cyberspace, cybercommunity, cybersex, and cybercommerce, to name a few of the "cyber" phenomena, often glazes over the fact that cyberspace is embedded in very traditional and essential elements of real space. Consequently, examining the cyber component alone offers only a partial look at a phenomenon which is actually taking place within the cybernetic space carved out through the intersection of the real and virtual. Using the lens of cybernetic space it is possible to examine the relationship between the real and the virtual as well as the way in which the inhabitants of the cybernetic space use the space. De Certeu made the point that spaces are often created by the way they are used. Although De Certeu writes of real spaces such as urban spaces, he makes the argument that "spatial practices in fact secretly structure the determining conditions of social life" (1993, p. 157). We go on to suggest that the construct of spatial practices become even more powerful when that would occur in cybernetic space where the modes of control are far less palpable than the real spaces that humans occupy. Indeed, the resistive use of spaces that De Certeu (1984) had explicated upon becomes even more realistic in the case of cybernetic space. Witness, for instance, the havoc that hackers can play with computer viruses that take control of cyberspace but whose results are felt in cybernetic space. Consequently we would argue that it is necessary to shift our focus from cyberspace to cybernetic space to begin to understand the way in which the notion of space is being transformed by the new technologies. To be sure, this realignment of locus of interest has certain consequences on thinking about the Internet in general.

Internet and Cybernetic Space

The first consequence of thinking of cybernetic space instead of either real space or virtual space is to question and alter the essential elements of space discussed in the beginning of the essay. Elements of space such as location, nationality and movement become relatively less important within cybernetic space where we live simultaneously within the realm of physical nations and virtual communities. The ideas of nationality and diaspora become less critical since it is possible to remain physically tethered to one place but discursively connected to a different virtual community (see, e.g., Mitra, 1996). In such cases, looking at

identity as connected to either the real or the virtual is unproductive. With the emergence of cybernetic space, identity too is a product of the allegiances in cybernetic space, where some of the allegiances are grounded in real space, and others are rooted in cyberspace.

The mobilization of the idea of cybernetic space forces the analyst and the critic to constantly look at the interplay of the real and the virtual and offer a label to this new space that we are living in. In many ways, the approach based in cybernetic space does not privilege the real over the cyber or vice versa, but focuses on the fact that one cannot exist without the other and we constantly live in both.

A second consequence of the use of the idea of cybernetic space is to recognize the fact that to understand the Internet it is important to focus on cybernetic space as opposed to cyberspace. The notion of cyberspace has a certain mystique about it and in its very science fiction inception there was a certain hyperbole about the possibility of imagining an alternative universe and space. However, the development of the Internet has not necessarily supported the idea of an alternative cyberspace, but has, on the contrary, demonstrated that the Internet is grounded in reality. The discussions about redesign of space and the fascination with new wireless gadgets all demonstrate that to understand the Internet it is essential to come out of cyberspace into the more synthetic cybernetic space which is built around web pages but also around the design of tiny displays for WWW pages on mobile phones.

Much of the work on the Internet, both in the technological sector as well in social sciences, has focused on the way in which the technology is transforming our experience of living in cyberspace. The interest in cyberspace has generated debates about free speech, privacy, new technologies of access and other such issues that are centered in the technological potential of the Internet. However, given this focus, the research has tended to take a technologically determined view of how cyberspace has been transformed by the emergence of new tools. Yet such approaches have not necessarily recognized the way in which the practice of technology has been transformed. Pacey (1992) has argued that it is necessary to recognize the practice of technology as the locus of interest for any new technology just as Rogers (1995) has argued for the examination of new technologies as

they diffuse as new innovations. Both these approaches, when applied to the Internet, actually force us to look at the idea of cybernetic space where the Internet is practiced and used, and not only on the way in which the technology develops. This shift in emphasis is critical to understand the role of the Internet in everyday life and move away from the naturalized understanding that the Internet is a tool for entering cyberspace only. It is indeed a tool for living both in cyberspace and real life and thus the understanding of the Internet lies in the realm of cybernetic space.

The transfer of interest from either the real or cyber to the cybernetic also calls for a change in the way in which Internet is researched. As demonstrated in the various essays in the book *Doing Internet Research* there is usually an insistence on looking either at the discourses available on the Internet (see, e.g., Mitra and Cohen, 1999; Sharf, 1999) or the way in which people use the Internet (see, e.g., Garton, et. al., 1999). Thus, there has been either a discursive focus or a behavioral focus. This distinction is expected since researchers have either considered issues of cyberspace (the discursive) or the real (behavioral) and have tried to understand the Internet from one of these perspectives. This trend has existed precisely because the theoretical conceptualization of the Internet it has made it necessary to distinguish between the two. However, there are situations where the discursive and the behavioral merge and the consequences of this merging defy explanation if approached from the perspectives of the cyber or real separately. However, the idea of the cybernetic space allows for the simultaneous understanding of both the real and the cyber as one conceptual whole and the Internet can be analyzed from both the perspectives. Perhaps trying to understand the consequences of living in a cybernetic space would shed further light on the work of Kraut et. al. (1998).

The emphasis on the cybernetic space therefore makes it important to see how people behave when they are faced with the discourse of Internet as they are able to re-negotiate their identities in cybernetic space. The behavior in the real can become influenced by the discourse encountered in the cyber and it is the sum of the behaviors and the discourses that need to be studied together when looking at cybernetic space. This recognition could lead to a new set of research agendas and goals as we examine the Internet and the many technologies that are being built to make it easier for people to access the discourses and

then live in cybernetic space. The questions about the Internet begin to change as the researchers have to focus on how people live in cybernetic space where the idea of "live" addresses both their behavior as well as their discursive practices of making meaning of the cybernetic discourse and the production of the cybernetic discourse. Indeed, when considered from the perspective of '"cybernetic discourse" it includes both the discourse in real life as well as the discourse in cyberspace. Consequently, to understand the Internet, it will not be enough to only understand how web pages are constructed but also how the web discourse is represented in other non-cyber elements of cybernetic space. The analysis of the Internet, when considered from the perspective of cybernetic space, would thus be a more involved and holistic process than what it is now.

Conclusion

We began this essay with a discussion on the idea of space as it relates to the traditional issue of location at a given point on the globe. To be sure, location, the accompanying interest in knowing one's location, and the significance of that location has been the focus of a considerable amount of human endeavor, from map-making to space exploration. The idea of location has become so central to our popular culture that science fiction has played on this idea in calling "space" the final frontier, demonstrating the fixation on location. Consequently, the need to know where one is, and where one is going, has been an ongoing obsession for human beings, precisely because being lost is an uncomfortable feeling.

Interestingly, however, to confirm that one is not lost, it is now increasingly possible to rely on technologies that connect human beings to a different kind of space where the idea of being lost is almost non-existent. To know how to get from one physical place to another, it is possible now to enter cyberspace and visit a well-defined WWW site and then get directions to go from one physical place to another. This mundane example demonstrates the way in which humans begin to find an intersection between the real and the virtual to be able to operate efficiently in both. The good life is no longer just in the real, or just in the virtual but in a congruence of the two where one seamlessly feeds into the other,

transforming both, and creating the cybernetic space that becomes the synthesis of the two.

We thus suggest in this essay that a metaphoric shift is called for in understanding the human relationship with space and how that relationship is represented in popular culture. It is no longer possible to live within the metaphors of maps, movements, and nations, but it is important to move away from these signifiers to ones that address the more authentic lived experience of web-maps, hyperlinked-spaces and cyber-communities where the hyphenation signifies the cybernetic space we occupy.

In closing, we argue that this shift needs to happen quickly as we begin to understand the ways in which the new technologies are transforming who we are, where we live, and how we answer the question: where am I?

Footnotes

[1] The term "cyberspace" is being introduced here in a particularly broad sense. Indeed the purpose of the essay is to unpack the term itself. However, at this point, the term refers to the more "common sense" use of cyberspace as the imaginary place that one can access by connecting to the Internet.

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Chapter 9

Research Results II

Objectives :

- Free Reading
- Comprehension: Search reading and scanning
- Expressing technical and scientific functions:(Experimenting, hypothesizing)
- Writing: Summarizing research results
- Extensive Reading

Time Now :

1. Reading

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9(1) November 2003 Margaret McLaughlin and Sheizaf Rafaeli, Editors

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The Multilingual Internet:
Language, Culture and Communication in Instant Messaging, E-mail and Chat

Brenda Danet and Susan Herring, Special Issue Editors

Editors' Introduction

The number of non-English speaking Internet users has grown to 470 million, roughly two-thirds of all users. In this special issue the authors explore the rich variety of linguistic practices emerging on the global network.

Greeklish and Greekness

"Greeklish" involves the use of the Latin alphabet in Greek online communication. The authors approach Greeklish as a glocal social practice, and investigate attitudes towards Greeklish as they are represented in the Greek press.

Pan-Swiss English?

English has become increasingly important on a Swiss mailing list studied by the author. She considers the implications of this case for the linguistic situation in Switzerland in general and for the global spread of English via the Internet.

Newsgroups in Catalonia

Study of a corpus of newsgroup messages written in Catalan and Spanish sheds light on the relevance of characteristics of the e-mail register, the impact of language contact and interference, and their implications for machine translation of CMC.

Politeness in Portuguese

Results from a study of a Portuguese CMC environment

Nebila DHIEB-HENIA

ASCII-ized Gulf Arabic

This paper presents a study of ASCII-ized Arabic used by female university students in the United Arab Emirates, drawing on data from a small corpus of instant messenger (IM) conversations, and an e-mail survey of users' experience with this form of writing.

Casual Japanese CMC

The author explores the linguistic and interactional properties of informal asynchronous CMC in Japanese, using Bulletin Board Systems messages as the primary source of data.

Taiwanese Writing Systems

Popular creative uses of writing systems are identified and discussed by the author: rendering in Chinese characters of the sounds of English, Taiwanese, and Taiwanese-accented Mandarin, and recycling of a transliteration alphabet used in elementary education.

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confirm traditional gender roles of men as interactionally dominant and representative of "authority," but do not support findings for English-language CMC that women are more concerned with politeness than men.

Thai Women & Chat

Contrary to culturally-based expectations about the subordinate status of Thai women, females appear to be relatively empowered in the Thai chat room studied by the authors, as assessed through turn-allocation patterns.

Also in Issue 9/1: Tiger Talk for SMEs

Formidable barriers have to be overcome before significant uptake of computer-mediated communication by small and medium-sized business enterprises can be realized.

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2. Comprehension Check

- Reading
- Expressing Numbers

Reading

- Exercise 1
- Exercise 2
- Exercise 3
- Exercise 4
- Exercise 5

Exercise 1: General pre-reading questions

Have a quick look at the headings and subheadings (Fr: titres et sous-titres) in this web page and answer the following questions:

1. What is the general theme of the page?

   Submit Reset

2. What are the different languages being reported on?

Submit Reset

3. From the heading, can you think of some of the reasons why would this journal be interested in studying the language issue in the Internet?

Submit Reset

Exercise 2 : Search reading and scanning

The purpose of this type of reading, **search reading** and **scanning**, is to look for information, details (for example a name, a date, a figure) without having to read all the text. Look at the text and find an answer for these questions as quickly as you can:

1. What is specifically studied in the Thai chat room?

Submit Reset

2. What is the specific area that will benefit from the study of newsgroups in Catalonia?

Submit Reset

3. What does the corpus used by the author in Switzerland consist of?

Submit Reset

4. What is the attribute (adjective) traditionally connected with Portugese men when interacting on the net?

Submit Reset

5. What is the percentage of English-speaking Internet users?

Submit Reset

6. What is the exact number of English-speaking Internet users?

Submit Reset

7. Where was ASCIIized Arabic studied?

Submit Reset

8. What are the forms of communication studied in this Arab country?

Submit Reset

9. What is the primary source of data in the Japanese study?

Submit Reset

Exercise 3 : Paraphrasing

Paraphrase or translate into French the following sentences.

1. "contrary to culturally-based expectations about the subordinate status of Thai women, females appear to be relatively empowered in the Thai chat room studied by the authors, as assessed through turn-allocation patterns".
2. "formidable barriers have to be overcome before significant uptake of computer-mediated communication by small and medium-sized business enterprises can be realized".

Exercise 4 :Inference

Write an inference from this sentence.

"Greeklish" involves the use of the Latin alphabet in Greek online communication.

……

Exercise 5 :

These expressions appear in the web page. Link each word in Column A with another that goes with it from Column B.

A	B
1. draw on	A. the rich variety
2. overcome	B. attitudes
3. confirm	C. results
4. empower	D. The impact of language
5. investigate	E. females
6. shed light on	F. barriers
7. explore	G. popular creative uses
8. identify	H. data

2. Comprehension Check

- Reading
- Expressing Numbers

Expressing Numbers

Although no universal convention exists in scientific writing for expressing numbers, several aspects are common to all conventions. This exercise tests you on those common aspects. In the exercise below, decide the appropriate way to express the number. Corresponding information for this exercise can be found in *The Craft of Editing* (denoted *CE*) and *The Craft of Scientific Writing* (denoted *CSW*). Note: In the general preferences of your browser, please do not override this document's choice of font colors.

1. **The Titanic was nearly 900 feet long, stood (25 / twenty-five stories) high, and weighed an incredible 46 thousand tons.**

2. **The Charpy test is run by holding the coupon against a steel backing and striking the coupon with a 67-pound pendulum on a (2-foot arm / two-foot arm).**

3. **(1522 people perished when the Titanic sank. / When the Titanic sank, 1522 people perished.)**

4. **The maximum amperage for each of the two devices is (3 A / three A).**

5. **In its day, the Titanic cost more than ($7.5 million / $7,500,000 / seven and one-half million dollars) to construct.**

Nebila DHIEB-HENIA

6. **During that time the water temperature dropped (.6K / 0.6K / zero point six degrees Kelvin .**

Available online at: http://www.writing.eng.vt.edu/exercises/usage5.html
Retrieved 28 August 2004

Key to Expressing Numbers

Congratulations, you have answered # 1 correctly.

Correct version : The Titanic was nearly 900 feet long, stood **25** stories high, and weighed an incredible 46 thousand tons .

Discussion: Because the sentence contains two other numerals that present parallel information, the number "twenty-five" should also be expressed as a numeral, "25." Note that if the other two numerals were not presenting parallel information in the same paragraph, then the format's convention would dictate whether "twenty-five" should be written out or expressed as a numeral.

Congratulations, you have answered # 2 correctly.

Correct version : The Charpy test is run by holding the coupon against a steel backing and striking the coupon with a 67-pound pendulum on a 2-foot arm.

Discussion: Measurements are expressed as numerals.

Congratulations, you have answered # 3 correctly.

Correct version : When the Titanic sank, 1522 people perished.

Discussion: In English, it is improper to begin a sentence with a numeral. Note that writing the number out here would have been technically correct, but difficult for the audience to

read. For that reason, it is better to rearrange the sentence. Also note that having a comma after the first digit (1,522) depends on your format's convention.

Congratulations, you have answered # 4 correctly.

Correct version : The maximum amperage for each of the two devices is 3 A.

Discussion: Writing out the number "two" here is appropriate in most conventions because the number is simply arrived at by counting, and in most conventions, counted numbers can be written out if they can be expressed in a single word. On the other hand, the numeral "3" is appropriate because it was arrived at by measuring, and measurements are always expressed as numerals when the units are abbreviated .

Congratulations, you have answered # 5 correctly .

Correct version : In its day, the Titanic cost more than $7.5 million to construct.

Discussion: With large numbers, it is acceptable to write out part of the number to avoid a string of zeroes. Note that "7.5" has to be a numeral on two counts--it contains a decimal, and it represents a monetary figure .

Congratulations, you have answered # 6 correctly .

Correct version : During that time the water temperature dropped 0.6K .

Discussion: A digit has to appear before the decimal.

Answer key

Exercise 1 :

1. Language, culture and communication on the Internet
2. Arabic, English Greek Swiss, Thai…
3. languages carry with them their cultures, so it is important to have an idea about which languages are more used, more dominant on the Internet.

Exercise 2 :

1. turn allocation patterns
2. machine translated CMC
3. Swiss mailing list
4. dominant
5. about one third
6. we don't know because the author says "roughly"
7. United Arab Emirates
8. instant messaging and emails
9. bulletin board systems messages

Exercise 3 :

1. Through this study of turn allocation patterns, Thai women seem to have a powerful position, which does not go well with the belief that women generally take inferior position.

2. Firms of small and medium sizes must work hard and take a challenge before they can invade the computer-mediated communication market.

Exercise 4:

Greek does not use the Latin alphabet.

Exercice 5:

1. H
2. F
3. C
4. E
5. D
6. B
7. A
8. G

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3. Expressing technical and scientific functions: Experimenting, hypothesizing, predicting, and emphasizing

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Study the following expressions for experimenting, hypothesizing, predicting, and emphasizing , then translate the sentences in Exercise 1 into English.

- Experimenting
- hypothesizing
- predicting
- emphasizing

1. Experimenting

To test whether	Afin de juger si
Testing a single hypothesis	Vérifier une seule hypothèse
Test positive on the Greiss test	Avoir une réaction positive au test de Greiss
Satisfactory tests cannot be madeunless..	On ne saurait mettre au point des tests satisfaisants sans…
The reference scale has to be tested	l'echelle de référence doit être testée
X testified to…	x témoigne du
Xs are testimony to..	Xs attestent de…
To experiment with	Faire l'expérience avec
A rough empirical check	Une vérification expérimentale approximative
This establishes that	Ceci démontre que
X matches well with	X est en bon accord avec
Xs are consistent with	Xs sont cohérents avec/ en accord avec
..are inconsistent with	En désaccord avec
the results should be viewed with some degree of reservation	Il faudrait considérer les résultats avec une certaine réserve

2. Hypothesizing

If …..then…	Si… alors…

If we were ever to…, we would first have to..	Si jamais il nous fallait…, il nous faudrait d'abord…
Should x be…, it would …	Si x s'avérait…,
Given……, it may be possible to..	Si l'ont parvient à…, on pourra envisager..
There is no reason to assume..	Il n'y a aucune raison de supposer que…
Under the above hypothses,..	D'après les hypothèses ci-dessus,..
X postulates that…	X postule que…
X suggested the possibility that..	X a émis l'hypothèse que…
He conjectured that…	Il supposa que…
X remains a speculation..	Ceci reste une hypothèse
To put forth/forward an idea	Emettre une idée

3. Predicting

It is expected that	On pense que
Scientists expect that/predict that	…prévoient que..
X is tentatively scheduled for…	on prévoit actuellement…
These observations suggest that..	d'après ces observations..
It is likely that	il est vraisemblable que
the likelihood	la probabilité pour que…
x has a high probability of…	a toutes les chances de…
the chance that..	la probabilité que
the chance of incidentally finding….is small	La probabilité de trouver par hasard ..est faible
the chances of … are slim	l'espoir de… est fable
the odds are..	il y a de fortes chances que…

4. Emphasizing

……., so did…….	……..ainsi que…….
indeed,..	En effet,…
…, in effect,…	….en effet…
in fact,	De fait,..
it must be emphasized that..	il faut souligner que…
x insisted that..	x soutenait que
it is striking that…	Il est frappant que..

x is crucial for..	…joue un rôle essentiel dans…
x is central to…	x est déterminante pour…
is critical to..	joue un rôle fondamental
in no manner/ in no way	en aucune façon

Exercise 1

1. l'auto-correlation (GB: serial correlation) des fluctuations de la variable de sortie du modèle est en bon accord avec celle qui est observée. P61
2. Ces corrélations sont toutes deux en désaccord avec les observations.
3. Ceci reste pour l'instant une hypothèse fascinante mais purement métaphysique.
4. Il supposa que la contraction gravitationnelle qui avait forme la terre avait été à l'origine de toute sa chaleur interne. P78
5. Le souci de la défense nationale ainsi que la recherche du prestige national influèrent sur les débuts des programmes spatiaux des deux nations. P79
6. Les logiciels informatiques jouent un rôle essentiel dans la sécurité de fonctionnement des chemins de fer, des équipements hospitaliers, et des avions.
7. la probabilité que deux personnes prises au hasard aient la même empreinte d'ADN est de un sur trente milliards.p109
8. D'après ces observations un réchauffement général accélérerait le processus de décomposition des matières organiques.

key to expresstechnical 9

1. The serial correlations of fluctuations of the output model variable match well with those observed.
2. . Both of these correlations are inconsistent with the observations
3. For the moment, this remains a fascinating but a purely metaphysical hypothesis.
4. He conjectured that the gravitational contraction that formed the earth had generated all of the earth's heat.
5. The desire for national security shaped the early space programs of both nations. So did the desire for national prestige.
6. Computer software is crucial for the safe operation of railways, hospital equipment, and aircraft.
7. The likelihood that any two people will have the same DNA print is one in 30 billion.
8. These observations suggest that a global warming will speed the decay of organic matter.

