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Thesis Map

Figure 1 is an outline of the route that the chapters follow:

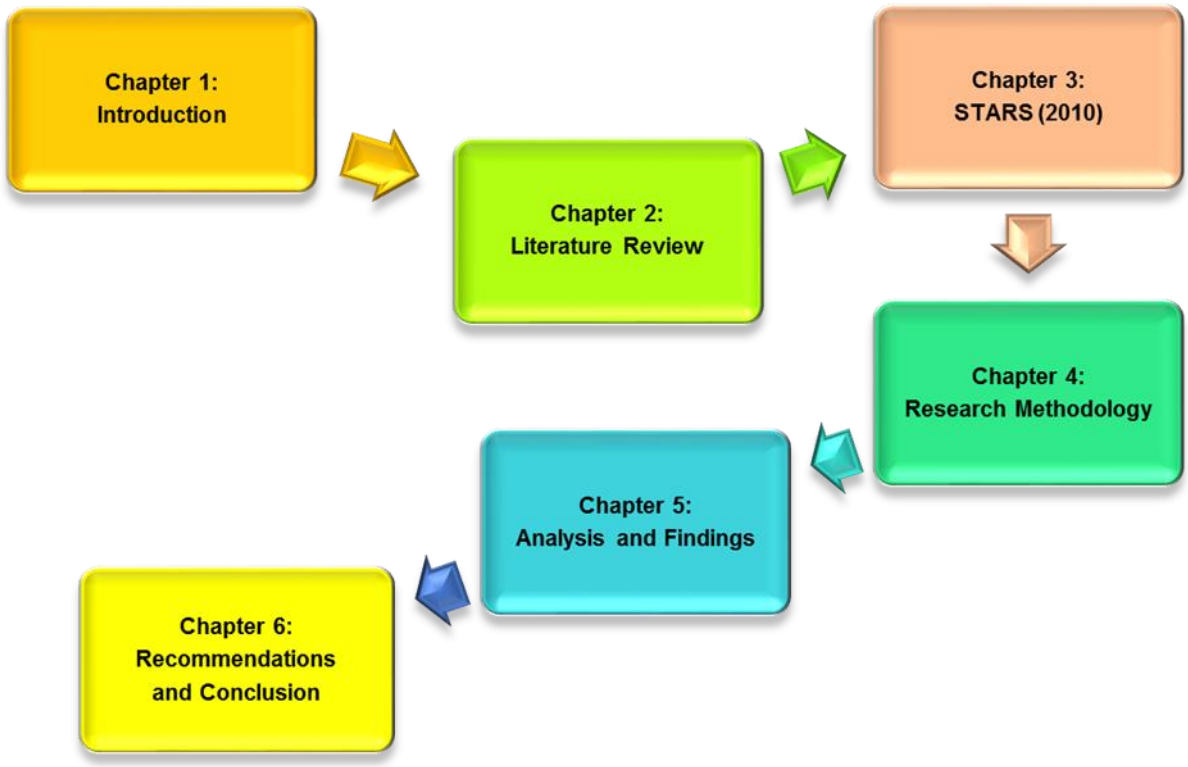
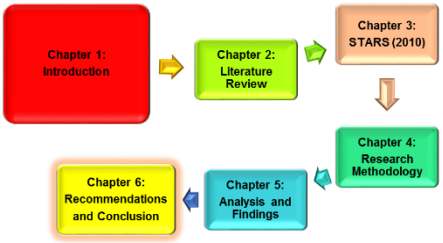


Figure 1: Road map of the thesis



Chapter 1: Introduction

1.1 BACKGROUND TO THE PROBLEM

The University of Pretoria (UP) is a recognised leading research university in South Africa. It has transformed from a mainly White, Afrikaner institution to a multilingual, multi-racial university that has more than 50 000 students and offers a high standard of education to South Africans over a wide spectrum, irrespective of colour or creed (UP, 2017). Like all other Higher Education Institutions (HEIs), the main aims of UP are to improve the graduation rates and decrease the attrition rates of first-time entering students, address equity of access and supply the private work force with well-educated and skilled staff (UP, 2017).

The academic programmes of UP are diverse and are offered in nine faculties, one of which is the Faculty of Engineering, Built Environment and Information Technology (EBIT), within which the School of Information Technology (SIT) is located (UP, 2017). The main aims of SIT are to upskill students in the specialised field of Information Technology (IT) and prepare them for the challenges of the workplace. SIT was formed in April 1998, and comprises of three departments – the Department of Computer Science, Department of Informatics and the Department of Information Science – all tasked with the responsibility of offering undergraduate and post-graduate degrees, and in so doing, opening avenues for IT practitioners. Furthermore, it offers students who did not meet the criteria for the three-year IT study programmes the option of following an extended four-year programme (E4YP) in IT.

The three disciplines offer a high level of instruction, amongst others, in the following IT degrees (the emboldened titles indicate that these degree courses are part of the E4YP in IT):

- Bachelor of Information Technology (BIT)
- Bachelor of Information Science (BIS) (Multimedia)

- Bachelor of Information Science (BIS)(Multimedia)(E4YP)
- Bachelor of Information Science (BIS)
- Bachelor of Science (Computer Science)
- Bachelor of Science (Information Technology)
- Bachelor of Science (Information Technology)(E4YP)
- Bachelor of Commerce (Informatics)

The student cohort at UP comes from diverse cultural backgrounds, from South Africa's so-called rainbow-nation and subsequently bring different levels of proficiency and world experiences to the higher education (HE) sector. This is in contrast to pre-1994, where the portrait of the typical student was "White males from privileged backgrounds" (Rendon, 1994; Cabrera, 2014). Presently the student population "suggests a tapestry of differentiation in social background, race/ethnicity, gender, disability, lifestyle and sexual orientation" (Rendon, 1994; Cabrera, 2014; Rendon, 2017).

Depending on their secondary school results, students are admitted to UP as either mainstream students, or allocated a seat in the E4YP if they do not meet the standard entrance requirements. This study concerns itself with IT students on the E4YP.

According to Daintith (2009), IT is defined as "*the application of computers to store, study, retrieve, transmit, and manipulate data, or information, often in the context of a business or other enterprise*", and is considered "*a subset of Information and Communications Technology*" (ICT). Furthermore, IT as defined by the Information Technology Association of America (ITAA) and quoted by Wang (2011), is the "*study, design, development, implementation support and/or management of any computer-based information systems, particularly software applications and computer hardware*". Hence the concept of IT is broad but has a strong focus on computer-based activities.

This study is a four-year longitudinal study (2011 - 2014) of two hundred and seven students taking the E4YP in IT degrees in one institution, including students who have dropped-out, or graduated and are employed in a range of professional settings. Collectively, as indicated by Sheppard et al. (2010), this study was

geared towards understanding the experiences of the E4YP students in IT, and their transition from university to the workplace. The study also focuses on how students in IT experience their education, how they gain knowledge of what IT is, and what their plans after graduation are.

1.2 SHORT LITERATURE SURVEY

Student academic progress has been at the centre of concern to all higher education institutions (HEIs) in South Africa. It is understood that student progress emanates from a range of dynamics that gives students different educational experiences. When students enter tertiary study, they have one common goal: to achieve diplomas and degrees (CHE, 2013). How this common goal is to be achieved or attained differs, based on students' disposition on entry, goal commitment and their individual university experiences after entry – both socially and academically. Most importantly, HEIs should be wary of relying on materials taught at high school level to act as a scaffold on which to build new learning material.

In tracing the history of E4YPs, it is necessary to note that it began in the latter days of the apartheid era, in the early 1980s, nearly a full decade before democratic change in South Africa. The first bridging programmes were offered at the white English-medium universities as a means of academic support to assist the small numbers of non-White students that were admitted to their universities. These could be considered as the earliest forms of E4YPs (Kloot et al., 2008). The aim was simply to assist students from inferior schools to adapt to the educational demands of university, with the main drivers being to improve the graduation rate and decrease the attrition rate of first-time entering first-year students. With the dawn of the new South Africa, the nature of the E4YPs changed to specialised programmes to bridge the educational gap created by the former apartheid government schooling system.

The National Higher Education Plan (Moosa and Murray, 2016) provides a framework outlining the role of HEIs in South Africa:

> *The key challenges facing the South African higher education system remain outlined in the White Paper: "to redress past inequalities and to transform the higher education system to serve a new social order, to meet pressing national needs, and to respond to new realities, and opportunities"* (White Paper 1.1) (DoE, 1997).

The South African Government identified the use of ICTs for instruction and learning as an important priority, and put into action strategies to improve the efficiency and equity needs of the country. The e-Education Policy states the following:

> *Every South African manager, teacher and student in the general and further education and training bands will be ICT capable (that is, use ICT confidently and creatively to help develop the skills and knowledge they need as lifelong students to achieve personal goals and to be full participants in the global community) by 2013* (DoE, 2001).

Despite the good intentions of the above policy, the transition from school to university has proved to be a time of extreme stress for students arriving at the university gates for the first time. Mostly the expectations of students are unknown, but from past experiences, educators know that students entering university are diverse, with inequality in terms of schooling being paramount, and some have other issues, such as being financially deprived. Various studies have indicated that these challenges are exacerbated by the fact that most students enter university "*under-prepared and therefore require more support to bridge the gaps in the required knowledge and skills*" (Paras, 2001). However, researchers such as Tinto (1975) and Tinto (2000) agree "*that obtaining a degree is a critical leverage point for participation in work, leisure, and politics*". Education is seen as "empowering as well as enabling", Tinto (1975) and Tinto (2000) and students must be assisted in obtaining a degree. Hence, it is the intention of this study to explore the undergraduate IT experience of an E4YP.

1.3 PROBLEM STATEMENT

This study focuses on understanding undergraduate IT students' experiences of an extended four-year programme (E4YP). It takes into consideration the identity, background and behavioural characteristics that influence students' progress in the E4YP. Furthermore, it looks at the pre-entry factors that influence the students' first-year experiences. Finally, it determines if student readiness for university directly affects academic performance, and/or the likelihood of withdrawal.

The problem statement seeks answers to address the following overarching questions:

- How do institutional factors influence the sense of belonging and success of students on the extended four-year programme in Information Technology at UP?
- How do student identity, experiences, attitudes, difficulties and pre-entry characteristics influence their sense of belonging and success at UP?

1.4 RESEARCH QUESTIONS

Process-based research suggests that the researcher should try to use different research paradigms to view the problem from different perspectives. Instead of doing the research from one particular point of view, the researcher should try to pose a variety of questions that will explore the different aspects of the problem. Hence, it is proposed that researchers should use these in a creative way to view the research problem from various vantage points (Du Plooy, 2009; Introna, 2011; Roode, 1993; Mertens, 2014).

According to Roode (1993) and Mertens (2014), the researcher "*should deliberately pose questions to explore different aspects of the problem or situation at hand*". Roode (1993) and Mertens (2014) also suggest that the researcher uses the diagram as indicated in Figure 2, to inquire about the different facets of the research problem, allowing the researcher to obtain as much information about the problem as possible.

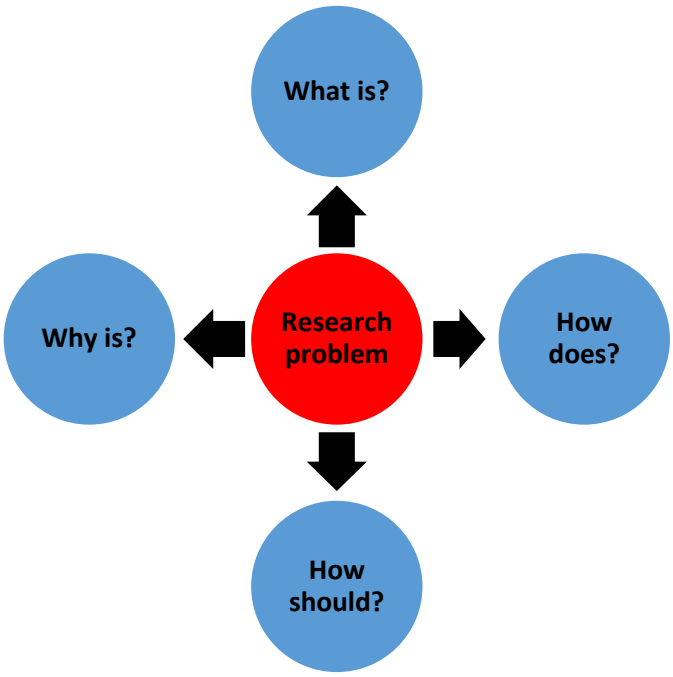


Figure 2: Different facets of research

In the diagram (Figure 2), **Why is** relies on the Functionalist paradigm of Burrell and Morgan (2017), **What is** on the Interpretive paradigm, **How does** on the Radical Humanist paradigm and **How should** on the Radical Structuralist paradigm. Thus, the suggested framework allows the researcher to get a holistic view of the problem (Roode, 1993; Creswell and Poth, 2017).

The following research questions focus on understanding the E4YP in IT:

1. How do students identify themselves as IT students?
2. How do students' IT skills and knowledge develop and/or change over time?
3. What do students find difficult and how do they deal with this?
4. How does student appreciation, confidence and commitment to IT change as students navigate their education?
5. How does this in turn impact on graduates of the programme, and how they make decisions about further participation in IT after graduation?
6. What are the specific pre-entry factors that influence the students' first-year experiences?
7. Does student readiness for university directly affect academic performance, and/or the likelihood of withdrawal?

1.5 RESEARCH METHODOLOGY

Based mainly on the theoretical framework of Tinto (1975-2015), this study provides an analysis of research regarding student withdrawal and retention. It is intended as a four-year longitudinal study (2011 - 2014) of 207 first-year students in the E4YP in IT at one institution, namely Mamelodi Campus, including students who have 1) dropped-out (voluntarily or involuntarily, and who may, or may not have found employment), or 2) currently still students at UP, or 3) graduates employed in a range of professional settings. Taken together, these components are designed to expand one's understanding of the undergraduate IT experience in the E4YP, and the transition from university to the workplace.

The research methodology employed to conduct this study includes a mixed methods approach to the research, undertaken from "*more than one point of view*" (Creswell, 2013). The research uses a combination of qualitative and quantitative research features. The data was generated by surveys (mainly an online questionnaire, mini-questionnaire), mini-essays, and academic transcripts integrated with the results of STARS scores were used with the intention of gaining a broader and richer picture of students' undergraduate IT experiences in the E4YP.

1.5.1 Description of instruments

- Literature review: This covers relevant legislation, journal articles, books and electronic documents available on the topic.
- Internet mailing lists: A number of mailing lists were identified and consulted in order to obtain relevant electronic information from previous/past students.
- E-mail postings: Identified individuals were contacted electronically to determine their participation.
- Correspondence: Surveys (online questionnaire, mini-questionnaires) with structured, open-ended questions were utilised. Requests to and responses from respondents were sent mainly via email. The mini-essay was an assignment submitted via email.

- Web pages (i.e. ‘surfing’ the Internet): From time-to-time this was an efficient manner of retrieving information, or consolidating other information.
- Academic records: Student records were viewed to see progress made from semester-to-semester over the study period.
- Results from STARS: Information with regard to the scores obtained, together with information from the academic records of students, were collated so that further analyses could be performed.

The data from the survey (online questionnaire) was analysed quantitatively, while the results of the mini-questionnaire and mini-essay were analysed qualitatively, and conclusions were drawn and integrated with the literature review. The results of the statistical analysis received from the Department of Statistics were incorporated.

1.6 LIMITATIONS

The researcher is of the opinion that this study may be limited in its scope as the research was conducted with a subset of students on the Mamelodi Campus, within a large multi-campus university (UP, 2017). However, the researcher believes that the sample was representative in terms of age, gender and field of study. In summary, the manner in which the study was conducted, and data collected and analysed, suggests that the results could be used advantageously by other universities. The researcher is of the opinion that the study outcome could have been enhanced by the use of additional data from interviews.

1.7 A ROAD MAP OF THE THESIS

This section serves as the blue-print or research route that this study followed:

1.7.1 Chapter 1: Introduction

In this chapter the researcher introduces the research topic and outlines the research problem. The research questions guiding this study are indicated and followed by the methodology indicating how the research was undertaken. A brief conclusion of the chapter is provided.

1.7.2 Chapter 2: Literature Review

The literature relating to this study is discussed at length in this chapter, and covers a range of topics to provide a foundation for the findings outlined in Chapter 5.

1.7.3 Chapter 3: Students' Academic Readiness Survey (STARS)

This chapter sees the researcher expound the theory behind the origin and development of STARS, which is the work of Juan-Claude Lemmens (2010), a researcher on the staff of UP. He undertook an extensive and comprehensive theoretical discussion, wherein he investigated and discussed at length the various theories of retention and withdrawal, to illustrate how "*entry characteristics relate and interact with the student's learning experiences and student output*" (Lemmens, 2010).

1.7.4 Chapter 4: Research Methodology

The research questions are discussed, the methodological approach is explained, and the theoretical approach set out in Chapter 4. Inter alia, this chapter describes the research assumptions, the research methods, the data gathering techniques and the data analysis techniques used. It provides information regarding the research participants and the data collection instruments used.

1.7.5 Chapter 5: Analysis of Findings

In Chapter 5 the data collected is discussed and analysed to present the research findings. This includes analysing the different surveys, mini-essays, and compiled documentation containing academic results and STARS scores.

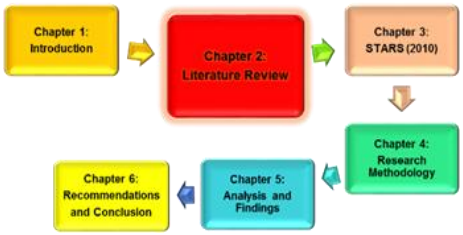
1.7.6 Chapter 6: Recommendations and Conclusions

In the final chapter, answers to the research questions have emerged and are discussed. Hence the research is evaluated, the contribution of the research explained, and avenues worth exploring for future research are identified.

1.8 CONCLUSION

In this first chapter, an overview of the study is presented in which the motivation and rationale are discussed and chapter demarcations that detail the nature of the study are delineated.

The next chapter, the literature review, discusses relevant literature and recommendations made by previous authors on the topic and in the field. It shows the main focus areas and identifies relevant themes relating to the study evident in the literature.



Chapter 2: Literature Review

"*To know how to teach them, we must understand our first-years better. We must have a clear-eyed view of who they are, where they come from, how they have been instructed, what values they hold, and what their expectations and goals are.*" (Erikson and Strommer, 1991)

2.1 INTRODUCTION

In this chapter, a discussion of the relevant literature is presented and previous study findings relevant to this study are noted. A discussion of the major theoretical frameworks underpinning this research follows.

The intention of the researcher was to understand the E4YP in IT student experiences by considering the different aspects that underlie the successful transition from school to university. This required in-depth insight into the types of student that arrive at the door of the university, their eligibility for the degree programme, and the journey the students take from arrival at the university until the end of their first-year studies. There is no doubt that there are many factors, both intrinsic and extrinsic, that affect their progress. The literature review draws attention to and explores the different layers of social demographics, such as the socio-economic status (SES) of students, the fact of their being first generation university students, family background, gender and demographics as well as other factors that are all shown to have an impact on student retention.

2.2 CHARACTERISTICS OF SUCCESSFUL UNIVERSITY STUDENTS

After a school period spanning at least twelve years, most students cannot wait to make the transition from school to university. Once the euphoria of being accepted as a university student settles, students leave the school scenario behind them, and become part of a university. According to Tinto (1987) the first year of

university is a critical year in the success of the student and there is no doubt that this transition is the biggest that a student will ever make.

For some it is catastrophic, while for others, after a period of adjustment, they settle into the life of a university student. The excitement of leaving home, the freedom of being out of the confines of a rigid classroom, soon pale when confronted with the reality of being a successful undergraduate university student. There is no doubt that the commencement of formal activities, the challenge of new learning styles and independent study are overwhelming to the new student. Students have to adapt to "*academic rigour and new social responsibilities*" (Smith and Wertlieb, 2005). For some, university is a time of experimentation and self-discovery. Students are in new surroundings, meeting new people, developing a different social life and having all sorts of new responsibilities (Smith and Wertlieb, 2005). For some it may be the first time they have to get up on their own, prepare and cook their meals, get along with roommates from different walks of life, make new friends, and confront choices about drinking and dating (Smith and Wertlieb, 2005). Many students are ill-prepared for these challenges, partly because the chasm between university and school is huge, with each having different standards and expectations (Venezia et al., 2003).

According to Astin (1993) and Tinto (1975; 1987; 2000), students who feel a connection with the university and other students have a greater likelihood to persist until graduation. While at school, proficiency in superficial rote-learning and other outcomes is stressed, whereas lecturers assume that the student arriving at university will already possess high-level skills, such as comprehension skills, analytical skills, the ability to synthesise information, and to engage in independent learning (Rendon, 2017). Despite these differences, it is expected and hoped that the student achieves success as a first-year student.

The most famous statesman in South Africa, the late President Nelson Mandela (2013) said:

> "*Children of today are the leaders of tomorrow and education is a very important weapon to prepare children for their future roles as leaders of the community"* (Mandela, 2013).

Hence, the qualities that students portray will determine their future and career paths. This has led the researcher to ponder questions such as, Who are good students? What are the characteristics of successful university students?

According to the American Heritage Dictionary (Chickering, 1991), a student is defined as "*one who attends a school, college or university*" and who "*makes a study of somethin*g", while the Merriam-Webster New Collegiate Dictionary gives the definition as "*one who attends schoo*l" and is also "*an attentive and systematic observer*". Furthermore, a good student classified according to the Merriam-Webster New Collegiate Dictionary (copyright, 2014), "*one who devotes considerable energy to studying, spends much time on campus, participates in student organizations, and interacts frequently with faculty members and other students*".

Obviously, the academic ability and potential of students differ, but it is the manner in which they conduct themselves, and their determination to flourish that set the successful students apart from others. It is important to note that the successful student is not necessarily the most intelligent student, but the student who is hard-working, resilient and perseveres in his/her aim to achieve a degree despite obstacles. These students possess the characteristics that assist and help them develop into successful adults. They have developed good habits and qualities early in their schooling, and this has augured well for them at university. A brief discussion of what defines good students is captured under the headings of the discussion by Monash University (2015) and follows:

A good student is normally motivated: Good students want to be at the university, they have a commitment to learn, and they have a thirst to succeed. This is demonstrated by attending lectures regularly and having punctual habits. An

absence from lectures is validated and is normally for legitimate reasons. They should have a willingness to do their best and regard an assignment as a challenge to test their strengths (Pettigrew, 2012). Good students do preparation for lectures, come ready to learn, take good notes, and hand in work on time. They also make use of the resources (library, computers, seminars) provided by the university for their use (Monash University, 2015). Good students sit near the front of the lecture room, remain attentive throughout the lecture and have no intention of looking out of the windows, doodling, having side conversations, texting or playing games on their cellular phones, or sleeping (Monash University, 2015). These qualities give them the motivation to attend class, take good notes and complete high-quality work. The traits that make a student successful often translate into better jobs as well (Kokemuller, 2017).

A good student has educational expectations: Good students come to the university with the right expectations and are not overwhelmed by the heavy workload and the disparity between the work done at school and that of the university (Monash University, 2015). They make opportunities to meet with the lecturer/tutor to engage him/her in areas of difficulty that are of concern to them. In trying to understand something, they read, analyse and evaluate information, and understand that they are responsible for their own learning (Weimer, 2014). It is their responsibility to meet with instructors out of class time to clarify their understanding of difficult concepts.

The good student is an organiser: A good student has to navigate effectively between home and university life. It is important to keep daily and weekly calendars for tests, project deadlines, social occasions, etc. Often functioning at a frenetic pace, the student has to control his/her diet, sleeping patterns and exercise habits. The student has to maintain an even keel emotionally, failing which he/she should be aware of and willing to use support services if needed, e.g. financial assistance, health service, counselling, etc. The student has to continue to be involved in family activities and share some household tasks, understand that university is about developing personally and socially, as well as academically (Monash University, 2015). A good student should be disciplined and systematic in order to learn. Good students know themselves well, how they learn, and what suits them best in order to achieve an effective learning that lasts.

Such students recognise that they need to set their own targets and work consistently and steadily to ensure that they keep up with the pace of university studies. It is all about maintaining a balance between studying, socialising and living. Students who attend university are interested in establishing a good career for themselves and in so doing ensuring self-growth and improvement (Center for Teaching, 2010).

The good student is a communicator: Good students never run out of questions, even if the attempts are clumsy and difficult. Mostly, they ask the questions the instructor anticipates and knows that many in the class are bound to have, provided they are listening. These students have a thirst for knowledge and are never satisfied by what they have. A wonderful trait is that they are always willing to share the knowledge that they have acquired (Weimer, 2014). They develop rapport with lecturers, peers and other support staff. Hence, when group work is necessary, students who can communicate well within a group setting can learn and perform better. If students are curious and enthusiastic, completing assignments and tasks is a pleasurable educational experience.

Good students are curious: They possess a sense of curiosity, open-mindedness, a willingness to be engaged (Pettigrew, 2012). Furthermore, they enjoy the discovery part of learning, wanting to know more than their area of expertise. Through engaging in class in active participation and listening, they build connections with peers, and learn more and perform better. Good students seek alternate presentations of information. When one presentation is not clear, they will try others to fill in the gaps.

Good students are humble: They have the confidence to push themselves to the limit, but are humble enough to know that one can never know everything – there will always be more to learn (Pettigrew, 2012). They do not give up at the first sign of failure; rather, failure spurs them on towards a determined, committed path to persist and succeed. Failure frightens good students, but they know it is beneficial, as it poses a challenge that they will eventually figure out, and learn through experience (Weimer, 2014). They are attentive and polite, even if the learning is difficult or when they are bored.

Good students are creative and flexible: Academia comes with many rules and restrictions, but these can be "*stretched or broken when the occasion demands*" (Pettigrew, 2012). A good student gets hold of an idea and drives and guides it to the destination. Successful students are flexible and are quickly able to adapt to different teaching and learning styles.