4. Writing: Summarizing research results

This figure sheds light on the structure and main players in an e-marketplace. Study it carefully, then write three paragraph summarizing the main points in the figure.

Start as given:

In contrast to a traditional exchange of goods between two parties (Alderson & Martin, 1965), a third partner intervenes here in the bilateral exchange relationship between buyer and seller. In this configuration all parties (seller/buyer/marketplace operator)……..

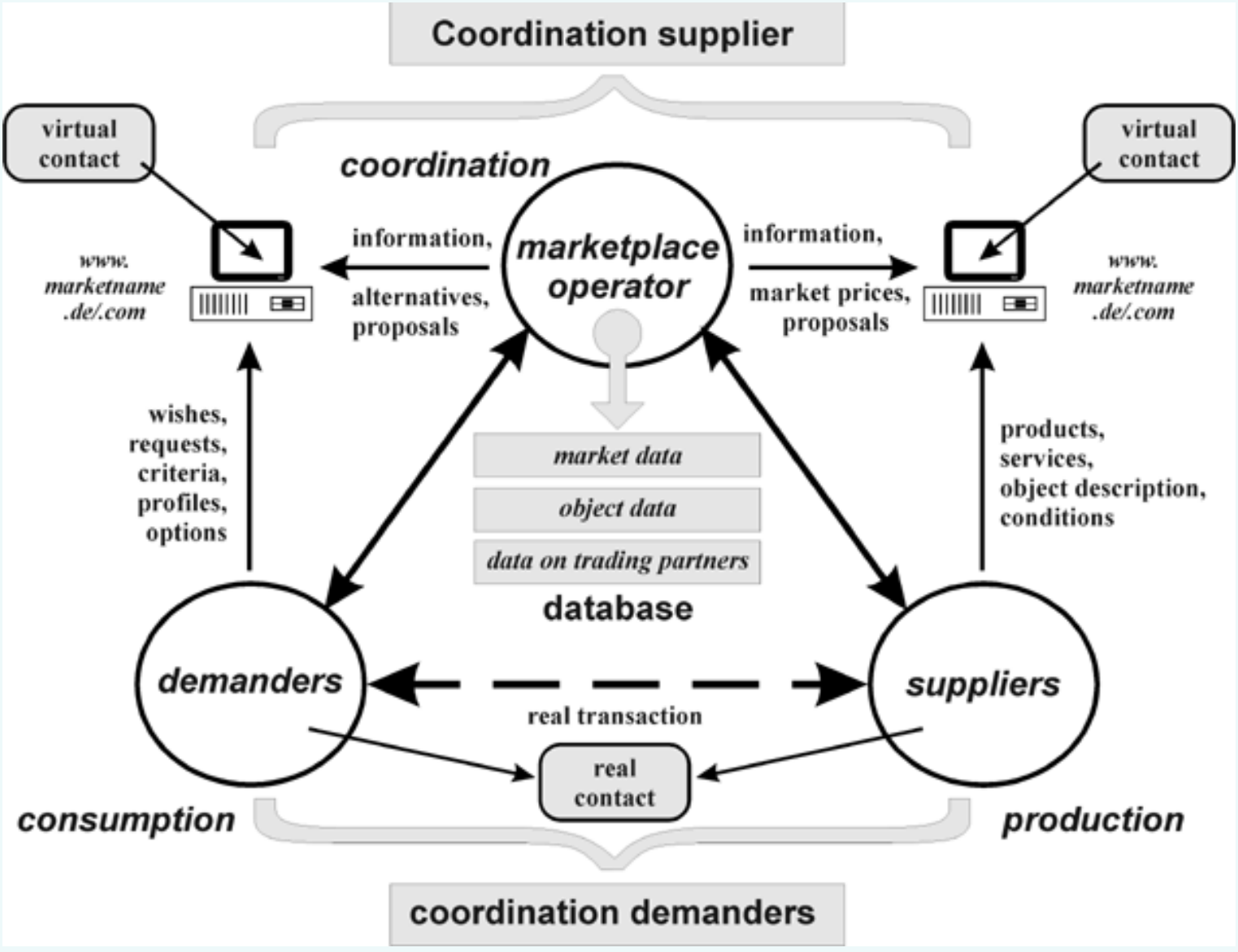

Fig x: The basic structure and players in virtual marketplaces

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5. Extensive reading

Available online at: http://www.ascusc.org/jcmc/vol7/issue3/meis.html
Retrieved 28 August 2004

Extensive reading:

What are the different reasons advanced by the authors to convince the reader that an Internet-based intervention may be more successful especially with adolescents?

JCMC 7 (3) April 2002

Message Board

Development of a Tailored, Internet-based Smoking Cessation Intervention for Adolescents

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Abstract

Computer-assisted interventions represent an innovative approach to adolescent smoking cessation that may offer advantages over traditional smoking interventions in their potential to provide adolescents with a variety of appropriate cessation-related activities, as well as interactive feedback tailored to their developmental, psychosocial, behavioral, and biological needs. As part of a larger project to evaluate the effectiveness of an Internet-based approach to smoking cessation among adolescents, this paper will describe the intervention development process. Stomp Out Smokes (S.O.S.), an Internet-based information and support system, was created to address the specific needs and experiences of adolescents who want to quit smoking. The development of S.O.S. involved an iterative process with five distinct yet often overlapping phases: Phase 1: review of the adolescent development, smoking cessation, and health literature; Phase 2: development and implementation of a needs assessment; Phase 3: construction of a site development strategy; Phase 4: development, review, and revision of content; and Phase 5: development of the website architecture and graphic design.

Introduction

Adolescent smoking is a major public health concern (CDC, 1998). In addition to the estimated 3000 youth who begin using tobacco each day, many adolescent smokers express the desire to quit, but find it difficult to do so. One study reports that nearly half of high school seniors who smoke say they would like to quit; of them, nearly forty percent had tried unsuccessfully to quit (Perry, 1999).

Despite the mean age of initial tobacco use of 10.7 years in boys and 11.4 in girls, until recently, very little work has been done to provide intervention for younger smokers (Brownson et al., 1991). Targeting adolescents for cessation programs as early as age 11 may help minimize their lifetime exposure to and damage from tobacco.

The few interventions that have been studied for adolescent smokers have not addressed their unique developmental needs, nor have they been developed specifically for them. Recent studies testing pharmacological interventions among adolescent smokers found that adolescents exhibit lower abstinence rates than adults who are given the same interventions (Smith et. al., 1996; Hurt et. al., 2000). This suggests that quitting smoking is a different experience for adolescent smokers and that research on effective interventions tailored to adolescents is needed to learn how to help them stop smoking.

A comprehensive search of the literature on behavioral treatment of smoking among adolescents (Sussman, Lichtman, Ritt, & Pallonen, 1999) yielded 17 cessation studies based on a wide range of theoretical perspectives. Most of the interventions were based on adult models and were not tailored to adolescents. In addition, the majority were conducted in school settings. However, since adolescent smokers are more likely than nonsmokers to be dropouts or absent from school (Charlton & Blair, 1989; Pirie, Murray, & Luepker, 1988), school-based studies may fail to reach a substantial portion of smokers. In addition, these studies had several methodological limitations including use of single group or quasi-experimental design and small sample sizes. These research findings, and more specifically, the gaps in this body of research led us to develop an alternative approach to adolescent

smoking cessation: an Internet-based intervention. A unique and important aspect of this intervention is that its development was driven by research exploring the specific needs of adolescents who were either current or former smokers.

With funding from the National Cancer Institute, smoking cessation experts at the Mayo Nicotine Research Center (Patten et al., 2001) teamed with Comprehensive Health Enhancement Support Systems (CHESS), acknowledged leaders in the field of interactive health communications (Slack, 1999), to create a CHESS-based module for adolescent smoking cessation. This module was named Stomp Out Smokes or S.O.S. CHESS has created tailored, computer-based health information and support programs based on the identified needs of the target population and theoretical models of crisis, coping, learning, and behavior change theories that are among the only systems of this sort to have shown positive outcomes in randomized controlled trials (Gustafson et al., 1999; Gustafson et al., 2001).

An Internet-based intervention has the potential to provide adolescents with a variety of appropriate cessation-related activities, as well as interactive feedback tailored to their developmental, psychosocial, behavioral, and biological needs. Even more importantly, it can give the adolescents some control over treatment decisions.

As a medium, the Internet has several characteristics that make it especially promising for an adolescent smoking cessation intervention (Borzekowski & Rickert, 2001). First, its interactive nature permits immediate, individualized feedback, which allows for tailored information and group discussions, qualities that are associated with interpersonal encounters. It also can deliver information to masses of individuals quickly, efficiently, and on demand, which gives it the capacity to provide in-depth information and the combination of audiovisual and textual content. In addition, the Internet shares with print media the ability for users to refer back to information found previously, 24-hour access, and nonlinear control over navigation through the material. All of these characteristics facilitate greater user involvement, and thus effect a more active audience than do traditional mass media (Street & Rimal, 1997). Furthermore, since an Internet-based intervention can be delivered outside of traditional health care settings and instead be used in the home or school, there is also the potential to increase access to health care services for those with geographic or financial limitations.

In order to take advantage of the many promising characteristics of the Internet as a medium while creating a behavior-change program based on a theoretical framework, we followed a carefully planned development process.

Development Approach

The development of S.O.S. involved an iterative process with five distinct yet often overlapping phases: Phase 1: review of the adolescent development, smoking cessation, and health literature; Phase 2: development and implementation of a needs assessment; Phase 3: construction of a site development strategy; Phase 4: development, review, and revision of content; and Phase 5: development of the website architecture and graphic design. Even when the site was first "complete," we anticipated changes; in practice, the site is currently subject to continual review and revision.

The tremendous ease of publishing on the Internet (in comparison with other forms of publication) is what allows us to use this iterative approach, which is impractical with other media. This is not to suggest, however, that additions and changes are made frivolously; they are made only when there is compelling new information that is evaluated as being more beneficial to our audience than what is currently published. We consult the literature whenever questions arise that are not adequately covered in the material previously reviewed. Relevant bodies of literature are constantly monitored for new developments regarding all elements of our project, including user needs, treatments, and design, and relevant information is incorporated in our intervention as soon as it is prepared for publication.

Phase 1: Review of the Literature

We began the site development process with an in-depth review of the literature on adolescent development, health, and smoking behaviors, which yielded important information related to the unique developmental, psychosocial, biological, and behavioral factors that play a role in the adolescent smoking experience.

Developmental Issues. One aspect of smoking in adolescents that makes it particularly difficult to treat is that smoking can play a role in fulfilling key developmental needs of adolescence, including establishment of autonomy, independence, intimacy, and identity (Perry, 1999), as well as bonding with peers, maturity, and having a positive social image (CDC, 1994). Understanding and acknowledging the importance of these needs allows us to address them and attempt to provide alternatives to satisfy the underlying developmental needs of adolescent smokers.

In order to understand fully the needs met through the adolescent smoking experience, we must first ask the question: in the eyes of the adolescent, what value is produced by smoking? (Firat & Venkatesh, 1995). In a series of nine focus groups of adolescent smokers between the ages of 15 and 18 years, Balch (1997) found that the most important perceived benefits of smoking were mood control, social bonding and companionship, a more mature or "cool" appearance, and weight control. Perceived disadvantages of smoking were financial costs, conflicts with parents, social hassles, and pressure from nonsmoking friends. Balch also found that adolescent smokers prefer to be involved in their own treatment decisions, set their own goals, and progress at their own pace. Aspects of smoking cessation interventions that adolescents perceived as negative were preaching and nagging.

A study by Williams, Cox, Kouides, & Deci (1999) confirms the importance of adolescents' involvement in their own treatment in their findings related to an autonomy-supportive style of interaction. According to the autonomy-supportive style, an authority figure, such as a physician or counselor, takes into account the adolescent's perspectives when providing relevant information, offers choices and minimizes pressure, and encourages them to accept more responsibility for their own behavior. This study found that when adolescents perceived messages about not smoking as autonomy supportive, they had more autonomous motivation for not smoking, which in turn predicted a decrease in self-reported smoking.

Psychosocial Factors. Peer influence appears to be a significant predictor of the initiation and maintenance of adolescent smoking (Botvin et al., 1992; Chassin et al., 1991; Stanton & Silva, 1991; Swan, Creeser, & Murray, 1990). Similarly, adolescents who stop smoking experience effects on their social environments that they often perceive as negative, including a decline in the number of smoking friends (Chassin et al., 1994). Conversely,

positive peer support can have a beneficial effect on a young person's health. According to Turner (1999), peer-led initiatives inherently acknowledge young people's skills and abilities and their constructive role in the solution to problems. In fact, several studies have shown that peer initiatives can improve knowledge, change attitudes regarding health-related behavior, and improve both self-esteem and self-efficacy, all of which are important factors in obtaining and maintaining a healthy lifestyle (Bernard, 1991). Based on normal adolescent psychosocial development, and on current research on adolescent smoking behaviors and theories, a smoking cessation intervention that involves the use of peer support should contribute to its effectiveness (Albrecht, Payne, Stone, & Reynolds, 1998).

In addition to social influences, an adolescent's psychological well-being appears to influence smoking behaviors. Several studies have shown that positive outcome expectations for the effects of smoking (e.g. concentration and improved affect) are related to the persistence of smoking (Hansen et. al., 1985; Skinner et al., 1985; Wills & Shiffman, 1985). According to a Centers for Disease Control report (1994), a substantial proportion of adolescents report smoking to reduce stress and negative affect. A strong link has also been found between smoking and beliefs about its consequences (Hansen et al., 1985; Skinner et al., 1985; Wills & Shiffman, 1985), as well as perceived ability to cope with a difficult situation (Ellickson & Hays, 1992). Adolescents low in personal resources such as self-esteem, mastery, or social support may turn to cigarette use because it is the only means available to cope with stress (Pederson et al., 1997; Wills & Shiffman, 1985). Researchers have also reported links between cigarette smoking and anxiety (Patton et. al., 1996) as well as depression in adolescents (Choi, Pattten, Gillin, Pierce, & Kaplan, 1997).

In addition, Sussman et al. (1998) concluded that the most effective approaches in reducing cigarette smoking among adolescents included cognitive-behavioral components, such as instruction in coping skills, that can help adolescents find alternative ways to cope with negative affect. Wills came to a similar conclusion (1986) upon observation that certain coping strategies (adult support, behavioral coping, and relaxation) resulted in less smoking.

Biological Factors. Biological factors have also been shown to affect the smoking status of young smokers. Like adult smokers, adolescent smokers develop nicotine dependence and exhibit withdrawal symptoms when they try to stop smoking (McNeil, West, Jarvis, Jackson,

& Bryant, 1986; Smith et al., 1996; Stanton, Lowe, & Silva, 1995). Researchers administering the Fagerström Tolerance Questionnaire and the Fagerström Test for Nicotine Dependence with adolescent smokers have found scores comparable with those of adult addicted smokers (Prokhorov, Pallonen, Fava, Ding, & Niaura, 1996; Rojas et al., 1998; Smith et al., 1996). A survey by Stone and Kristeller (1992) found that 28% of daily smokers (those who smoked at least one cigarette per day for the last month) reported nicotine addiction as the most important reason they continued smoking. Recent research suggests that addiction to nicotine may occur even before an adolescent becomes a daily smoker (DiFranza et al., 2000).

Behavioral Factors. Smoking cessation in adolescents is also influenced by behavioral factors, such as readiness for change and motivation to change. Readiness for change refers to the causes, considerations, reasons, and intentions that move an individual to perform certain behaviors or sets of behaviors like quitting smoking (DiClemente, 1999). Varying degrees of motivation imply that there are several stages of behavior change, such as those identified by Prochaska and DiClemente (1992) in their transtheoretical model (also know as the Stages of Change model). The transtheoretical model, which has been applied in various health behavior contexts, including smoking cessation, conceptualizes behavior change as a five-stage process (Maibach & Cotton, 1995). These stages were adapted for use in the context of adolescent smoking (see Table 1).

According to this model, behavior change requires stage-specific interventions, based on Bandura's social cognitive theory (SCT), to motivate an individual to move from one stage to the next. SCT indicates that behavior is determined reciprocally by both internal personal factors and the external living environment; in other words, individuals and their behavior are influenced by their surroundings, yet individuals also influence their surroundings through their behavior and expectations. According to Bandura (1997), perceived self-efficacy has a great influence on a person's motivation for making behavior changes. He notes that efficacy beliefs determine the height of goals people set for themselves, how much effort they are willing to exert, their staying power in the face of difficulties, and how formidable they perceive the obstacles to be (Bandura, 1999). In fact, Bandura (1997) perceives that self-efficacy affects every phase of change in substance abuse-the initiation of changes, their achievement, recovery from relapse, and long-term maintenance of abstinence.

According to Bandura (1997), high self-efficacy can be achieved through successful self-regulation. Successful self-regulators track their behavior and the cognitive and situational conditions under which they engage in it. They set proximal goals for exercising control over their behavior in the here and now. They draw from an array of coping strategies rather than relying on a single technique. They create motivating incentives to sustain their efforts. And they apply multifaceted self-influence consistently and persistently.

Maibach and Cotton (1995, p. 44) have prescribed specific strategies for improving perceived self-efficacy and moving an individual from one stage to the next which are based on SCT. Table 1 outlines the application of Maibach and Cotton's strategies to an adolescent smoking cessation context.

Summary of Literature. Our literature review on adolescent development and smoking cessation had substantial implications for the design of our website, including fundamental decisions on content and our approach to content development. Perhaps the most important overriding theme in the literature is that smoking is not an isolated act; rather, it is a complex and variable behavior that occurs in particular and dynamic developmental, psychosocial, biological, and behavioral contexts. Therefore, throughout the site development process, we attempted to consider the multitude of factors that play a role in adolescent smoking cessation and build an intervention capable of changing dynamically to address a user's needs over time and through the various stages of behavior change.

Phase 2: Develop, Administer, and Analyze Needs Assessment

To improve our understanding of adolescent smokers and their quitting experiences, we developed and administered a comprehensive needs assessment survey. This phase began with focus groups conducted at four geographically and ethnically diverse sites: Hartford, CT; Kansas City, MO; Madison, WI; and Rochester, MN. Focus group participants were adolescents ages 11 to 17 who were current or former smokers. Of the 37 adolescents, 59% were minorities, 50% were female, and 65% were current smokers.

The focus groups were conducted to gather information on the process of quitting as defined by current and former adolescent smokers. This information was used to build a quantitative

needs assessment survey. The surveys were completed by 1305 adolescents at four sites: Hartford, CT; Kansas City, MO; Madison, WI; and Rochester, MN. Of the respondents, 46 were former smokers, 234 were current smokers, and 1025 were nonsmokers. In addition to answering survey questions, participants were asked what they considered the three most important questions or concerns they had when they quit or when they think about quitting. This open-ended item allowed participants to communicate what they thought about when thinking about quitting, without being prompted by preselected survey responses, which guided our decisions about relevant topics and main ideas for the website.

The following is a general description of the needs assessment results as they apply to website development. The specific methods for survey development and administration as well as an in-depth analysis of its results can be found in Pingree et al.(2001).

Responses from current and former smokers were considered most relevant for site development purposes. Our overall finding in the extant literature—that adolescent smokers and their smoking attitudes, beliefs, and behaviors are widely variable—was confirmed by the needs assessment. It is clear that not all adolescent smokers have the same needs, and those needs might change within the same individual as s/he continues on the path of adolescent development. More detailed analysis indicated that on 29 items, the data showed distinct differences between what current smokers reported would help them quit, and what former smokers indicated helped them quit. This suggests that those who have successfully quit may have gained some insight into the circumstances of their smoking and quit attempts that could be used to help current smokers quit.

Data from the needs assessment also showed distinct differences between the responses of smokers segmented by their stage of behavior change, which suggests that the Stages of Change model is an appropriate basis for the website structure. However, DiClemente (1999) found that although the stages represent a sequential pathway through the process of change, individual substance abusers do not usually negotiate the stages in a single sequential transition; recovery and movement through the stages are marked by regression and relapse, as well as recycling. This evidence suggests that a strictly linear structure is not appropriate for this site, an approach which can be easily accommodated via standard website structuring strategies.

Phase 3: Site Development Strategy

Based on the literature review, needs assessment, our considerable clinical and research experience with adolescent smokers (Patten et al., 2001), and our experience in developing interactive information, social-support, and problem-solving systems, we constructed our site development strategy. The strategy comprises underlying theory, message content, context and meaning, information architecture considerations, graphic design plan, and voice (point-of-view). The overall site development process led to the identification of some basic objectives:

· include content that will be meaningful to an adolescent audience;

· use language that appeals to and is understood by an adolescent audience;

· provide information in a context that is appropriate for an adolescent audience;

· organize the information in a nonlinear, hierarchical structure that is easy to navigate;

· include graphic design elements that appeal to an adolescent audience;

· establish a voice that is accessible to an adolescent audience.

It should be noted that this does not mean that all messages, design elements, and graphics will appeal to and/or be understood by all users; rather, the intent is that every adolescent who enters the site should be able to easily find something of interest somewhere in the site. Ultimately, certain content areas and messages will be more popular than others, but to the greatest extent possible, our main objective is to address the needs and interests of all users.

The process through which these objectives are met is continuous iteration of content development, modification, user evaluation, and feedback. Online comment and feedback mechanisms are in place in S.O.S. to facilitate continuous communication between users and developers. Users can communicate what they like and don’t like at any time by writing in a specific section of the discussion group entitled Website Feedback or by writing in our Comments section. Developers can then make modifications based on the comments sent

through these systems. By structuring an intervention that generates true dialogue between users and developers, we attempted to downplay adult-adolescent power differentials and alienation by focusing our attention on the issues adolescents were likely to face in their smoking cessation efforts.

Construction of the site development strategy also included drafting a basic site map to guide the initial creation of content and design. This site map detailed the elements that we expected to include in the site, although final decisions for specific content were based on findings from the literature, needs assessment results, and adolescent panel feedback. The site map provided a foundation for how specific content areas would be presented and eventually connect to one another to form a comprehensive smoking cessation program. This site map defined three major categories of services we hoped to provide through the content and design of the final product: interactive feedback, mechanisms for self-expression, and informational pieces.

Interactive feedback services include Quit Plan and Quit Notes, which offer ways to interact with the computer and allow for tailoring of an individual's quitting plan as well as tools for tracking an individual's quitting progress. These services allow users to self-assess where they are in their quit attempt and how they are doing at each login. The system then uses this information to guide the user to the content most likely to be relevant to that particular user and that particular time, whether it be an interactive exercise or an informational piece. The services also allow users to input personal information regarding their smoking habits and receive feedback based on their input. Users can review alternatives to smoking and tips for getting through all of the stages of quitting, select those that they find most appealing, and save them in their Quit Notes for future reference. Most importantly, these services allow users to revise and update any information they enter into the system or any information they save in their Quit Notes at any time, creating a system that can meet user needs that may evolve dynamically.

Services that allow for self-expression include an online Discussion Group, Live Chat, a personal journaling service, an art gallery where users can post their artwork, and an Ask an Expert service that allows adolescents to communicate with smoking cessation experts through private bulletin boards. These services not only allow the user to become involved

with others going through the quitting process, but they provide an automatic mechanism for keeping the site up-to-date with real-life struggles and solutions experienced in the quitting process. In addition, the social contact, built-in accountability, and ongoing communication help to keep the interest of the user and promote ongoing use of the system.

Informational pieces provide accurate, up-to-date information on smoking and quitting and other topics relevant to an adolescent smoker. It should be noted that specific content areas often combined two or three of the major categories of services. Table 2 presents the site map which lists the content areas and shows which categories of services each content area provides.

Phase 4: Content Development, Review, and Revision

For all practical purposes, Phases 4 and 5 (Information Architecture Development and Graphic Design) occurred simultaneously. While content was being developed piece by piece, the planning and programming of the site architecture was also being developed using the draft site map to determine an inherently logical order and categorization of the elements that were to be included. During this highly creative process, sometimes the categories suggested a new piece of content, and sometimes the content suggested a new categorization scheme. Content and architecture development are excellent complements to the other, and developing them more or less simultaneously is a logical, dynamic, synergistic, and beneficial approach.

Once drafted, content and design ideas were presented, in written form, to adolescent panels from Madison, Rochester, and Hartford, who provided frank feedback on writing style, word selection, and concept presentation. A core group of approximately 17 adolescents was involved in the panels. It should be noted that the purpose of the panels was not to evaluate the effectiveness of the system as a whole, but rather to evaluate content and design choices. Evaluating the system for its effectiveness in smoking cessation is currently underway and will be discussed in future papers.

In the writing process, we made a concerted effort to follow additional guidelines that emerged from our team knowledge and interactions with our target audience:

· Use colloquial language without trying to impersonate adolescents.

· Use direct, clear language.

· Use non-judgmental language.

· Use pictures rather than text whenever possible.

· Use specifics rather than abstractions.

· Use an active voice both in sentence structure and ideas.

· Simplify and contextualize the language.

Content development included extracting the primary implications of our literature review and needs assessment and finding ways to present the information with appealing graphics, language and clarity. The following gives examples of how we applied our findings to create specific content areas.

1. Implications of developmental factors.

· Acknowledge that adolescents perceive some aspects of smoking as beneficial and identify alternative sources for the perceived benefits of smoking.

· Emphasize negative aspects of smoking as perceived by adolescents.

· Avoid tactics that adolescents perceive as negative such as preaching and nagging.

· Allow adolescents autonomy in cessation process and decisions.

Allowing adolescent users autonomy in their quit attempt is achieved through the S.O.S. Quit Plan and personalized Quit Notes (e.g. "Steve's Quit Notes"). The Quit Plan is an interactive component of S.O.S. that allows the user to choose a quit date and then offers, on a daily basis, different tailored information and links to specific S.O.S. content relevant to planning their quit attempt. The system also allows users to track their progress and receive tailored

tips and problem-solving strategies for up to six weeks following their quit date. Unsuccessful quit attempts (based on user self-report) trigger supportive tailored feedback and an opportunity to review possible reasons for the slip or relapse and set a new quit date. This component of the system provides some guidance while at the same time allowing users to progress at their own pace and design their own quit plan. Figure 1 is an example of a Quit Plan screen.

Quit Notes let adolescent users tailor their smoking cessation intervention to their unique needs. These tailored Quit Notes allow users to select and store (and retrieve with a single mouse click) only those quitting tips, coping strategies, names of supporters, and planning strategies that are meaningful to them. Users can find information to personalize and place in their Quit Notes throughout the various content areas of S.O.S. All interactive content can be revised and/or updated at any time. See Figure 2 for an example of a Quit Notes screen.

Content is provided to address the aspects of smoking that adolescents may perceive as beneficial. For example, if an adolescent smokes to portray a certain image, information in the section "Me as a Nonsmoker" can help them find ways to portray that image without smoking. For adolescents who have not identified their motivation for smoking, there is an interactive component that allows them to answer questions about their smoking, identify their smoking behaviors, and consider their motivations for smoking. It also helps them to identify the negative consequences of their smoking and offers positive alternatives to smoking based on their input.

Research with adolescent smokers has shown that a significant predictor of planning to stop smoking or having actually stopped is believing that secondhand smoke harms nonsmokers (Glantz & Jamieson, 2000). This negative aspect of smoking is emphasized in content on the health effects of smoking and secondhand smoke. Figure 3 is a screen from the section on the health effects of smoking.

The financial cost of smoking, also cited by adolescents as a negative aspect of smoking (Balch, 1997), is discussed in a section that automatically calculates the cost of their smoking habit, and provides a list that includes popular items that cost approximately the same amount as the adolescent is spending on cigarettes.

2. Implications of psychosocial factors.

· Reinforce positive peer influences; suggest ways to resist negative peer influences.

· Include content on how to cope with negative affect and stress.

· Provide content about smoking beliefs and consequences.

Several sections of S.O.S. encourage adolescents to support each other in their quit attempts. An online support group, as well as Live Chat, are available for adolescents to support each other through their quitting process. These services offer a venue for anonymous, non-threatening communication among adolescents facing similar issues and concerns. Adolescents can also support each other by sharing tips and suggestions for staying smoke-free that have worked for them. In addition, we have developed content to address dealing with others who smoke and dealing with supportive and non-supportive friends and family.

In focus groups conducted by Balch (1997), adolescents stated that they preferred advice about smoking from a successful quitter. S.O.S. contains Personal Stories, which are real-life accounts of people who have quit or are trying to quit smoking. These first-person accounts are of past or current smokers with different racial, socioeconomic, and educational backgrounds, and who have had both positive and negative experiences with different treatment options. These stories address barriers to quitting and how the barriers were managed, successfully or unsuccessfully. See Figure 4 for an example.

Content areas on reasons for smoking and reasons for quitting were developed to address the perceived benefits of smoking. For example, several sections of S.O.S. directly address how to deal with negative affect, including stress, depression, anger, and boredom, without smoking. These content areas give specific examples of typical situations adolescents often face and concrete suggestions for dealing with them. Interactive components on the site allow users to enter and save personal plans for dealing with negative affect. Also, the common belief among adolescents that cigarettes offer some physical benefits, such as increased concentration, increased energy and decreased agitation, is examined in a section on the health effects of smoking that explains temporary and lasting physiological effects of

smoking. Content also addresses smokers' desire to control their weight and to create a desired image. Myth Quizzes provide a fun way for users to learn the true consequences of smoking on their health and relationships.

3. Implications of biological factors.

· Address cravings and withdrawal symptoms that tend to occur during smoking cessation when a smoker is addicted to nicotine.

S.O.S. addresses the most common withdrawal symptoms reported by ex-smokers and offers ways to deal with them without smoking. These tips are offered throughout the site as well as automatically at login, at appropriate times, dictated by the user's quit date. Information on medications that can be used to help smokers overcome cravings and withdrawal symptoms, as well as how to use the medications properly, is provided. There is also a section dealing with cravings that discusses what to expect, as well as ways to get them under control. There is a comprehensive list of smoking substitutions, including things to do with one's hands and mouth when the urges strike. Adolescents can also enter their unique withdrawal symptoms, cravings, substitutions, and strategies for dealing with them, and save them in their personal Quit Notes to refer to when needed.

4. Implications of behavioral factors

· Acknowledge that adolescents will be at different stages of change and provide content relevant to all stages.

· Help adolescents become successful self-regulators to improve their self-efficacy and thus increase the motivation for moving through the Stages of Change with the goal of reaching the maintenance stage.

· Provide concrete suggestions for making behavioral changes that will benefit smokers at all stages of change.

S.O.S. contains content for an adolescent at any stage in the quitting process from thinking about quitting to staying smoke-free. This is evident when you look at the side menu of any

page of the site (see Figure 5). Relevant information and interactive components that offer tailored feedback are provided for every stage. Self-regulation is encouraged by daily tailored feedback provided by the S.O.S. system. It helps adolescents track their quitting process by giving them daily feedback specific to their situation, including the number of days they have been smoke-free, praise for success, support for setbacks, withdrawal symptoms they may be feeling and how to handle them, the positive effects quitting has had on their body so far, reminders of how they said they would handle negative affect, and rewards they chose for themselves to reinforce their successes. In addition, users who relapse have the opportunity to write about their relapse experiences and save them to refer to when needed. Users can also enter information into their Quit Notes such as smoking triggers to remind them of what to avoid (see Figure 6 for an example)

5. Implications from our needs assessment

· Include content that touches on a wide variety of topics, issues, cessation tactics and strategies.

· Present the point of view of former smokers.

· Acknowledge and address the wide range of attitudes, beliefs, and behaviors of current smokers.

· Include comprehensive information on strategies and methods for quitting.

Content covers a wide variety of topics related directly and indirectly to smoking. Some content areas are more comprehensive than others based on the findings of the needs assessment. For example, the information on various strategies used for smoking cessation and relapse prevention is very detailed because so much interest was expressed on this topic in the needs assessment. Other issues that were mentioned in the needs assessment, but with less frequency, are addressed with less detail.

Because the needs assessment showed a difference between the attitudes and beliefs of current and former smokers, S.O.S. provides the point of view of each. Adolescents can read about and learn from the experiences of former smokers in Personal Stories. They can also

express their own attitudes and beliefs by displaying artwork, writing in a journal, and conversing with others through an online Discussion Group. Common issues and concerns of current smokers are also addressed by an extensive list of expert-answered Frequently Asked Questions (for an example of a FAQ see Figure 7).

Although the needs assessment identified differences in needs by sex and race, this website does not segment the audience on a group level; rather, tailoring occurs on an individual level to better address the needs of all users.

Phase 5: Information Architecture Development and Graphic Design

Designing the S.O.S. website took place in three stages: 1) information architecture development, 2) interface design, and 3) content layout and structure programming.

Information architecture development. Creating the overall information architecture was the first step in making the site logically and consistently organized. The architecture is the backbone of the site design and is the map used to develop the interface of the website. Based on our findings that there are distinct differences between adolescent smokers from stage to stage, we chose Prochaska and DiClemente's Stages of Change model (1992) to provide a basic structure for site architecture. We organized the site using a hierarchical structure, while also considering how adolescents may look for information as they go through the quitting process. By looking at the navigation bar on the left of every screen or at the content area menu in the center of the screen, adolescents can get an overview of the content of the site and choose what section they wish to navigate (see Figure 5)

Our team of researchers, graphic designers, computer programmers, and adolescents then transformed written documents with important information into interesting, eye-catching, interactive web pages that would appeal to an adolescent smoker. Our adolescent panel and other adolescent reviewers were critical to this process, providing invaluable feedback.

Interface design. To design the overall look of the interface, graphic designers first reviewed existing websites with popular culture themes that were aimed at an adolescent audience. A primary consideration was getting and keeping the user's attention. We created prototype designs, including several color palettes, based on the popular culture influences we

identified, which were then reviewed and critiqued by panels of adolescents. Through our research and feedback from the adolescent panels, we concluded that our audience prefers graphical elements such as mouse rollovers, videos, photos of other teens, with bits of animation and sound distributed throughout. We were also able to determine that they preferred icons and other visual elements to words, which led to our translation of much of the content into visual representations, such as use of a bomb to identify sulfur as one of the components of tobacco smoke (see Figure 8). Once final design decisions were made, we translated the documents and interface into html and dhtml code, active server pages, Flash, javascript, and style sheets. We then programmed the content of the website.

An important consideration in the design and programming process was download time; if the site lacks a cutting-edge multimedia design, adolescents may lose interest in the site, but if it takes too long to download, they will move on to another site (or non-S.O.S. activity) before it ever comes up.

Content layout and structure. Content was reviewed by designers and laid out in ways that truncated and summarized large textual documents. In some cases, content was transformed into multimedia presentations using Flash software to help keep the audience engaged. Programmers constructed interactive applications such as Myth Quizzes, Quit Notes, Quit Plan, Discussion Groups, Ask an Expert, Live Chat, Art Gallery, and a journaling system to encourage active participation with the website. Internal editing and testing of the site was done by staff writers, designers, and programmers.

As the web pages were developed, the adolescent panel met frequently to thoroughly examine and experiment with the system. Each individual section was rated by adolescents on the overall look, ease of use (navigation), and content. Adolescents were then given the opportunity to suggest changes and express any other comments. As previously mentioned, this was not intended to provide a thorough evaluation of the effectiveness of the system to help teens quit smoking. Our intent is not to test any one message, but rather the overall value of the intervention in behavior change. Also, individual use patterns will determine which content is presented to a user and that content will be tailored to fit with an individual user's situation. Therefore, the effectiveness of the website as a smoking cessation tool will be determined in a clinical trail which is currently underway. Results will be presented in a

future paper.

In addition to the sections described, S.O.S. also offers the opportunity to incorporate new developments in the study of smoking cessation on an ongoing basis. The ability to respond to new developments in the field enriches the multidimensionality of the intervention and enhances the likelihood that S.O.S. users will find content in the site that resonates with their worldview and is compatible with their values and preferences.

Challenges, Limitations and Practical Considerations

Developing S.O.S. proved to be an especially challenging process for many reasons. First, it differs greatly from other CHESS modules. The greatest differences were a result of the audience we targeted. S.O.S. is for people who want to change an addictive behavior, rather than those in a health crisis, who have been the target audiences of existing CHESS modules. Without an imminent health crisis, such as a diagnosis of breast cancer, to motivate use, emphasis was placed on the integration of motivational tactics to prompt use of the site.

The age of our targeted population (11 to 17 years) also presented a new challenge for CHESS developers. There was very limited research on smoking cessation interventions designed specifically for this age range to guide us. In fact, there were no previous studies specific to web-based interventions and those websites that were generally available on the Internet were not research-driven, not created for a young audience, not tailored for the individual, and/or not designed for sustained use through the quitting process. However, the characteristics of the target population did provide great latitude for design and structure of the site because, unlike other CHESS audiences, adolescents tend to be quite familiar with the Internet and computer technology. It also forced us to push the boundaries and create a more fresh, engaging, graphics-intensive and interactive program that could function within the constraints of the hardware available.

Another challenge was balancing the need to give users independence and control of their quitting process with our responsibility to provide protective measures for adolescents using the system. S.O.S. offers several avenues for adolescent discourse, dialogue, and

expression, not only among themselves, but with smoking cessation experts and the site developers. Both unmediated and mediated opportunities for verbal interaction with others using the site are offered. Because adolescents have a higher degree of vulnerability due to their age and developmental status, it is necessary for trained facilitators to observe all communications that go through the system. Facilitators monitor exchanges for expression deemed inappropriate for the purpose of the site (e.g. planning or endorsing criminal activity, attempting to use it to sell goods or services, expressing statements that are demeaning to an individual or group, expression of suicidal or homocidal ideation or intent, etc.). In the S.O.S. module, facilitators included adolescents who have quit smoking and can more closely relate to the adolescents using S.O.S. The official policy of S.O.S. is to keep disruption of such interactions to a bare minimum and to always communicate through the adolescent facilitator. Participants of the site are informed that all communication is being monitored. We recognize that although necessary, this could potentially inhibit their use of the intervention.

Ensuring participants' relative anonymity is an important consideration for the success of this type of intervention. Since this intervention is still in the testing phase, the website is only available to study participants. To ensure anonymity, adolescents choose a user name and password when they register with the study coordinator. Any information that can link a user to his or her identification is kept in a secure file. Participants are identified in the system only by their user name and there is no way for one user to link another user's name to the adolescent's true identity. Users are thus allowed to interact with others trying to quit smoking as well as experts in smoking cessation without being identified. Adolescents are also asked not to reveal their real names or contact information when using S.O.S. The ability to remain anonymous proves to be another advantage to an Internet-based intervention. It may, however be a challenge if S.O.S. becomes available to anyone on the Internet.