Rendon (1994) further identified "*a highly involved student*" as one who "*devotes considerable energy to studying, spends much time on campus, participates in student organisations, and interacts frequently with faculty members and other students*". According to (Klein, 2013), this statement postulates five basic ideas:

- Involvement refers to the investment of physical and psychological energy in various objects.
- Regardless of its object, involvement occurs along a continuum.
- Involvement has both quantitative and qualitative features.
- The amount of student learning and personal development is directly proportional to the quality and quantity of student involvement.
- The effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement.

Hence, it is crucial that students arriving at the university doors have a realistic idea of the challenges of university-life. Facing these challenges head-on would be a good strategy to ensure university success.

2.3 FIRST YEAR EXPERIENCE (FYE)

2.3.1 In general

Over the past decade student academic success and the transition from school to university have come under immense scrutiny (CHE, 2013). Universities constantly focus on increasing their efforts aimed at improving student success. One of the key observations is that universities should have a thorough understanding of the students who attend the institution. Every student entering higher education has a First Year Experience (FYE). Most are aged between 18 and 20 years (a few are older) and live either on campus, or somewhere close-by. It is expected that the students who live on campus would be less racially diverse andmore likely to be male than the overall first-year cohort (CHE, 2013).

There is no doubt that universities were very far removed from the tapestry of students found on today's campuses. The traditional curriculum was Euro-centred and excluded the contributions of non-Whites and women, and teaching styles placed the lecturer as the authority in the classroom. Hence, students not coming from these environments entered university with a sense of trepidation, feeling alienated and intimidated by the culture they found themselves in. Given these dynamics, a student could only succeed at university if he/she "*replaced his allegiance to his/her native culture with loyalty to a new academic culture*" (Rodriguez, 1974). The student had to be able to disconnect from his past and turn over his loyalty to the new institution. For many students this was a traumatic experience as they could come across as being disconnected or uninterested, and develop a fear of the institution, which may be one of the biggest obstacles to student learning (Kuh et al., 2011a). It then becomes the responsibility of the academic staff to validate students from culturally diverse communities within the academic community (Kuh et al., 2011a).

For some the FYE is a good experience that is characterised by freedom, independent thought, growth in confidence, and intellectual and personal discoveries (Scott, 2009). For others, it is an experience characterised by loss of confidence, failure and disillusionment. While universities have always talked about the experiences of their first-year students in broad and general terms, it is only in more recent decades that a strong focus and sustained conversation on the FYE has found currency on campuses around the world. Statistics released by the CHE (CHE, 2010; CHE, 2013) indicate that students in South African higher education find it difficult to succeed. South Africa's combination of a low participation rate and a high drop-out rate has been called a "*low participation, high attrition*" system (Van Zyl, 2016). This is evidence of a waste of money and talent, and more serious interventions need to be in place to improve the FYE. It is only in recent years that universities in South Africa have been deliberately focusing on the FYE. In part this international and national trend has been fostered by the growing realisation that the ultimate success of students at university and their pathway to graduation is strongly shaped by their FYE (Barefoot, 2000). It is also partly shaped by the reality that institutions are being asked to do more for students but with fewer resources (van Schalkwyk et al.,

2010); therefore universities are examining ways to maximise student retention and engagement in a cost-effective manner (Fontaine, 2014).

An important aspect mentioned in the literature is that "student attrition was predominantly thought of as reflecting the failure of the individual to measure up to university either through a lack of maturity, a personality flaw, or a lack of ability" (Pather and Chetty, 2016). Hence, the correct conclusions must be drawn as to why students leave an institution of learning. According to Tinto (1975) and Tinto (2000) in many institutions, "*more students leave in good academic standing than leave because of their inability to keep up their grades*". Hence, the diminishing number of first year students should not always be attributed to poor performance. Factors such as death of a breadwinner, or insufficient funds to continue studying, are all factors that need to be considered.

Scott et al. (2007) in Lemmens (2010) tabulated the graduation rates of different bachelor degrees in South African universities over the past ten years, as reflected in Table 1:

Table 1: Graduation rates

Programme	Graduate within 5 years	Still registered after 5 years
Business / Management	50%	7%
Life and Physical Sciences	47%	13%
Mathematical Sciences	51%	9%
Languages	47%	7%
Social Sciences	53%	6%

Table 1 is indicative of the poor graduation rates at universities (Scott et al., 2007) based on the 2000 cohort of contact universities. Only half manage to obtain a degree after five years, and at least 43% leave without having completed a degree. After five years, about 7% of students are still registered for a first degree.

Disappointingly, South Africa's graduation rate of 15% is one of the lowest in the world, according to the National Plan for Higher Education (NPHE) compiled by the Department of Education (DoE, 2001). Furthermore, the South African survey, 2002-2003 revealed that South Africa has the highest number of HE students in

sub-Saharan Africa, but that fewer than two students in every ten actually graduate (Page et al., 2005).

The DoE plan that “calls for the total university enrolment to rise from 900 000 in 2011 to 1.5 million by 2030 (DoE, 2013), underscores the issue of attrition. The National Development Plan (NDP) supports this with a target of 1,62 million enrolments for 2030. Furthermore, the plan calls for 400 000 graduates a year by that date” (Moodley and Singh, 2015). However, with the alarming number of students falling out in the first-year, the chances of achieving these statistics are slim.

In their study, Smith and Wertlieb (2005) utilised two theories, the Expectancy-value theory and the Ecological theory to provide a theoretical foundation to emphasise the “*interconnected relationship*” informing the study of the transition from high school to university. A major aspect of the Expectancy-value theory is its emphasis on the importance of self-motivation of students. It states that if a student is motivated to study, despite all the obstacles, he/she will put in the time and effort to ensure success. However, if the student is not motivated and does not see the success-value of his/her study the chances are that the student will perform poorly (Smith and Wertlieb, 2005). This theory characterises the attitude of well-performing students in the E4YP, as students who are resilient, motivated and persevere despite the many obstacles in their path. A pictorial representation of this theory follows in Figure 3:

Figure 3Figure 3: Expectancy-value theory

The Ecological theory of Smith and Wertlieb (2005) was used to indicate a student's ability "*to connect*" with the institution of learning. According to this theory, "*the extent of a student's 'fit' with the academic environment is a definite indicator of the success of the student*" (Kuh et al., 2011a).

If the student's characteristics conflict with those of the institution of learning, it would spell the end of the student's stay at the institution. However, in some instances, students with a positive view of university-life should be able to adapt their thinking and succeed at university.

The most important theory that underpins this research is Tinto's "*Student Integration Model (SIM)*" of attrition, (Tinto, 1975). It was "*designed to offer a longitudinal model which would explain all of the aspects and processes that influenced an individual's decision to leave university, and how these processes interact to ultimately produce attrition*" (McCubbin, 2003). Tinto (1975) firstly "*aimed to differentiate between the different kinds of leaving behaviour such as academic failure, voluntary withdrawal, permanent drop-out, temporary drop-out and transfer*". Tinto (1975) borrowed some, but not all, of Durkeim's theory of suicide, e.g. "*Durkeim believed that the student committed suicide because of non-integration into society, whereas Tinto (1975) asserted that dropout occurred because the individual was insufficiently integrated into the different aspects of university life*" (McCubbin, 2003). Tinto (1975) argued that a student who spent vast amounts of time engaged in social activity, their academic performance would suffer, and vice versa. Tinto's work included assessing the degree to which individual characeristics affect attrition.

Tinto (1975) indicated that high levels of social integration can lead to attrition, but he further clarifies this by indicating that if the socialisation has "occurred with groups with strong academic orientations", it could yield positive results. A student's strong goal commitment, can ensure success at univeristy.

Tinto (1975) suggests that "a match between the academic ability of the student and the level of integration into the university system is necessary", if the student is to attain academic success. The term "*integration*" refers to the extent to which students are involved in academic activities and interaction with peers and faculty.

A distinction can be drawn between academic and social integration. Academic integration refers to such traits and behaviours as the number of hours students spent studying, the degree of interest in their courses and good study habits (Astin, 1975). Social integration concerns interaction with peers and faculty (Astin, 1975). Student interaction both inside and outside the classroom bodes well for student learning and personal development. Through socially constructed activities, students "*actively construct and assimilate knowledge through a reciprocal process*" (Zhao and Kuh, 2004). Learning becomes meaningful and deeper, unlike superficial rote-learning which is soon forgotten. This is a key aspect in the constructivist approach to knowledge. Getting students involved in interacting with the academic staff, management and peers may encourage them to continue in this vein throughout their studying years. A pictorial representation of Tinto's model (van Zyl, 2013) is indicated in Figure 4:

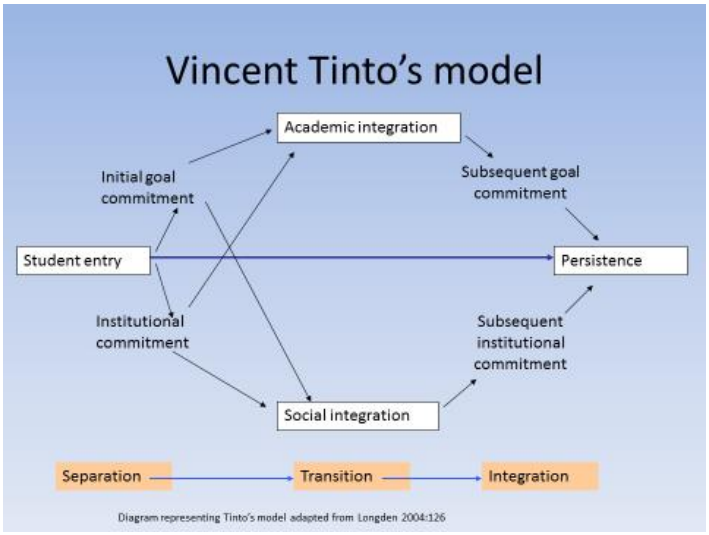


Figure 4: Tinto's model of SIM (1975)

According to Tinto (1975); Tinto (2000), if the student is not integrated into the university, he/she will develop a low commitment to the university. Tinto (1975) outlines three stages new students will move through: "*separation, transition and incorporation/integration*".

Tinto (1975) and Tinto (2000) contend that students first go through the separation phase in which they move away from their home environment. Typically students attending university live on their own for the first time, albeit in the campus residence accommodation provided by the university, or in other private

accommodation. Tasks that they have previously taken for granted, such as doing laundry, shopping, and budgeting now become the responsibility of the student. The new routine of university life brings with it different patterns of eating and sleeping, increased workload and new responsibilities. Most importantly, the student has to adapt to university rigour and the new social responsibilities that come with the territory. The amount of stress experienced may be influenced by the individual's ability to cope effectively with stressful events or situations (Astin and Oseguera, 2005). Many first-year students complain of sleeping disorders, decreased attention, loneliness and isolation, hunger, reduced concentration, the temptation to cheat in examinations, depression, loss of objectivity, increased incidence of errors, and improper behaviour, such as negligence, imbibing alcohol or drugs. All of this has been defined as the physical effects that students experience as a result of stress (O'Rourke et al., 2010).

Although being separated from their known environment is traumatic for students, most settle down into the second phase, which Tinto (1975) and Tinto (2000) refers to as transition. During this stage students are torn between their old environment and the new one; they may no longer belong in their old environment but have yet to find their place in the new one.

Finally, students move into the incorporation stage when they have achieved full membership of the social and academic communities of the institution (Tinto, 1975; Tinto, 2000). The immense workload is the first to strike – it is heavier and more intense than any a first-year student has ever experienced before. The second major challenge of university work is the large volume of reading, pressing deadlines and the quality of work that has to be submitted. Students often doubt their ability to perform the tasks at hand and become frustrated at their lack of success, often the result of the fast pace of the work.

No longer is there the comfort of a parent bringing a late cup of coffee, or giving a motivating pat-on-the back. The student experiences the loneliness of waking up for lectures, making new friends, confronting choices about dating and other ethical issues. As students at an institution, they are away from the comforts and friendships their homes provided during the previous years (Palmer et al, 2009). Students have to adapt to the rigours of the classroom, but most importantly, new

social responsibilities (Holmstrom et al., 2002). Many students are ill-prepared for these changes, partly because university and high school have different standards and expectations (Venezia et al., 2003). Failure to understand the different expectations in the two settings can have a significant impact on academic motivation and achievement (Kern et al., 1998).

Tinto's theory of SIM is one of the most studied models on student drop-out (Tinto, 1975; Tinto, 2000). It analyses the interaction of several propositions relating to student pre-entry attributes (e.g. gender and high-school academic achievement), intentions, goals and commitments, and academic and social institutional characteristics. According to Tinto (1975), "*there are a plethora of reasons why students may choose, or be forced, to withdraw*". It is noted by McCubbin (2003), "*as the number of students enrolling in tertiary education increases, so does the number of students who will be affected by dropout*".

However, it also points to the fact that students do not leave only because their ability is compromised. Tinto (1975) notes that there are at least "eight or nine different events or forces that affect students at different points of their career" (Tinto, 1975; Tinto, 2000). Most importantly, data suggest that slightly more than a third of students terminate studying in the area that they thought they would study when they entered university. Approximately half enter university undecided and decide to leave during or at the end of their first year. In order for students to be part of the university environment, a significal financial cost is involved, all of which is wasted if the student is a drop-out. This money could have been spent beneficially on students who were determined to complete their degree course. McCubbin (2003) indicates that the dropping out of students from the degree course, can "negatively affect the educational achievement and development of other students, through damanging their morale or making them question their own commitment to their course or educational institution. Also, perhaps counter intuitively, it is rarely the least able students who drop-out (Tinto, 1982). Given the astronomical costs involved, "most universities would like to better understand the forces driving it". If universities could have a better understand of attriition, they could attempt to change their policies with regard to selection and admission, or lear how to deal with students with a view to reduce the rates of attrition (McCubbin, 2003).

While Tinto's Student Integration Model of persistence has much acclaim and dominated the attrition for over 25 years, it has also been critqued (McCubbin, 2003). The follow are criticisms levelled against Tinto's student integration model:

Criticism 1: The SIM is inadequate in modelling Student Attrition (McCubbin, 2002).

Tinto (1975) model was criticised for "having its origin in Durkheim's model of suicide. Their argument is effectively that even supposing that Durkeim's original model was an accurate and effective model of suicide, there remain serious doubt over the extent to which the relationship of dropout and suicide can truly be seen as analogous" (Brunsden et al, 2000). By basing Tinto's model on Durkheim's, he is acknowledging that attrition is a "negative process, ignoring that for many it can represent a positive experience, changing courses, having decided that one is the preferred option" (McCubbin, 2003). Tinto (1975) acknowledges that it is the individual's own perceptions of the constructs in his model that is important, rather the degree to which each construct is expressed in an individual, which his model entirely fails to take account of.

In trying to remedy his model, Tinto (1982) explained that the model "was developed to explain certain, not all modes or facets of dropout behaviour that may occur in particular types of higher educational settings" (Tinto, 1982). He had not claimed that his model was generaliseable to all student types in all forms of tertiary education. Tinto's claimed that "the fault was not in the model itself, rather it was with those researchers who attempted to overextend it" (Tinto, 1982).

Criticism 2: The SIM is only applicable to "traditional" students (McCubbin, 2002).

The second criticism levelled against Tinto is that "it is applicable solely to a traditional residential type of student". Rovai (2002) published a paper which discussed that Tinto's model is of limited applicability in the study of non-traditional students as it is based around the analysis of how traditional undergraduate students fit into the higher education institutions which they attend (McCubbin, 2002). Furthermore, Tinto's model "did not expain attrition in students who were over 24 years of age, did not live on campus, and were not in full-time education,

and it does not account for students who did not particularly wish to be involved in the social aspects of student life, and for whom the greatest concern about the university they attend, is what it can offer them, academically speaking". Due to the nature of its design, it was almost invevitable "that it would fail to adress attrition behaviour of some student populations simply because their entire experience of the higher education process is different to that from traditional students" (McCubbin, 2002).

Criticism 3: Academic integration is not an important predictor of student attrition in traditional student populations (McCubbin, 2002).

According to McCubbin (2002), following Tinto's SIM (1975), several investigations by other researchers have revisited it with the intention of confirming the importance of academic integration. Pascarella and Terenzini (1977) tested "*the effect of the level of student-faculty interaction on student attrition in a traditional student population. Their experiment was designed to determine whether the amount of non-classroom interaction with academic staff that a student had was predictive of their attrition or retention. This non-classroom interaction with members of faculty staff is potentially important as it raises not only the level of that individual's academic integration but also their social integration*".

Pascarella and Terenzini (1977) found that the amount of informal contact with the faculty was found to discriminate significantly between those students who chose to leave the university and those who chose to persist. Pascarella and Terenzini's (1977) findings indicate that "*some students who have certain personality traits and needs are more likely to seek non-classroom contact with members of faculty staff and that as a result of this contact they are likely to attain higher levels of both social and academic integration and as a result are more likely to persist at university*". The results of this experiment do however indicate that the individual student characteristics do not totally account for the difference in frequency of faculty contact for different students. "*Whereas most studies measure the student's characteristics once, then assess dropout at a later date,* Terenzini and Pascarella (1977) *assessed the students at three time points which gives a better*

understanding of the nature of the interaction between different factors of the SIM" (McCubbin, 2003).

Despite the criticism over *Tinto's theories*, the researcher contended that it was the correct model to adequately explain the experiences of E4YP students in IT. Together with the *Expectancy-value theory* and the *Ecological theory*, it provided a layered set of lenses to view the school to university journey. These theories state that if one was looking for a description of a university dropout, or a personality or demographic profile, or a common event that shapes leaving university, one would not find one. Rather, there are several events or forces that affect students at different points in their careers (Tinto, 1975; Tinto, 2000).

Students need to have a clear idea of their goals, weaknesses and strengths, and their abilities and capabilities, so that they have realistic expectations of themselves and can try to improve in order to make the university experience a positive one for themselves. The expectations of each of the parties (school and university), in preparing students for university make it difficult for congruence. Schools may believe scoring high marks in a subject is an important factor, whereas the university may assume that students will be arriving at their doors with advanced "*reading comprehension, analytical and synthesizing skills*" (Smith and Wertlieb, 2005).

There is no doubt that the transition from high school to university presents a myriad of changes and challenges, such as learning styles, language of instruction, sudden independence, finances, time management, accommodation and living conditions. This is encapsulated by Chaskes (1996) when he says:

"First-year university students are truly like strangers in a strange land. Everything about the university setting is unfamiliar, from the campus acronyms to study skills that can facilitate success. Just as we citizens would not expect immigrants new to our country to master our colloquialisms and customs as soon as they set foot on land, we educators cannot reasonably expect new first-year university students to act like, well, natives, until they have had ample opportunity for enculturation".

Hence, according to Cuseo (2012), having summarised the findings and extensive survey data gathered under the auspices of the Carnegie Foundation, "*students find the transition from (high) school to university haphazard and confusing*" (Cuseo, 2012).

Studies have shown that many students who enter university doubt their ability to be successful, and are unsure whether they possess the correct study habits or the rigour needed to attend to university level academics (Smith and Wertlieb, 2005). Some students do not consider a university degree to be a valued incentive and therefore do not do their best in order to attain it, while others give in to parental pressure to attend university. Hence, their expectations are not aligned with their experiences and this is not a recipe for success.

In many cases, students do not enter into meaningful friendships, report feelings of loneliness, and miss their friends from home. It has been found that pre-matriculation expectations impact student adjustment to university life (Jackson et al., 2000). Students with pessimistic expectations are more likely to have a difficult time adjusting to the university environment when compared to students who see the value of a university qualification and are optimistic of their future.

Students' lack of engagement, such as skipping classes, coming to class unprepared, not finding their courses stimulating, not enjoying their courses, or having other problems with their courses are all signals that these students are dissatisfied with their overall university experience. One of the challenges that students encounter is the difficulty of finding accommodation, or living in less than desirable living conditions (Kift, 2009; Kuh et al., 2011b). The challenges of accommodation and living conditions seem to be the most prevalent of all. These students are unhappy or discontented with most aspects of their experience and are highly disengaged. They lack a clear sense of purpose and have problems settling in (James et al., 2010).

Students new to the university environment have to deal with factors such as academic unpreparedness and new approaches of instruction and learning used in tertiary institutions. Unlike the school environment, lecturers do not adopt

a spoon-feeding approach. Students struggle to master approaches, learning styles and tactics of studying in this new environment. They have difficulty in understanding academic literacy, compulsory knowledge of technology used for instruction and learning, the language of instruction, intense peer pressure, loneliness, difficulties in the change of environment, cultural conflict, personal fears, doubts, confusion and low self-esteem (Kuh et al., 2011a).

A study conducted by Ambrose and Freeland (1997) succinctly summarises the inadequacies of a first-year student, which in later years are not as daunting as they are in the first year. Hailikari et al. (2016) reflect on the "*emotional landscape*" that second-year students experienced in their FYE. These include instances where many first-year students (as verbatim):

- have to share their private space with someone else;
- struggle to find their way around a new and different environment;
- have a need to learn norms and rules for behaviour in a different environment;
- adapt to being away from home with all its familiarities, e.g. family life;
- pine for their old home environment;
- have to contend with not always having something to eat (financial constraints);
- struggle with tasks such as having to cook and do laundry;
- have to interact with a diverse group of people with a different value-system;
- have to make difficult choices, such as deciding whether to drink at university parties;
- make sense of new ways of learning and learning styles;
- make new friends through association and introduction;
- identify new methods of studying;
- explore and understand their new-found sexuality;
- worry about their future;
- feel like a small fish in a big pond; and
- find ways to redefine their view of learning.

In addition to the above inadequacies experienced by first-year students, there are other reasons for students not coping in their FYE (Tinto, 1975; Tinto, 2000). On arriving at the institution, students need to be committed to the institution and their studies. However, this may change as the year continues, depending on their

experiences in and out of university. External factors could involve aspects such as finance, marital problems and/or family problems. There have been instances where students drop out of university in the first year, and return later at the point when their problems have been resolved. Due to the mass exodus of first-year students, universities have put together programmes to assist students in settling down to university life. Some students are unable to make the adjustment from school to university successfully; from being a housewife and returning to university; or arriving at university and finding out that one is the minority in a big class (Tinto, 1975; Tinto, 2000). These are important factors in understanding why students leave university.

Furthermore, if the curriculum is not a match or fit, too difficult and insufficient help is provided; if the subject matter is boring, not challenging or irrelevant, students regard the study as not being suitable to their academic or career interests (Tinto, 1975; Tinto, 2000). Students must feel at ease and not feel out of place because if the mismatch is too great, students will drop out of university.

In order to combat the problem of attrition and retain students in the university environment, universities are putting measures in place to assist students with transitional issues. Different universities use different strategies, but Tinto (1975) and Tinto (2000) refer to these as "*principles of effective retention*", a commitment by the university to "*further the students' welfare, integrate individuals into the mainstream of the social and intellectual life of the institution. The university must reach out and make contact with students in order to establish personal bonds amongst and between students, faculty members and staff*" (Tinto, 1975; Tinto, 2000). Furthermore, programmes for at risk students, or remedial programmes should be "*centralised and provide integrative, not segregated, experiences for their students*" (Tinto, 1975; Tinto, 2000). Students must not be "*set apart, stigmatised and labelled*" (Tinto, 1975; Tinto, 2000), as this would spell disaster for students.

Sidle and McReynolds (2009) advise in their research that universities must be committed to transforming the FYE. It must be organised and designed such that alliances are formed between the university, student affairs and academic affairs. Expertise, skill and competencies should be shared and exchanged, forming what

could be called "*learning communities*" (Zhao and Kuh, 2004; Braskamp et al., 2016). This shared commitment is evidence to the new student that high priority has been invested in ensuring that he/she continues studying right up to graduation. During 2017, UP has been using the acronym *FLY* to indicate to students that the "*Finish Line is Yours*" as a motivational strategy to assist students in completing their degrees and achieving success.

Academic staff who treat students equally, assist students who seem to have problems, and present structured learning experiences, are able to show all students that they are capable of learning (Rendon, 1994; Biggs, 2011; Rendon, 2017). According to Tinto (1975) and Tinto (2000), faculty members must be trained to teach the diverse population of students that they will encounter. This notion is echoed by other researchers such as Tinto (1987); Pascarella et al. (2005); Astin (2017) and Rendon (2017) who indicate that the more time and effort students devote to learning and engaging in their own education in combination with the eagerness of the learning institution to assist, the greater the achievement and satisfaction with the learning process. It is of paramount importance that partnerships have to be garnered between academic, administrative and support areas "*to transcend the silos and enact a holistic, systematically-managed vision for FYE that is truly learning-focused and is indeed greater than the sum of its many parts*" (Kift, 2009).

2.3.2 IT Students

Many countries now regard an understanding of and mastering the basic skills and concepts of ICT as being part of the core of education together with reading, writing and arithmetic (numeracy). According to Daniels (2002), ICTs have become, within a very short time, one of the basic "*building blocks of modern society*" and have a "*strong impact on the teaching learning process; quality and accessibility of education; learning motivation and learning environment*". Yusuf (2005) and Adu et al. (2016) contend that ICTs have the "*potential to innovate, accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change*".

Hence, universities have seen an upsurge in the number of students enrolling for degrees that have a Computer Science, Information Technology, or Informatics flavour due to the global interest in ICT. This is not misplaced, as in a rapidly changing world students need to keep pace with the latest digital trends. ICT has the "*flexibility to allow students to access information from anywhere in the world, regardless of time or geographical barriers*" (Yusuf, 2005; Adu et al., 2016). This sentiment is echoed by Lakshmi (2013) who indicates that "*The challenge was to develop a higher education system that was flexible and dynamic so as to holistically integrate technology in the management and delivery of learning programmes*".

There is no doubt that the paradigm of instruction and learning has changed from traditional-based learning to technology-mediated instruction and learning. ICT can be perceived as a game-changer, or agent for education. However, it is important that the expectations must clearly be stated – what and how do we want students to learn, and what type of individuals would our classrooms produce – superficial rote learning students or students with an analytical mind having an in-depth understanding of the subject (Lakshmi, 2013).

Davis et al (1989) introduced the Technology Acceptance Model (TAM) as indicated in

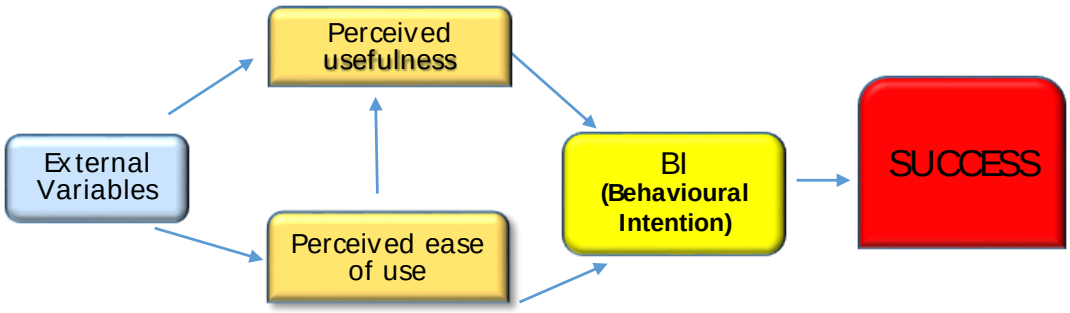


Figure 5, in an attempt to explain and model user acceptance of ICT. Simply put, "a person's performance of a specified behaviour is determined by their behavioural intention (BI) to perform the behaviour" (Davis, 1989).

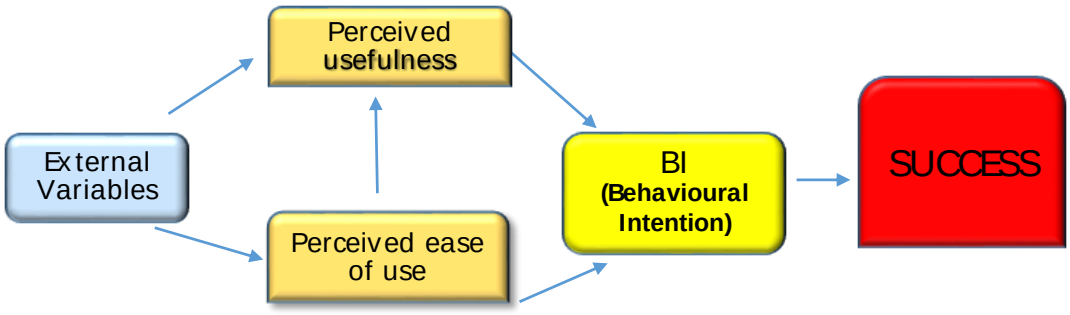


Figure 5: Technology Acceptance Model (TAM)

The TAM model (Figure 5) has external variables (demographic variables, end-user background variables) "*which attempts to explain end users' attitudes to computing technology*" (Gu et al., 2013). The perceived enjoyment, usefulness and ease of use of ICT affect ICT success, attitude and acceptance.

The first year IT student is a subset of ICT students in general and thus has all of the symptoms of the bigger set. However, it is an assumption that many IT students arrive on the university campus being 'tech-savvy' and already 'Digital Natives', a term coined by Prensky (2001), describing that the majority of students entering the university today have "*spent their entire lives surrounded by and using computer-aided technology. This would include videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age*". Consequently there is the notion that since most students are exposed to computer technology at such a young age, education instruction must take advantage of this and adapt accordingly (Prensky, 2001; Wilkinson, 2006; Gikas and Grant, 2013; Grant et al., 2015). The observation is that, to a large extent, academic instructors speak an "*out-dated language (that of the pre-digital age), and are struggling to teach a population that speaks an entirely new language*" (Prensky, 2001).

In spite of Prensky's (2001) observations, even though some students appear to be IT-savvy, their results in programming are only of an average level (Bennedsen and Caspersen, 2007). It is obvious that some students experience conceptual difficulties with aspects that require abstract and logical thinking. Furthermore, the assumption that all students entering university have a comparatively good digital upbringing is not accurate, as a large component of students still suffer from the

ravages of post-apartheid education, and arrive on campus from poorly resourced schools, without having had any exposure to IT. Hence, even as technology and Internet access become affordable, a digital divide exists between the rich and poor (Thinyane, 2010). Not only must they contend with the pressures of commencing tertiary study, they are confronted with a discipline with which they may not have had any prior engagement. Considering that a large number of students have English as a second language, it is as though they must essentially learn another new language, which is a programming language (Bennedsen and Caspersen, 2007). It remains a reality that many South African first-year students gain exposure to computers only when they first enrol at a university (Thinyane, 2010).

This is contrary to Prensky's (2001) observations and his notion that all students have sophisticated knowledge and technical skills, and can therefore be taught using advanced IT skills. If the education system is changed to rely on new technologies, it will only widen the digital divide, i.e. "*the gap between those who have access to and use of technologies, and those who do not*" (Thinyane, 2010). As it has been mentioned previously, South African university students come from a diverse population that may know the functionality of a mobile phone, but cannot be categorised as Prensky's (2001) "*technology-savvy*" population.

The criterion to study IT at a university normally requires an above average symbol in Mathematics and English, and an acceptable APS score as access to the degree. At no point is there a criterion for students to have completed programming at school. However, a first semester of study in IT encompasses units of study such as Computer Systems, Data Communications and Computer Programming, and Java training. Suffice it to say, some students may find themselves in unfamiliar territory and computing fundamental subjects can prove to be a challenge, particularly the introductory programming courses.

2.4 EXTENDED FOUR-YEAR PROGRAMMES

2.4.1 In general

There are fundamental principles that underpin the introduction of the E4YPs, the first of which is that students, particularly those from educationally disadvantaged communities, may have the potential to study successfully at a tertiary level but

are under-prepared for the particular program. It would be unethical to exclude students with potential if they are under-prepared due to reasons beyond their control. Hence, universities have created opportunities to develop and facilitate success. However, it should be borne in mind that providing an "*open door for students, can also be creating a revolving door*" for admission of low-performing students to the university (Engstrom and Tinto, 2008). Allowing students without the necessary potential to register for a programme is also unproductive and unethical. Tinto (2008), Barefoot (2000) and Everett (2015) make it clear that "*access without support is not opportunity*". Many low-income students enter the university sector but do not succeed, as they have had little exposure to academic resources compared to their peers from advantaged backgrounds (Tinto, 1975; Tinto, 2000; Barefoot, 2000; Everett, 2015). Universities must make it a priority to institute the necessary measures to assist students in upgrading their skills and knowledge. Furthermore, the selection programme of universities should have clear criteria and only students with a reasonable chance of success must be selected by virtue of merit (Pervin et al., 2015; Guard et al., 2015).

The philosophy behind the E4YPs is to allow access to students who do not meet the minimum admission requirements for admission into university, but have the potential to succeed (Everett, 2015). In the years following the democratisation of South Africa, the poor number of Africans in the fields of Science, Technology, Engineering and Mathematics (STEM), and Humanities have also added to the establishment of E4YPs allowing access to disadvantaged students (Scott, 2009; Scott et al., 2015).

Programmes have been aimed at "*building a firm foundation in scientific skills, knowledge and attitudes through innovative teaching and learning experiences*" (Matlou, 2013). The Government Funding for Higher Education document (CHE, 2013) builds on this earlier work by offering the opportunity for such programmes to be funded in a sustainable fashion.

In the planning of the E4YP, several perspectives need investigation. Tinto (2012) introduced the longitudinal interactionist approach, which stated the following:
Improvement in rates of student success requires intentional structured and proactive action, that is systematic in nature and coordinated in application.

E4YPs have been designed to equip students with the necessary tools to allow them to complete their studies successfully. In some cases, these students do not have the required skills and competencies to be successful in the normal curriculum, but have proven potential. Hence E4YPs may be defined as "*programmes for students who have potential, but are underprepared and should be provided access by providing relevant pre-tertiary development (bridging) and, integrating the bridging activities with mainstream study*" (Mundy, 2015).

Tinto (1993) offers a very useful set of action principles for the implementation of a retention program:

1. *Institutions should provide resources for program development and incentives for program participation that reach out to faculty and staff alike.*
2. *Institutions should commit themselves to a long-term process of program development.*
3. *Institutions should place ownership for institutional change in the hands of those across the campus who have to implement that change.*
4. *Institutional actions should be coordinated in a collaborative fashion to insure a systematic, campus-wide approach to student retention.*
5. *Institutions should act to insure that faculty and staff possess the skills needed to assist and educate their students.*
6. *Institutions should front-load their efforts on behalf of student retention.*
7. *Institutions and programs should continually assess their actions with an eye toward improvement.*

As other models have established, the importance of assessment, ownership, collaboration, institution-wide coverage, and commitment are essential to Tinto's principles.

According to Matlou (2013), disadvantaged students, through no fault of their own, encounter many problems that negatively impact their studies. Some of these are the following:

- Language barrier/s: Most students come from backgrounds where English is not their first language. In addition to learning the content of the subject, students have to learn the vocabulary associated with the subject.
- Content knowledge gap: Students come from impoverished backgrounds where having a TV and a computer are luxuries. Thus, their general and background knowledge is insufficient for success in a module, unless effective measures are instituted.
- Transition from school to university: This is a problem faced by most FYE students, those in the normal stream as well. Getting used to a new environment and its new rules and regulations, meeting new people and adjusting to campus life are insurmountable problems for some students. Added to all the problems of the FYE, many students on the E4YP in IT also have a problem with a lack of confidence, poor self-image, fear of the unknown, and not being able to use the technology available.
- Diversity issues: A large number of students come from rural or township schools, or Afrikaans-only schools and are subsequently unable to interact with other racially mixed groups due to language and cultural barriers.
- Lack of role models: There is the likelihood of the student being the first in the family to access higher education and therefore has no role model to emulate, or to serve as a mentor.
- Financial difficulties: Another problem of many FYE students is that parents or guardians are unable to supplement the financial aid received through the university's financial scheme.
- Residential and transport problems: Students are unable to find suitable living accommodation, as university accommodation is mostly reserved for high-achieving students who are given preference. Hence, a large percentage of students have to commute to campus for long hours, which results in other financial implications. The FYE also becomes a 'narrow' experience – commuting long hours to and from campus, spending hours in lectures, preparing for tests or assignments, and returning back home for part-time work or other family responsibilities.

- Learning difficulties: Some modules are not easy to understand and contain facts that are difficult to remember. Students then employ superficial, rote-learning, which is temporary in nature and of no value as it is soon forgotten. Subjects that require a high-level of English proficiency are also problematic. During tests and examinations, students struggle to interpret the questions and cannot answer the questions properly.

The main aim of the E4YP is to identify at-risk students, place them in the E4YPs, with the sole intention of trying to increase the throughput rate of students who have been disadvantaged due to no fault of their own. Students are carefully selected and those who do not meet the exact requirements but who show motivation and/or potential to learn at a university, are given the opportunity to continue (Mundy, 2015). In line with the DoE regulations, all modules taught in the extended degree programmes have to be credit bearing, and have to be foundational to modules that students can build on and continue with in their later studies.

Different institutions have different ways in which they implement the extended degree programmes, but the basic premise is that the three-year degree is converted to four years to provide students with assistance in the gaps they may have. The curriculum of this additional year is specifically designed to provide additional academic support, foundational subjects, and up-skilling students to facilitate the transition between school and university. Students are introduced to mentorship programmes, workshops, and support programmes offering them all opportunities to attain success. Grayson (1996), however, indicates that to ensure student success, explicit attention must be paid to factors such as cognition, metacognition and self-efficacy. The course load in the first year is reduced with the level also simplified, but it must build-up gradually to that of a proper degree by the time the student has reached the fourth year of study.

Furthermore, students who embark on this programme have a much greater opportunity to succeed in their studies, as the programme provides dedicated support to students who need assistance to bridge the gap between school and higher education. It is very important that students do not feel stigmatised for being on the E4YP, rendering them stupid or weak when compared to students of the

prevalent and dominant university culture. There may be a tacit implication that only Black students are by their nature unable to proceed to mainstream programmes (Kioko, 2010). However, this thinking must be negated and the main concern should be that students, who otherwise would have been excluded, are now given the opportunity to proceed to a degree programme, albeit that it will take an extra year. The following are some aspects of the foundation support (Snyders, 2002):

- Additional modules help students to cope at university by focusing on the use of language in specific disciplines and study skills. Extra support is also given through career guidance and counselling. Holistic factors that impact on a student's life are also included (not only academic knowledge).
- Most of the instruction and learning take place in smaller groups. This allows individual attention and gives many opportunities for questions and discussion. Lecturers are sought from a pool of dedicated staff with the patience, skills and special attitudes needed to cope with students on an E4YP.
- In addition to small classes, students attend lectures in large groups where the teaching style is more formal, and in keeping with the degree programme. This is excellent preparation for the second phase of the programmes where students will be part of general university life.
- A variety of methods are utilised to deliver subject content to remedy possible gaps in school knowledge. The programmes focus on understanding and develop critical thinking skills as well as the practical skills needed to continue with the subject. Quality control of the learning material is done.
- The assessment and monitoring of the programme is done on a continuous and regular basis. Throughout the year students have to meet certain levels of academic performance. Failing to do so will mean that they are not allowed to continue with the programme.
- The development of language skills in English is indirectly enforced as the programmes are offered only in English.

First-year students are especially at risk of erratic to poor performance, academic disinterest, personal demotivation, and disengagement from studies due to a combination of factors (Jossberger et al., 2017). Students have to make drastic

adjustments in their transition from high school to higher education. Attendance in higher education is not compulsory; hence, students have to exercise a personal choice to be present and attentive at lectures. Even though student performance is monitored and measured continuously, poorly performing students are often identified, but very seldom mentored or coached on how to improve their academic results (Cox et al., 2015). Furthermore, students are exposed to the wider world that is alluring and distracting; hence, they can lose or change focus from the academic diligence required (McDowell, 2017).

2.4.2 At the University of Pretoria (UP)

Extended four-year programmes are offered to students in the following disciplines:

- BSc Mathematical Sciences
- BSc Biological and Agricultural Sciences
- BSc Physical Sciences
- BSc IT
- BIS (specialising in Multimedia)
- BCom

As this study concerns itself with the experiences of IT students, the researcher lists the admission requirements that are pertinent to the BSc IT and BIS students (both take IT as a major subject) (O'Brien-McElwee, 2013):

- National Senior Certificate (NSC) with admission for degree purposes
- An Admission Points Score (APS) of at least 26
- Mathematics level 4 (50 - 59%)
- Two languages, of which one has to be English or Afrikaans: level 4 (50 - 59%)
- Life Orientation: level 4 (50 - 59%) (Excluded when calculating the APS)
- Institutional Proficiency Test (National Benchmark Test – NBT)

In the years since the National Senior Certificate (NSC) (Grade 12) was introduced, universities have been unable to establish the predictive value of the NSC results (due to the rumoured upward adjustment of marks to meet norms set by the DoE). Hence universities use the NSC results together with the National

Benchmark Tests, NBT (2011), as an additional measure in their placement of students (Grayson, 2011; Engelbrecht et al., 2017).

The NBT is usually scheduled to take place during July and October of the previous year as indicated on the registration procedures of UP on the website (www.nbt.ac.za). As there are a limited number of places available at universities, all applicants meeting the requirements cannot automatically be assured of a seat in the faculty (O'Brien-McElwee, 2013).

At UP the curriculum of the E4YP in IT consists of fundamental, core and elective modules in each year of study. The degree is awarded upon successful completion of at least 513 credits as specified in the curriculum. UP identified the Mamelodi Campus (± 20 km from the Hatfield Campus) as suitable for the E4YPs, of which IT is one. The Naledi Residence situated in the Savannah Estate close to Mamelodi Campus is home to students on the E4YP who qualify for hostel accommodation. Other students are transported daily by bus to and from the Hatfield Campus. After the successful completion of their first year, students then move on to study on the main Hatfield Campus.

The study programme has two phases. During the first phase, which lasts 18 months (three semesters), students are trained and developed academically and psychologically for further studies. After successfully completing the first 18 months of the programme, they obtain credits equivalent to semester one of a three-year degree programme. They then continue their studies in the second phase where they join students in the second term of the normal three-year mainstream degree programme.

During the first part of the first phase, which lasts 12 months or two semesters, while the students are based on the Mamelodi Campus, the academic learning content is delivered at a slower pace than the normal programme, so that students have more time to engage with the subject content and develop a thorough understanding of the material. Additional modules help students to cope at university by focusing on the use of language in specific disciplines and study skills. Extra support is given through career guidance and counselling. Most of the instruction and learning takes place in smaller groups. This allows for individual

attention and platforms for questions and discussion. In addition to small groups, students attend lectures in large groups where the teaching style is more formal. This is excellent preparation for the second phase of the programme (O'Brien-McElwee, 2013).

According to Grayson (2011), the following five main principles guide the four-year programme and must be effected for the success of the E4YP:

- Support must be provided for students in the programme who are transitioning from high school to university;
- Student workload (time students spend working) should be high throughout;
- The volume of work (amount of content covered) should be low initially, and increase over time;
- Initial support should be high, but tapering off gradually;
- The curriculum should encounter familiar subjects initially, less familiar subjects later in the year; and modules must comprise mainstream modules accompanied by developmental modules that address students' need for a range of academic, life and cognitive skills, conceptual understanding and background knowledge.

In order to deliver subject content adequately, a variety of teaching styles and teaching methods are utilised to remedy possible gaps in school knowledge. The programmes focus on understanding and developing critical thinking skills as well as the practical skills needed to continue with the subject. The E4YP focuses on "*holistic support for students in terms of their personal, academic and professional development*" (Young, 2013). Progress is continuously assessed throughout the year to gauge whether students are meeting certain levels of academic performance. Should students fail to perform adequately, there is a possibility that after the first semester, or second semester, students will be dis-allowed to continue with the programme.

At the beginning of the next year, students move to the Hatfield Campus where they continue with the last part of Phase 1 (six months). During this time the instruction and learning pace is gradually increased. By the time students have completed the three phases (18 months), they are considered to have completed Phase 1, and move on to Phase 2. They then continue their studies in the second

phase where they join students in the normal three-year mainstream degree programmes.

During the second phase students who successfully completed the first phase obtain credits equivalent to the first semester of the first year of the degree programmes and may register for the modules of the second semester of a preferred first year in a degree (2nd Phase). Transfer to the second year of the specific programmes takes place in the third year of registration (O'Brien-McElwee, 2013). By this time, most students have developed the necessary skills and capabilities of their counterparts on the Hatfield Campus.

2.4.3 IT Students

In the HE landscape, much attention is given to computer literacy, implying the ability to use software in order to do word processing, spreadsheets, or presentations. This is a small subset of what is known as digital literacy that encompasses the "*capability to use current media or technology in a competent manner, the artefacts that digitally literate people produce, or the activities in which digitally literate people can engage*" (Mallinson, 2010). It is one of the aspirations of HE to ensure that "*every student is technologically literate, referring to the capacity to access and use networked computer resources*" (Snyders, 2002). Hence, it is a great challenge to ensure that all students who attend UP are computer literate. However, being computer literate does not guarantee that a student will excel in IT, the benchmarks between the two being distinctively different and needed to be pointed out to students prior to their commencing with the degree.

Students in the E4YP in IT come from a colourful plethora of backgrounds. To gain entry to degrees offered in the Computer Science Department, students are not required to have prior knowledge of Computer literacy/computing and/or programming. Students arrive at the university fresh-faced, confident and full of excitement of what the first year has to offer. Unfortunately, the first year becomes a "*roller-coaster*" ride for many students (Powell, 2005). Thus, the suspicion is that many students undertake to study IT having the hobbyist idea of IT and have inaccurate expectations of what is required of them. It is also possible that students perceive studying IT-applications for diverse fields, such as robotics,

artificial intelligence, cognitive science and bioinformatics, none of which is taught in the first year of study (Powell, 2005). Others do so due to parental pressure and encouragement as IT is perceived to be a lucrative and noteworthy career. Unfortunately though, there are also students who undertake studying IT, not fully having an idea of what this entails, but use it as a stepping stone to other programmes, with the main objective of getting a qualification that will enable them to grow, prosper and enrich their lives.

In a previous study completed by the researcher in 2009, it was noted that students who had registered for the E4YP in IT, had not completed the course after the stipulated time of four years. Students mainly had either the modules Mathematics (WTW) or Computer Science (COS), which were still outstanding at a certain level and prevented them from meeting the criteria for continuing onto the second year of their degree course. This then extended the four-year degree by a further minimum of six months. Unfortunately, in some instances, when a student had after several attempts still failed the module, it resulted in the university applying the exclusion policy to students who failed to complete the degree during the negotiated stipulated time. In some instances students appealed against the decision of the faculty, and if properly motivated, a reprieve was granted and they were allowed to remain for a further semester, but had strict rules and conditions imposed upon them.

It was evident from the results of these three consecutive years that the students who performed poorly in the modules Computer Science and Mathematics in the E4YP in IT in their first year, did progressively worse in the subsequent years in this area. From a perusal of the academic records of students, it was apparent that some students who performed poorly in IT changed direction by either following another degree in the SIT that did not require programming (mainly BIS Information Science), or disappeared from the EBIT radar. This implied that they had changed to another degree programme in another faculty, or dropped out of university.

According to Tinto (1975) and Tinto (2000), student success hinges greatly on academic and social integration. Therefore, to promote student involvement, the IT modules should strive to include co-curricular activities or projects that

encourage student interaction. The incumbents of the university should ensure that E4YP in IT students have the opportunities of being properly integrated into the university system so that they have a "*sense of belonging, a sense of achieving, and a sense of being part of a 'community of students*" (Tinto, 1975; Tinto, 2000). Most new students have a tendency of focusing on their academic goals only and lose sight of the balance needed between academic and social experiences. There is no doubt that the workplace seeks employees who have both academic and social skills. Tinto (1975) points out the following:

"Other things being equal, the higher the degree of integration of the individual into the university systems, the greater will be his commitment to the specific institution and to the goal of university completion".

Once the platform is provided by the university, only then will students begin to settle down and collaborate with their peers, and understand that they too can be part of the present technological era (Postner and Stevens, 2005). They can also be capable of solving every problem and passing every test, but if a student does not see the possibility of success, they are unlikely to become anything in any genuine sense of disciplinary participation. Students are more likely to leave their studies when they feel they are treated differently because they belong to an under-represented group, or if they are not at the same level as their peers (Giannakos et al., 2016; Griffin et al., 2016).

The role of parents and other stakeholders in providing unconditional encouragement and support to struggling IT students cannot be over-emphasised. It is essential that universities "*create a profile of incoming students*" (Keup, 2013). This will allow the university to "*identify students at risk of failure, as well as those with a reasonable chance of success*" (Keup, 2013). Hence, universities should be cognisant of this and acquaint themselves with the following aspects:

2.4.3.1 Demographics of IT students

UP's diverse student population makes it hard to describe the typical IT student as students enrolled for the discipline come from all over South Africa – from cities, suburbs, small towns and farms; from government and private schools; from every ethnic and religious background; and from across the economic spectrum.

Pascarella et al. (2005) note that factors such as students' race, gender, academic ability and parental education, all impact on how a student will perform. Thus, as a point of departure, it is important that universities understand where today's IT students come from (place of residence, type of background, reason for selection of courses, etc.) (Keup, 2013; Holton, 2015). Students entering university do so from positions of extreme inequality, most obvious in schooling, but also in terms of financial and other resources. The problem is that no two students are alike. They have different backgrounds, strengths and weaknesses, interests, ambitions, sense of responsibility, levels of motivation, and approaches to studying (Felder and Brent, 2005; Masika and Jones, 2016).

For many students the first year of study is the first time they venture so far beyond the confines of their homes, without close parental guidance, and they often find that they are ill-equipped to handle the challenges of the FYE (Feldman and Zimbler, 2011; Adamo, 2017).

High poverty rates can have a definitive impact on academic ability, socio-economic status, and other factors that could lead to student regress (Klein, 2013). Educationally disadvantaged students are generally those students who attended previously non-White schools and did not have adequate opportunities to develop their academic opportunities. Their failure is "*attributable to a lack of basic skills and of fluency in the strategies that lead to success in university such as time management, writing ability, effective reading strategies, note-taking skills, and the knowledge of test-taking strategies*" (Feldman and Zimbler, 2011). Regarding subjects such as IT, some students do not have the background ability to understand the complicated language of programming. Furthermore, *"if students are not convinced they can learn this new language, they will not learn it*" (Barr and Guzdial, 2015). They simply lack the background to succeed at taking an IT degree at university level, due to not having been exposed to the teaching of IT previously. However, the interest and eagerness shown by these students to be part of the educated society of South Africa cannot be denied. Therefore, it is imperative that HE institutions identify, select and direct students to appropriate study disciplines (Ognjanovic et al., 2016), so that despite their educational disadvantages, they have the potential for success.

The most important influence upon choice of institution is its reputation, followed by geographical location (De Jager and Du Plooy, 2006). One of the reasons why location is important to students is that academic facilities (such as the library) are available at the site of learning, ensuring the use of the Internet and Wi-Fi facilities. It has been said that an institution's actual quality is often less important than its reputation for quality, because it is its perceived excellence that guides the decisions of prospective students (De Jager and Du Plooy, 2006). HEIs can build their academic reputation with marketing activities, such as open days and school visits as well as communicating the availability of bursaries, and the institution's national and international standing. E4YP students in IT on the Mamelodi Campus are provided with the same educational resources as those provided on UP's Hatfield Campus, albeit on a smaller scale. Should students need to work after university hours, their student cards give them full access to the facilities on the Hatfield Campus.

Certain aspects of demographics have an effect on the performance and success of the educational institution being described. When large numbers of students do not speak the dominant language of the area, low levels of academic success can often result. Merton (1957) defined socialisation as "a *process by which people selectively acquire the values and attitudes, the interests, skills and knowledge – in short, the culture current in the groups of which they are, or seek to become a member*".

Despite their diversity, all students come to HE in order to improve their lifestyle. It is within the first year "that students must be inspired, supported, and assisted in realising their sense of belonging, not only for early engagement and retention, but also as foundational for later year learning success and a life-time of professional practice" (Kift, 2009). In the E4YP for IT on the Mamelodi Campus, students display enthusiasm, eagerness and persistence in wanting to move through the first phase of the degree.