A practical consideration we took into account as we developed S.O.S. was that in order for an adolescent smoking cessation intervention to be truly effective it must be accessible and desirable in a natural setting. It is important that adolescents make the decision to seek help for smoking cessation and make the commitment to follow a quitting plan on their own. This had implications for our study design, but also challenged us to create an intervention that

adolescents could and would seek out on their own, at any time, and feel at ease using without adult guidance. This limits our abilities to improve compliance to our intervention, but challenged us to find ways to capture our audience creatively.

Conclusion

Although studies of research-based Internet interventions for adolescent smoking cessation are scarce, our review of the literature and experience in adolescent smoking cessation and interactive health communications led us to believe an intervention of this sort has great potential. Previous work indicates that an effective adolescent smoking cessation intervention should acknowledge that smoking is not an isolated act and address the multitude of developmental, psychosocial, biological, and behavioral factors that play a role in adolescent smoking. The intervention should be based on the needs of adolescent smokers, have the ability to evolve dynamically as the individual's needs change, and it should be available when and where it is wanted.

The development of S.O.S. was based on the needs expressed by adolescent smokers and nonsmokers. It has the ability to tailor information for individuals, evolve dynamically as the user moves thorough the stages of quitting, is accessible at any time, and can be easily and quickly updated.

Internet-based interventions must be maintained continuously. Because S.O.S. targets an audience known for setting trends and demanding cutting edge innovations, maintenance of the website will, in many ways, resemble the development process. Implementing fresh design and content as well as keeping up with technological advances in computer software and hardware will be necessary in order to present a site that remains interesting to an adolescent user. Even more importantly, we must continue to offer the latest on smoking cessation information and methods. However, before we reach the maintenance phase, testing the effectiveness of the current site will provide the initial guidance for revisions and improvements.

Implementation of the Internet-based smoking cessation intervention has begun with a

randomized clinical trial to study the effectiveness of the system in helping adolescents (ages 11 to 17) to stop smoking. Participants are randomized to one of two treatments: a brief office intervention or the Internet home-based intervention. All subjects randomized to S.O.S. are given a computer for in-home use, Internet access for 6 months, and are trained to use S.O.S. The primary outcome is the point-prevalence smoking abstinence rates at week 24 verified with expired air carbon monoxide. The effectiveness of the website will be determined indirectly through the study's primary outcomes which include smoking cessation and/or reduction in smoking. In addition, we can link the study outcomes to use data collected on each user. This will allow us to look at patterns of use that correlate with smoking cessation. Issues related to the clinical trial and implementation of this intervention will be discussed in future papers.

While it is still too early to report any results, we are hopeful that S.O.S. will have an impact on the growing number of adolescents seeking help to stop smoking. We also hope that our experiences with the development process of an Internet-based intervention will provide insight for further development of interactive health communication systems. We will conclude with a few initial comments we have received from adolescent users.

"There was a lot of good advice and a lot of good points…"
"I feel that S.O.S. is very well put together and thought through. I have no objections to anything on this site and think it will help many teens."
"Cool pictures and image effects"
"I think this program is pretty cool . It has sound effects"
"I thought it was a pretty cool program. You guys really stuck to it and really wanted to help us quit. That was the coolest part."

And as many of our Discussion Group users would say in departure, "Peace out."

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Table 1. Application of Maibach and Cotton's strategies for movement from one stage to another, based on social cognitive theory, to adolescent smoking cessation context.

Stage-based Content Development Strategy for Stomp Out Smokes (S.O.S.)
Precontemplation. The adolescent does not intend to quit smoking in the foreseeable future. Strategies to move to contemplation stage are:

- Enhance the adolescent's knowledge of, and outcome expectancies about smoking.
- Personalize the adolescent's risk of smoking.
- Emphasize the benefits of quitting smoking.
- Encourage the adolescent to reevaluate his/her outcome expectancies including information about the benefits of quitting smoking.

Contemplation. The adolescent begins to consider quitting smoking sometime in the next six months. Strategies to move to the preparation stage are:

- Encourage adolescent to specifically consider changing something about him/herself.
- Encourage the adolescent to try not smoking on a specific occasion or try cutting down his/her cigarette consumption.
- Promote and reinforce positive outcome expectations.
- Identify and dispute commonly held misconceptions about negative consequences.
- Suggest ways to minimize legitimate drawbacks.
- Enhance self-efficacy by identifying how to effectively overcome perceived barriers to quitting.

Preparation. The adolescent plans to quit in the next 30 days. Strategies to move to the action stage are:

- Teach and encourage the adolescent to restructure his/her environment so important cues to quit smoking are obvious and socially supported.
- Encourage adolescent to identify and plan ways to overcome barriers to

quitting that he/she is most likely to face.

- Encourage the adolescent to set specific quitting goals, and teach him/her how to set incremental goals.
- Promote enhanced self-efficacy to cope with situations the adolescent anticipates may be problematic as well as other obstacles that may arise when he/she is trying to quit.
- Provide social reinforcement of behaviors that contribute to the goal of quitting smoking.

Action. The adolescent quits and is able to stay quit for a while. Strategies to move to the maintenance stage are:

- Encourage refinement of skills and strategies to avoid relapse, and to cope productively with setbacks that threaten full relapse.
- Bolster self-efficacy for dealing with new barriers to staying quit and with setbacks ("slips") that threaten relapse.
- Encourage the adolescent to feel good about him/herself as he/she progresses toward the goal of complete and sustained smoking cessation, especially in the face of temptation.
- Reiterate and reinforce the concrete benefits of quitting as well as the adolescent's self-evaluative benefits of quitting.

Maintenance. The adolescent consolidates the non-smoking behaviors and incorporates them into his/her daily routine. At this point the teen is considered to have successfully quit.

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Content Areas

Thinking About Quitting

- Myth Quiz (F,I)
- Am I Addicted? (F,I)
- Why Quit? (F)
- What to Expect: Benefits of Quitting (I)
- Tobacco Industry (I)
- Weight Concerns (I,F)

Life's Ups and Downs

- Myth Quiz (F,I)
- Relationships (I,F)
- Health (I)
- Feelings (I,F)
- School Stuff (I)
- Spirituality (I)
- Time Management (I)

How to Quit Myth

- Quiz (F,I)
- My Quit Plan (F)
- About My Smoking (F)
- Quitting Tips (F,I)
- Quitting Methods (I)
- Medications (I)
- Support Resources (I)
- Rewards (I,F)
- Dealing with Withdrawal (I)
- Dealing with Cravings (I,F)

Smoking & Health

- Myth Quiz (F,I)
- What's In a Cigarette? (I)
- Effects On You & Others (I)

Speak Out

- My Journal (E)
- Discussion Group (E,F,I)
- Real Time Chat (E,F)
- Ask an Expert (E,F,I)
- Personal Stories (I)
- Art Gallery (E)

Staying Smoke-Free	Other
Myth Quiz (F,I) Smoking Triggers (I,F) Long Term Tips (I,E) Me as a Nonsmoker (I) When Others Smoke (I,F) They're Not Helping (I)	Panic Button (I) Glossary (I) Quit Notes (F) Basic Web Skills (I) Evaluating Websites (I)

I= information

F= interactive feedback

E= self-expression

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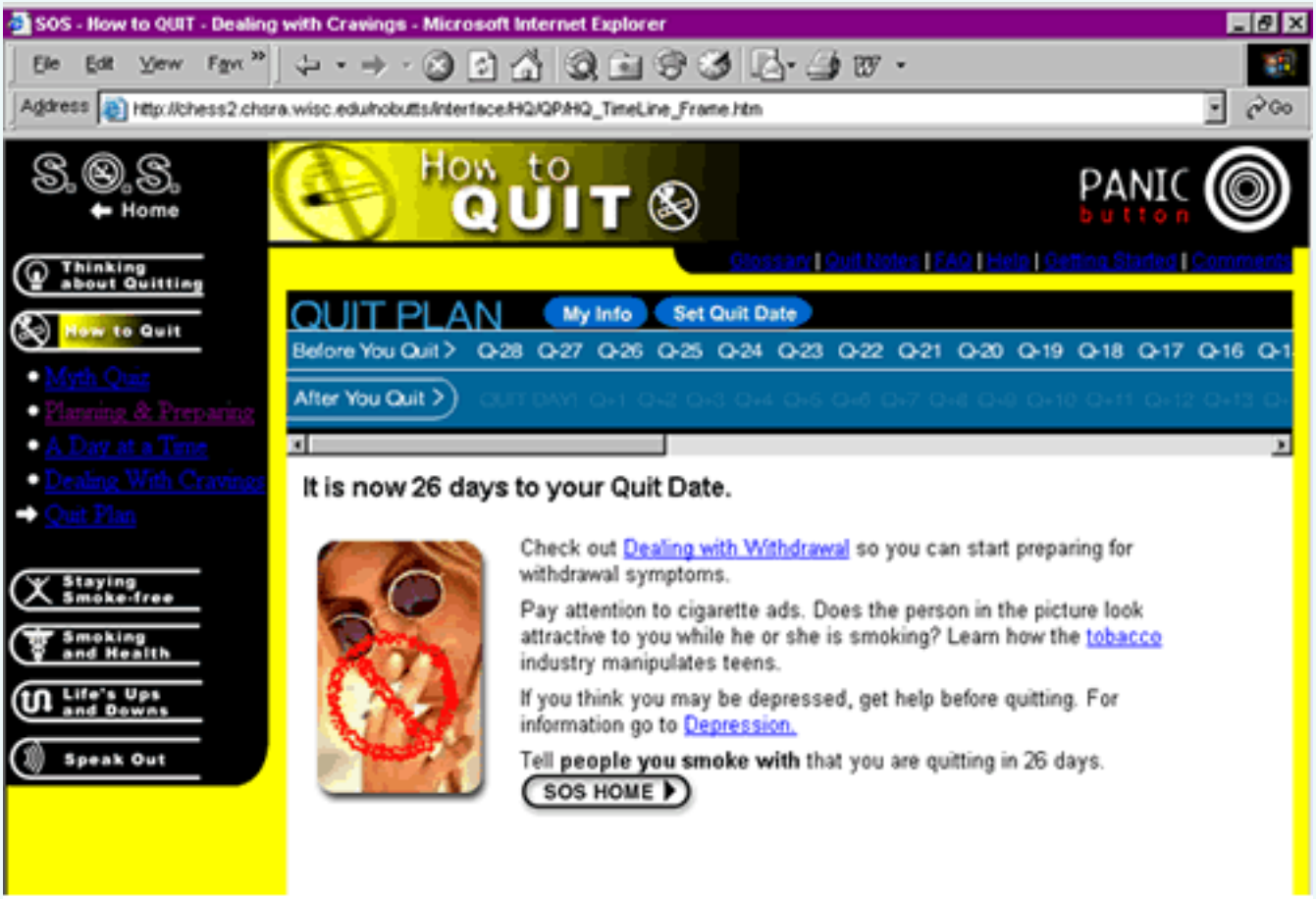

Figure1. Quit Plan screen. Information in bold print is tailored based on the user's input.

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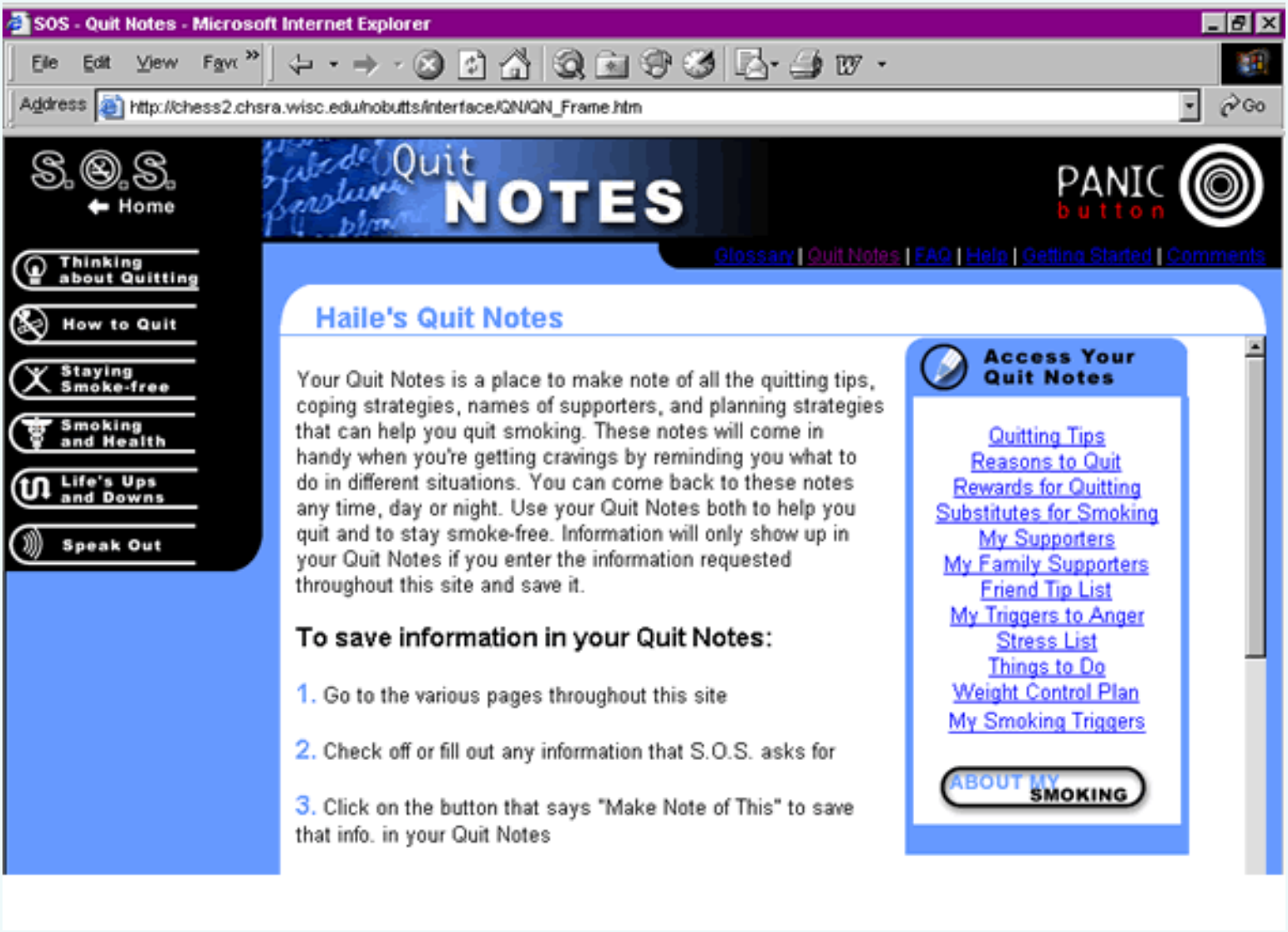

Figure 2. Quit Notes menu page. By clicking on a section in the blue box a user can retrieve the specific quitting tips, strategies, manes of supporters, etc. that they entered and saved in sections throughout out the site.

Back

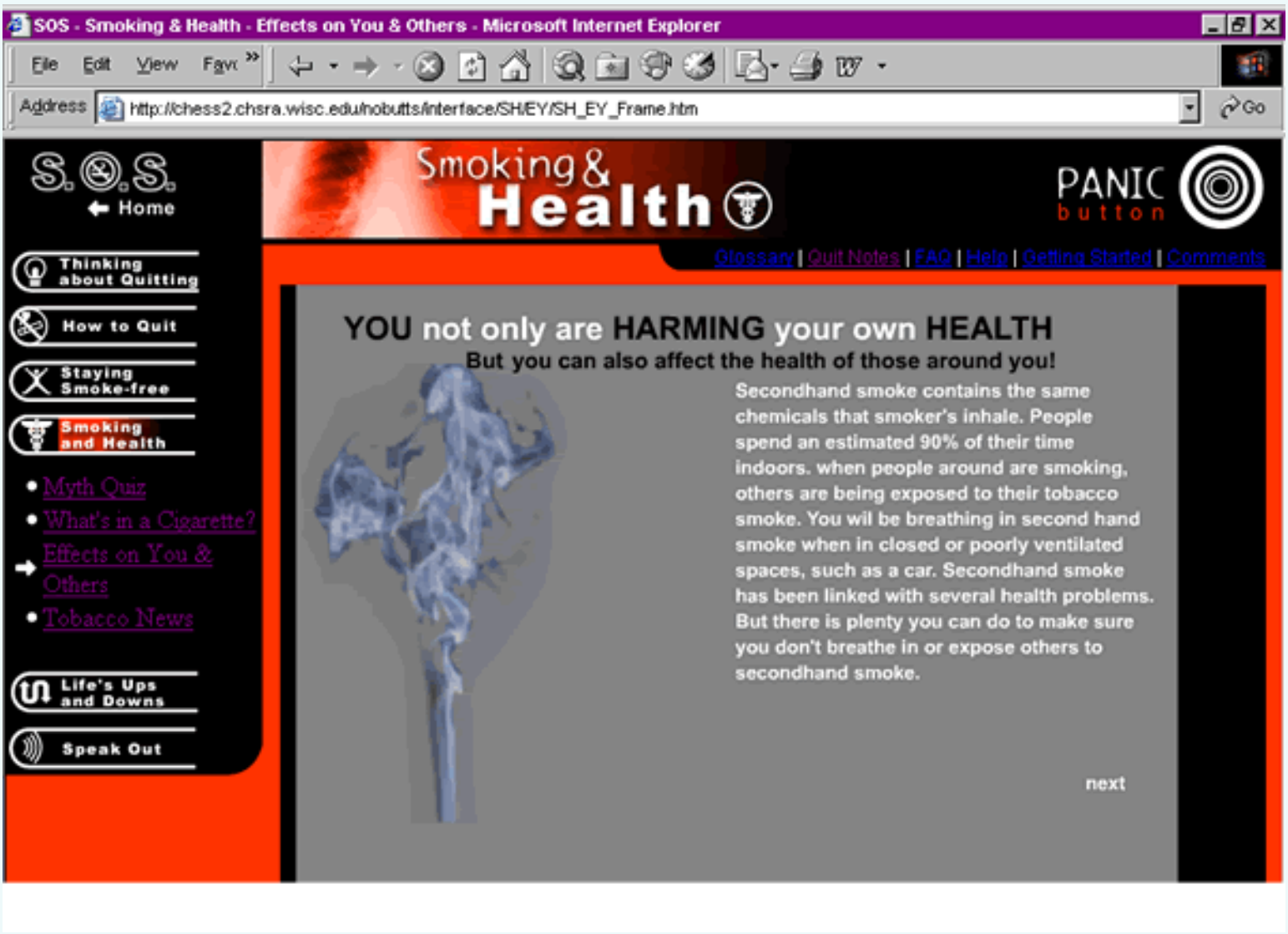

Figure 3. This screen is from the section on the health effects of smoking. In order to make the content more interesting and appealing to our audience, Macromedia Flash was used to create graphics with movement and sound effects.