In designing a course for IT, the first task is to introduce students to the concepts of "computing and a computer, and to present a hierarchy of IT knowledge from basic to advanced levels through the introduction of a syllabus system, research trends, IT applications in society, ethics and career potentials in IT" (Son et al.,

2012). These sections are generally divided into a first course (semester 1), which comprises the “introduction to a computer, computing, internet, ethics, and technical skills of analysis, design, implementation, and testing” (Son et al., 2012). The second course (semester 2), comprises the “hierarchy of IT knowledge from basic to advanced levels through education systems and research” (Son et al., 2012). Students are presented with some experiences about the project-based approach for laboratories and informed how personal skills and professional attitudes are trained (Son et al., 2012). The idea is to teach students about the wider application of IT in society locally and internationally, so that once the course is studied, they will have another view of their role in IT and it will help students to think and navigate their future career in IT.

2.4.3.2 Female students

All HE education institutions have seen an increase in the number of females entering their institutions, including the E4YP in IT, even though they are still in the minority. It is a well-documented fact that females face many more challenges than men when they have to study. These include the risk of physical abuse, the phenomenon of teenage pregnancies, economic and physical deprivation, racial and gender stereotypes, and the unequal roles that they play compared with their male counterparts within the confines of their homes and immediate environment (Clark, 2015; Palmer et al., 2017). Despite all of this, women have proved to be resilient and persevere in achieving success.

In all universities the female population doing ICT-related subjects such as IT is normally one third of the total population. According to Powell (2005) and Palmer et al. (2017), even though many female students surpass the entry requirements for the IT degree, they are usually loathe to pursue the IT route for several reasons. In her doctoral dissertation on “*Women’s experiences in the first year of a computer science program*”, Powell (2005) focused on the problems and the solutions of women progressing in a male-dominated arena.

In both Powell (2005) and Gallos's (2017) studies, female students spoke of how “*inadequate and stupid*” they felt in the IT classes due to their male counterparts having experience and more knowledge than them, especially when they expressed boredom when the lecturer had to explain elementary concepts.

Consequently the women felt too intimidated to ask questions, and then lost confidence in their ability to continue in the module (Clark, 2015; Gallos, 2017). It was later revealed through statistics that in actual fact the vast majority of males in the class feigned to be familiar with the material being presented, with only few having proficiency.

Female students were encouraged to use the terminology of IT when completing tasks and engaging in IT. This would allow them to gain acceptance by their peers in the discipline. Powell (2005), Clark (2015) and Gallos (2017) speak of students needing to learn to "*talk the talk*" before they can "*walk the walk*". Failing to integrate themselves adequately into the IT community resulted in social isolation, partially as a result of their gender minority status.

With IT being a dynamic field that changes rapidly by the day, students need to be exposed to new programming languages, new software packages, and new methods of doing. While many female students are able to cope, there are many who struggle and according to Powell (2005), "*spend inordinate hours doing tasks due to the lack of programming experience and familiarity with computing tools*". Many female students do not select ICT-related modules because they dislike the "*passivity of the computer, the narrow focus of programming courses, and the violence, redundancy and tedium of computer games*" (Gorski, 2002).

It is suggested by Powell (2005), Clark (2015) and Gallos (2017) that IT departments should welcome female students into a "*community of students*" that could support them both academically and socially, and provide a climate of trust and safety. These forums could serve as platforms where students could "*share ideas, solve problems, feel comfortable with each other, engage in the process of becoming computer scientists, and have fun doing it*" (Powell, 2005). Research has demonstrated that learning, academic performance and retention rates are associated with students' interactions with their peers, with faculty, and the involvement in out-of-class activities (Astin, 1993; Pascarella et al., 2005; Tinto, 1993; Tinto, 2012). Female students should be given opportunities to work collaboratively on projects with their male counterparts, where ideas can be exchanged and preclude the loss of confidence and isolation that some female students experience.

Powell (2005) refers to "*paired programming*" in IT, where students write a program collaboratively using one computer. The "*driver*" controls the manipulation of the task – controls the keyboard and mouse and enters the program code. The "*navigator*" watches for errors, concurs on design approaches and offers suggestions. At some point they change roles. Werner et al. (2005) note that students who paired most often handed in programs that worked. Women benefitted greatly from the paired programming as they were more confident to submit work and this indirectly closed the gender-gap.

Powell (2005), Clark (2015) and Gallos (2017) all stress the fact that women faculty members, especially those who perform multiple roles such as professors, researchers, wives and mothers, should serve as examples to female students that combine an academic role in IT and a satisfying home and family life.

2.4.3.3 Accommodation

In line with Maslow's hierarchy of basic needs, the need for housing and proper accommodation is a primary identified need and is no doubt a factor that influences academic success. For as long as students feel isolated and struggle with basic needs such as accommodation, food and finances, they will not perform to their optimal level. HEIs need to address this shortcoming with urgency, as students will otherwise not make sense of their new academic environment if their primary needs are lacking. The South African context with its multitude of problems results in students not only struggling to pay their fees, but are also responsible for their basic needs such as food, transport and accommodation. Obviously then, being hungry and homeless will detract from the students' ability to apply their body and mind to academic success (Van Zyl, 2013).

There is a general consensus among researchers that university students are more likely to complete a degree if they come from higher-income families, have parents who went to university, have stronger academic preparation in high schools, and enrol in university shortly after high school (O'Donnell and Blankenship, 2017). Despite this finding, the HSRC (2008) has highlighted that since 1994 South Africa has seen the increased migration of the black middle classes from townships to previously privileged whites-only suburbs, and their

children now have the choice to attend Model-C schools (former White schools). It is the determination of most parents that their children are educated ensuring a better standard of living for themselves. However, it should be stressed that despite this statistic, vast numbers of students are still trapped in poverty in the townships and rural areas. Illiteracy and unemployment are still major problems facing South Africans as a fair number of university students still live in informal settlements or other cramped living quarters and study under extremely difficult conditions (Vertovec, 2015; Ross, 2017).

Many underprivileged students arrive at the gates of HEIs in awe of this new environment. In their resolve to promote institutional integration, it is important that universities conduct a comprehensive induction programme that introduces students, both urban and rural, to their surroundings on campus, and the immediate environment outside of it. If the student is living away from home for the first time, it will be less intimidating and allow the student to be comfortable in the area he or she resides in. Strange though it may sound, these are all factors that are necessary to ensure that students do not drop out of university. According to Tinto (2013), universities must encourage a "*sense of belonging*" shaped by "*a complex array of forces, not the least of which are the students' own perceptions of how others in the environment perceive them*". Students would feel more at ease if the ratio of students to administration, staff and faculty "*are reasonably representative of the students who attend the university so that they can form sustaining student communities*" (Tinto, 2013; Coldwell et al., 2016).

2.4.3.4 Language of instruction

South Africa is a multilingual society with 11 official languages. This diversity is clearly reflected in the student population of South African HEIs. A study by Czerniewicz and Brown (2005) on higher education students and academic staff's access to and use of computers in five South African universities, found that 39% of respondents spoke English as a home language and 54% spoke other languages. English, which is the language of instruction, is therefore a second, third or foreign language for many South African (and international) HE students (Van Rooy and Coetzee-Van Rooy, 2015). In trying to improve their vocabulary, especially when it is subject-related to IT, some students hear the words for the first time in their lives. Students are faced with learning and studying a subject,

which is content-related in a different language, than their mother tongue. Thus, they are faced with the problem of content literacy, which Tinajero and Hurley (2001) defined as "*the ability to use reading and writing to learn subject matter in a given discipline and how a student uses literacy to learn*". It has been noted that, the higher the student's proficiency in the language of instruction, the better the academic proficiency in the course or module (Pather and Chetty, 2016) .

It is unfortunate that many students are not afforded the opportunity to read for pleasure, due to community libraries being under-resourced, or students not having the time (or resources such as electricity) to read for pleasure. IT students are noted for struggling with time-management issues as their assessment comprises of writing or coding of programs that need to be submitted, which results in these activities occupying their every moment. Students who struggle with the trials of daily life do not have money to waste on buying books to read (Van Zyl, 2013). Thus, a lack of fluency in the language of instruction, coupled with a poor schooling background, leaves students greatly impaired and disadvantaged.

2.4.3.5 Mother's education

According to Walker-Smith (2016), the Ghanaian scholar, Dr James Emmanuel Kwegyir-Aggrey (1875-1927) had very wisely said:

> *"If you educate a man you educate an individual, but if you educate a woman you educate a nation".*

Pilcher (2017) alludes to this when she notes that "*women are the mothers of our future generation*". Children with educated mothers have academic achievement of a higher level than children whose mothers are not educated (Crede et al., 2015; Clark, 2015; Monaghan, 2017).

For the first six years of its life, a child is dependent on its mother, who will impart the knowledge and skills she has to her child (Kellaghan et al., 1993; Pilcher, 2017). A survey of the research literature by Kellaghan et al. (1993) shows that "*the home environment is a most powerful factor in determining the school learning of students – their level of school achievement, their interest in school learning,*

and the number of years of schooling they will receive". The mother obviously plays a prominent role in the educational and professional choices that a student makes. These choices are influenced by the financial position and mother's level of education, culture, mentality and ideals. The mother's professional model, her ambitions and desires for the child's professional status, the mother's philosophy about life, and her attitude towards the social status of professions or her prejudice against others, greatly influence her children (Crede et al., 2015; Clark, 2015; Zimmerman et al., 2017; Monaghan, 2017). These factors guide the student to a choice of profession that is directly, or indirectly imposed on him/her by the influence and natural motivation of the mother. Family environment influences the emotional and mental development of the children, the motivation and the values that will guide their lives (Zimmerman et al., 2017). It is argued that by virtue of the time spent with their mothers, children are more exposed to their mother's values, aspirations and attitudes than those of their fathers. Therefore the importance of the mothers' socio-economic characteristic influence on their children's educational and occupational attainment has to be acknowledged (Marks, 2008).

However, there are also certain aspects that cannot be taught from a book – motherly instincts, the ability to teach morals and standards, and so on. Children who have mothers who are educated perform better in tests as they have someone to monitor and teach them, assist with homework and generally provide a better quality of living for their children. In some instances children who have no support and assistance from their mothers often drop out of school since their parents do not understand or value education (Crede et al., 2015; Clark, 2015; Schunk and DiBenedetto, 2016; Monaghan, 2017).

As a direct contradiction a study carried out on uneducated Mexican immigrant mothers' influence on young children, Schaller et al. (2007) indicate that their "*positive attitude manifested in daily pro-educational behaviours to both motivate their children to pursue academic success, and participate in the children's learning*". Furthermore, according to Hernández et al. (2016), Mexican children's "*competence and educational expectations*" are not compromised by the mother being uneducated.

2.4.3.6 Perceived family income

There is a large and growing body of literature on the role of family background, that is, income and socio-economic status in determining student success (Blanden and Gregg, 2004; Heckman and Carneiro, 2003; Meghir and Palme, 2005; Haveman and Wolfe, 1993; Watkins and Howard, 2015; Benner et al., 2016). Their studies have found "*family background to be an important determinant of educational achievement*" and suggest that the "socio-economic gap in educational achievement" emerges (Dearden et al., 2011). According to Cofer and Somers (2001) the most demographic risk factor that influences student retention is a student's financial status (Kruse et al., 2015; White and Perrone-McGovern, 2017).

Universities with a greater percentage of students from middle class, university-educated families, or from cultures that emphasise the value of education, often have higher levels of success. Children of well-educated parents will have the incentive and motivation to aspire to greater heights by completing the programmes for which they enrol. The higher income of the parent ensures that the student has the means by which to continue with studies over the stipulated period of time. In South Africa, students from low SES are dependent on the National Student Financial Aid Scheme (NSFAS) for financial assistance (Ziderman 2005), which is mostly insufficient to cover all their educational needs. This lack of money, (Bonham and Luckie, 1993; Kruse et al., 2015; White and Perrone-McGovern, 2017) is a significant contributor to attrition.

Most often the scenario depicted is that students from poor households have to work either full-time or part-time to meet their financial responsibilities – sometimes to support a family or an ill-parent, or to help the other children in the household to attend school, or just to ensure that they can put a meal on the table (Pascarella et al., 2005). As a result students lose lecture time and are unable to cope with the module demands, and find themselves in conflict with the work situation. The absolute need to work then supersedes the need to study, and results in students withdrawing from the university experience.

2.4.3.7 First-generation university student

Today's common definition of the first-generation student is still derived from the coined definition and refers "*to a student who is the first in his/her family (mother, father, or siblings) to complete a university education*", or a student *whose parents have had no university or post-secondary experiences* (Payne, 2007). However, there is a possibility "*that family members may have attended or may be concurrently attending, but have not yet completed either an associate or bachelor's degree*" (Payne, 2007).

Lopez (2016); Hutchison (2017); Castillo-Montoya (2017) and Vega (2017) are all of the opinion that entering university is a daunting experience for most students but more so for students coming from disadvantaged schooling systems with little if any preparation for the experiences and expectations of university life. In the South African context there are added stressors arising from student under-preparedness due to historically disadvantaged schooling, language medium barriers and financial constraints and the lack of parental figures to advise or understand the commitment needed for success, the amount of time needed for studying, and the expenses associated with university education (Lopez, 2016; Hutchison, 2017; Castillo-Montoya, 2017; Vega, 2017). Parents are often not able to counsel their children in matters related to university education. The sum of these factors equates to limited opportunities for reaching potential and achieving success, adds strain, and creates psychological distress and adjustment difficulties to the first-time entrant attempting to cope with the new environment – academically, socially and emotionally (Conley, 2010).

After 1994 colleges and universities saw the influx of a diverse group of students, many of whom had the "*first in the family*" experience of university in the family (Feldman and Zimbler, 2011). In addition, O'Shea et al. (2016) contends, educational institutions became increasingly accessible to women, and students from low-income families. The new educational landscape resulted in the profile of the undergraduate student body changing with respect to students' age, enrolment status, attitudes, family conditions and physical and psychological health, as well as gender and race/ethnicity (Pascarella et al., 2004).

As defined by Feldman and Zimbler (2011), "*first in the family*" students could further be divided into those who had a sibling attending university before them. The situation would be just the same – "*the incongruence of background experiences, and the ways of being and doing at higher education institutions*" (Feldman and Zimbler, 2011). Obviously, the lack of parental influence, or close family, leaves the student trying to cope on his/her own. This in turn makes the gap (between previous life-experiences and the challenges posed by higher education) deeper and wider (Vosloo and Blignaut, 2010).

There is no doubt that first generation students face challenges unique to themselves and that are critical for those in higher education institutions to understand. In the initial stages, the attitude of the higher education institutions was one of swim or sink. However, once the revolving door effect of students entering and leaving the institution in quick succession was seen, where even though admission numbers increased, retention numbers for first-year students grew disturbingly low, HEIs knew that it was time to take charge of the situation. As noted by Feldman and Zimbler (2011), "*when the number of first generation students enrolling in university was unprecedented, it became clear that orientation programmes needed to be implemented, sufficient resources needed to be devoted to help this group to prepare for, transition to, and succeed at university*"

One of the biggest challenges is related to shortcomings in academic and life skills, and students may also struggle with time management, studying and test skills, due to their other family responsibilities (Peterson, 2016; Tovar, 2015). Some students have learned from previous school experience that very little effort resulted in good results. Hence, to their detriment, they use this model of inadequate study habits when they arrive at university, resulting in devastating repercussions. There is no doubt that financial obligations and lower income rates often affect retention rates as there is a constant worry as to how tuition fees will be paid. Sometimes the lack of a mentor to advise on how to procure a bursary, loan or a grant is also a factor that causes financial strain on the student (O'Brien-McElwee, 2013).

Furthermore, on entering the university portals, the "*first in the family*" student is confronted with two contrasting cultures – the one he has left behind, and the new one that he struggles to identify with, but which he has to become enculturated with (Rodriguez, 1974; Namenwirth and Weber, 2016). When students are accepted into university they have every reason to celebrate – they will be venturing out into whole new, unexplored territory since no one else in their family has gone to university previously. The pressure is bound to get to them, as in some instances they do not bring only their own expectations to the situation, but those of their family as well. The student is expected to stand up for himself, shape his own education, and take what the institution offers (May et al., 2016; Storm and King, 2016; O'Shea et al., 2017).

The evolution in the demographic profile of students entering higher education indicates that on arriving at university, the student will not immediately find it to be a second home. There will be lots of challenges considering that there will be no role model from home to emulate (May et al., 2016; Storm and King, 2016; O'Shea et al., 2017). The challenges include personal, academic and financial problems, but with the programmes that the university implements, it is anticipated that the first-year student should settle down and use the intelligence and skills that ensured that he was able to gain admission into the university (Kift, 2009).

According to Terenzini et al. (1996) first generation students are entering universities in increasing numbers, and their numbers can be expected to continue to grow over the next decade, both in total and as a proportion of the total undergraduate student population. Due to their different characteristics and experiences compared to the traditional first-year student, they are a group at risk, and must be given special attention if they are to survive in the university environment. Student advisers should be appointed to assist students to navigate the normal day-today life of the campus; they should be knowledgeable of campus and community resources so that they can provide referrals should students inquire about matters that may be barriers to their success. Campus resource information includes financial aid, campus employment, counselling services, adaptive education services, mentor and tutor services, and workshops that focus on life skills. Community resources include childcare provider information, state or country financial assistance programmes employment or internship information,

and transportation ideas (Payne, 2007; Coleman et al., 2017; Adamo, 2017; Aruguete, 2017).

At the other extreme, as noted by Feldman and Zimbler (2011), the social freedom of university, where the first in the family student has to manage his/her own finances, structure and organise time, moderate alcohol and drug consumption, may lead a student down an unproductive path until such time as he/she is able to achieve some level of control. However, all of this is a steep learning curve for the student, who will view how other students behave, and adapt their behaviour accordingly.

Consequently the university should strive to create communities of learning where students with the same skills and interests can be encouraged to act as guides and in so doing, encourage collaborative learning and make the university experience a more fulfilling one for its students (Tomlinson, 2014). It has been found that students in learning communities are more likely to pass a set of courses than those not in a learning community, and are more likely to enrol the following year for further study. Furthermore, students that are supported and encouraged by a learning community are more likely to believe that their coursework emphasises higher order thinking skills. Learning community students have been found to be more engaged and to have a stronger sense of learning (Zhao and Kuh, 2004; Feldman and Zimbler, 2011; Wlodkowski and Ginsberg, 2017).

According to Rendon (2017), not all students benefit from out-of-class validation. As first-generation university students, many minority students are not encouraged by their peers, who make them feel as *"though they were wasting their time attending college*" and trying to get an education (Moreno, 2016). In other instances, family members discourage students from studying as they believe that the student should rather work and generate an income to sustain the family. One may not think of this as a challenge, but for the first generation university student there exists a real challenge as the immediate family members "*who have no experience of university or its rewards may be non-supportive or even obstructionist*", rendering the student isolated and alone on this journey to get an education (Rodriguez, 1974). Thus, they risk the alienation of family

support. While they feel significant pressure from the financial commitment their parents have made, they are less likely to believe their parents have an understanding of what university is all about. It is up to the institution to retain and nurture these students and prevent them from being part of the attrition statistics.

Tinto's (1993) theory of student departure is a widely cited theory for explaining the student departure process. However critics have lambasted it "for its failure to recognise cultural variables when applied to minority students". Tinto (1993) asserts that students should "break-away" from past associations and traditions to become integrated in the culture of the institution.Given that minority students' cultural bakgrounds often differ from the Eurocentric frameworks upon which the norms and values of at predominantly White institutions are based, Tinto's theory "rooted in Western paradigm, ignores bicultural integration, or the ability of minority students to to succeed at college while being part of both the majority and minority cultures" (Guiffrida, 2006).

Therefore it is the responsibility of academic staff members to try and understand "where students come from, their cultural histories, as well as life experiences, to assist in incorporating all students into the teaching and learning environment" (Rendon, 2017). It will always be of benefit if the lecturer understands the diverse backgrounds from which students come, e.g. the language they speak, the areas they come from, and their levels of proficiency with the language of instruction. The lecturer must communicate the fact that all students in the lecture room will be treated fairly without any prejudices (Nussbaum, 2002; Brookfield and Preskill, 2012; Brookfield, 2017).

In order to show students that the lecturer is genuinely interested in their welfare, students can be asked general questions with regard to their individual situations – *Who still does not have accommodation? Are they travelling long distances to get to campus? Who needs help in getting settled in the area?* and so on. With regard to the latter, the lecturer can ask for volunteers to assist those students who are coming from outside of Pretoria. Furthermore, the lecturer must be cognisant of the fact that many students are from low-income homes, and in many cases, where the grandparents are the carers, with limited resources (Mills et al., 2005; Hubbard, 2016; Spiteri, 2017). The chances of the student arriving at

university without having had anything to eat are a reality. The caring lecturer will be able to identify and direct students to the student support departments where cognisance has been taken of the situation, and structures to assist are available. Sadly, the most fragile students, in the absence of "*in-and-out-of-class validation*" will most likely fall out of class (Rendon, 2017).

2.5 REASONS FOR STUDYING IT

The use of technology is embedded in the culture of today's youth. The Internet is their playground and with the sophistication offered by mobile cellular phones, students are able to interact with friends and family quickly, and at a reduced cost. The beginning of a semester sees many students registering to study IT, but by the end of the semester, the interest has waned and many either drop out, transfer to another department, or are not allowed to continue in the field of study due to their poor results.

The researcher strove to find the reasons why students choose to study IT. The following aspects were deemed to be relevant, and will be studied further:

- Motivation to study IT
- Learning about IT
- Family member is an IT graduate

2.5.1 Motivation to study IT

Many students arrive at university not having had career guidance, and perceive someone studying IT as excelling in Mathematics, and therefore consider IT to be a better discipline for intelligent students. In other cases, students have been motivated by parents, mentors and teachers to enter the IT field. A large number of students indicate that IT has always held a fascination for them, while others regard a career in IT as a precursor to get a better job, of one day being financially secure and generating sufficient income to raise a family, and also becoming an authority in their field. The perceived usefulness – extrinsic motivation – and ease of use of IT, and enjoyment – intrinsic motivation – seemingly through the endless hours of playing computer games, are all relevant factors for choosing IT as a career (Ozoemelem, 2009; Akbar, 2016; Pwadura et al., 2017). This is corroborated by Dick and Rallis (1991). Akbar (2016) identified the following major reasons for IT as a career choice:

- Students' beliefs about themselves (self-concept);
- Perceived relative values of different careers (career values), determined by intrinsic (e.g. interest) as well as extrinsic factors (e.g. salary);
- Interpretation of past experiences; and,
- Perception of attitudes and expectations of socialisers (e.g. parents, teachers).

Tanenbaum and Woodhull (1987); Magana et al. (2016) and Matthews et al. (2016) all concur that students arrive at university with a range of abilities and backgrounds, with novices having to share the learning space with students who are proficient in programming. This disparity in IT-related abilities is a significant challenge for lecturers confronted with this diversity in class. On one end it would be students who are not computer literate, and on the other end would be students proficient in programming. Bain (2011) and Brookfield (2017) indicate that sometimes lecturers are also confronted with students whose motivation bears little relation to the field of study, as they perhaps see the E4YP in IT to be a stepping-stone to other departments.

A good point of departure when students choose IT as a field of study is to "*to explore students understanding of IT*" (Coleman et al. 2015). It is obvious that the term IT clearly "*means different things to different students*" (Ramsden, 2003; Tanenbaum and Woodhull, 1987; Magana et al., 2016; Matthews et al., 2016). A greater number of students defined IT to include the active components of IT (e.g. problem-solving, application of Mathematics and Science skills), in contrast to the thinking component of the definition (e.g. brainstorming, critical thinking, problem-solving, improving mankind) (Gredler, 2004; Swartz and Perkins, 2016).

Atman et al. (2010) from The Centre for the Advancement of Engineering Education (CAEE) Research Brief 3 point out the following:

"This attitude combined with a high failure rate and a low throughput rate for first-year undergraduate students has resulted in a need to change how the curriculum is taught. As part of this process each course was evaluated to identify the problematic courses. Through this process it was discovered that students were

expected to learn programming without completing a course in computer literacy. It was noted that the campus has a majority of rural students, many who have little to no experience with computers which adversely affects their success. To address these issues a new curriculum was designed".

2.5.2 Learning about IT

Dahlstrom et al. (2013) postulate that the factors that have had the greatest influence on students' attitudes and behaviours with regard to learning about IT are the schools, parents, media, senior students, faculty members and administrators. Students are impressed by the manner in which Computer Literacy and Computer Science is taught at school. They own laptops and desktops and have become highly proficient gamers. However, this skill is far removed from the skills needed to do programming, or to study IT.

Students have recognised that the career aspirations of being in the IT field will yield high salaries and status. The uniqueness and the usefulness of the work regarded as a scarce skill will gain the student a place in the working environment. Parents will positively encourage the student to embark on this career path as it could bring a degree of status in the community. Some students even have the idea that by being involved in IT, they can combine their hobby (playing computer games, etcetera) with their study direction (IT). Earning a lucrative salary can be an important factor in the career choice as the student may be influenced by his/her experiences of IT-related activities (Myburgh, 2014; De Vos et al., 2016).

2.5.3 Family member is an IT graduate

According to Pike and Kuh (2005), the culture and people that surround students on a daily basis can shape their decision to pursue a certain career path. Parents are able to steer their children to a particular career they feel is right, or encourage students to follow in their footsteps. The racial or ethnic background or the region where students emanate from can also create expectations about the type of career they pursue (Rashid and Asghar, 2016; Glass et al., 2017) as some cultures may place a higher value on a professional career in medicine, law or teaching.

Youths in more affluent communities appear to have more family and school support in career exploration, which results in consideration of a wider range of career options. Parents, followed by other family members, provide valuable learning experiences through their own role models and supporting activities that assist in exploring career interests. Work-bound youth's parents frequently teach skills that provide students with a broader understanding of their own aptitudes contributing to career choice. This has an immense influence on how students choose their careers (Eccles and Harold, 1996; Chan, 2016; Xiao et al., 2016).

2.6 SKILLS NEEDED BY IT STUDENTS

First-year IT students face a wide variety of challenges as they enter the university arena. While IT may appear to be a wonderful choice, it has been reported by O'Brien-McElwee (2013) that first-year programming courses have a relatively high failure rate. The causes of the high failure rate could be related to a number of factors, the most important being that many students are already second language English speaking students who are now confronted with having to learn another language, namely that of programming. It has been noted that many students struggle with "*conceptual difficulties with elements of the curriculum that require abstract and logical thinking*" (Hagan et al., 1997). Peppard and Ward, 2016; Kabra et al., 2017). Therefore, it is extremely important that lecturers help guide novice students through the learning process so that they develop the important skills needed to be an IT professional (write and code programs, etcetera) (Hagan et al., 1997; Peppard and Ward, 2016; Kabra et al., 2017).

IT professionals, by definition, are the people who "*create, maintain, and fix the software and hardware*" used to manage information (Bennedsen and Caspersen, 2007). All IT careers require a similar set of basic skills; an understanding of mathematical concepts and a high degree of skills in data manipulation and multiple step logic is required. Communication (verbal and written), teamwork, and the ability to understand a wide range of perspectives is critical. Problem-solving, reasoning, analytical, time-management, and detailed orientation and mental focus are crucial and most necessary skills (Myburgh, 2014).

Some relevant skills needed for IT professionals are listed by Trans et al. (2013) and Kabra et al. (2017):

- Deal making and meeting skills – to have knowledge and interpretation of business functions and be able to develop appropriate technical skills;
- Communication skills – to communicate and work closely with users and maintain a positive user or client relationship;
- Project management skills – the ability to plan, organise and lead projects;
- Team player – the ability to work collaboratively in a team project environment;
- Teaching, mentoring and knowledge sharing – the ability to train others in a group;
- Vendor management – the ability to develop and deliver effective, informative and persuasive skills; and
- Contract negotiation – the ability to write technical documentation and reports.

McKeachie and Svinicki (2010); Brabazon (2016); García-Peñalvo (2016) and Dahlstrom et al. (2013) contend that the goal of universities in teaching IT is the following:

- To get students to master core programming skills.
- To teach the ability to reason logically and solve problems.
- To implement solutions to those problems.
- To cultivate the ability to synthesise ideas.
- To get the student to be professional and ethical.
- To propagate the ability to communicate ideas to others.
- To instil in students the desire and ability to develop and educate themselves further.

According to Grossman (2012) and Voogt et al. (2013) the most popular IT professions in the current market are the following: Programming and Application Development, Project Management, Help-Desk/Technical Support, Security, Business Intelligence, Cloud, Virtualisation, Networking, Mobile Applications and Device Management, and Data Centre Management.

2.7 GRADUATES AND THEIR FUTURE CAREERS

“The real world is a big change, more than you can ever imagine when you are sitting in the classroom thinking about the outside world!” – Anonymous business school graduate.

The above quotation could possibly be a mantra for all graduates leaving the safe confines of university and venturing out into the world of work. Many IT-graduates are now faced with the ordeal of job-hunting, attending interviews and facing the reality that having a degree is not the key to walking into a job. The successful transition from life as a student to life as a productive employee is often chaotic and stressful. Armed with a degree, the graduate is still not confident as soft-skills such as “*adaptability, open-mindedness, problem-solving, decision-making, communication skills, self-learning and knowledge discovery, empathy and teamwork, motivation and attitude encompassing initiative, perseverance in adversity and ability to motivate others*” continue to be relevant factors in the workplace (Pratt, 1984). Moreover, the graduate soon finds out that what is covered in the syllabi of the university, and what is practised in the work environment, are vastly different. The conflict of expectations and reality of the workplace proves to be a shocker to a new graduate.

However, in order to make the transition smoother, Dwyer and Wyn (2004) and Sykes (2017) recommend that graduates be aware of the pitfalls that follow the transition process and makes mention of some issues that will confront them:

- Time-related factors: graduates confront the formality of working hours (e.g. 08:00 to 17:00). Workers have to be punctual and absenteeism is not tolerated in the workplace. This is a far cry from the life of a student where attending an early morning or late evening class is optional. The regular end of term vacation breaks of university life are restricted to perhaps 10 or 20 days a year in the workplace. If a graduate thought that handing in several assignments and studying for tests at university was difficult, working a 40 hour week with all its challenges becomes a time-management issue of sink or swim. The number of graduates who find the workplace easier than being a student, is minimal.

- Professionalism: Being unprofessional in the workplace can have serious repercussions. A graduate will rarely have all the right answers so developing the following traits, as indicated by Nicol (2010) will stand him/her in good stead:
  - *initiate and implement constructive change in their communities including professions and workplaces;*
  - *have excellent interpersonal and decision-making skills, including awareness of personal strengths and limitations;*
  - *mentor future generations of learners; and*
  - *engage in meaningful public discourse, with a profound awareness of community needs.*

- The right job: There are few graduates that find a job that perfectly suits their qualifications. The vast majority will have to learn the business as on-the-job training and some have to change multiple positions until they find their niche area.

One of the most overwhelming issues that graduates have is that the university has not prepared them for the reality, challenges and dynamics of the workplace. Unfortunately, having a degree (no matter how high the marks are) does not equip a graduate for a job. According to Mohamed (2016), graduates are faced with the dilemmas of dealing with the following:

- Teamwork;
- All types of people and personalities;
- Personal finance issues and budgeting;
- Expenses of living on their own;
- Balancing work demands with family/friends/personal life;
- Job-hunting skills (networking, interviewing, salary negotiation; and
- Entry-level jobs: unfortunately, most graduates only enter the workplace on entry-level jobs. The implication is that the job will normally entail long hours, low salaries and hard work.

Mohamed (2016) alludes to graduates having realistic expectations of their career path. Very few graduates will be high-earners in terms of immediate salary. They need to have a clear idea of their worth in the job they are doing, but to look at the bigger picture for future career aspirations. The workplace seldom takes

graduates, no matter what the degree is, in high-earning positions (Mohamed, 2016; Johnston, 2017). IT graduates may have the advantage of IT being a scarce-skill, but few graduates will be offered high salaries, and luxuries of perks such as a company car at the commencement of their career. Graduates will have to look at various job offers, change a few jobs, until they find a corporate culture that suits their skills and expectations (Cottrell, 2015; Mohamed, 2016; Johnston, 2017).

2.8 THE ROLE OF ACADEMIA IN IMPROVING STUDENT SUCCESS

Improving student success and throughput rates are key challenges facing HE; in order to address this key challenge, it is imperative that academic staff reflect on how they teach students in the 21st century. It is of vital importance that the teaching styles of lecturers address the needs of a diverse student population. According to Entwistle and Ramsden (2015) and Jossberger et al. (2017) the ideal situation would be to provide students with more reflective and engaged learning opportunities to better their learning experiences. Lizzio and Wilson (2010) and Rodgers and LaBoskey (2016) contend that the successful transition into university is "*predicted by five core aspects: capability, purpose, resourcefulness, connectedness and culture*" that help to understand aspects of transition for first-year students into the programme, and for graduates as they transition out and prepare for the work place. Cuseo (2012) echoes this sentiment when he says, "*the freshman year experience efforts are manifested by their deliberateness, their effort to make things happen by design, not by accident or spontaneity, i.e. those things that must happen if students are more likely to be successful*".

According to Grayson (2011) "*to facilitate the learning process and improve student success, academics at universities need to embrace their identity as university teachers and embark on the path to develop the knowledge and skills that go with that identity*". Grayson (2011) further notes that while "*good curricula and a supportive environment are important for ensuring student success*", this will only be beneficial if there is "*good alignment between the profile of entering students and what the university (UP) is able to provide*". It is therefore incumbent upon every lecturer to seek and find ways to "*show evidence of these values within one's module content, delivery mode, assessment methods and especially how one interacts with the student. Ultimately, it is the duty of the lecturer to prepare*

the student for employers, for society and family" (Hansen and Hansen, 2011; Book et al., 2015).

As has been discussed, the changing face of HE in the post-apartheid era has made IT more accessible for all. Looking at the student as the future graduate and no longer as part of the university landscape but a member of the broader community, the university can no longer function in isolation, but has to be relevant and incorporate community engagement into their mission statement and vision (Hansen and Hansen, 2011; Book et al., 2015).

There are ample examples in the literature to suggest that factors such as teaching strategies, students' motivation, the students' approach to learning, the interaction between the students and the academic and the social systems of the university (Tinto, 1975; Tinto, 2000), cultural expectations and psychosocial factors (McKenzie and Schweitzer, 2001), are not all likely to influence students' success at university.

Killen and Hattingh (2004); Kahu (2013); Petty (2014) and Shernoff et al. (2014) suggest that no matter how carefully they are constructed, school matriculation examinations or special university entrance examinations are not likely to be strong predictors of success at university. These examinations measure the cognitive factors but do not measure non-cognitive factors that are related to many of the important influences on success that students encounter after they have enrolled at university.

For example, Killen and Hattingh (2004) conclude that some significant factors in students' academic success at university are "*interest in the course, motivation, self-discipline and effort*", none of which can be determined from NSC results. In a study conducted by Schmelzer et al. (1987); Entwistle and Ramsden (2015), and Wolters and Hussain (2015), persistence and active study were the most common reasons that university students gave for their academic success. What is of importance is setting goals, a good study environment and effective time-management. Academic failure was ascribed by Xuereb (2014) to a lack of study, poor time-management and inadequate goal-setting. It was Tinto (1975) who wrote that "*sufficiently high commitment to the goal of university completion might*

not lead to drop-out from the institution" and *"… the lower the individual's commitment to the goal of university completion, the more likely he/she is to drop out from university*". The notion of self-efficacy features prominently in attempts to explain student success (Phan, 2016). Furthermore, Bandura (1989) defines self-efficacy as "*a person's belief in his or her ability to succeed in a specific situation or at a specific task*". Some students have the ability to learn from past experiences and the interaction with others, allowing them "the capacity to have some degree of control over their environment (locus of control)" (Tinto, 2012).

2.9 CONCLUSION

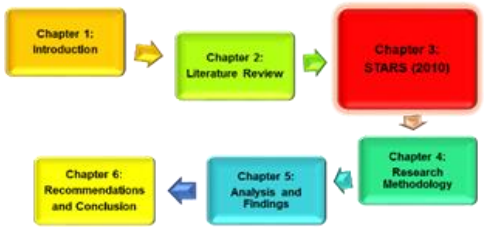
In this chapter the researcher viewed the literature through the layered lens of the Expectancy-value theory and Ecological theory (Smith and Wertlieb, 2005). However, the framework for the study is based mainly on Vincent Tinto's "*Theory of Student Integration and Motivation*" that he first theorised in 1975, but up to the present time is still being explored and refined by him (Tinto, 1975; Tinto, 2000; Tinto, 2003; Tinto, 2006; Tinto, 2008; Tinto, 2012; Tinto, 2013; Tinto, 2015).

The researcher focused on understanding and forming the conceptual framework for this study. The information was funnelled from literature on the E4YP in IT, and sought answers to the identity of students, the characteristics of the student at UP, students on the Mamelodi Campus (E4YP), the IT student, and then the E4YP in IT.

A number of theoretical models, theories and perspectives were explored to determine an understanding of the experiences of student on the FYE, more especially E4YP in IT. The researcher found resonance with the many theories of Tinto (1975-2015), all focusing on student retention or attrition, and student integration and motivation, and supported this process of defining the experiences of students in E4YP (van Schalkwyk et al., 2010).

In Chapter 3, the doctoral research of Juan-Claude Lemmens (2010), a researcher at UP who designed the first cognitive and non-cognitive questionnaire to measure academic readiness, is discussed. His questionnaire, known as the Academic Readiness Questionnaire (ARQ), was "*developed, translated and standardised*" by him (Lemmens, 2010). He later refined the survey and named it the "Student's

Academic Readiness Survey" (STARS; Lemmens, 2010). This survey enjoys international recognition, and is an extremely relevant tool used by UP. On admission to UP, this survey is administered to every entering first-year student, in every faculty during the orientation week for first-year students.



Chapter 3: Students' Academic Readiness Survey (STARS)

3.1 INTRODUCTION

In this chapter the researcher expounds the theory behind the origin and development of the Student Academic Readiness Survey (STARS), which is the brain child of Dr Juan-Claude Lemmens, a researcher on the staff of UP.

Lemmens (2010) submitted a dissertation in fulfilment of the requirements for the degree Philosophiae Doctor (Psychology), which investigated students' readiness for university education. He developed the present instrument, STARS, which is administered to every-first year student in every faculty during the orientation week for first-year students.

In his research he refers to this questionnaire as the Academic Readiness Questionnaire (ARQ). What follows is a brief summary of why, when and how the survey originated, was developed and perfected. Lemmens (2010) was of the opinion that the survey results could then "*serve as an early warning system and tracking of first-year students*".

In the current study the researcher has made extensive use of the results of STARS as an indicator of whether students have a pre-disposition for success or not. The researcher was interested in ascertaining whether the students admitted to the E4YP commenced in a degree that was their first choice. Furthermore, did their scores in the various assessment models indicate the chances of the student being successful in HE study. Most importantly, whether lecturers are able to influence, implement and direct the progress and persistence of students, despite them been identified as at risk for failure, or students likely to withdraw.

Furthermore, the researcher wanted to illustrate how entry characteristics relate and interact with the students learning experience, and final output.

3.2 BACKGROUND

Since the new democratic dispensation of 1994, there has been widespread educational change and reform. In 1995, The National Commission on Higher Education (NCHE) was established, which in 1997 published a position paper entitled Education White Paper 3: A Programme for the Transformation of the Higher Education to provide guidelines and principles on how the higher education system should be modified (DoE, 1997; Kraak, 2004; Bunting, 2006; Smith and Arendse, 2016).

One of the provisions was to ensure that the student profile of HE changed from the present predominantly White male landscape to one that is an equitable system, with access for all the racial groups in South Africa. It was also meant to increase the participation of students enrolling in Science, Technology and Commerce, rather than the favoured Social Sciences (Bunting, 2006). Higher education institutions have complied with this ruling to a large extent, and universities have seen an upsurge in the numbers of non-White students. However, the disappointing aspect of this phenomenon is that despite many measures to improve success having been put in place, large groups of students are still unable to achieve success in studying towards a degree. While there have been several types of questionnaires to rate the cognitive aspects of students, there has not been one that includes the non-cognitive factors that can measure and predict performance of students entering the higher education arena.

It was the aim of Lemmens' study (2010) to investigate the readiness characteristics that determine risk for either failure or withdrawal before students enter university. The entire research process that Lemmens (2010) undertook was completed in three phases. He firstly, through thorough and careful planning, developed a structured questionnaire called the Academic Readiness Questionnaire (ARQ) for first-year students that enter university, to measure the non-cognitive factors relating to their readiness for university education. This questionnaire went through a stringent scientific process of test development and standardisation. In the next phase, he administered the questionnaire in 2008 to

a cohort of students from the Faculty of Economic and Management Sciences during the orientation week. In the third phase, he telephonically interviewed students who had withdrawn from their studies to try and determine the reasons for their non-performance.

The faculty in which Lemmens was based (Economic and Management Sciences), like all the other faculties, provided access to a limited number of students only. As it wanted the best students, the Faculty applied a selection criterion for admission. At the time, the only measures available for selection were the Matriculation scores (M-scores) and the Alternate Admissions Research Project (AARP) for students who performed below a set standard in Grades 11 and 12. The Faculty also made use of a compulsory language test for all their first-year students. Hence, when students complied with the M-score, they were allowed to continue with their studies, while students with provisional acceptance due to some shortcomings, first had to complete the AARP test. According to Conley (2010), the M-score and the AARP adequately measured cognitive skills and strategies, and content knowledge, and were effective indicators of a student's readiness for university education.

However, Sternberg and Grigorenko (2007) and Grigorenko and Sternberg (2016) argued that these tests did not measure the full range of abilities and characteristics needed by students. Combined with this, was the dubious and contentious issue of the National Senior Certificate (NSC) results (marks allegedly having being manipulated), and did not indicate the true ability or potential of a student for university education. Furthermore, the diverse student population registering at historically White universities would most definitely have problems settling into a different culture and mind-set. A further complication was that the M-Score would be replaced by the APS in 2007, despite it still not including non-cognitive factors.

According to Kuh et al. (2011a) an institution "*must understand and know its students*" when they arrive at the university. While the M-score and other tests are important, really understanding the student is a relevant step in understanding a student's readiness for university. Tinto (2012) warned that "*together with academic ability, students bring with them their own personal life views and other*

charactertistics they have obtained from their interactions in their own society, that could greatly influence their performance at university". The reasons for not completing their studies can vary, but many authors have cited family responsibilities, social support, integration versus isolation, motivation, and financial constraints (Tinto, 1975; 2000), as the main contributors to students not completing their studies successfully.

According to the statistics of the Bureau for Research and Institutional Planning (BIRAP, 2008) at UP, the majority of students who leave the university do so in their first year for reasons ranging from emotional to financial, and as well as academic (Scott, 2009). The responsibilities (family, work, and other chores) become untenable for the student who struggles to keep many balls in the air (Scott, 2009).

In trying to find a measure that would adequately determine the non-cognitive factors of students, Astin's (1970) model of student development is appropriate in indicating three components of higher education as indicated in Figure 6 below:

Figure 6: Astin's model of student development

In explaining his model of student development, Astin (1970) refers to the following:

- Input as being the abilities, skills and expectations a student arrives with at the institution of learning.
- Environment refers to all the experiences that the student will have at the university and that will influence the learning process. These can include methods of instruction/learning, learning and assessment, curricula, and academic and pastoral support.
- Output refers to the knowledge, skills, leadership ability, motivation, communication and team work that the institution wants to influence.

Based on Astin's (1970) model of student development, Lemmens (2010) then reasoned that the institutional environment was affected by student inputs (Relationship A). Secondly, the institutional environment had an impact on the outputs of students (Relationship B) and lastly, the student's inputs could affect outputs directly in Relationship C. This is indicated in Figure 7:

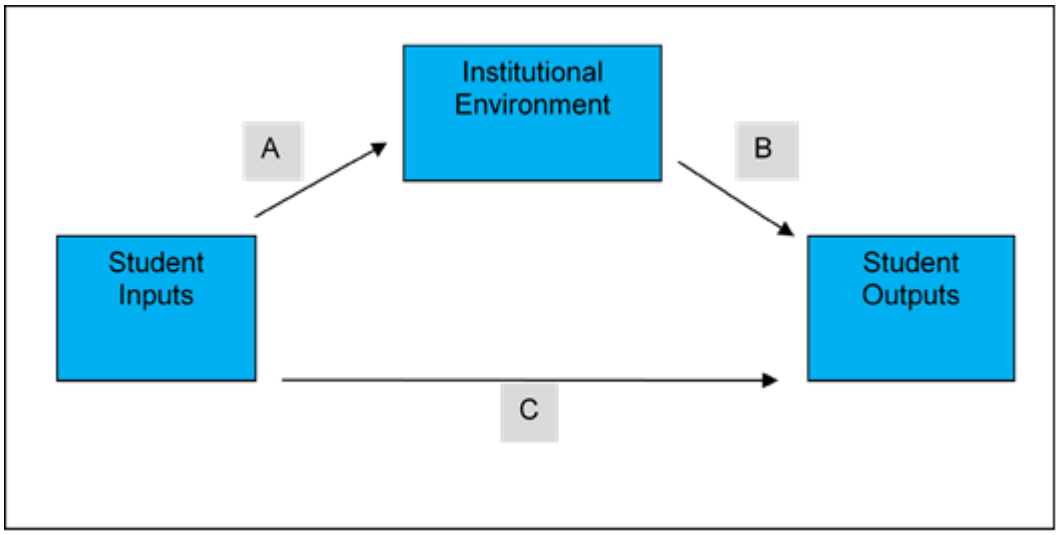


Figure 7: Astin's model (adapted)

The empirical part of Lemmens' (2010) research leant heavily on relationship C of Astin's model (1970). Student inputs were measured with a questionnaire and all available student information, such as demographic data. Relationships A and B were clarified with a literature discussion that included readiness for university education, student transition, retention and withdrawal models.

Lemmens (2010) contended that retention and withdrawal models were essential and had to be investigated to find the range of factors that could influence student persistence. Based on these results, inferences could be drawn about the factors that needed to be included in an academic readiness questionnaire. The survey results could then serve as an early warning system and tracking of first-year students.

Many hypotheses were proposed by Lemmens (2010) which he intended testing empirically. Most importantly, he undertook an extensive and comprehensive theoretical discussion, wherein he investigated and discussed at length the

various theories, retention and withdrawal models, and other perspectives that could possibly influence student persistence. The idea was to illustrate how entry characteristics relate and interact with the student's learning experience and student output.

The theoretical framework that Lemmens (2010) compiled consisted of the following elements:

- Readiness theory (Conley, 2010).
- Transition theory (Schlossberg, 1995; Tinto, 1988).
- Longitudinal model of student departure (Tinto, 1975; Tinto, 2000).
- Psychological model of university student retention (Bean and Eaton, 2000).
- Psychological perspectives: Other constructs that have been related to student success include attribution theory, expectancy theory, achievement goal theory, and self-efficacy theory.

3.3 ACADEMIC READINESS QUESTIONNAIRE DEVELOPMENT

After conceptualising the above models and theories, Lemmens (2010) proposed a structured questionnaire to incorporate the non-cognitive perspectives of students. He reviewed various other questionnaires, which he used to form the foundation for the development of the ARQ. His research on the questionnaires indicated that they were reliable measures for predicting retention, graduation and academic performance. According to Lemmens (2010), the purpose of the ARQ was to function as a screening test for entering first-year students, to identify at risk students, i.e. students who might possibly be at risk of failure or withdrawal. Support services could also utilise the questionnaire as a tool for placement tests.

The questionnaires that formed the basis of the ARQ are indicated in
Figure 8:

Figure 8: Basis of ARQ

After engaging thoroughly with the literature on questionnaires (based on specified criteria), Lemmens (2010) identified the following constructs and indicated these with their corresponding meaning in Table 2:

Table 2: Constructs and meanings

Constructs	Definitions
Self-efficacy	Confidence in one's own ability to achieve one's academic goals.
Vocational identity	Ability to settle on an occupational identity.
Educational values	The importance of pursuing a higher education degree.
Goal orientation	The ability to set task-oriented goals.
Academic apathy	The lack of interest in academic work and an inclination to do as little as possible.
Autonomy and Locus of Control	The degree to which one takes personal responsibility for learning.
Reading behaviour	The tendency to find pleasure in extensive broad reading.
Institutional integration	The sufficiency of information from UP.
Financial support	The degree of financial support during one's studies.
Family support	The degree of family support during one's studies.
Social integration	The extent to which one can relate easily to others.
Cultural integration	The extent to which one can relate easily to people from other cultures.

3.4 THE DEVELOPMENT OF THE QUESTIONNAIRE

Having extensively studied previous literature, academic theories and other important information on questionnaires, Lemmens (2010) completed the ARQ. The questionnaire comprised general questions based on relevant HE issues, as well as questions that gave answers to the constructs as outlined in Table 2. The time duration for completion of the questionnaire was pitched at 30 minutes, which would allow approximately 60 to 80 questions to be completed.

The development phase comprised several stages, the first of which was the pool of questions, in excess of 130 items, which would be phrased to be measured on an interval scale. The second stage comprised the questionnaire being rigorously reviewed by a committee consisting of a pool of experts – a statistician, research psychologist, clinical psychologist, career counsellor and an educationist. In the third stage, the recommendations of the committee were implemented and the final list of 84 Likert-type scale questions was confirmed.

The pilot questionnaire was finalised in English and administered to 368 students from three faculties. It was then revised and standardised and eventually comprised only 70 questions answered on a 5-point Likert-type sliding scale. According to UP's then language policy, which specified both English and Afrikaans as the languages of instruction, the questionnaire was translated into Afrikaans by translators who had an understanding of the context of the field.