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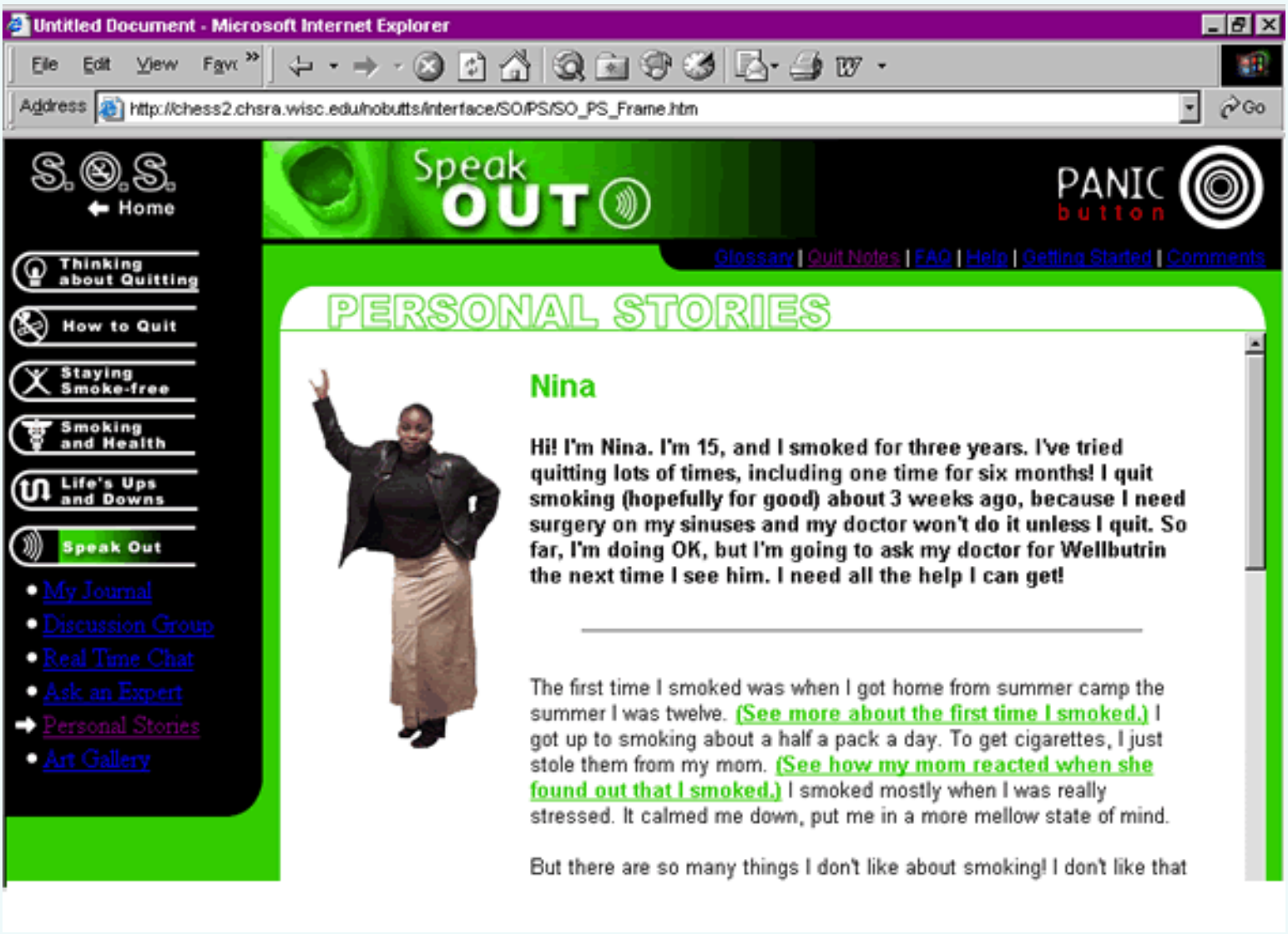

Figure 4. One of the many Personal Stories found on S.O.S.

Back

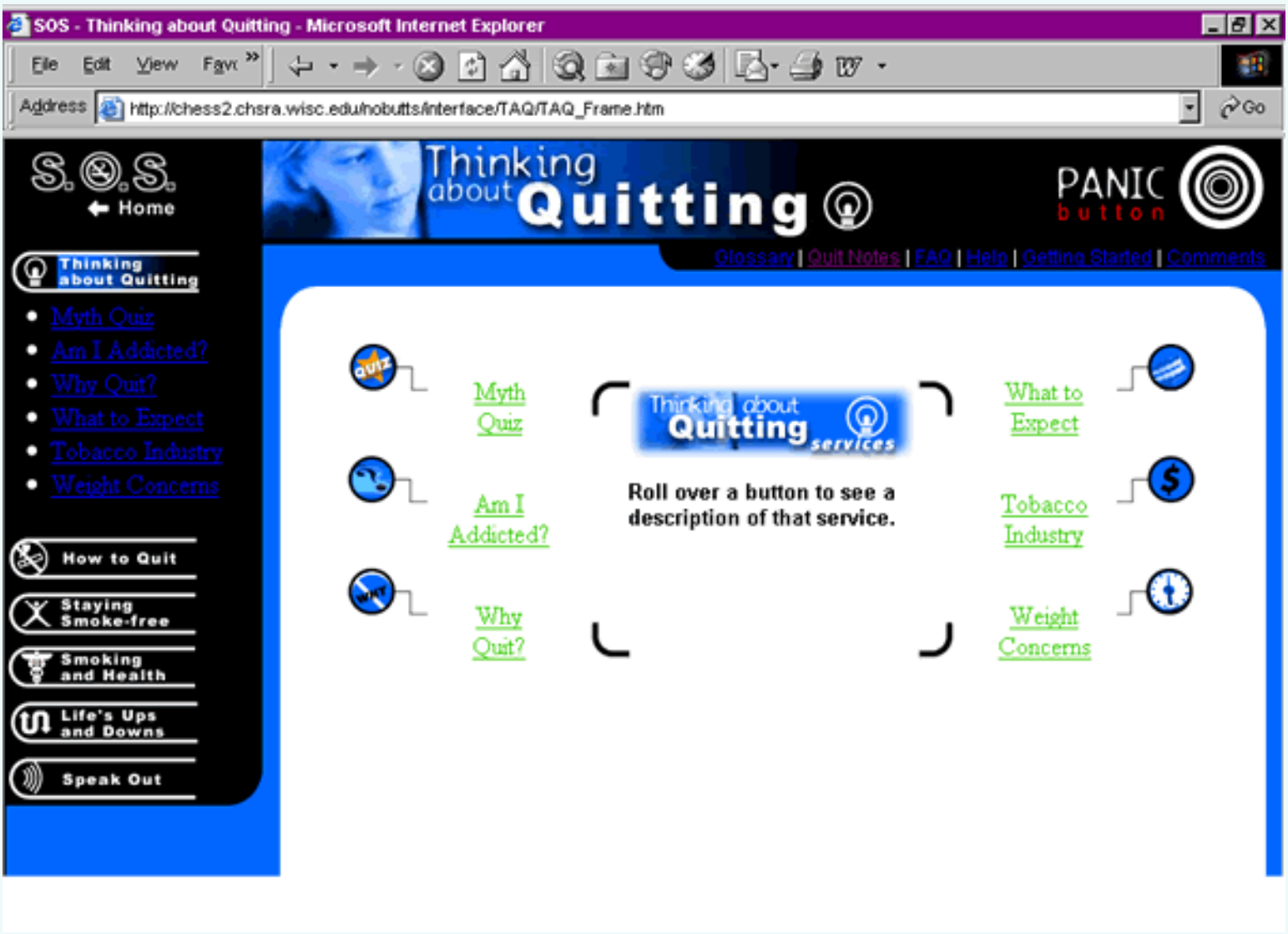

Figure 5. This screen demonstrates the navigational structure of the site which is based on Prochaska and DiClemente's Stages of Change model. By clicking on a topic found in the left side bar you get a drop down menu of subtopics as well as a larger subtopic menu in the center of the screen. When you roll-over the icons in the center of the screen you will see a description of the content in that section.

Back

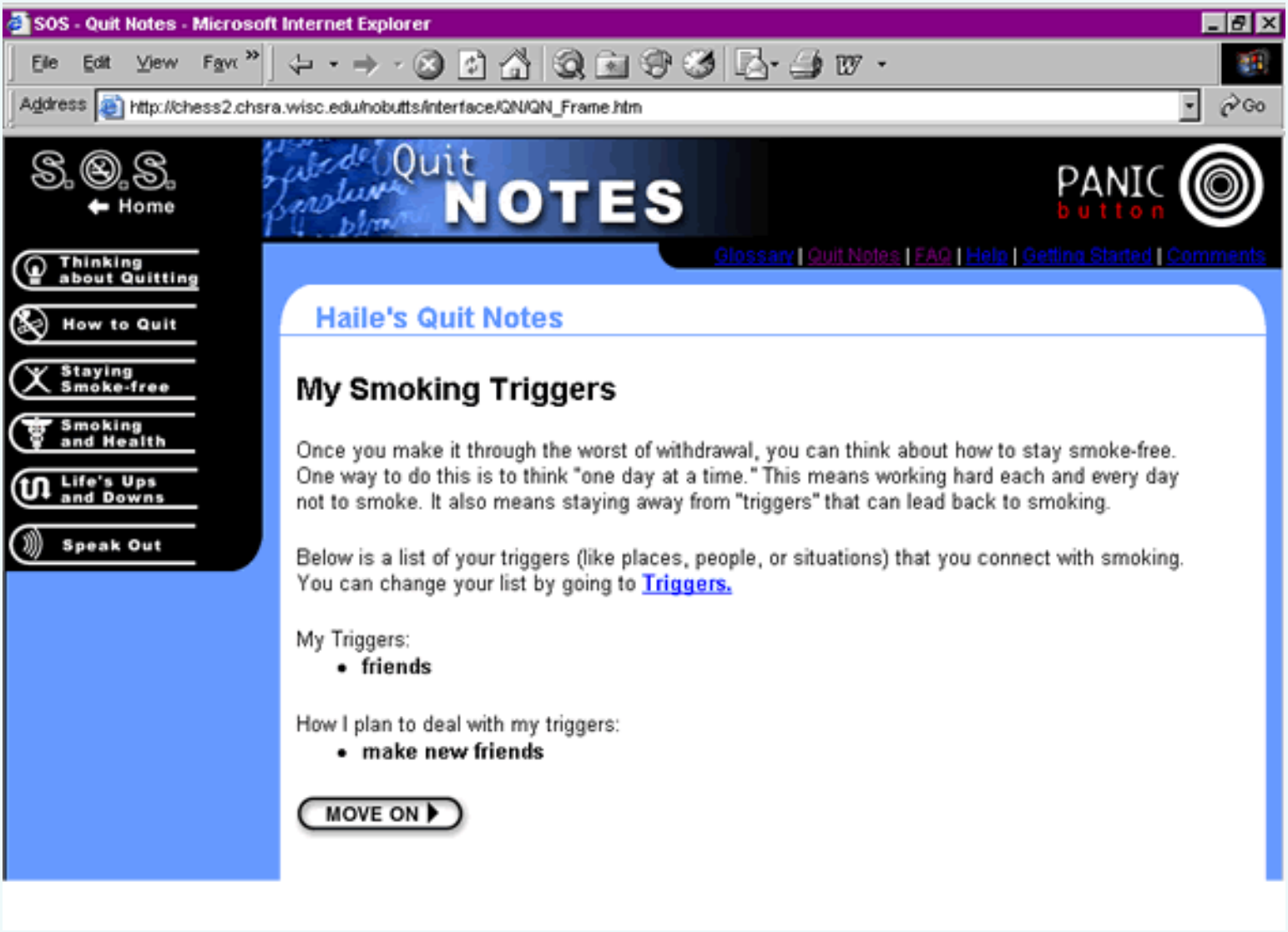

Figure 6. Smoking triggers and a plan for avoiding them saved in the the user's Quit Notes.

Back

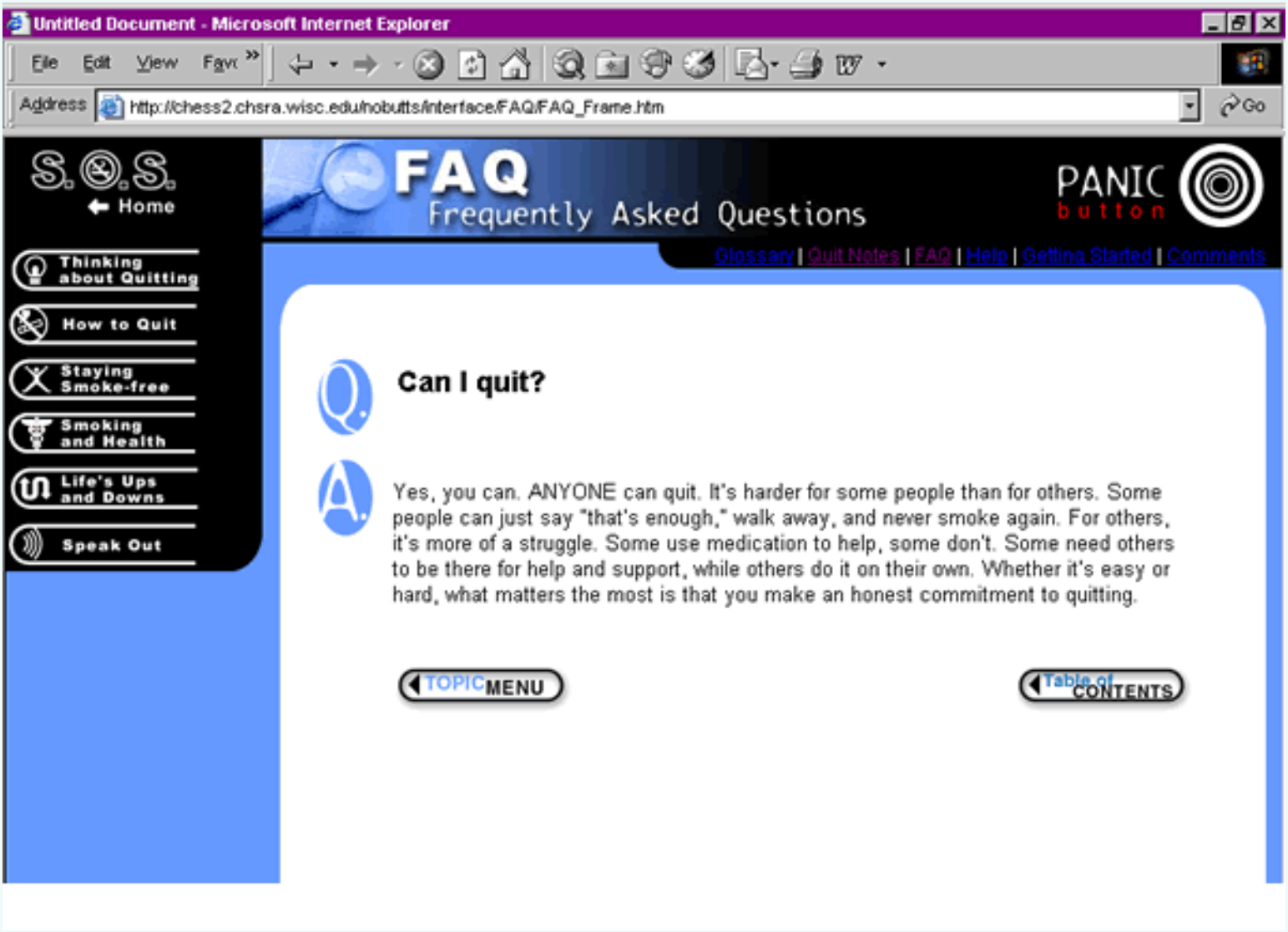

Figure 7. One of many Frequently Asked Questions.

Back

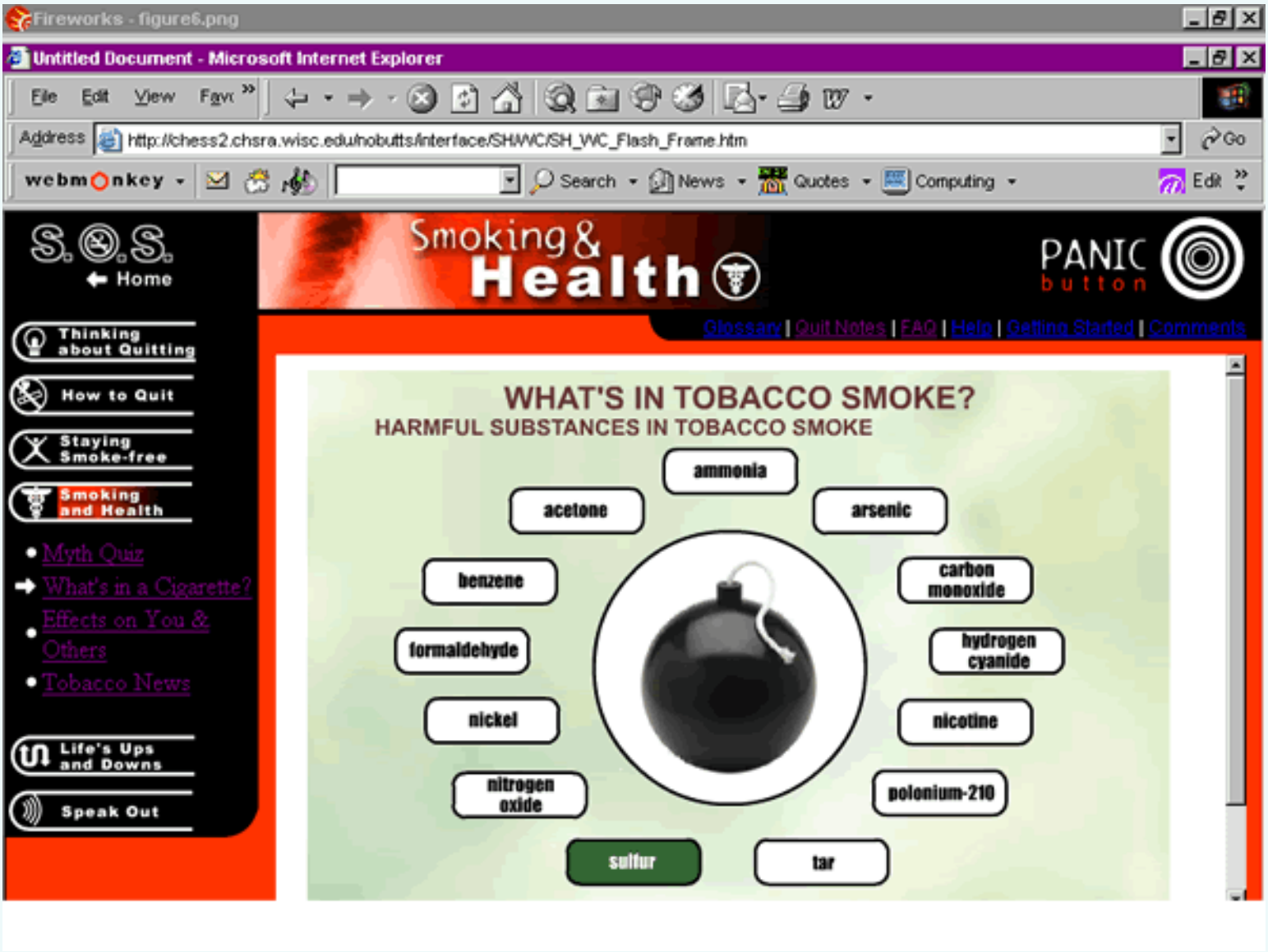

Figure 8. By rolling over the different substances found in smoke you can see a graphical example of the substance. By clicking on the different substances you can get more information.

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Chapter 10

Summary of scientific functions

Objectives :

- Free Reading
- Comprehension: Interpreting and predicting
- Expressing Scientific Functions(sequencing, planning an article…)
- Free writing
- Extensive Reading

Time Now :

1. Reading

Available online at: http://www.ascusc.org/jcmc/vol8/issue1/
Retrieved 28 August 2004

Journal of Computer-Mediated Communication
8(1) October 2002 Margaret McLaughlin and Sheizaf Rafaeli, Editors

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In this issue:

Ghostwriter: A Child's VE

Improvisational dramatic role-play activities are used in classrooms to encourage children to explore the feelings of the characters in a story and gain insight into the relationships among them. Role-play can also help the development of moral reasoning by presenting moral dilemmas in concrete situations. This paper presents a desktop role-play virtual environment, *Ghostwriter*.