According to Lemmens (2010), Table 3 indicates the five factors of the ARQ clustered around the construct that it measures. The item statement, as it is found on the ARQ, is referenced back to the original construct and questionnaire scale. Hence, as compiled by Lemmens (2010), Table 3 indicates the ARQ items, the constructs and the reference scale:

Table 3: Constructs and reference scales

Factor	Item number	Item statement	Construct	Scale	Original construct
Achievement motivation orientation	4	I have the ability to be successful in my studies this year.	Vocational identity	VIS	Vocational identity
	7	I feel I made the right decision in choosing to study this degree programme.		IIS	Institutional and goal commitments
	20	I know exactly what I want to major in.		VIS NCQ	Vocational identity
	59	I have the ideal personality to pursue my field of study.		VIS	Vocational identity
	29	It is important to always be prepared for class.	Educational values	MSLQ	Intrinsic value
	43	It is important to have a good university education to make a success in life.		IIS	Institutional and goal commitments
	63	Getting good grades is important to me.		IIS	Academic and intellectual development
	22	Grades provide me with an ideal goal to work towards.	Goals	SAO	Structure dependence
	62	I usually double check things; just to make sure they are correct.		IPIP (TSRI)	Methodical-ness (Self-checking)
	64	I know what I want to be doing 10 years from now.		NCQ	Long range goals

Factor	Item number	Item statement	Construct	Scale	Original construct
	68	I have clear and reachable goals for my studies this year.		NCQ	Target goals
	45	I expect to do very well in my degree.	Self-efficacy	MSLQ	Self-efficacy
	25	The structure and routine of a person's work should be determined by himself/herself.	Autonomy and Locus of control	LCI	Internal LOC
	34	Getting good grades is mainly related to a person's dedication.		LCI	Internal LOC
	46	It is important to have people recognise the work I have done.*		LCI	External LOC
	53	I will ask for help if I am battling with a complex problem.		MAI	Regulation of cognition
	57	I take responsibility for my own intellectual development.		LCI	Internal LOC
Learning-efficacy	9	I like to occupy a leadership position.	Autonomy and Locus of control	LCI	Autonomy
	35	I feel in control of my life.		IPIP (LCI)	Internality (LOC) (Internal LOC)
	42	I have confidence in sharing my own opinions, even if they might be different from the way most other people think.		LCI	Autonomy

Factor	Item number	Item statement	Construct	Scale	Original construct
	54	I am generally satisfied with my life.		IPIP	Internality (LOC)
	67	I will continue working on a complex task even if I do not succeed at it with the first try.		TSRI (LCI)	Effort (Autonomy)
	13*	I expect to have a harder time to perform academically than most students here.*	Self-efficacy	NCQ (MSLQ)	Academic positive self-concept (Self-efficacy)
	16	I can easily adjust to different styles of teaching.		IPIP	Flexibility
	23	I am as skilled academically as the best students here.		NCQ (MSLQ)	Academic positive self-concept (Self-efficacy)
	24	I enjoy working on complex, intellectually demanding problems.		LCI (IPIP) (MSLQ)	Autonomy (Intellect/Self- efficacy) (Intrinsic value)
	31	I know what I want and I usually make sure that I get it.		NCQ (TSRI)	Realistic self-appraisal (Self-efficacy)
	47	I am quick to grasp new concepts and ideas.		IPIP	Intellect/Self-efficacy
	70	I learn things more quickly than most people.		IPIP	Intellect/Self-efficacy
Goal orientation	27*	I tend to study in spurts rather than at a regular consistent pace.*	Academic apathy	SAO	Academic apathy

Factor	Item number	Item statement	Construct	Scale	Original construct
	38*	My goal is to get the best grade I can without spending a lot of effort on my course work.*		SAO (TSRI)	Academic apathy (Effort)
	50*	I often don't see things through to the end.*		IPIP	Resourcefulness
	69	I plan my study sessions in advance and pretty much stick to the plan.		SAO (IPIP) (TSRI)	Academic Apathy (Methodical-ness) (Planning)
	5	I'm a very methodical person.	Goals	IPIP	Methodical-ness
	11	I set specific goals before I begin learning for tests/exams.		MAI (MSLQ)	Regulation of cognition) (Self-regulation)
	56	I like to have a routine to follow.		IPIP	Methodical-ness
	58	I organise my study time to best accomplish my goals.		MAI	Regulation of cognition
	60*	I prefer to be spontaneous rather than to set goals when I study for tests/exams.		NCQ	Long range goals
	36	I have the ability to plan my work (study time)	Self-efficacy	LCI (TSRI)	Internal LOC (Planning)
	65	I can motivate myself to study when I need to.		MAI	Knowledge of cognition
Integration & Support	**1**	I had sufficient information about	Institutional Support	Theory	Institutional support

Factor	Item number	Item statement	Construct	Scale	Original construct
		the University of Pretoria before enrolling.			
	2	I acquired information about my degree programme before I enrolled at the University of Pretoria.		NCQ (CSI)	Long range goals (Career planning)
	14	I was informed about the career possibilities for a specific degree programme.		Theory	Career planning
	49*	I worry about financing my way through higher education. *	Financial support	Theory	Financial concern
	66*	I need to undertake paid employment in order to help fund my studies.*		Theory	Financial concern
	6	My family has always wanted me to go to University.	Family support	NCQ	Support of academic plans
	39	My family is a source of encouragement and support.		NCQ	Support of academic plans
	52	If I run into problems at university, I have someone who would help me.		NCQ	Support of academic plans
	33	I enjoy meeting new people.	Social integration	NCQ (IPIP)	Ability to establish community ties (Sociability)

Factor	Item number	Item statement	Construct	Scale	Original construct
	51*	I try to avoid becoming involved with social groups and organisations.*		IPIP	Sociability
	55	I expect to be involved in many off- campus activities while enrolled here		NCQ	Ability to establish community ties
	61	My friends are extremely important to me		IIS	Peer-group interactions (Sociability)
	48*	I find it difficult to accept criticism.*	Autonomy and Locus of control	IPIP	Adaptability
	32	I have talked about my career goals with someone who has worked in that field.	Goals	NCQ	Academic familiarity
Reading behaviour	8	It is important to learn about other cultures and ways of life.	Creative expression	SAO	Creative expression
	30	I am comfortable interacting with people from other races and cultures.		NCQ (SAO)	Ability to establish community ties (Creative expression)
	10	I enjoy reading books on a variety of topics.	Reading behaviour	SAO	Reading for pleasure
	21	I will try to do optional reading even though I know it will not influence my performance.		SAO	Reading for pleasure
	28	Reading is one of my favourite pastimes.		SAO	Reading for pleasure

Factor	Item number	Item statement	Construct	Scale	Original construct
	37	I like to look through the library for books that spark my interest.		SAO	Reading for pleasure
Deleted	**Item number**	**Item statement**	**Construct**	**Scale**	**Original construct**
Deleted	44	When working on a project I prefer to work as part of a team.	Social integration	NCQ	Ability to establish community ties
	12	I get more comfortable in a new place as soon as I make some good friends.		NCQ	Ability to establish community ties
	17*	I prefer to do things on my own.*		NCQ	Ability to establish community ties
	15*	My parents/ guardians negatively influenced my achievement at school because of interference	Family support	LCI	External LOC
	3	I was informed about the combination of subjects needed to fulfil the requirements of my degree	Institutional integration	Theory	Institutional integration
	41	My high school grades don't really reflect what I can do at university	Self-efficacy	NCQ	Academic positive self-concept
	18	I sometimes wonder if I am really university material		SAO	Academic efficacy
	40	I try to break studying down into smaller steps	Goals	MAI	Regulation of cognition
	19	I will try to make time for outside reading despite the demands of my course work.	Reading behaviour	SAO	Reading for pleasure

[2]Questionnaire scale acronyms

[2] *NCQ (Non-Cognitive Questionnaire; SAO (Survey of Academic Orientations); MAI (Meta-cognitive Awareness Inventory); LCI (Locus of Control Inventory); IIS (Institutional Integration Scale); TSRI (Trait Self- Regulatory Inventory); MSLQ (Motivated Strategies*

Having administered and viewed the answers to this questionnaire, it was determined that the questionnaire did, in fact, among other factors, adequately measure the non-cognitive entry characteristics that are relevant to readiness for university education. The questionnaire has effectively reflected academic success and retention, and has also shown to have good psychometric properties.

3.5 CONCLUSION

With the non-cognitive factors in mind, Lemmens (2010) structured the ARQ to target and screen first-year students who enter the university arena. In perfecting the ARQ, it went through a rigorous scientific process of test development and standardisation, until the tool was perfected.

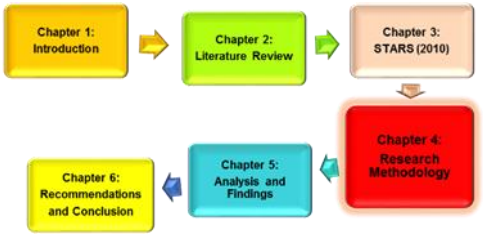
On the perfection of the instrument, Lemmens (2010) administered it to entering first-year students from the Faculty of Economic and Management Sciences. Lemmens (2010) made use of quantitative data analysis (for the ARQ), which involved using various descriptive and inferential data analysis, including factor analysis, regression analysis and multiway frequency analysis. He later held telephonic semi-formal interviews to determine why some students had withdrawn from their studies. The semi-formal interviews were analysed qualitatively using content analysis.

To date it has become the norm of UP to administer the ARQ, now renamed as the Student Academic Readiness Survey (STARS), as developed by Lemmens (2010), to all first-year students, with its main intention of using it as a screening tool to identify students at risk of failure or withdrawal.

This discourse was included by the researcher as the STARS survey has been used extensively in this research as an indicator of whether students arriving on the university campus have a pre-disposition for success or not. In the next chapter the researcher aligns the methodological choices with research questions and purpose of this study. The researcher outlines the research paradigm, the instruments and process of the data collection, provides a discussion of the

*for Learning Questionnaire); VIS (Vocational Identity Scale); IPIP (International Personality Item Pool). *Negatively worded item statement*

various methods that were employed to draw conclusions, taking into account the different ethical considerations.



Chapter 4: Research Methodology

4.1 INTRODUCTION

In this chapter, the researcher strived to align the methodological choices with research questions and the purpose of this study. The researcher commences the chapter with a brief restatement of the purpose the study, then outlines the research paradigm, approach and the design that was planned and implemented in this study. Thereafter the researcher explains the process of data collection and analysis. Finally, the researcher discusses the research design, the instruments used to collect the data, various methods that were employed and then draws conclusions, having thoroughly analysed the data, taking into consideration the different ethical considerations.

The researcher concludes this chapter by stating the limitations of this research.

4.2 PURPOSE OF THE STUDY

The study explores the undergraduate IT students' experience of an extended four-year programme (E4YP); the following research questions focus on understanding this journey:

1. How do students identify themselves as IT students?
2. How do students' IT skills and knowledge develop and/or change over time?
3. What do students find difficult and how do they deal with this?
4. How does student appreciation, confidence and commitment to IT change as students navigate their education?

5. How does this in turn impact on graduates of the programme, and how do they make decisions about further participation in IT after graduation?
6. What are the specific pre-entry factors that influence the students' first-year experiences?
7. Does student readiness for university directly affect academic performance, and/or the likelihood of withdrawal?

In a book entitled Research methods for Business students (Saunders, 2011) introduces the "*Research Onion*" that can be viewed in Figure 9. It forms the basis of this chapter to explain in detail the method followed in this study. This approach acknowledges that one has to start conducting research in the same way one would peel an onion. The outer layer has to be decided on first, and then each layer represents the steps to follow.

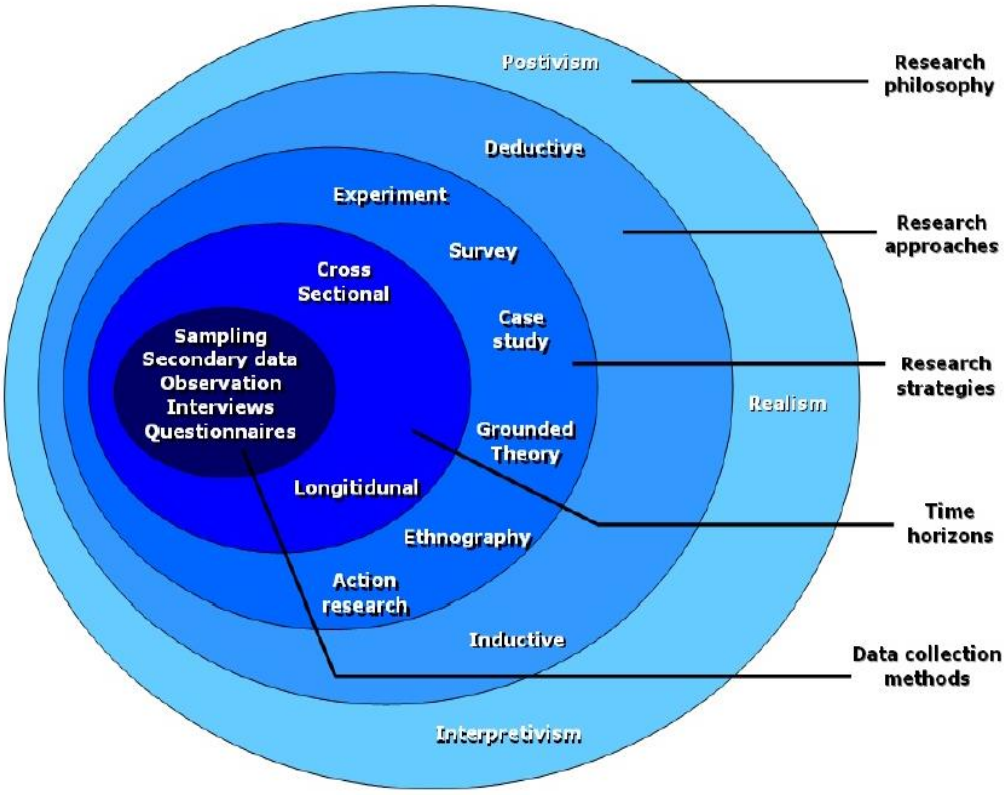


Figure 9: Research Onion

This study is a mixture of qualitative and quantitative approaches that include surveys and results of Chi-square tests as part of the research strategy. The data in the qualitative study (mini-essay) was analysed by using the constant comparative method, a hermeneutics approach described by Myers (2013); the

quantitative data (On-line survey, chi-square tests) was analysed following various techniques, such as frequency analysis and multiple response, to name but a few, and are discussed in more detail later in the chapter. The reason for following these two approaches will eventually manifest.

4.3 RESEARCH PHILOSOPHY

A research design is a blueprint or plan of how a study will be carried out (Myers, 2004; Myers, 2013; Cook and Cook, 2016; Swain, 2016; Patten and Newhart, 2017). The researcher's choice of design was determined by the research questions and the purpose of the study (Swanepoel et al., 2000; Cook and Cook, 2016; Swain, 2016; Patten and Newhart, 2017).

This study was conducted on the Mamelodi Campus of the University of Pretoria over the period spanning 2011 to 2014. The researcher's ontological perspective is viewed through the lens of the positivist and interpretivist paradigm. A paradigm is "*a set of shared assumptions or ways of thinking about some aspect of the world*" (Oates, 2006). According to Barr (Introna, 2011) a paradigm is "*like the rules of a game: one of the functions of the rules is to define the playing field and domain of possibilities on that field. But a new paradigm may specify a game played on a larger or smaller field with a larger or smaller domain of legitimate possibilities*". Different philosophical paradigms have different views about the nature of our world (ontology) and the ways we can acquire knowledge about it (epistemology). This shared way of thinking is reflected in the research strategies used and accepted as appropriate in a particular research community (Saunders, 2011; Oates, 2006). The philosophical paradigm called 'positivism' underlies the scientific method that mainly uses experiments (Oates, 2006). The shared worldview of those who work in the positivist paradigm has the following characteristics:

Positivism studies the rules that govern behaviour in society through a scientific lens. If you are a positivist sociologist, you are interested in the science of society (Denzin and Lincoln, 2011; Lincoln et al., 2011). You want to apply the scientific method and scientific tools to your studies to find the natural laws of human behaviour within society. Positivism is a philosophy in which people believe the goal of knowledge is only to describe what people experience, and that science

should only study that which is measurable (Bernard et al., 2017). Anything that is not measurable or not experienced is irrelevant. Positivists believe that knowledge should be obtained through using scientific methods (Denzin and Lincoln, 2011; Lincoln et al., 2011).

Table 4 outlines the differences and/or similarities between the two paradigms as expounded by (Goldkuhl, 2012):

Table 4: Comparison of paradigms: Positivism and Interpretivism

Paradigm	Positivism	Interpretivism
Ontology	Researcher and reality are separate.	Researcher and reality are inseparable.
Epistemology	Objective reality exists beyond the human mind.	Knowledge of the world is constituted through a person's lived experience.
Research Object	Qualities of research object exist independently of the researcher.	Research object is interpreted in the light of meaning structure of researcher's lived experience.
Methods	Statistics, content analysis.	Hermeneutics; phenomenology.
Theory of Truth	One-to-one mapping between research statements and reality.	Interpretations of research object match lived experience of object
Validity	Certainty	Defensible knowledge claims.
Reliability	Replicability: research results can be reproduced.	Interpretive awareness and reflexivity

This is the essence of positivist sociology: You develop a hypothesis about the forces at work in society and test it using scientific tools (Saunders, 2011). Positivism is only one way to approach sociological research. Another way to look at society is to ask how people interpret the world around them and react to those interpretations. Interpretive studies try to "*identify, explore and explain*" (Oates, 2006) how factors in a particular social setting are related and interdependent. They look at how people perceive the world, how those perceptions change over time, and differ from one person to another (Denzin and Lincoln, 2010; Lincoln et al., 2011).

'Interpretivism' on the other hand, looks at the way society is shaped by the interpretations of the world. This can be the way that subsets of society are viewed, how religious belief shapes a society or a variety of other factors that might shape the way people interpret society and their role in it. Thus, the research methodology that was used to conduct this study included a mixed methods

approach to the research undertaken from “more than one point of view” (Cresswell, 2003). The researcher used a combination of qualitative and quantitative research experiences, together with existing documentation from UP’s database BIRAP. The researcher believed that combining these would “*provide a rich description and at the same time give a picture that exists in areas that are quantifiable*” (Oates, 2006).

Quantitative, qualitative, and mixed measures are all differentiated by the question, “*How is the researcher explaining his or her findings?*” If the researchers use numbers, they are using a quantitative measure; if they use a descriptive style it is qualitative measure; and if they are somewhere in between it is a mixed method (Teddlie and Tashakkori, 2009).

Many researchers prefer quantitative methods because they provide objective, hard facts. Quantitative research uses numbers to test hypotheses and make predictions by using measured amounts, and ultimately describe an event by using figures (Patten and Newhart, 2017). By using numbers the researcher has the opportunity to use advanced and powerful statistical tests to ensure that the results have a statistical relationship, and are not just a ‘fluke’ observation. When using quantitative research, the researcher must define what he/she is measuring. The idea here is to look at a specific attribute or a variable. This is referred to as an operational definition (Oates, 2006). By operationalising what you are looking for, you are measuring only a particular and relevant thing, which restricts your view to what is relevant. A positive strength of quantitative methods is that pinpointing what, where, when, how often and how long social phenomena occur. Another advantage is the fact that we can use statistics to extrapolate the data collected in order to predict how people will behave in the future (Oates, 2006). When a researcher studies a specific variable that is operationally defined, the results can be applied to larger populations, making the findings generalisable (Tashakkori and Teddlie, 2010).

However, there are also disadvantages to quantitative methods. For instance, they cannot explain why social phenomena occur – they just quantify the fact that it does. They do not take into account the emotions, motives, imagination, beliefs,

etcetera of the subject. Of course, there is also the fact that not all social phenomena can be counted or measured in quantifiable ways (Morse, 2016).

Therefore, social scientists use qualitative research, which is based on data that cannot be measured or counted but can be collected and interpreted through observation. Qualitative research describes the kind and quality of a subject, while interpreting and attempting to understand an event. By using narrative descriptions, the purpose of qualitative research is to give someone a mental picture of what the researcher is seeing (Morse, 2016; Glaser, 2017).

This type of research focuses on why and how social phenomena occur. Instead of statistical analysis, the goal of qualitative measurement is to look for patterns and get a general feel for how things are (Creswell, 2003; Spradley, 2016; Creswell and Poth, 2017). Instead of numbers that can be analysed using statistics, the data is in the form of descriptive words that can be examined for patterns or meaning that can give us a view of the big picture and what people think and feel (Creswell, 2003; Creswell & Poth, 2017; Patten and Newhart, 2017). Qualitative research is also called descriptive research because its purpose is to describe social occurrences. The descriptions, however, take on a dynamic and personal account of what is occurring. This type of research can be conducted in focus groups, interviews or simple observation of social events as they happen in real life (Kohlbacher, 2006; Creswell & Poth, 2017; Patten and Newhart, 2017). The data is collected by the researcher himself or herself instead of through the inventories, questionnaires and other means used for quantitative research. This can be both good and bad. By collecting the research data personally, the researcher can gain an empathetic understanding of the behaviour of others, but inevitably, the data collection is bound to be subjective and can even include bias. Due to the personal involvement of the researcher, it is practically impossible to stay impartial. However, there is no doubt that qualitative research can provide a wealth of in-depth information and even explain findings from a quantitative study.

Qualitative research also allows complex issues to be studied in depth. Where quantitative research is better at getting a general overview, qualitative research can see the deep, complex relationships between things. Because both types have advantages and disadvantages, some researchers run studies that have

both quantitative and qualitative measures in them to get a fuller picture of the situation. Hence, between the two, there is a mixed method, which attempts to combine the two and take the best of both worlds (Morse, 2016; Brannen, 2017).

Mixed methods represent the middle group, the application of qualitative and quantitative methodologies to describe an event fully (Van Dyk and Weideman, 2004; Morse, 2016; Brannen, 2017). It is extremely difficult to have a purely qualitative or quantitative study. So there is some overlap between the two, and in the centre of it are the true mixed methodologies. Mixed methods can be used to describe something qualitatively, as in the form of a description of something new or a unique set of circumstances. They also use quantitative mechanics to provide statistically useful information that can be generalised to other situations (Creswell, 2013).

Teddlie and Tashakkori (2011) describe the mixed methods research methodology to be "*a design that combines elements of both quantitative and qualitative orientations across chronological phases in a study*". The mixed method design preserves the integrity of findings of different types of studies by using the appropriate type of analysis that is specific to each type of finding (Creswell, 2013). A summary of the strengths and weaknesses of mixed methods research according to Johnson and Onwuegbuzie (2004); Brannen (2017); Patten and Newhart (2017) are tabulated below:

- The mixed method design can be an effective design to use as long as the researcher has expertise in both qualitative and quantitative research methods. The researcher also knows how to avoid the pitfalls such as collinearity (a phenomenon in which two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the other with a substantial degree of accuracy) (Cresswell, 2013). However, it strengthens the weaknesses of both the qualitative and quantitative research by combining them with the idea being that two ways of thinking create stronger theory;
- It can provide stronger evidence for conclusions through convergence and corroboration of findings (principle of triangulation);

- Mixed methods research is practical because it allows the researcher to use all or any methods possible to address a research problem; and
- Mixed method research discourages most researchers because it is time-consuming, complicated and expensive.

4.4 RESEARCH APPROACHES

According to Ekka (2014), deductive research is "*theory-testing and inductive research is theory-generating*". Researchers have the tendency to link deductive research with quantitative experiments or surveys (online surveys, chi-square tests), and inductive research with qualitative interviews or ethnographic work (mini-survey and different groups of interviews. However, these are not hard and fast rules as for instance, experimental research, designed to test a particular theory through developing a hypothesis and creating an experimental design, may use quantitative or qualitative data or a combination. A deductive approach usually begins with a hypothesis, while an inductive approach usually use research questions to narrow the scope of the study. As this study used both quantitative and qualitative data, both the inductive and deductive approaches were utilised.

There are major differences between deductive and inductive research approaches in terms of logic, generalisability, use of data and theory. The following Table 5 by Felder and Brent (2005); and, Evans and Over (2013) illustrates this:

Table 5: Differences between Deductive and Inductive Research

	Deduction	**Induction**
Logic	In a deductive inference, when the premises are true, the conclusion must also be true.	In an inductive inference, known premises are used to generate untested conclusions.
Generalisability	Generalising from the general to the specific.	Generalising from the specific to the general.
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory.	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework.
Theory	Theory falsification or verification.	Theory generation and building.

4.5 RESEARCH PARTICIPANTS

Sampling is the process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected.

According to Field (2009) a sample is "*a smaller (but hopefully representative) collection of units from a population used to determine truths about that population".*

The sampling frame is a list of all elements or other units containing the elements in a population. Population is the larger group from which individuals are selected to participate. A target population is a set of elements larger than or different from the population sampled and to which the researcher would like to generalise study findings. The purpose of sampling is to gather data about the population in order to make an inference that can be generalised to the population. One of the most important tasks in the study design phase is to identify appropriate participants. Decisions regarding selection are based on the research questions, theoretical perspectives, evidence informing the study, and the total number of students in the programme.

In this study all 207 students in the first year of the IT degree (E4YP) for the years 2011 to 2014 were selected. Names of all first-year students for these years were entered into an Excel worksheet. Their progress for the first year (in the first and second semester subjects) was indicated in columns. Generic information such as subjects, passed or failed, was indicated on this worksheet. The results of STARS (containing cognitive and non-cognitive factors) were also incorporated into this worksheet. Only 93 students who had both academic results and scores from STARS were considered for the quantitative participant selection (Pearsons Chi-square results or Fisher's exact p-value scores).

4.5.1 Selection of participants for the quantitative approach

The researcher had a good idea of which students to use for the quantitative study. The data received from the Excel worksheet (containing academic results and STARS score) was then exported into a CSV file, and sent to the statistician who assisted in analysing the response using IBM SPSS Statistics, version 22. The statistician, the researcher and supervisor were in several and continuous discussions during this entire process to ensure that the results (Pearson's Chi-square for independence tests) were interpreted accurately, failing which the Fisher's exact p-value would be utilised). This was an ongoing and thorough process that took several months to yield conclusive results.

Furthermore, an online questionnaire comprising 47 Likert-type questions was made available to all students in the E4YP in IT. The intention was to get responses that could be analysed quantitatively. The questionnaire was administered to all 207 students from 2011-2014. However, due to a computer 'glitch' with the 'free online survey' website, the researcher was able to retrieve responses from only 74 students. After consultation with the supervisor, these 74 responses were deemed as sufficient for this study.

4.5.2 Selection of participants for the qualitative approach

Approximately one month after lectures commenced (from 2011-2014), the E4YP in IT students were given a mini-essay topic on 'The joys and frustrations of being a first-year student' to complete in class. Only a total number of forty four (44) responses were utilised for analysis which would be done using the constant comparative method of data analysis (Maykut et al., 1994; Glaser, 2017).

Finally, in 2016 the last data collection instrument was utilised. The researcher sent out questionnaires to the following groups of students:

- Graduates of the programme
- Present students still on the programme
- Ex-students of the programme.

A total of 100 questionnaires were sent out, but the researcher received only 40 responses – 12 from graduates, 10 from ex-students, and 18 from present students. The researcher considered this to be sufficient to analyse the responses qualitatively.

4.6 RESEARCH DESIGN STRATEGIES

According to Saunders (2011) the researcher has to develop a plan on how to address the research questions outlined in Chapter 1. Saunders (2011) indicates that a strategy "*will contain clear objectives, derived from one's research questions, specify the sources from which one intends to collect data, and consider the constraints that one will inevitably have*". Thus, the research strategy relates to the overall approach that the researcher follows in answering his/her

research questions. Oates (2006) lists six strategies that could be used: survey, design and creation, experiment, case study, action research and ethnography.

For this study, the researcher opted to use the following:

4.6.1 The Survey

Oates (2006) contends that the survey "*focuses on obtaining the same kinds of data from a large group of people in a standardised and systematic way. Patterns are then sought so that the findings can be generalised to a larger population than the group targeted by researcher*". According to Saunders (2011) surveys allow a researcher to gather data from a large population group in a cost-effective manner. Figure 10 illustrates part of the research design of this study:

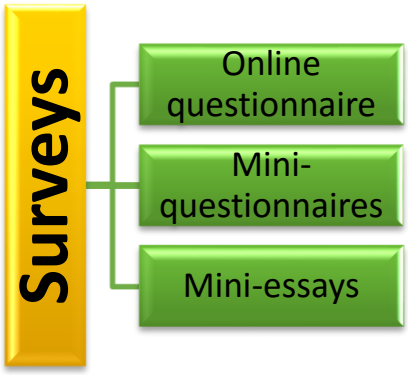


Figure 10: Research design: Surveys

The nature of survey data makes it easy to be understood by the target audience and the results are usually straightforward. As indicated in Figure 10, surveys are extremely popular, and for the purpose of this research the data-gathering techniques (online questionnaire, mini-questionnaire, mini-essays) as indicated were used. Hence, the information generated by these data gathering techniques allowed the researcher to gain a broader and richer picture of students' undergraduate IT experiences.

4.6.2 Use of documentation

Information gleaned from documents, was used as another source of data. According to Oates (2006), documents can be compartmentalised in two ways – one as found data, where the documentation is housed in the archives of an institution, and the other, when the researcher actually initiates and documents

records (e.g. field notes) solely for the purpose of the research task. In this study, the researcher utilised the documentation found in the records of UP (BIRAP, 2008; STARS).

The researcher perused the academic results of students from the institutional UP database (BIRAP, 2008). These records were private and confidential, and the researcher had to receive ethical clearance from UP's ethical committee in order to use the information. The records provided results of students as well as generic information (Age, race, gender, home language, etc.). The STARS questionnaire (Beck and Davidson, 2001) provided cognitive and non-cognitive information. The details from both the academic results and STARS scores were tabulated in an Excel worksheet and statistical analysis of the information was conducted by the Department of Statistics. The results provided the researcher with Pearson's Chi-square test for independence results (or Fisher's exact p-value scores). Thus, correlations could be drawn giving the researcher an indication of students' academic readiness, or pre-tendency to pass or fail their first year. This is indicated in Figure 11.

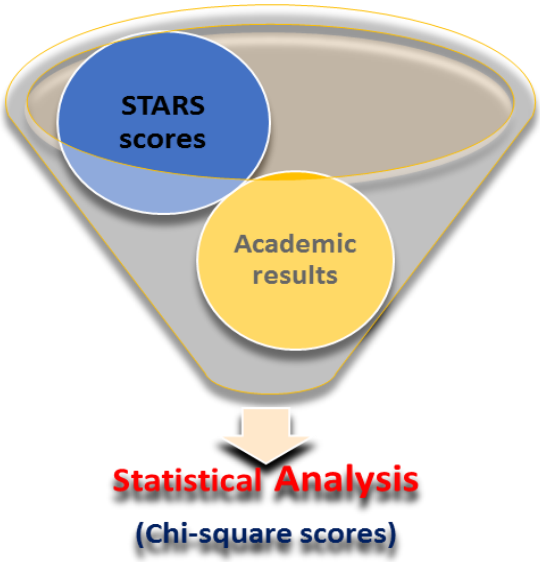


Figure 11: Research design: Statistical Analysis

Furthermore, the data from the statistical analysis, and that obtained from the online questionnaires, was used to guide the collection of the quantitative data, while the data obtained from the mini-questionnaires and mini-essays was analysed using a qualitative method. Ultimately, all data collected was analysed,

allowing the researcher to draw conclusions of a quantitative and qualitative nature.

The final research in 2016 (mini-questionnaires) was executed in three batches with the intention of obtaining information from each group of students. As previously mentioned, after sending out 100 questionnaires, only 40 responses were received. In the graduate responses, the researcher was interested in ascertaining if the training that students had received from UP was in line with the needs of the institution that employed them. In the second batch, the researcher was interested in understanding why students had overstepped the completion time of four years, and lists the hurdles they had encountered and overcome along the way. These students can be questioned as to whether they believed that obtaining the IT degree was within sight. With the final batch, the researcher was interested in knowing why students had withdrawn from their studies without having obtained a degree. The researcher was interested in ascertaining if the decision was voluntary, or a decision made by UP due to financial constraints or poor results of the students. If it was voluntary had the student sought any help before making the final decision to terminate studying at UP. Finally, the researcher was interested in determining if the students had sought to further their studies at other institutions, and what had motivated that choice. It would have been interesting to determine if these students were already part of the working community, or had resorted to being entrepreneurs, or unfortunately added to the unemployment statistics of South Africa. The responses from this mini-survey were analysed qualitatively.

4.7 DATA COLLECTION

In the process of data collection we need to decide on two things: (1) what to measure, and (2) how to measure it (Field, 2009).

The data collected for this study was obtained from 1) different surveys – online questionnaires, a mini-questionnaire and mini-essays; 2) statistical information (such as academic results, or STARS scoresThus it is obvious that since the data was collected using different data gathering tools, a mixed methods approach was used, which is beneficial when conducting research (Saunders, 2011). The advantage of using this approach is to gather data for different purposes. Another

advantage of using this method is that the concept of triangulation can be utilised where data gathered through various techniques, all "*tells the same story*" (Saunders, 2011) or also offers the researcher the means to "l*ook at the data from different angles*" (Myers, 2013). Data collection methods for impact evaluation vary along a continuum. At the one end of this continuum are quantitative methods and at the other end of the continuum are qualitative methods of data collection.

The following data techniques were utilised to obtain the necessary data from students registered for the E4YP in IT from 2011 to 2014:

4.7.1 Online Questionnaire

A questionnaire can be used as a method of generating data. It generally comprises a set of pre-defined questions, assembled in a pre-determined order. The questionnaire is given (or sent by post) to a sample of people who are asked to complete it and return it to the researcher. According to Oates (2006), the researcher then "*analyses all the responses, looks for patterns and makes generalisations about the actions or views about the larger population than the sample*". Furthermore, Oates (2006) contends that questionnaires are mainly used in a situation where the researcher:

- wants to obtain data from a large number of people;
- wants to obtain relatively brief and uncontroversial information from people;
- needs to obtain standardised data by posing identical questions to each respondent and predefining the range of answers which can be given;
- can expect the respondents to be able to read and understand the questions and possible answers; and
- has the money to pay for printing, distributing and collecting questionnaires and the time to wait between posing the questions and getting the responses back.

4.7.2 Questionnaire (STARS)

When students arrive at the University of Pretoria, their introduction to the University arena commences with the orientation week. During this week, students are introduced to the culture of the university, and are given road-maps to the university. On one of the days of the orientation week, students are given a compulsory questionnaire to complete. This is known as the STARS (Student

Academic Readiness Survey), the brain-child and model of Lemmens (2010). The STARS is a 66 item Likert-type self-report measure of psycho-social constructs relating to academic readiness.

The total number of students on the E4YP in IT was 207, but due to circumstances as indicated earlier, not all students had completed the questionnaire. Irrespective of this, the 93 students who were extrapolated from the STARS questionnaire, and for whom the researcher had both academic results and STARS scores, proved to be representative of the group of E4YP in IT students. The results of this questionnaire were analysed using a quantitative approach.

Based on specific criteria, Lemmens (2010) identified constructs from the literature and current questionnaires (well-suited to this research) in compiling the STARS, and tested the variables and their meanings as indicated in Table 6:

Table 6: STARS – Constructs and meanings

Variable	Questionnaire determined headings	Meaning
V1-V60[3]		
V61	Planning	The ability to plan your studies by setting goals.
V63	Locus of control (Accountability)	The level of personal responsibility you take for your actions.
V65	Self-efficacy	The perception of your ability to achieve your academic goals.
V67	Institutional support	Sufficient information received from UP.
V69	Financial support	The level of financial support for their studies.
V71	Family support	The level of family support.
V73	Social integration	Extent to which one can relate to others.
V75	Pleasure reading	Finding pleasure in reading.
V79	Leadership	The perception of leadership abilities.
V81	Well-being	Perception of emotional and physical health.
V83	Test-taking skills	The ability to be free of anxiety during tests and level of concentration.
V85	Career exploration	The extent to which you have explored your career field.
V87	Goal achievement	The belief in your ability to find ways to solve problems and achieve your goals.

[3] The variables from V1 to V60 are not reflected in the table as they contain more generic aspects and are also dependent variables, e.g. V1 = year: first enrolment, V3 = student number, V15 = completed degree, V16 = still busy, V17 = changed degree, etcetera.

Variable	Questionnaire determined headings	Meaning
V91	Hope agency	The ability to imagine actions and behaviour to reach your goals. Closely related to self-efficacy beliefs but focused on one's ability to reach goals despite the circumstances.
V93	Hope pathway	The ability to imagine actions and behaviour to reach your goals. Closely related to self-efficacy beliefs but focused on one's ability to reach goals despite the circumstances.
V94	Optimism	The level to which you expect good things to happen to you.
V97	Self-motivation	The level to which you take responsibility and action.
V99	Hopefulness	The level to which you are positive about the future.
V101	Agency	The ability to formulate goals and work towards them.
V102	Study skills	In order to be successful at your studies to what extent will you need support in this skill.
V103	Reading skills	In order to be successful at your studies to what extent will you need support in this skill.
V104	Writing skills	In order to be successful at your studies to what extent you will need support in this skill.
V105	Time management skills	In order to be successful at your studies to what extent will you need support in this skill.
V106	Test-taking skills	The perception of your ability to be free of anxiety during tests and your levels of concentration during tests and examinations.
V107	Maths skills	The extent to which more support will be needed to be successful in Mathematics.
V108	Computer skills	The extent to which more support will be needed to be successful in Computer skills.
V109	Presentation skills	The extent to which more support will be needed to be successful in presentation skills.
V110	Career guidance	The extent to which career guidance was sought.
V111	Part-time work	My studies are financed through part-time work.
V112	Full-time work	My studies are financed through full-time work.
V114	Bursary	My studies are financed through a bursary.
V115	Loan	My studies are financed through a loan.
V116	Consent	Provide consent to UP to release report to a UP Faculty Student Advisor in order to receive support.
V119	Year of study	Indication if student is completing year for the first time.
V121	Age	An indication that the student falls in the age group (18 - 21 years)
V122	Residence	Indication of students that are living in UP residence or in private accommodation.
V123	Gr 12 year	The year that I completed Grade 12.
V124	Previous ED language	The preferred language that students wish to use at UP.
V125	Home language	The language that is spoken in the students family home.
V126	Gender	Differentiation of students based on gender.

Variable	Questionnaire determined headings	Meaning
V127	Race	Differentiation of students based on race.
V128	Home environment	Character of the home environment where student lived with their family.
V130	First generation student	Indication of students whose parent/s have a university degree qualification or those students who are first generation students
V131	Distance of accommodation	Distance students have to travel from their current place of residence to the campus.
V132	Transport	Indication of sufficiency of transport to travel to and from university or not.

4.7.3 Online IT-questionnaire

When students reported for their lectures, two more tools were used to obtain the necessary data. The first tool was an online questionnaire that was designed to obtain the required data about the student, e.g. male/female, race and other generic information, but also about student computer access, computer literacy, and motivational and other orientation. The questionnaire strived to obtain the "*same kinds of data from a large group of people (or events) in a standardized and systematic way*" (Oates, 2006). The software used for the online questionnaire was a free online service called freeonlinesurveys.com. Students were informed via an email of the URL to complete the questionnaire. The online questionnaire was a self-administered questionnaire where all the respondents saw the exact questions and the researcher was not present when the questionnaire was administered. Completing this questionnaire via this URL ensured complete anonymity and thus the generalisations and validity of the result can be confirmed. This online survey allowed data to be exported in Excel or in text format for further analysis, although the system could also provide certain data analysis and in a graphical format (FreeOnlineSurvey, 2013). The data of 74 students was exported to Microsoft Excel and a quantitative method of data analysis was followed.

Saunders (2011) lists the attributes of online questionnaires in Table 7:

Table 7: Attributes of online questionnaires

Attributes	Online-questionnaire
Population's characteristics for which suitable.	Computer literate students (IT and Multimedia) who can be contacted via e-mail or Internet.
Confidence that right person has responded.	High if using e-mail.
Likelihood of contamination or distortion of respondents' answer.	Low.
Size of sample.	Correct as predicted.
Likely response rate.	Variable 30%, reasonable, Internet 10% or lower.
Feasible length of questionnaire.	Not long, but questions of interest to respondents.
Suitable types of questions.	Mainly closed question (Likert-type) but related to issues around IT.
Time taken to complete collection.	Two weeks, then link would close.
Main financial resource implications.	World Wide Web.
Role of the interviewer/field worker.	None.
Data input.	May be automated.

4.7.4 Mini-essay

Having completed the first month on campus, students were asked to write a short account of their 'Joys and frustrations of being a first-year student'. The input received from these essays proved to be interesting. The responses were analysed qualitatively using the constant comparative method of data analysis (Maykut et al. 1994).

4.7.5 Mini-questionnaire/s

A mini-questionnaire was piloted with (1) students who had successfully completed their studies during the stipulated time; (2) students still in the programme after four years; and (3) students who failed, transferred to another degree or dropped-out.

4.7.6 Academic Records

Information from documents was used as another source of data. According to Oates (2006), documents can be compartmentalised in two ways – one as found data, where the documentation is housed in the archives of an institution, and the other, when the researcher actually initiates and documents records (e.g. field

notes) solely for the purpose of the research task. In this study, the researcher utilised the documentation found in the records of UP (BIRAP, 2010; STARS).

4.8 DATA ANALYSIS

Data analysis is the collecting and organising of data so that a researcher can come to a conclusion. It allows one to find answers to questions posed, find solutions to solve problems, and derive other important information. The quantitative data that was collected could be translated into numbers that were displayed and analysed mathematically. The qualitative data (that would have been collected as descriptions, anecdotes, opinions, etc.) was recorded as narratives (Field, 2009).

4.8.1 Quantitative analysis and interpretation

As the researcher has mentioned previously, the information from the academic records of students (BIRAP, 2010), together with the results of the STARS, were combined in an Excel spreadsheet. The data was then given to the Department of Statistics to be analysed using IBM SPSS Statistics, version 22. Through several trial and error stages, the data was validated, edited, coded, and cleaned in preparation for the statistical analysis. The following methods were used to analyse the data:

- *Descriptive analysis*: Describes the main aspects of the data being analysed.
- *Exploratory analysis*: Looks for unknown relationships and is a great way to find new connections and to provide future recommendations.
- *Inferential analysis*: A researcher takes a small sample in order to point out something about a larger population.
- *Predictive analysis*: Predicts future happenings by looking at current and past facts.
- *Causal analysis*: Finds out what happens to one variable when you change some other variable.

The quantitative data analysis was undertaken using non-probability sampling that does not rely on the use of randomisation techniques to select members. This is typically done in studies where randomisation is not possible in order to obtain a representative sample. Bias is more of a concern with this type of sampling. The following are different types of non-probability sampling:

- Convenience or accidental sampling – members or units are selected based on availability.
- Purposive sampling – members of a particular group are purposefully sought after, e.g. STARS, mini-questionnaire, mini-survey, etc.

4.8.2 Qualitative data analysis

As indicated previously, a free online tool was used for the data gathering of the questionnaires and the data obtained was immediately available in an electronic Excel format with data analysis and a graphical representation of the data where necessary. The validity, significance and insights generated from qualitative inquiry have more to do with the information-richness of the data and the analytical capabilities of the researcher.

4.9 ETHICAL CONSIDERATIONS

In conducting this research, certain ethical considerations need to be ensured. The researcher thus continued in an ethical manner as indicated:

4.9.1 Background

Whatever procedure is used by the researcher, participants must be treated in an ethical manner. All proposals must be checked to ensure that they follow ethical guidelines. It is the researcher's ethical responsibility to safeguard the storyteller (respondent) by maintaining the understood purpose of the research. All respondents received communication regarding the aims and procedure of the research.

The relationship between researcher and respondents should be based on trust. The researcher must clearly inform participants of the purpose of the study. Being respectful of the research site, reciprocity, using ethical interview practices, maintaining privacy, and cooperating with participants, are all features of ethical research.

Patton (2005) offers a checklist of general ethical issues to consider, such as:

- Reciprocity
- Assessment of risk confidentiality

- Informed consent
- Data access and ownership

Qualitative researchers must be aware of the potential of their own emotional turmoil in processing this information. There is the possibility that participants may disclose sensitive and potentially distressing information in their responses, which must be kept confidential, and in a safe environment.

4.9.2 Application for Ethical Clearance

The Ethics Committee of the Faculty of Engineering, Built Environment and Information Technology (EBIT) meets once every two months to review applications for ethical clearance (Cuseo, 2012). It is compulsory for every application to include:

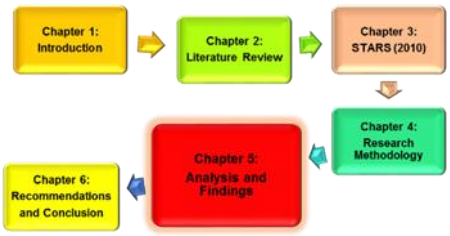
- the completed Application for the research project (to EBIT Faculty), including all the relevant attachments (Appendix A);
- the title registration form; and
- the research proposal approved by the Post-graduate Committee of the EBIT Faculty.

All of the above information of the researcher is contained in Appendix A, including the approved on-line questionnaire (Appendix D), and letter of informed consent to the respondents (Appendix B).

4.10 CONCLUSION

This chapter has discussed the important steps of the methodology process as set out in the 'Research Onion' (Saunders, 2011). The intention of the intensive and detailed steps was to gather data that was able to answer the research questions outlined in Chapter 1. A brief outline of the research paradigm and research approach is provided.

In Chapter 5 which follows, the researcher strives to analyse the findings of the data collection process.



Chapter 5: Analysis of findings

5.1 INTRODUCTION

In this chapter the researcher draws on the data measures discussed in the previous chapter and confirms these with previous findings in the literature. The results of the on-line questionnaire, mini-essays and mini-questionnaires and UP database are analysed. The chapter also focuses on the results of the chi-square tests. Finally, results of the research in relation to the experiences of students who have successfully completed their degree in the stipulated time, the experiences of the cohorts who changed their study direction or transitioned out of university and those students who are still persisting in pursuit of completing their degree study, are recorded. As a conclusion to this chapter, all relevant findings are aggregated.

5.2 ANALYSIS OF STARS SURVEY RESULTS

There was a total of 207 students who had enrolled for the E4YP in IT and formed the first-year cohort of students from 2011-2014. The results of the academic records and the STARS score were recorded in a spread sheet and then cleaned to select only students for whom the researcher had both sets of results. Those who did not have a STARS survey result were excluded from this study. Eventually, in total 93 students' responses were regarded as complete.

5.2.1 Identifying different variables

In commencing this process, data needed to be organised in a way in which it made sense, and would be easier to work with. Having cleaned the data the results of the 93 students were available for analysis. This was an important phase as it was a means of getting the quantitative data (numbers) ready for analysis. The Department of Statistics at UP assisted with the statistical analysis and interpretation of the collected data.

The starting point in this process was the *descriptive analysis* of the data (variables) in a succinct manner so that the data was organised, methodical and easy to interpret. Having perused the variables, the researcher identified two dependent variables and several independent ones. Both the dependent and independent variables were tabulated to indicate whether the variable label was continuous or categorical. The entire table of 38 variables was found to be categorical and was then categorised into a minimum number of two categories by combining the commonality of the categories.

5.2.2 Questionnaire determined headings (STARS)

To reiterate, the STARS questionnaire (Lemmens, 2010), was completed by all first-year students during the orientation week. However, due to extenuating circumstances (such as a lack of funds for registration) not all students had registered by that time and were therefore excluded from the results of the STARS.

5.2.3 Analysis of data obtained from STARS

In the analysis of the data, it was determined that the gender composition of the total number of students on the four-year E4YP was 66% male, and 34% female. Students ranged mostly in the age group between 18-20 years. The racial component, as indicated in Figure 12, reflected the following:

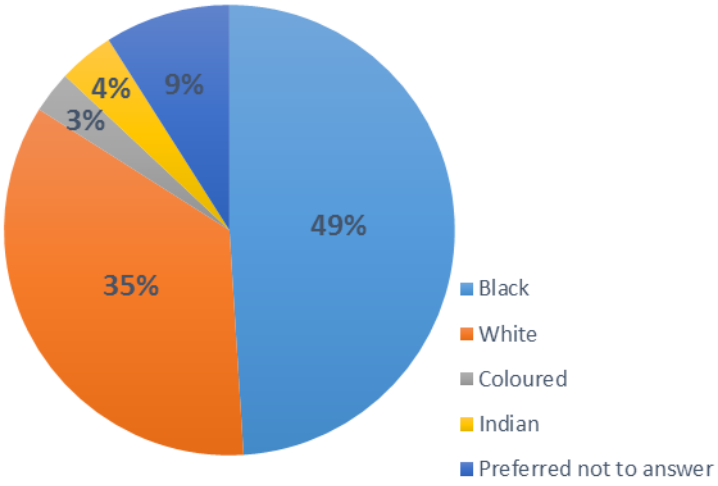


Figure 12: Racial composition

When comparing the ethnicity and the gender, the following data emerged, as indicated in Table 8.

Table 8: Ethnicity and Gender

Ethnicity and Gender (%)			
Race	**Male**	**Female**	**Total**
African	27	9	**36**
Coloured	4	0	**4**
Indian	3	1	**4**
White	30	25	**55**
Other	1	0	**1**

The conclusion that can be drawn here is that the statistics conformed to the general consensus that the field of IT is predominantly White, male-dominated, with females beginning to enter the field, but are still in the minority.

The home environment of students was classified as urban, rural and township, with 72% from urban households, 10% from rural, and 18% from township dwellings (categories were amended to only urban and rural). This is reflective of the fact that the majority of students were from urban areas, and would therefore have a working understanding of English. Figure 13 indicates the home languages of students on the E4YP in IT:

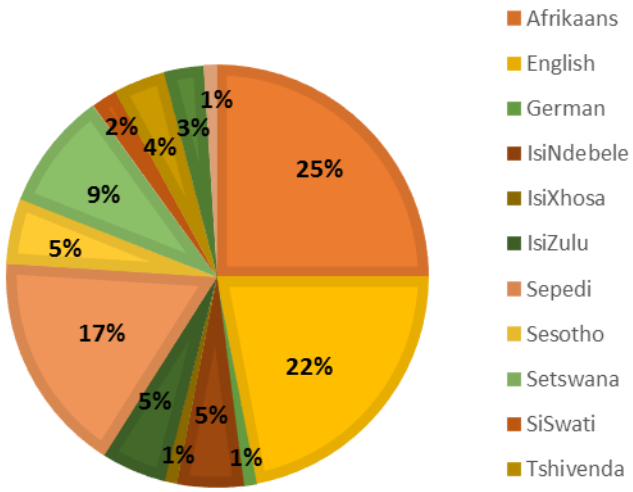


Figure 13: Home languages

These eleven categories were later collapsed to include only Afrikaans, English and Other. However, in the initial analysis, the conclusion was that even though English was not the first language of most students, all students had the experience of using English as either a first, second or third language. Hence, even though the literacy level in the usage of English could be problematic, all students had at some time been exposed to English.

The ability to plan their studies by setting goals revealed that the majority of students arrived at the university with no pre-existing goals, while many had an idea of more-or-less what they were going to achieve, with only a small percentage being definite regarding planning and setting goals to achieve academically. Figure 14 indicates the ability of E4YP to set goals:

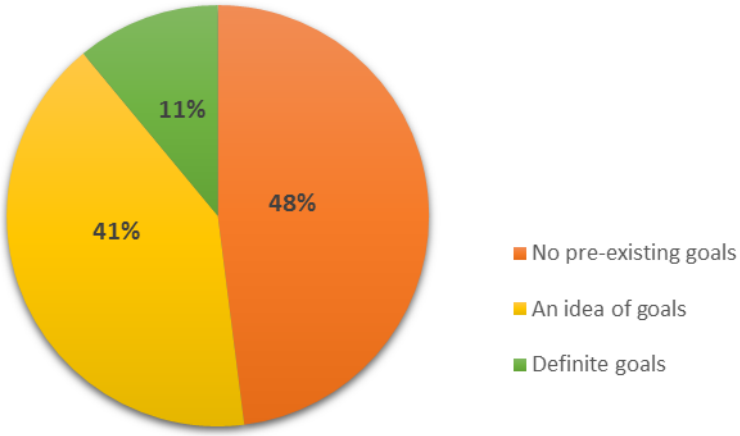


Figure 14: Ability to set goals

What was even more alarming was the low-level of personal responsibility that students took for their own learning. An astounding number of 56% felt they were not accountable for their own learning (the institution was blamed instead), while 35% thought that they should be accountable to an extent, with only 9% believing that they had to take personal responsibility for their learning while they were studying at UP.

The accountability that students took for their progress is reflected in Figure 15:

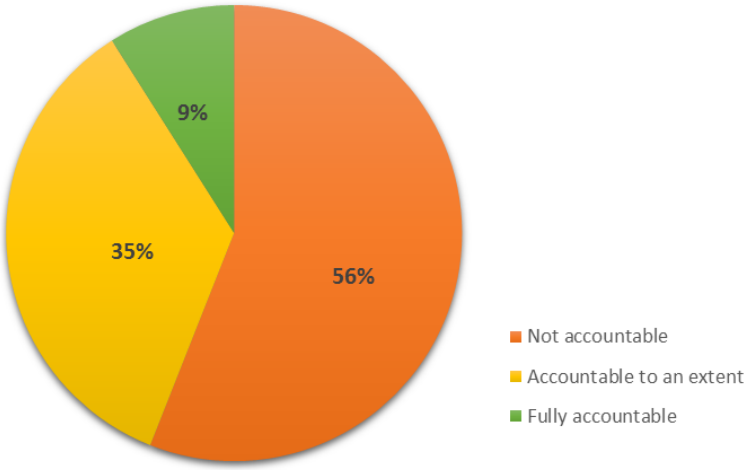


Figure 15: Accountability

The level of family support was categorised into low, average and normal (thereafter collapsed to only low and high categories); only a small percentage of students (8%) indicated that they had no family support. However, when looking at the institutional support, only 8% of students indicated that they received a high level of support from the institution (UP) (also categorised into low, average and high but later collapsed to only low and high).