Risk & Online Auctions

Voters & Online Campaigns

In focus groups sessions with voters in New Hampshire, the authors explored how citizens understand the role of the Internet in political campaigns, and the role they can play in the campaign process by utilizing the net's interactive features.

Understanding E-Shoppers

Although online shoppers may prefer to purchase only certain types of products online, such as books and computers, e-tailers could motivate consumers to purchase difficult-to-sell products online like clothing or perfume by understanding and providing the attributes that are important to them.

Cultural Factors in CSCL

Content analyses of online conference transcripts were conducted to compare collaborative behaviors among US, Finnish, and

Consumers rely on customized information, word- of-mouth and brand to assess the risks of purchasing in online auctions. Information processing associated with product performance plays a crucial role in reducing consumer perceived risk in these online transactions.

Korean conferees. Results indicated Korean students were more social and contextually-driven online, Finnish students were more group-focused, reflective and theoretically driven, and U.S. students were more action-oriented in seeking results or giving solutions.

2. Comprehension Check

Exercise 1: Interpreting and predicting

A- Ghostwriter

1. what is *ghostwriter* ?

   Submit Reset

2. what are the advantages of ghostwriter?

   Submit Reset

3. what are the possible future perspectives for this invention?

   Submit Reset

B- Risk and online auctions

1. what 3 factors do consumers rely on to buy in auctions?

Submit Reset

2. how can consumers feeling of perceived risk be attenuated?

Submit Reset

3. in what way(s) would research on "risk and online auctions" benefit people in the future?

Submit Reset

C- Voters and online campaigners

1. what could be the possible uses of the Internet in political campaigns?

Submit Reset

2. give at least two uses.

D- Understanding e-shoppers

1. which are the products easily sold online?

Submit Reset

2.

which are the products not so easily sold online?

Submit Reset

E- Cultural factors…

1. Fill in this table with information from the text

Koreans	Finnish	U.S. students
…… ……	…… …… ……	……

2. What is the possible use of this information on how different people interact in an online conference?

Answer key

Exercise 1: Interpreting and predicting

A- Ghostwriter

1. A desktop role-play virtual environment
2. Explore feelings of characters in a story, gain insights into relationships among characters, development of moral reasoning
3. Free answers depending on your knowledge in the subject

B- Risk and online auctions

1. Customized information, word-of-mouth, and brand
2. information processing and product performance
3. Free answers but the general message of the text is that this will reduce risk

C- Voters and online campaigners

1. Voting, campaigning, interacting with other voters…

D- Understanding e-shoppers

1. books, computers…
2. clothing, perfume…

E- Cultural factors…

1. Fill in this table with information from the text on how conference participants interact

online

Koreans	Finnish	U.S. students
social contextually-driven	group-focused reflective theoretically-driven	action-oriented

2.

- better preparation of future online conferences

- better understanding of communication strategies in conferences online

3. Expressing technical and scientific functions: Sequencing, planning an article, referring, and acknowledging

---

Study the following expressions for experimenting, hypothesizing, predicting, and emphasizing , then translate the sentences in Exercise 1 into English.

- Sequencing
- planning the article
- referring
- acknowledging

1. Sequencing

Prior to 1970	Avant 1970
Long before	..bien avant…
Previously,	auparavant,
As…..,……	a mesure que
As early as	des
In the meantime	entre temps
Meanwhile	pendant ce temps
Now that I have described..	ayant décrit..
henceforth	désormais
hithrto	jusqu'alors

ulterieurement	subsequently
in the long run	a long terme
ahead of their time	en avance sur leur temps

2. Planning the article

The plan of the paper is as follows	Le plan de l'article est le suivant
The paper is organized as follows	L'article est organise de la façon suivante
In this section, we shall discuss..	Dans la section suivante, nous discuterons…
In section 1 we review….	Dans la section 1, nous passons en revue …
We then provide in section 2 the definition…	Nous donnons ensuite en section 2 la définition…
Section 4 is devoted to discussing…	La section 4 est consacrée à la discussion de..
In sections I-IV, we shall limit ourselves to the case of…	dans les sections de I a IV nous nous limiterons au cas de…
Finally, in section 5 we outline	finalement, dans la section 5, nous esquissons…
Section 5 is a brief conclusion..	la section 5 constitue une brève conclusion…
…and in the appendices, we deal with ..	et dans les appendices, nous traitons…
we close by discussing…	nous terminons en discutant…

3. Referring

Referring to other references	
A comprehensive study of…may be found in	On trouvera une étude détaillée de …dans…
For a complete discussion of…, we refer the reader to (4) (5).	Pour une discussion complète de…, nous renvoyons le lecteur aux références (4) et (5)
The reader should consult (6) where….	Le lecteur pourra consulter la référence (6) ou
An excellent historical account.. is provided by x	X présente an excellent compte rendu historique du…

Recent papers have explored….	Des publications récentes ont explore…
X has been highlighted in previous papers..	X a été mis en lumière dans des articles antérieurs..
Account	Compte rendu
For a more complete review see Melzack and Wall (1964)	Pour une revue plus complète, on pourra consulter Melzack et Wall (1964)
This phenomenon is discussed more fully in McNamara and Houston (sous press)	Ce phénomène est discute de façon plus détaillée par McNamara et Houston (in press)
We draw heavily on the results of Refs. 7 and 10	Nous nous appuyons surtout sur les résultats des références 7 et 10
This paper is a sequel to an earlier one.	Cette publication fait suite a un article antérieur.
Little research has been done on…	Pas de recherches ont été menés quant a …
Referring to earlier sections in the article	
….referred to as…	A laquelle on se réfère comme étant…
par reference a S1 et S2	With reference to S1 and S2
for the latter, ..	Pour ces derniers,…
in the above exercise	Dans l'exercice pre-cité
Referring to figures and illustrations	
By referring to Fig. 1	En se référant à la figure 1
As illustrated by…	Comme l'illustre…
Shown here is…..	Nous pouvons voir ci-contre…
..is shown graphically in Fig. 3.	Est illustre sur le graphique de la figure 3
The **solid** / **thin** / **thick** / **dashed** , **broken/ dotted** lines show..	Les traits **pleins/ fins** / **forts** / **interrompu** / **pointille** représentent…
As is made clear by Table 3 and 4 below	Il ressort clairement des tables 3 et 4 ci-dessous que…
Read across/ down	Lire horizontalement/verticalement

4. Acknowledging

We thank …for	Nous remercions..pour
We wish to thank….who..	Nous souhaitons remercier …d'avoir..
By X,… to whom we are thankful	Par X, a qui nous exprimons nos remerciements
Xs wish to acknowldge….	Xs souhaitent exprimer leur reconnaissance

I should like to acknowledge	Je tiens à exprimer mes remerciements
…gratefully acknowledge…	Exprimer toute se gratitude..
Deeply grateful	profondément reconnaissant..
x is most appreciative for	Exprime toute sa gratitude pour..
I am indebted to	Je suis redevable a
Deeply indebted	Profondément oblige au

Exercise 1

1. La section 6 constitue une brève conclusion et dans les appendices, nous traitons plus en détail de certains aspects techniques.
2. Nous passons en revue les conditions de stabilité indispensables.
3. A long terme, l'aspect le plus important du développement économique est sans doute l'intégration des connaissances techniques aux processus industriels et agricoles.
4. Pendant ce temps, les ingénieurs qui avaient étudie la navette remarquèrent des modifications importantes quant a l'état des matériaux.
5. Edward donne un compte rendu très clair de l'article de Rieman, des développements ultérieurs et de son incidence sur les mathématiques.
6. peu de recherches ont été faites quant a l'origine fondamentale de cette preference.
7. Une matrice d'entrées-sorties du type décrit ci-dessus est un organigramme..
8. la combinaison des ressources peut se lire verticalement dans les colonnes correspondantes.

key to technicalexpress 10

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1. **Section 6 is** a brief conclusion and **in the appendices we deal with** some of the technical aspects in greater detail.
2. …then, **we review** the necessary conditions of stability
3. **In the long run** the most important aspect of economic development is probably the incorporation of technical knowledge into industrial and agricultural processes
4. **Meanwhile** , engineers examining the shuttle observed significant changes in the condition of many of the materials.
5. An extremely **clear account** of Riemann's paper , subsequent developments, and its impact on mathematics is given by Edwards
6. **little research has been done on** the ultimate source of such preference
7. An input-output matrix of the type **described above** is called a flow table
8. The combination of inputs **can be read down** the corresponding columns

---

4. Writing

Exercise 1

Based on information available in JCMC Vol 8/2 section 1 in chp10 , Write a short paragraph summarizing the different uses and future perspectives of creating virtual environments.

……

……

……

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5. Extensive reading

Available online at: http://www.ascusc.org/jcmc/vol1/issue3/hoffman.html
Retrieved 28 August 2004

Extensive reading:

What are the main challenges for commercial scenarios? Discuss them taking into account the present state of knowledge.

Commercial Scenarios for the Web: Opportunities and Challenges

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Table of Contents

Abstract

The potential of the World Wide Web on the Internet as a commercial medium and market has been widely documented in a variety of media. However, a critical examination of its commercial development has received little attention. Therefore, in this paper we propose a structural framework for examining the explosion in commercial activity on the Web. First, we explore the role of the Web as a distribution channel and a medium for marketing communications. Second, we examine the factors that have led to the development of the Web as a commercial medium, evaluating the benefits it provides to both consumers and firms and its attractive size and demographic characteristics. Third, we discuss the barriers to commercial growth of the Web from both the supply and demand side perspectives. This analysis leads to a new classification of commercialization efforts that categorizes commercial Web sites into six distinct types including 1) Online Storefront, 2) Internet Presence, 3) Content, 4) Mall, 5) Incentive Site, and, 6) Search Agent. The first three comprise the "Integrated Destination Site," and the latter three represent forms of "Web Traffic Control." Our framework, argued in the context of integrated marketing, facilitates greater understanding of the Web as a commercial medium, and allows examination of commercial Web sites in terms of the opportunities and challenges firms face in the rush towards commercialization.

Introduction

The tremendous growth of the Internet, and particularly the World Wide Web, has led to a critical mass of consumers and firms participating in a global online marketplace. The rapid adoption of the Internet as a commercial medium has caused firms to experiment with innovative ways of marketing to consumers in computer-mediated environments. These developments on the Internet are expanding beyond the utilization of the Internet as a communication medium to an important view of the Internet as a new market (Ricciuti, 1995).

The Internet is a massive global network of interconnected packet-switched computer

networks. Krol and Hoffman (1993) offer three (mutually consistent) definitions of the Internet : "1) a network of networks based on the TCP/IP protocols; 2) a community of people who use and develop those networks; [and a] 3) collection of resources that can be reached from those networks". Note that there is no agreed-upon definition because the Internet is at once a set of common protocols, a physical collection of routers and circuits, distributed resources, and even a culture of connectivity and communications.

The most exciting commercial developments are occurring on that portion of the Internet known as the World Wide Web (WWW). The WWW is a distributed hypermedia environment within the Internet which was originally developed by the European Particle Physics Laboratory (CERN). Global hypermedia allows multimedia information to be located on a network of servers around the world which are interconnected, allowing one to travel through the information by clicking on hyperlinks. Any hyperlink (text, icon or image in a document) can point to any document anywhere on the Internet. The user-friendly consumer-oriented homepages of the WWW utilize the system of hyperlinks to simplify the task of navigating among the offerings on the Internet. The present popularity of the WWW as a commercial medium (in contrast to other networks on the Internet) is due to its ability to facilitate global sharing of information and resources, and its potential to provide an efficient channel for advertising, marketing, and even direct distribution of certain goods and information services.

The World Wide Web as an Efficient Channel

Anecdotal evidence suggests that Web-based commercial efforts are more efficient and possibly even more effective than efforts mounted in traditional channels. Initial conjectures on efficiencies generated by online commercial efforts suggests that marketing on the Web results in "10 times as many units [sold] with 1/10 the advertising budget" (Potter, 1994). It is about one-fourth less costly to perform direct marketing through the Net than through conventional channels (Verity & Hof, 1994). This fact becomes especially critical in the face of shrinking technology and product life cycles and increasing technological complexity (IITA, 1994). Consider the example of SunSolve Online , which has saved Sun

Microsystems over $4 million in FAQs alone since they "reengineered information processes around the WWW" (Neece, 1995).

The Web as an Active Model of Marketing Communications

Firms use various media to communicate with their current and potential customers. Marketing communications perform three functions: to inform, to remind, and to persuade (Anderson and Rubin, 1986). The traditional one-to-many marketing communications model for mass media is shown below in Figure 1. In this passive model, firms (denoted by F) provide content through a medium to a mass market of consumers (denoted by C). The first two functions of marketing communications may be performed by a traditional communication model. However, the persuasion function necessary for differentiating a product or brand is limited by the unidirectionality of traditional mass media.

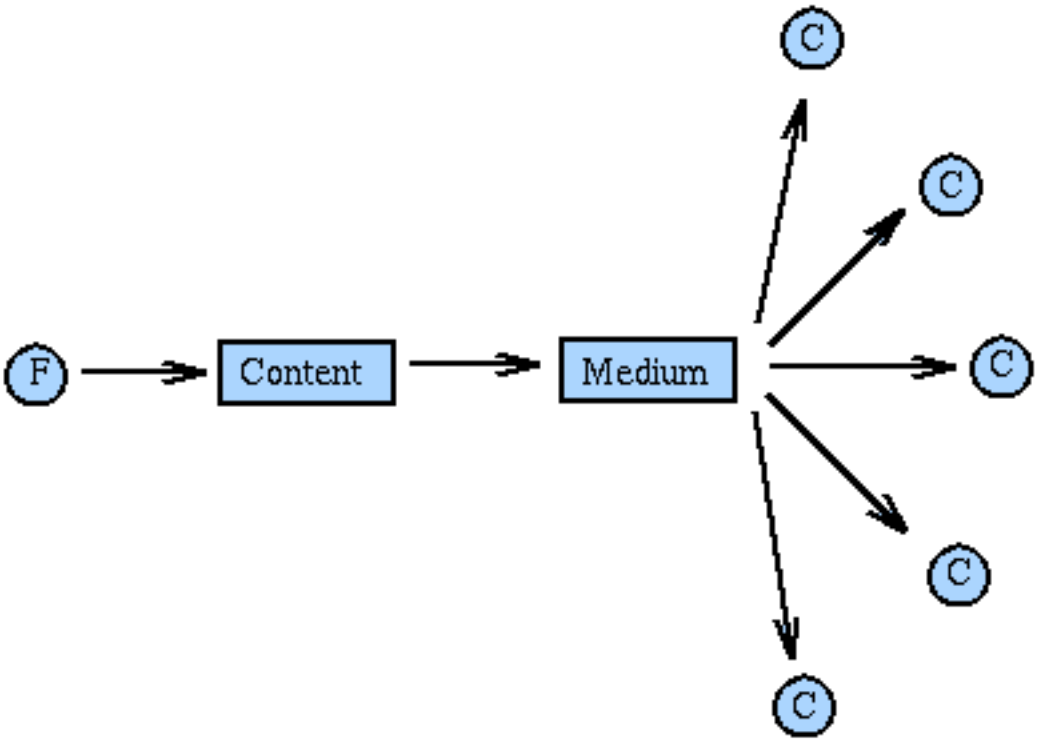

Figure 1.

Traditional Mass Media Model of One-to- Many Marketing Communications

The Internet, a revolution in distributed computing and *interactive* multimedia many-to-many communication, is dramatically altering this traditional view of communication media. As Figure 2 indicates, the new many-to-many marketing communications model defining the Web offers a radical departure from traditional marketing environments (Hoffman & Novak, 1995).

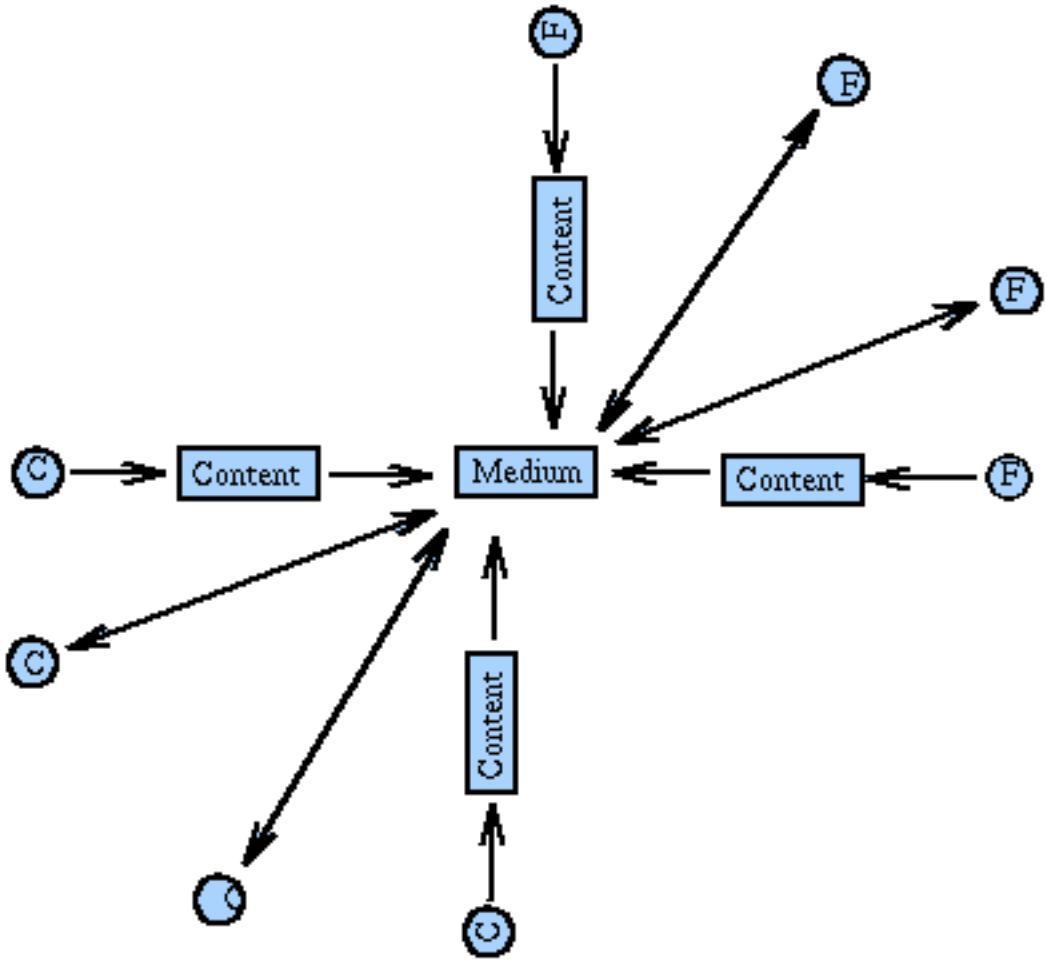

Figure 2.

New Model of Marketing Communications for the Web

Figure 2 suggests that the Internet offers an alternative to mass media communication. Some applications on the Internet (e.g., personal homepages) represent "narrowcasting" to the extreme, with content created by consumers and for consumers. As a marketing and advertising medium, the Web has the potential to change radically the way firms do business with their customers by blending together publishing, real-time communication broadcast and narrowcast. As an operational model of distributed computing, the "Net" supports:

- Discussion groups (e.g., USENET news, moderated and unmoderated mailing lists),
- Multi-player games and communications systems (e.g., MUDs, irc, chat, MUSEs),
- File transfer (ftp) and remote login (telnet),
- Electronic mail ("email"), and
- Global information access and retrieval systems (e.g., archie, veronica, gopher, and the World Wide Web).

From a business and marketing perspective, the most exciting developments are occurring on that portion of the Internet known as the World Wide Web. In this paper, we present an initial attempt to organize the commercial activity on the Web thus far according to its business function. We identify two major categories of sites: "Destination Sites," and "Web Traffic Control Sites." Under destination sites, we identify Online Storefronts, Internet Presence Sites, and Content Sites. These comprise the ultimate "destinations" housing a firm's virtual counterpart. The purpose of the Web Traffic Control Sites is to direct consumers to these various Destination Sites. There are three major categories of Web Traffic Control: Malls, Incentive Sites, and Search Agents. We argue for considering our framework in the context of "integrated marketing," in which various communications vehicles are coordinated to create a single, strategically appropriate marketing effort to maximize customer response (Schultz, Tannenbaum, & Lauterborn, 1992; Tynan, 1994).

The Web as a Commercial Medium

As a commercial medium, the Web offers a number of important benefits which can be examined at both the customer and firm levels. In this way, we can address both demand and supply issues. We discuss the buyer benefits first, followed by the firm benefits. Buyer benefits arise primarily from the structural characteristics of the medium and include availability of information, provision of search mechanisms, and online product trial, all of which can lead to reduced uncertainty in the purchase decision. Firm benefits arise from the potential of the Web as a distribution channel, a medium for marketing communications, and a market in and of itself. These efficiencies are associated with Web technology and the interactive nature of the medium.

Consumer Benefits

One important consumer benefit associated with marketing on the Web is the access to greater amounts of dynamic information to support queries for consumer decision making. The Hermes survey of Web users found gathering purchase-related information was the most preferred Web activity (Gupta, 1995). Further, the interactive nature of the Web and the hypertext environment allow for deep, nonlinear searches initiated and controlled by customers. Hence marketing communications on the Web are more consumer-driven than those provided by traditional media. In addition, recreational uses of the medium, manifested in the form of nondirected search behavior, can be an important benefit to consumers intrinsically motivated to use the medium (Hoffman & Novak, 1995).

The ability of the Web to amass, analyze, and control large quantities of specialized data can enable comparison shopping and speed the process of finding items (Wallace, 1995). The Web facilitates trial (AA, 1995) and provides instant gratification; customers can test products online which may stimulate purchase (e.g., Mathsoft browser , Dec Alpha AXP). There is also the potential of wider availability of hard-to-find products and wider selection of items due to the width and efficiency of the channel.

In addition to the above, the advantages for industrial consumers are reduced costs to buyers from increased competition in procurement as more suppliers are able to compete in an electronically open marketplace. This increase in competition leads to better quality and variety of goods through expanded markets and the ability to produce customized goods (IITA, 1994).

Benefits to the Firm

Distribution

Firm benefits arise partly from the use of the Web as a distribution channel. First, the Web potentially offers certain classes of providers participation in a market in which distribution costs or cost-of-sales shrink to zero. This is most likely for firms in publishing, information services or digital product categories (Jones, 1995). For example, digital products can be delivered immediately, hence such businesses may encounter massive disintermediation or even the eventual elimination of middleman (Michalski, 1995). Moreover buyers and sellers can access and contact each other directly, potentially elmininating some of the marketing cost and constraints imposed by such interactions in the terrestrial world. This may also have the effect of shrinking the channel and making distribution much more efficient (mainly due to reduced overhead costs through such outcomes as uniformity, automation, and large-scale integration of management processes). Time to complete business transactions may be reduced as well, translating into additional efficiencies for the firm. However, such potential efficiencies must be tempered with market realities (Kline, 1995).

Second, business on the Web transfers more of the selling function to the customer, through online ordering and the use of fill-out forms (Michalski, 1995), thus helping to bring transactions to a conclusion. This permits a third benefit in the form of capture of customer information. The technology offers the firm the opportunity to gather market intelligence and monitor consumer choices through customers' revealed preferences in navigational and purchasing behavior in the Web. Note however that there are many social, legal and technological issues and drawbacks at the present level of technology which prevent firms from fully capitalizing on this benefit (see, for example, Caruso, 1995).

Marketing Communications

At the present time, most firms use the Web primarily to deliver information about the firm and its offerings and for both internal and external communication (Magid, 1995; Sharples, 1995) with other firms and consumers. The interactive nature of the medium (see Hoffman & Novak, 1995 for discussion) offers another category of firm benefits since it is especially conducive to developing customer relationships. This potential for customer interaction, which is largely asynchronous under current implementations, facilitates relationship marketing and customer support (Cuneo, 1995) to a greater degree than ever before

possible with traditional media.

Web sites are available on demand to consumers 24 hours a day. The interactive nature of the medium can be used by marketers to hold the attention of the consumer by engaging the consumer in an asynchronous "dialogue" that occurs at both parties' convenience. This capability of the medium offers unprecedented opportunities to tailor communications precisely to individual customers, allowing individual consumers to request as much information as desired. Further, it allows the marketer to obtain relevant information from customers for the purpose of serving them more effectively in the future.

The simplest implementations involve engaging customers through the use of email buttons located strategically on the site. More sophisticated implementations may involve fill-out forms and other incentives designed to engage customers in ongoing relationships with the firm. The objective of such continuous relationship-building is dual-pronged: to give consumers information about the firm and its offerings and to receive information from consumers about their needs with respect to such offerings. Hence, effective customized advertising, promotion and customer service (Berniker, 1995) is the fifth benefit that the commercial Web offers to the firm.

Most importantly, the Web offers opportunity for competition on the "specialty" axis instead of the price axis. From a marketing perspective, it is rarely desirable to compete solely on the basis of price. Instead, marketers attempt to satisfy needs on the basis of benefits sought (TK), which means pricing is dependent upon value to the consumer, not costs. Such opportunity arises when the offering is differentiated by elements of the marketing mix other than price. This results in the delivery of value-laden benefits, for example, convenience through direct electronic distribution of software, or enjoyment through a visually-appealing and unusual Web site. As evidence that this is occurring, consumers indicated that price was the least important product attribute considered when making online purchases (Gupta, 1995). The ability to compete on dimensions other than price will become especially critical in categories where brands are perceived as substitutes, since it allows for more opportunities to differentiate along other dimensions.

Operational Benefits

Operational benefits of Web use for industrial sellers are reduced errors, time, and overhead costs in information processing; reduced costs to suppliers by electronically accessing on-line databases of bid opportunities, online abilities to submit bids, and online review of awards. In addition, creation of new markets and segments (Schrage, 1995), increased generation of sales leads (Krumenaker, 1995), easier entry into new markets (especially geographically remote markets) and faster time to market is facilitated (Wilder,1995). This is due to the ability to reach potential customers easily and cheaply and eliminate delays between the different steps of the business subprocesses (IITA, 1994).

Size and Growth of the Internet and the World Wide Web

Internet Hosts

A main reason the Web is "hot" as a commercial medium is because of its current size and future growth prospects and exceedingly attractive demographics. Figure 3 below shows the growth in Internet hosts from 1981 to 1994. The WWW-name host is most prevalent on the Net, implying that many hosts are Web servers.

As of July, 1995 there were 6.64 million host computers on the Internet (Network Wizards, 1995). This number has been approximately doubling annually since 1981. Of these 6.64 million hosts, 1.74 million are .com domains, 1.41 million are .edu domains, .30 million are .net, .27 million are .gov, .22 million are .mil and .20 million are .org domains. Demonstrating that the Internet is truly a global phenomenon, the same source shows that 2.37 million of these are international hosts connected to the Internet, representing 150 countries.

The number of domains is also impressive; as of October 6, 1995, there were 135,023 domains registered with InterNic, as reported by Walsh (Internet Info, 1995), with the bulk of those representing commercia l or the ".com" addressess (115, 827).

The growth in Internet-connected networks is also impressive (Internet Society, 1995). In

January, 1989, there were 213 networks in the United States and 34 networks connected to the Internet outside the U.S. Six years later, in January, 1995, there were 26,681 U.S. networks and 19,637 international networks. The Internet Society projects that at current rates of growth, by 1996 these numbers will rise to 57,910 U.S. Internet-connected networks and 47,245 non-U.S. networks.

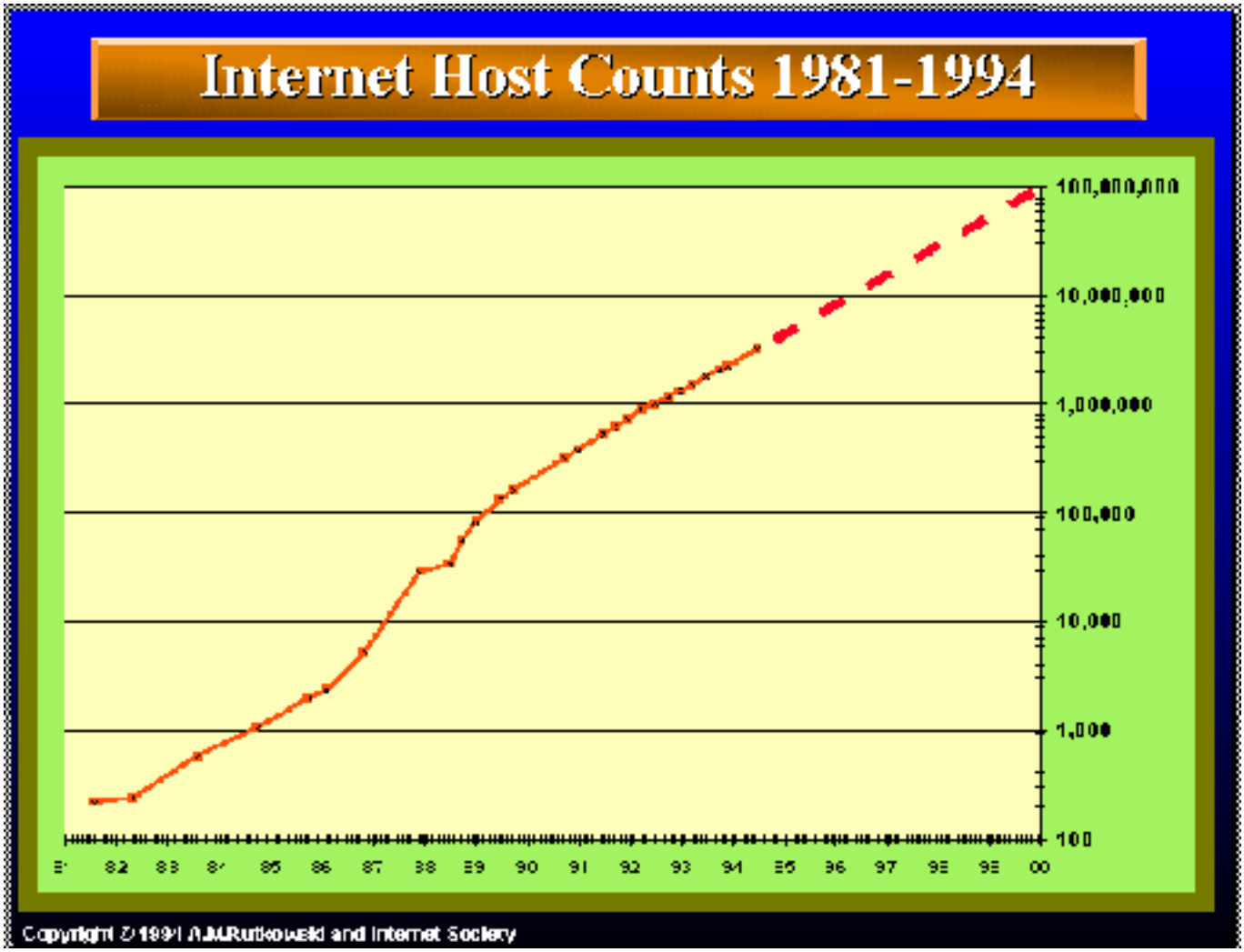

Fig. 3

The World Wide Web: Background - Internet Host Growth

World Wide Web Growth

Growth in Web sites is even more impressive than that of Internet; the Web grew a staggering 1758% in 1994 alone and doubles in size roughly every two to three months. More than 23,000 Web sites were found by the Web Wanderer in July, 1995 (Gray, 1995). Lottor (1995) estimates that there are over 80,000 Web servers on the Internet and that this is likely an underestimate by as much as 20 percent. In the table below, we show the growth

in Web servers since Mosaic was introduced. These numbers, obtained from Gray (1995), also underestimate the true number of servers since the estimation problems that plague host measurement, including "bogus" addresses and firewalls, also occur for server measurement.

Month/Year	Number of Hosts
Jun 1993	130
Dec 1993	623
Jun 1994	1265
Dec 1994	11576
Jan 1995	12000
April 1995	15768
July 1995	23000+

In terms of content served up by these Web sites, the popular search engine Lycos indexed 8.54 million unique URLs as of October 7, 1995.

Statistics show that Web traffic (on the NSFNET backbone) now dominates Net activity (Anderson, 1995). In April, 1995 (Merit Network, Inc., 1995), the Web accounted for 21.4% of total packet traffic and 26.25% of total byte traffic, ranking first among all networks on the Internet. Ftp service ranked second with 14.02% of packet traffic and 21.53% of bytes. News (nntp) ranked third in packets (8.12%) and bytes (8.66%) and telnet ranked fourth in packets (7.5%) and seventh in bytes (2.5%). But note that many ftp and news requests are now issued through the Web, so that Web traffic over the backbone is actually even higher than these figures suggest.

Observers credit NSCA Mosaic (introduced in the Spring of 1993) for jump-starting the growth of the Web. This stunning growth is a classic example of a rapid diffusion process (Rogers, 1983) where adoption is fueled by word-of- mouth communication, an internal influence (Bass, 1969; Mahajan, Muller & Bass, 1993). Word-of-mouth centers around the

uniquely interactive nature of the Web. Hoffman & Novak (1995) discuss the unique characteristics of the Web medium as computer-mediation, hypermedia, machine-interactivity, network navigation and telepresence.

Attractive Demographics

Computer-oriented consumers are "techno-savvy" (O&M Direct, 1994) and PC penetration in the United States is significant. The PC market is "young," since 58% of PC owners have had their PCs for less than two years (Zeigler, 1995). According to the recently released Odyssey Homefront Survey Results (Vonder Haar, 1995), one-third of U.S. households have a PC at home (up 27% from July, 1994), 13 percent have CD-ROM drives, and 18 percent have modems. However, online service penetration remains low; only nine percent of American households subscribe to one or more online services.

The non- representative Georgia Tech/Hermes survey of Web usage (Graphic, Visualization, and Usability Center,1995; Gupta, 1995) based on 13,006 responses reveals a decidedly upscale profile of Web visitors. The average age is 35, 91% have at least some college education or better, the median income is between $50,000 and $60,000, with an average household income of $69,000. Further, according to this online survey, Web visitors are mostly white (82%), and mostly male (82%). The fact that Web visitors are primarily upscale may account in part for the premium they apparently place on convenient and reliable content and their relative indifference to price as a factor in commercial transactions. Web visitors also tend to be employed in the professional and computer-related occupations.

SRI's (1995) psychographic analysis of the Web population gives further insight into the Web visitor and identifies two broad categories of the Web "audience." The first group is called the "upstream" audience and represents 50% of the current Web population. This group is estimated to represent 10% of the U.S. population, is 77% male, educated (97% have at least some college education), and upscale. Members of this group are what SRI terms "Actualizers," successful men and women with high self-esteem and active 'take-charge" lifestyles. Upstream Web visitors typically receive institutional subsidies for Web usage and represent the pioneer Internet users. Because most upstream users are already

online, future Web growth must come from the "downstream" segment.

If the SRI analysis is valid, then the rate of adoption of the downstream or "Other Half" of the Web will determine when and if the Web achieves critical mass as a commercial medium. The other half already online represents the lead users of of the other 90 percent of United States society. This group is noticeably less gender-skewed than the upstream group (64 percent male and 36 percent female), younger (70 percent are under 30), and on its way to being just as educated (89 percent have at least some college education) as the group is comprised of students or recent college graduates. The other half are predominantly made up of what SRI refers to as Strivers and Experiencers. According to SRI, Strivers are unsure of themselves and seek approval from the world around them. In contrast, Experiencers are enthusiastic and impulsive, seeking variety and excitement from life. An interesting findi ng that requires further study is that some of the downstream Web visitors appear not to find the Web valuable.

Note, however that the results of such surveys are not population-projectable, nor necessarily representative of the "typical" Web visitor. However, these early demographics surveys suggest that current Web consumers are leading-edge early adopter s (Freeman, 1995).

Motivated by Hoffman and Novak's (1994a) "call-to-arms" for a non-proprietary, industry-wide survey of Internet demographics, CommerceNet , a non-profit consortium of firms dedicated to promoting electronic commerce, has funded the first-ever, population-projectable, representative survey of who uses the Internet and why. Nielsen Media Research was selected to administer the survey. Our own independent analysis of the results will be available in the Spring.

Barriers to Commercialization of the Web

The barriers to consumer and firm adoption impact critical mass (Oliver, Marwell, & Teixeira,1985). Accumulated industry experience and anecdotal evidence strongly support

the contention that the primary barrier to consumer adoption of the Web as a commercial medium is ease of access. Convenience of access is at the core of the adoption of any technological application and determines its ultimate success (Gupta, 1995). In the context of the Web, ease of access is a multidimensional construct and includes high speed access (the "bandwidth" problem), ease of finding a service provider, and the diffusion of the computer hardware/software/modem bundle into the home. The secondary barriers are ease of use, price, and risk, including such factors as privacy and security. Ease of use includes issues such as the user-friendliness of the software, ease of software installation, and the like. The marketplace will weed out even technically feasible Web applications if they prove too complicated for the average consumer to use (Seaman,1995). Hence attempts to develop technology that is user- friendly are as important as the development of the technology itself.

There is a great deal of concern regarding the security of financial information transmitted over the Internet and its impact on consumer willingness to buy or sell products (IITA 1994). This limitation is critical to mass adoption of the Web, especially since surveys of Web users indicate that vendor reliability and security of financial transactions are important to users (Gupta, 1995). At this writing, such limitations impact consumer behavior on the Web: currently, the majority of consumers use the Web to browse or search much more than actually to purchase something (Booker, 1995, Wintrob, 1995).

The barriers to firm adoption arise from the Web measurement problem (Donaton, 1995b). Firms are unsure of the number of people on the Net and how many people use the Web and this uncertainty makes investment decisions difficult. In addition, there are no established criteria for judging the success of Web sites (Bellafante, 1995). Hence, researchers need to develop concepts to shape standards. Such standards are critical to demonstrate the viability of the Web as a commercial medium, and provide mechanisms for measuring investment opportunities and business success.

The commercial success of a firm's Web site depends in part on accurate information on market potential and consumer needs (Donaton, 1995b). The Web provides multiple ways to reach a diverse and exciting set of markets. Determining the appropriate set of target

market segments and evaluating the penetration of Web access technology in each market is the first step in developing an integrated marketing strategy.

Because critical mass for interactive technologies is "all-or-none," (Markus, 1987), the Web will not be successful as a commercial medium until it achieves critical mass. An important first step in any marketing program is therefore the determinat ion of how many people are on the Internet and what they are doing there (Hoffman and Novak, 1994a). It is also necessary to define and estimate segments of Web behavior based on customer need. The economics of the Web can then be examined for each specific case to determine if the return on investment meets financial targets.

Some sites, e.g., Pathfinder , HotWired , and Internet Shopping Network are attempting to capture data to address the above objectives by providing the option for visitor "authentication." In this process, visitors may register as subscribers in order to use the site fully (e.g., to search for specific content or to make a purchase). This enables the marketer to use demographic data and information on new and repeat visit patterns to strengthen its (and sponsors') marketing programs on the site. Ultimately, marketers may build detailed databases and tailor marketing programs specifically to individual visitors or groups of visitors.

Models of Web-Based Business

Consider the following. As of October 9, 1995, a significant number of the 80,000-plus Web servers on the Internet represent commercial sites. Nearly 14,000 firms were listed in Open Market's (1995) "Commercial Services on the Net" directory and in the Yahoo Business and Economic directory, there were 23,540 entries under "Companies," with an additional distribution of listings as follows (including cross-listings):

Yahoo Heading	Number of Sites
Classifieds	262

Directories	178
Electronic Commerce	67
Marketing	46
Markets and Investments	308
Products and Services	4431

There is no doubt that a great deal of commercial activity exists on the Web and that this activity is increasing. However, the proliferation is confusing. What sorts of business models are being implemented? Are some better than others? Two questions are especially relevant: 1) Is anyone making any money? And 2) Where are the opportunities?

Profitability from commercial activity on the Web includes productivity savings, marketing and sales savings, and incremental or new revenue streams. Productivity savings arise from reduction in order and processing costs and more efficient inventory management. Increases in productivity on the "soft" side through more efficient personnel may also lead to productivity gains.

Savings may also be realized from efficiences in the marketing and selling functions. The Web shifts more of these functions to the customer; savings result through reduced brochure printing and distribution costs and reductions in order-taking as c ustomers use fill-out forms to prepare their own orders. As control is also effectively transferred to the customer, we speculate that customer satisfaction might actually be increased.

Finally, incremental or new revenue streams are available for firms participating in digital commerce, through, for example, online sales, advertising revenues, or information brokering. Incremental revenues may be achieved for those firms who use the Web to expand into new channels of distribution and new market segments. Corporate training, electronic distribution and maintenance provide additional revenue opportunities for appropriate firms. However, secure mechanisms for transactions are necessary to fully exploit the revenue-generating opportunities of the Web (Donaton, 1995).

Although we can address the potential for profitability, the question of whether anyone is

making money on the Web remains largely premature. However, a careful examination of where the opportunities are can be undertaken. Despite the current frenzy of activity, there is little information on the types of business models in use and whether some have the potential to be more effective than others. Strategic insight is therefore needed into how sites are differentiated, how they may be designed more effectively, and how to attract customers to sites.

A New Classification of Commercial Web Sites

In integrated marketing programs, marketing managers combine elements of various media in order to maximize the effectiveness of a communications program (Belch, 1995). Despite the intense interest in such coordinated efforts (see, for example, Duncan and Everett, 1993), there has yet to be widespread adoption and implementation of the concept (Cleland, 1995e; Schultz, 1995).

The concept of integrated marketing holds appeal and promise for business efforts on the World Wide Web, because the Web offers enormous potential for developing customer relationships and customizing the offering to individual customers. In this section, we define six functional categories of Commercial Web Pages . Each can be considered as an element in an integrated marketing program in the context of digital commerce. Below we discuss each category in detail and suggest how the elements may combine structurally to form the components of an integrated marketing program. The examples presented below were selected to reflect the range of practice regarding commercial activity on the Web, not necessarily best business practice. The reader should also be aware that as the Web is rapidly evolving, some links may have changed or disappeared altogether.

- Online Storefront
- Internet Presence (Flat Ad, Image and Information)
- Content (Fee-Based, Sponsored, Searchable Database)
- Mall
- Incentive Site

- Search Agent

The six functional types provide the building blocks for a successful site. An integrated strategy should involve all of these, put to different use. Commercial Web site design includes Online Storefront sites, Internet Presence sites and Content sites as shown in Figure 4.

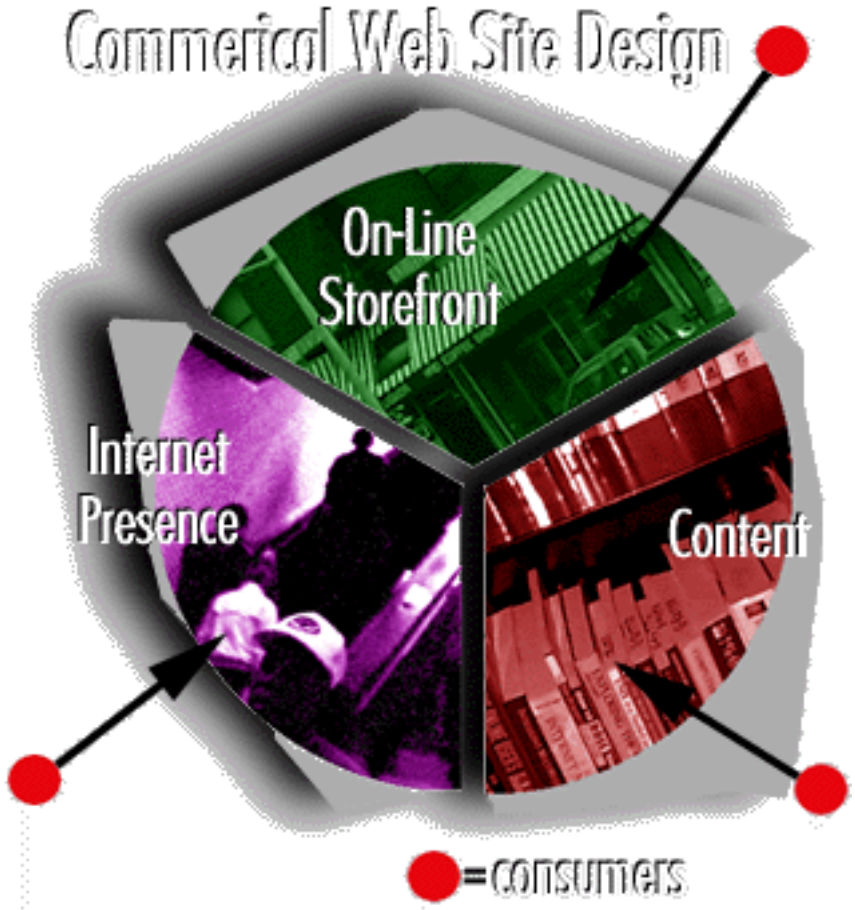

Figure 4.

Commercial Web Site Design

The main challenges for marketers are to attract visitors to the site and generate significant repeat visits (Williamson & Johnson, 1995). Awareness leads to trial or the initial site visit so that the trial problem depends on "Web Traffic Control." However, sites will only be successful in the long run if they generate repeat traffic, which is far more difficult to achieve than trial. The repeat visit problem is partly a function of Web site design (Saloman, 1995) and depends to a large extent on customer need. Figure 5 displays several types of Web traffic control, a ll of which share the marketing objective of attracting visitors to the Web

site.

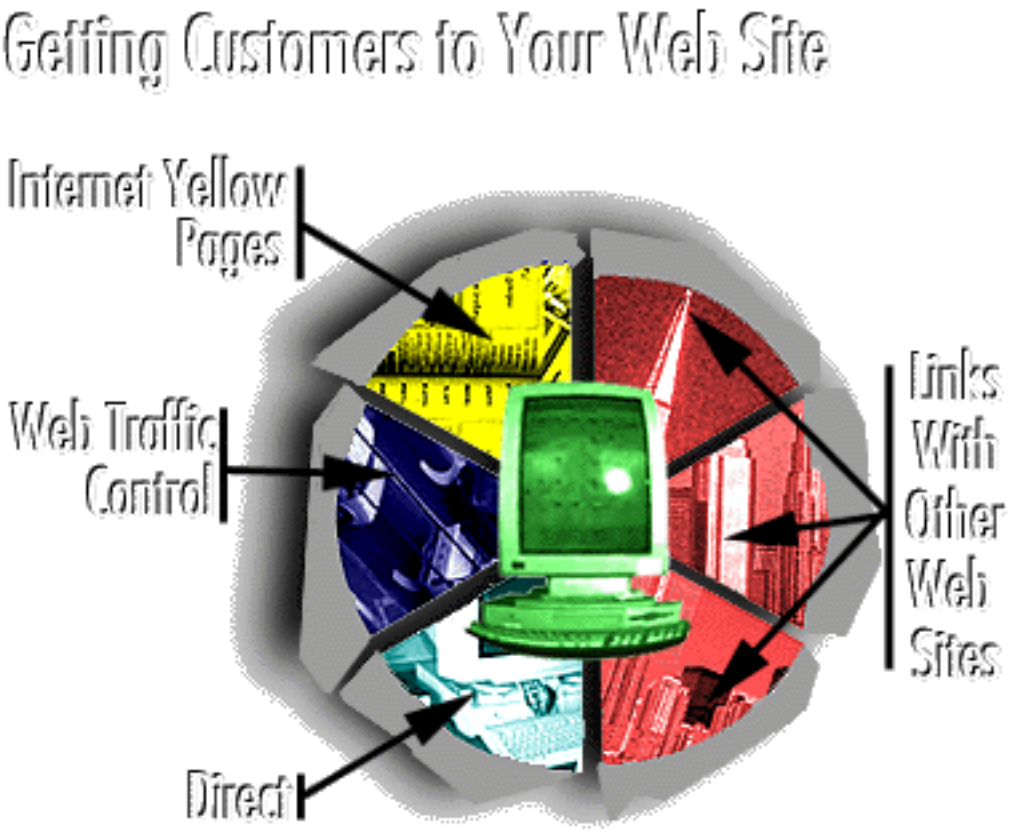

Figure 5.

Attracting Customers to a Web Site

Online Storefront

These Web sites offer direct sales through an electronic channel via an electronic catalog or other, more innovative format. The number of products presently being sold on a single site ranges from one to many. Consumers order goods via fill-out form, 800 number, registration, or surface mail. Online storefronts cover a wide variety of offerings; examples include Absolutely Fresh Flowers , Adventurous Travelers Bookstore , Alaska River Adventures , Ann Hemyng Candy , CDNow, Freeway Enterprises Person-to- Person Web Sites & Greeting Cards , HeadFirst, Internet Shopping Network , San Francisco Music Box Company, and Shrink- Link. . A recent innovator in this category is Security First Network Bank, FSB, the world's first Internet bank. This entry offers online consumers the ability to open accounts, pay bills, and manage their finances via the World Wide Web.

Opportunities abound for the Online Storefront model. It combines elements of direct marketing with in-store shopping and has the potential to be vastly more efficient than either. In this approach, there are tremendous opportunities for customization and relationship marketing. A much broader definition of product and service categories becomes possible in this environment. The ultimate development are those products that can exist or be consumed *only* on the Web (see, for example Freeway Enterprises Corp. offering electronic greeting cards for person-to-person Web sites.)

However, the Online Storefront model poses a number of *Challenges*. Current access speeds can make online shopping frustrating and tedious. Additionally, the terrestrial approach to shopping necessarily sets the standards for online offerings. In many cases, the online versions pale in comparison to real-world experiences of flipping through glossy catalogues or shopping in department stores. Because the technologies for secure transactions (e.g., online payment) are not mature yet, security and privacy are major issues that have yet to be addressed satisfactorily in this medium. Finally, the consumer behavior issues are completely unknown. For example, we have little idea how to stimulate "trial" and "repeat," do not know yet what the most effective segmentation bases will be for online shopping and understand little about the impact of marketing tools like custom- designed incentives.

Internet Presence Sites- Flat Ads, Image, and Information

Internet presence sites provide a virtual "presence" for a firm and its offerings. They may also serve to signal to current and prospective customers and competitors that the firm is on the cutting edge, possibly driven by "mimetic isomorphism" (DiMaggio & Powell , 1983). We identify three types of Internet Presence sites: flat ad, image, and information.

Flat Ads are single page electronic flyers with no hypermedia links. They could just as easily appear in a newspaper or magazine, though a flat ad is decidedly less sophisticated than its print counterparts. We expect the evolution in this category to include hypermedia,

particularly as Web browsers like Netscape integrate real-time audio and video (for example, Sun Microsystem's Java multimedia language (Johnson, 1995). Weightlifting 101 and Xopix represent current examples of flat ads.

In Internet Presence **Image** sites, the consumer appeal is emotional rather than rational. Information about the product, if any, is provided in the context in which the product is consumed, or has meaning to the consumer. Such sites appear to be especially suited to products that have low hard-information content. Examples include Late Show with David Letterman on CBS Eye on the Net , Miller Genuine Draft , Paramount's U.S.S. Voyager: Sickbay , Planet Reebok , and Zima.com .

Information sites provide detailed, rational information about the firm and/or its offerings. Internet Presence Information sites can take on innovative and sophisticated forms (for example, Sun Microsystems), and are best suited to offerings with high degree of hard-information content. Decision aids (e.g. "Step Search,") can be used to facilitate navigation.

One objective of such sites is to build a relationship with the consumer even before the need to purchase the product or service arises (Rechtin, 1995). Examples include American Airlines , Andersen Consulting , Apple Computer , Burlington Coat Factory , Club Med , FedEx , Fidelity Investments , Forrester Research , HeadsTogether/Bookworm , Lotus , MathSoft , Network Wizards , and Volvo .

Opportunities for Internet Presence sites include the ability to reach motivated customers with an information- or image-rich communications message. Because the entry barriers are so low, smaller firms can set up Internet Presence sites as well (or in some cases even better) than larger firms. We believe that Internet Presence sites represent the future of advertising and marketing communications on the Web.

Challenges include the actual execution, that is, what is the best way to implement such a concept? Executional challenges are greater for image sites, but the rewards may be greater, as well, since image sites are possibly more likely to generate flow, the "glue" holding the user in a site (Hoffman & Novak, 1995). A final challenge is how managers can

evaluate the effectiveness of such sites.

Content - Fee-Based, Sponsored, and Searchable Database

In **Fee-Based** content sites, the provider supplies and/or pays for content which the consumer pays to access. Fee-based content sites are expected to proliferate as secure payment mechanisms are implemented. To date, however, the model has met with only limited success, perhaps because consumers may be unwilling to pay for content delivered in this manner. A recent trend is toward information-brokering, as with Newshare, and usage-based pricing, as with NewsPage, where visitors are able to access news summaries at no charge, but incur a small fee for the full text of a story. Other examples include DowVision , QuoteCom, and Washington Weekly .

Sponsored content sites sell advertising space to reduce or eliminate the necessity of charging fees to visitors (Donaton, 1995b). Thus, as with magazines in the terrestrial world, advertising appears from a variety of sources and underwrites the editorial content. A recent trend is toward sponsored "entertainment" content (e.g., The World Wide Web Dating Game), and sponsored search agents (see below). Typical current examples of sponsored content sites include Mother Jones , PowerPC News , Triangle Online , and Washingtonian Online . Some sponsored content sites combine elements of the Internet Presence model and the Mall. Examples of such hybrids include GNN , MecklerWeb , and Pathfinder . Current advertising rate structures and information on sponsored content sites is available from Interactive Publishing Alert.

In the third type of content model, merchants or advertisers pay a provider for information placement in an organized listing in a **Searchable Database**. The unit of analysis is a person, service, or information source, all of the same type. This is the inverse of Fee-Based content model. Selected examples include Catalog Mart Home Page , Single-Search , and the Virtual Headbook .

Opportunities abound for content sites, as they closely parallel traditional media models. At the present time, there is generally no (sponsored content) or at most a small (fee-based) charge to consumers to consume the content. For some firms, e.g., Wired and Time/ Warner, they offer a new channel for expansion. Firms adopting this model have the opportunity to reach an advertiser-coveted audience. In addition, such sites may provide meaningful exposure that would otherwise be lost in the unstructured clutter that currently typifies the Web (Cleland ,1995d). Additionally, content sites can demonstrate innovation, are efficient compared to their terrestrial counterparts, and are, in theory, easy to implement.

However, the *challenges* for content sites arise due to this perceived ease of implementation. The close parallels to traditional media represent significant execution hurdles for content sites. How best to measure and optimize consumer response to advertising in sponsored content sites is completely unknown.

Mall

The **Mall** site typically constitutes a collection of online storefronts, each of which may contain many different categories of goods for sale. The provider charges rent in exchange for the virtual real-estate and may offer a variety of services to the storefront (Gaffin, 1995). Some malls also accept advertising, as with, for example, the Internet Mall. Other examples include the Branch Mall , CyberMart, eMall , and Shopping 2000 .

Incentive Site

The **Incentive Site** represents a unique form of advertising that attracts a potential customer to a site. The objective is to *pull* the user to the commercial site behind it, thus helping marketers generate traffic to their Web sites (Cleland, 1995a). The content may be transitory in nature and may appear to serve as a "public service announcement" or offer incentives. From the context of web traffic control, Incentive Sites serve the same function

as Malls. Some efforts may be especially sophisticated, as in directory services like Open Market . Other examples include As the Web Turns , Cupid's Cove , and Lucky Leprechaun's Lane .

Search Agents

The purpose of **Search Agent** sites is to identify other Web sites through keyword search of a database that extends throughout the Web. Software agents are used to generate and/or assist the search through the database.

A recent trend in such sites is the emergence of fee-based (e.g., InfoSeek) or advertiser-sponsored (e.g. Yahoo) search agents. Other examples are Lycos, Open Text, and Web Crawler, with additional contenders entering the market regularly. Newer search agents like BargainFinder incorporate increased assistance to the user in the search pro cess.

In terms of *opportunities*, there are a wide variety of novel ways of generating traffic to a Destination Web site. There is also the potential to model the diffusion of site visitors as a function of the location from which the consumer entered the site. Recently, search agent sites have shown potential as high-traffic vehicles for advertising sponsorship.

Web traffic control sites face a number of *challenges*. The proliferation of commercial Web sites means that it is increasingly difficult to find anything on the Web, especially if one is not looking for it! Therefore, identifying pivotal cross-li nking opportunities will be critical.

Summary and Conclusions

We have proposed a framework for evaluating the commercial development of the World Wide Web on the Internet. Our categorization scheme organizes the explosion of commercial activity and identifies two major categories of sites: "Destination Sites, " and "Web Traffic Control Sites."

Destination Sites include Online Storefronts, Internet Presence Sites, and Content Sites. These comprise the ultimate "destinations" competing for consumers' share of visits on the Web. Web Traffic Control Sites, including Malls, Incentive Sites , and Search Agents, function to direct consumers to these various Destination Sites. We argued that the marketing objective is to integrate these sites into a coordinated plan designed to achieve the important marketing objectives of generating initial visits and securing repeat visits.

Our systematic categorization also serves to focus strategic attention on:

· *Understanding evolution of sites and structural characteristics over time:* Examining the attributes underlying Web site structure can lead to insight into what makes a successful site.

- *Gaining insight into categories that do not exist yet:* Since site characteristics will change over time, tracking changes will suggest where the development is headed.
- *Keeping an eye on the leading edge to gain differential advantage:* From a developmental point of view, managers needs to identify the extent to which firms are following existing models or developing new models. One path to differential advantage will be to create innovative sites in less crowded categories, particularly as sites proliferate.

The models we have identified here reinforce the idea that the firm's relationship with the customer must take advantage of a key feature of the medium, namely interactivity, and that such relationships must be updated continuously. The inter active nature of the Web is especially conducive to relationship building and offers marketers new opportunities to create stronger brand identities which have the potential to translate to brand loyalty (Upshaw, 1995).

Future work should focus on empirically estimating the relative distributions of firms across these different categories and the types of firms within each category. Research efforts should be especially concentrated at developing integrated marketing approaches that specify the ways in which these different elements can be combined for maximum

advantage.

The Internet, especially that portion known as the World Wide Web, has the potential to change radically the way businesses interact with their customers. The Web frees customers from their traditionally passive role as receivers of marketing communications, gives them much greater control over the information search and acquisition process, and allows them to become active participants in the marketing process.

However, significant adoption barriers to commercialization preclude predictable and smooth development of commercial opportunities in this emerging medium. Commercial development of the Web must follow the demand ("demand pull"), instead of being driven by "gold fever." Firms will reap the benefits of innovation in interactivity by being closer to the customer than ever before.

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