In perusing the extent to which students could relate to one another (categorised as low, average and high, but later re-categorised as low and high), 17% indicated a high level of integration, 51% indicated that they could relate to one another in an average manner, while 32% indicated that they struggled to integrate and relate to others. It was enlightening to note that 92% students were willing to consult with lecturers, tutors and peers should they experience problems.

Figure 16 shows the integration level of students:

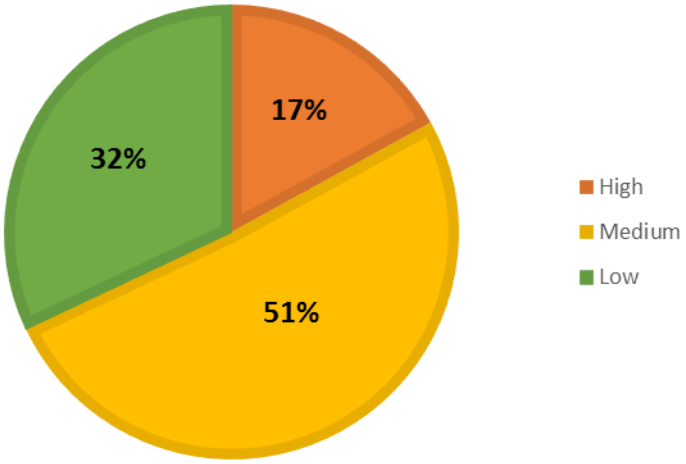


Figure 16: Integration levels

The analysis with regard to students' reading, writing and test-taking skills were categorised into low, average and high. The analysis indicated that students felt competent in their reading and writing ability, but 51% indicated that they were not free from anxiety during tests, and were concerned about their levels of concentration.

In their goal achievement, which was categorised into low, average and high (later collapsed into low and high), 47% thought it was achievable, 42% indicating that there was a possibility of achieving their goals, whereas 11% thought that achieving their goals was not possible. This is indicated in Figure 17:

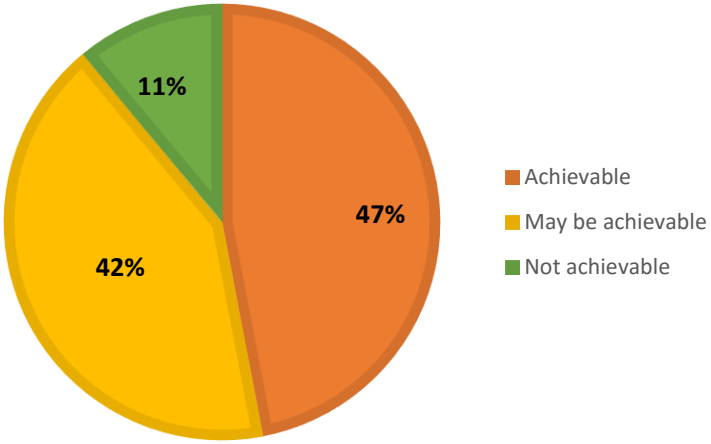


Figure 17: Goal achievement

In analysing their future vision, it was appalling that only 37% of students were confident of success at university. This was indicative of students also not being sure of the study direction they had opted for. Furthermore, only 10% of students indicated that they were self-motivated to achieve. It was depressing to note that such a large number of students were unsure of their future success as university students.

Remarkably, 37% of students were confident that they could manage their time properly, while 46% indicated that they were knowledgeable about the strategies to manage time effectively. A small number of students (17%) were unsure as to how their time should be managed, as indicated in Figure 18:

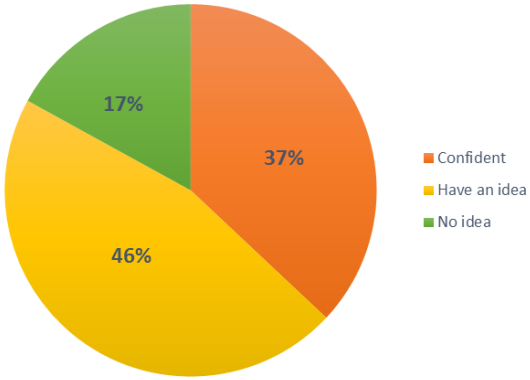


Figure 18: Time management

Regarding their levels of presentation skills, 20% indicated that they had no skills whatsoever, 46% thought they were competent to an extent, while 34% were confident that they possessed the skills necessary for presentation purposes. This is reflected in Figure 19:

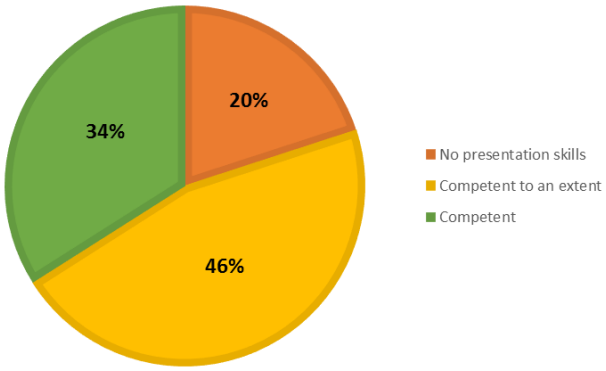


Figure 19: Presentation skills

In commenting on their skills in Mathematics and Computer Science, 11% indicated that they were not at all competent; 47% trusted their competency to an extent, while 42% thought that their mathematical skills were advanced. Similarly, when assessing their computer skills, 44% expressed their inability to use a computer competently, 40% were competent to an extent, while 16% considered themselves to be skilled in computer usage. These statistics are indicated in Figure 20:

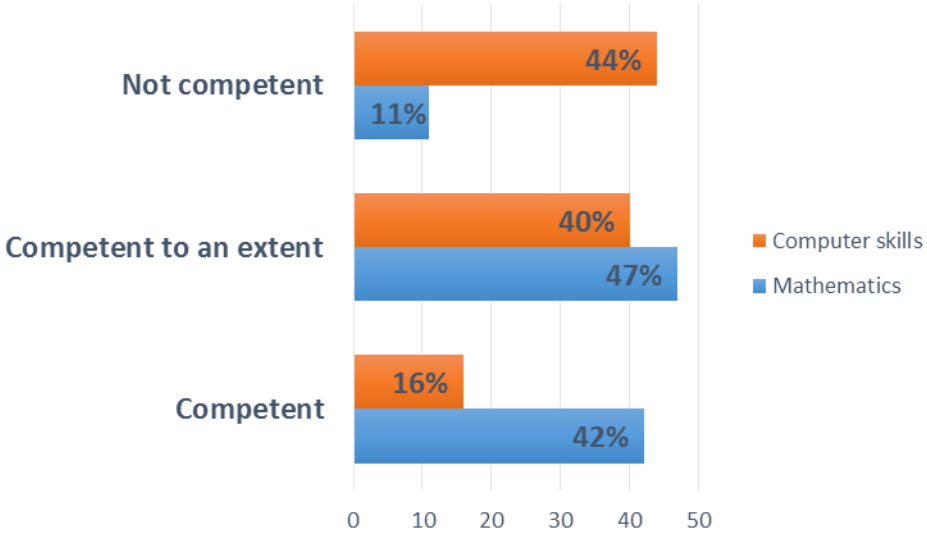


Figure 20: Mathematics and Computer skills

A very small percentage of students (8%) indicated that they were dependent on having to work either full-time or part-time in order to study, while 28% indicated that they had to acquire a loan before studying. A small percentage (5%) were fortunate enough to have qualified for a study bursary, while the remaining 59% had the privilege of having parents and guardians who were able to finance their university studies. However, this result could be skewed because at the time the STARS was completed, many students had not yet registered. However, as indicated in the STARS, part-time and full-time work is reflected in Figure 21:

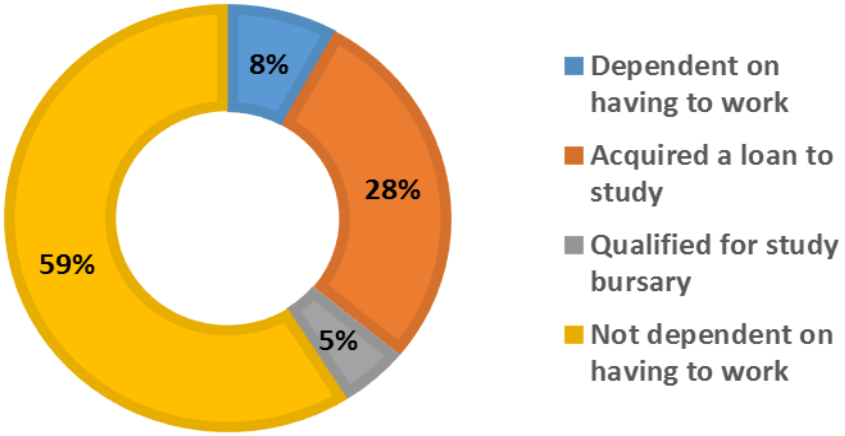


Figure 21: Part-time or full-time work

The lack of proper accommodation appeared to be a concern to many first-year students, with 61% indicating that they were unable to obtain accommodation in UP's residences. Many students had to find alternate accommodation or make arrangements to travel to and from campus to home. Fortunately, 44% of students lived within a 5 km radius of UP, 10% had to travel between 6 and 10 km, 19% between 11 and 30 km, and 15% more than 30 km daily. Only 6% of students were able to obtain campus residence. A daunting prospect was that 6% of students had already registered at UP, but had yet to find accommodation. The graph of the kinds of accommodation that students were able to procure is provided in Figure 22:

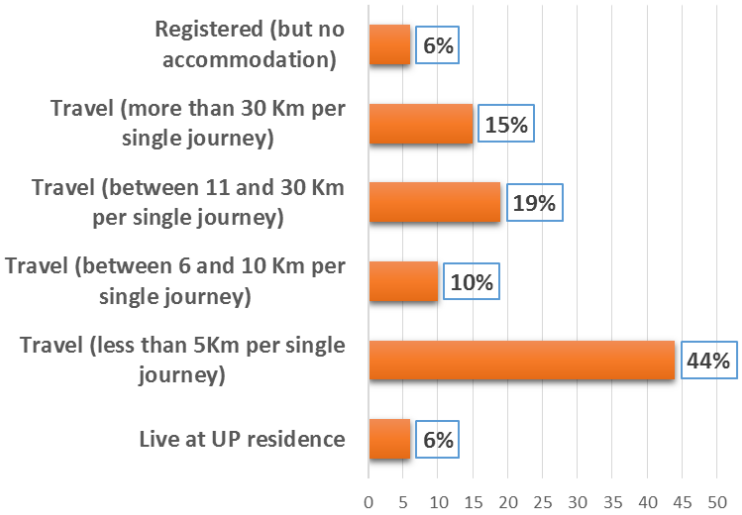


Figure 22: Kinds of accommodation

The statistics also revealed that 24% of students could be termed “first generation students”, while the rest had parents or siblings who had obtained HE qualifications.

5.2.4 Statistical Methods

Using the spreadsheet containing data from the academic results of students, and the individual results of the STARS, the cleaned data was now ready for further analysis. Guided by the statistician, the researcher compared each of the two dependent variables with all thirty-eight independent variables. It should be noted that the variables, both the dependent, and two independent ones, were all categorical. The idea was to take into account the simultaneous effect of specified categories of two or more factors. This necessitated the need for cross-tabulations with the Pearson’s Chi-square test for independence (referred to as Chi-square test), or Fisher’s exact (p-value).

When considering the statistics for the Chi-square tests, the researcher sought a probability score of 0.05 (5%) to indicate the relationship between the variables. If the chi-square score was **less than 0.05, a relationship could be deduced**. If the score was between **0.05 and 0.1, it was symbolic of a tendency for a relationship to exist**. However, if the score was **greater than 0.1 there was no relationship** between the variables. As a further observation, if the Chi-square test indicated that the result may not be a valid score, the Fisher’s exact (p-value) was used to determine the level of significance of the data. The same values were used to indicate the relationship, tendency for a relationship, and no relationship between the variables.

5.2.5 Cross-tabulation of dependent versus independent variables

As mentioned previously, only two dependent variables (both categorical), were identified. These were:

V1 – Outcomes (further categorised as Dropout/Dismissed and Still busy/Completed).

V140 – Results of courses (further categorised as Good and Not good).

5.2.6 Analysis of data (variables that have a significant relationship)

The Chi-square (or Fisher's exact) results were analysed to determine relationships between the dependent versus the independent variables. The following variables **were found to have a significant relationship** (scores less than 0.05)**:**

- Outcomes and residence
- Outcomes and gender
- Outcomes and transport
- Results and social integration
- Results and race
- Results and distance from accommodation

The above relationships are indicated in Tables 9-14 that follow.

5.2.6.1 Outcomes and Residence

There appears to be a significant relationship between the outcomes of students who reside in campus residence, and those who do not. The chance of students dropping out/dismissed if they lived in residence was zero per cent, whereas non-residence students had a 45% chance of dropping out, or being dismissed. Their outcomes in terms of still being busy/completed (8%) were also affected by whether they had campus accommodation as 47% students were still trying to complete the degree after the predicted four-years. Table 9 provides the analysis of this:

Table 9: Outcomes and Residence

Table of Outcomes			
Outcomes	**Residence (V122)**		
	Male	**Female**	**Total**
Dropout/ Dismissed	0 0%	42 45%	42 45%
Still busy/ Completed	7 8%	44 47%	51 55%
Total	7 8%	86 92%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
	✓			**0.01**

5.2.6.2 Outcomes and Gender

It is a significant factor (34%) that a male, aged between 18 and19 years would drop-out or be dismissed, as opposed to only 11% of that happening to a female, albeit that the females comprised less than 50% of the total student group. This is reflected in Table 10 that follows:

Table 10: Outcomes and Gender

Table of Outcomes			
Outcomes	**Gender (V126)**		
	Male	**Female**	**Total**
Dropout/ Dismissed	32 34%	10 11%	42 45%
Still busy/ Completed	29 31%	22 24%	51 55%
Total	61 66%	32 34%	93 100%

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
0.05	✓			

5.2.6.3 Outcomes and Transport

In the analysis of Outcomes and Transport, there is a significant indication that a student who was unable to find suitable transport, or travelled great distances to get to campus, would have a 33% chance of dropping out or being dismissed. Hence, only a small percentage of students (those who did not have transportation issues), would have completed. Unfortunately, the 47% who had problems with transport would be still busy/completed.

This is reflected in Table 11 below:

Table 11: Outcomes and Transport

Table of Outcomes			
Outcomes	**Transport (V132)**		
	Yes	**No**	**Total**
Dropout/ Dismissed	29 33%	12 13%	41 46%
Still busy/ Completed	42 47%	6 7%	48 54%
Total	71 80%	18 20%	89 100%

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
0.05	✓			

5.2.6.4 Results and Social Integration

It is also a significant factor that students who had integrated themselves socially into the university environment did better than those who were isolated from it. Aspects such as social learning, team effort, and learning through student dialogue all assisted in allowing the student to achieve good results. This is clearly indicated in the statistics that follow in Table 12:

Table 12: Results and Social Integration

Table of results			
Results	**Social Integration (V73)**		
	Low	**High**	**Total**
Good	17 18%	19 21%	36 39%
Not good	13 14%	44 47%	57 61%
Total	30 32%	63 68%	93 100%

Chi-square test score	Relationship	No relation-ship	Tendency for relation-ship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
0.01	✓			

5.2.6.5 Results and Race

There is a significant relationship between results and race. The past injustices of the apartheid schooling system still linger on, with students who achieved the best results coming mainly from privileged private schools, or previouslyWhite model-C schools, and all the rest achieving average, satisfactory or poor results. Table 13 is a reflection of this:

Table 13: Results and Race

Table of results						
Results	**Race (V127)**					
	African	**Coloured**	**Indian**	**White**	**Other**	**Total**
Good	7 8%	3 3%	2 2%	23 25%	1 1%	36 39%
Not good	26 28%	1 1%	2 2%	28 30%	0 0%	57 61%
Total	33 36%	4 4%	4 4%	51 55%	1 1%	93 100%

Chi-square test score	**Relationship**	**No relationship**	**Tendency for relationship**	**Fisher's Exact (p-value)**
	<0.05	>0.1	0.05-0.1	
0.03	✓			

5.2.6.6 Results and Distance from Accommodation

The relationship between results and accommodation is significant in that students who did not find adequate accommodation were at a distinct disadvantage in terms of their results. Being a first-year student, with all its complications and still having to struggle for a roof over one's head is demotivating. The most suitable accommodation for a student would be to obtain institutional accommodation. The effects of not having proper accommodation are reflected in Table 14 below:

Table 14: Results and Distance of Accommodation

Table of results				
Results	**Distance of Accommodation (V131)**			
	Campus Accommoda-tion	**Private Accommoda-tion**	**No Accommoda-tion**	**Total**
Good	4 4%	30 32%	2 3%	36 39%
Not good	3 3%	49 53%	5 5%	57 61%
Total	7 7%	79 85%	7 8%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
	✓			0.5

5.2.7 Analysis of data (tendency for a relationship)

In analysing the Chi-square (or Fisher's exact p-value), the values between the dependent and independent variables indicated **that there was a tendency for a relationship** (scores between between 0.05 and 0.1). This relationship existed between:

- Outcomes and Future Vision
- Outcomes and Bursary
- Outcomes and Age
- Outcomes and Race
- Outcomes and distance of Accommodation
- Results and Residence
- Results and Home Language

The tables indicating the relationships follow:

5.2.7.1 Outcomes and Future Vision

The results of the Chi-square tests clearly indicate a tendency for a relationship between Outcomes and Future Vision. If students were not sure about their future plans, the outcome to achieve would be suppressed. This is indicated in Table 15 below:

Table 15: Outcomes and Future Vision

Table of Outcomes			
Outcomes	**Future Vision (V89)**		
	Low (1-4)	**High (5-10)**	**Total**
Dropout/ Dismissed	13 14%	29 31%	42 45%
Still busy/ Completed	9 10%	42 45%	51 55%
Total	22 24%	71 76%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
0.1			✓	

5.2.7.2 Outcomes and Bursary

There is a tendency for a relationship between the dependent (Outcomes) and independent variable (Bursary). There is a 46% chance to drop-out or being dismissed in the event of studying without a bursary.

This is reflected in Table 16:

Table 16: Outcomes and Bursary

Table of Outcomes			
Outcomes	**Bursary (V114)**		
	Yes	**No**	**Total**
Dropout/ Dismissed	42 46%	0 0%	42 46%
Still busy/ Completed	45 50%	4 4%	49 54%
Total	87 96%	4 4%	91 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	**>0.1**	**0.05-0.1**	
			✓	0.1

5.2.7.3 Outcomes and Age

There was a greater chance of a student dropping out or being dismissed if were aged between 17-19 years, the typical age of a first-year student.

This is reflected in Table 17*:*

Table 17: Outcomes and Age

Table of Outcomes			
Outcomes	**Age (V121)**		
	17 - 19 years	**>19 years**	**Total**
Dropout/ Dismissed	36 39%	6 6%	32 45%
Still busy/ Completed	50 54%	1 1%	51 55%
Total	86 93%	7 7%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
			✓	0.1

5.2.7.4 Outcomes and Race

A tendency for a relationship exists between Outcomes and Race. The outcome would be a success rate of 45% for non-White students, as compared to 55% if the student was White.

An account of this is seen in Table 18:

Table 18: Outcomes and Race

Table of Outcomes			
Outcomes	**Race (V127)**		
	Non-White	**White**	**Total**
Dropout/ Dismissed	21 22%	21 23%	42 45%
Still busy/ Completed	21 23%	30 32%	51 55%
Total	42 45%	51 55%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
			✓	0.1

5.2.7.5 Outcomes and Distance of Accommodation

The relationship between student outcomes and finding suitable accommodation is a problem for first-year students. Many students in a new environment, perhaps in a new city, find that adequate and safe accommodation is problematic. Hence, the outcome of their studies hinged on finding accommodation provided by the institution, or within a short distance from it.

The analysis follows in Table 19:

Table 19: Outcomes and Accommodation

Table of Outcomes				
Outcomes	**Distance of Accommodation (V131)**			
	Campus	**Distance of Accommoda-tion**	**No Accommoda-tion**	**Total**
Dropout/ Dismissed	1 1%	38 41%	3 3%	42 45%
Still busy/ Completed	6 7%	41 44%	4 4%	51 55%
Total	7 8%	79 85%	7 7%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
			✓	**0.1**

5.2.7.6 Results and Residence

There was a 59% chance that a student not living on campus residence would be performing below their optimum level. Hence the student's results would be compromised. This is reflected in Table 20:

Table 20: Results and Residence

Table of results			
Results	**Residence (V122)**		
	Res_Yes	**Res_No**	**Total**
Good	5 5%	31 33%	36 39%
not Good	2 2%	55 59%	57 61%
Total	7 8%	86 92%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
			✓	**0.1**

5.2.7.7 Results and Home Language

There is a tendency for a relationship between the results of students whose home language was English, as compared to those who spoke Afrikaans or other languages. Table 21 is reflective of this:

Table 21: Results and Home Language

Table of results				
Results	**Home Language (V125)**			
	Afrikaans	**English**	**Other**	**Total**
Good	4 4%	9 10%	23 25%	36 39%
Not Good	16 17%	14 15%	27 29%	57 61%
Total	20 21%	23 25%	50 54%	93 100%

**Chi-square may not be a valid test*

Chi-square test score	Relationship	No relationship	Tendency for relationship	Fisher's Exact (p-value)
	<0.05	>0.1	0.05-0.1	
0.1			✓	

5.2.8 Conclusion (Statistical Analysis)

If the results between the dependent and independent variables were **greater than 0,1**, **it meant that there was no relationship between the variables**. This was then not discussed. However, a full account of the Chi-square results may be found in Appendix K and L.

The findings of the statistical analysis provide invaluable information with regard to the effects of cognitive and non-cognitive aspects of students. The results of the Pearson's Chi-square test for independence results (or Fisher's exact p-value scores) provided the researcher with a wealth of information on the relationship between the dependent and independent variables (as gleaned from the statistical analysis). In this way the researcher was able to determine if there was 'a

significant relationship', or a 'tendency for a relationship', or 'no relationship' between the different variables.

5.3 ON-LINE QUESTIONNAIRE

The online questionnaire (Appendix D) was given to all first-year students on the E4YP in IT. The responses of 74 students were retrieved and analysed quantitatively. According to Oates (2006) this was a suitable research method as it assisted the researcher in "*pin-pointing what, where, how often, and how long social phenomena occur*". In this manner, outcomes can be measured.

In the analysis of the questionnaire the majority of respondents (80%) were registered for the E4YP in the Bachelor of Science (IT) (Astin, 1993) degree, with 20% having registered for the E4YP Bachelor of Information Science (Multimedia) (Astin, 1993) degree. Both groups formed part of the E4YP in IT. In listing their academic standing, all respondents confirmed that they were first-year university students (100%) on the E4YP in IT. A large percentage (81.9%) of respondents indicated that they were most interested in majoring in Computer Programming and/or IT when they came to university, with small percentages indicating that they were interested in Arts and Humanities (2.8%), Engineering (6%), Maths and Natural Sciences (4%), and Other (1%).

As regards their current major, the largest number of respondents indicated Computer Science and Mathematics (76.1%), Multimedia (19.7%), Informatics (2.8%) and Other (1.4%). Their second choice of a major was mainly undecided (30.6%), with a smattering of respondents indicating Computer Science (19.4%), Informatics (8.3%), Multimedia (4.2%), Other (22.2%) and Not applicable (15.3%).

The responses to answering the question why they were studying IT are noted in Table 22. The reasons could be minimal, moderate or major reasons (some of the responses are provided verbatim):

Table 22: Reasons for studying IT

Questions (and responses)	Minimally influential reason	Moderately influential reason	Majorly influential reason
"IT plays an important role in solving society's problems" (53%)			√
"IT professionals make more money than most other professions" (45%)		√	
"My parent(s) would disapprove if I chose a major other than IT" (76%)	√		
"My parents wanted me to be an IT professional" (64%)	√		
"IT professionals have contributed greatly to fixing problems in the world" (60%)			√
"IT professionals were well paid" (57%)		√	
"An IT degree will guarantee me a job when I graduate" (38%)			√
"Neither a lecturer, academic advisor, teaching assistant or other university affiliated personnel has encouraged or inspired me to study IT" (47%)	√		
"Neither has a non-university affiliated mentor encouraged and/or inspired me to study IT" (40%)	√		
"Mentors have introduced me to people and opportunities in IT" (43%)	√		

Respondents agree with the statements “Creative thinking is one of their skills” (58%), “I am skilled at solving problems that can have multiple solutions” (61%), and “A mentor has supported my decision to major in IT” (44%).

On requesting that “Respondents should rate themselves on traits compared to the rest of their colleagues” they had above average scores in “*Self-confidence*” (34%), “*Communication skills*” (41%) in their “*Ability to perform in teams*” (34%), and “*Critical thinking skills*” (36%). For the rest of the skills – “*Leadership ability*” (40%), “*Public speaking ability*” (31%), “*Maths ability*” (49%), “*Science ability*” (56%), “*Ability to apply Maths and Science principles in solving real world problems*” (47%), “*Business ability*” (36%), students rated themselves as average. The level of skills is reflected in Figure 23:

Figure 23: Level of skills

Regarding their satisfaction with aspects of campus life such as "*Quality of Instruction*" (47%), "*Availability of lecturers*" (48%), "*Quality of advice by lecturers*" (40%) and "*Academic Advising*" (61%), respondents indicated that they were satisfied. On rating the "*Overall quality*" of their university experience so far, 68% indicated that they were satisfied. Respondents also indicated that about half of the lecturers used "*Individual projects*" (25%) and "*Team projects*" (32%) as instructional and assessment tools.

In rating the overall experience of their university experience so far, 1% was very dissatisfied, 7% were dissatisfied, 68% were satisfied, and 24% were very satisfied. This is reflected in Figure 24:

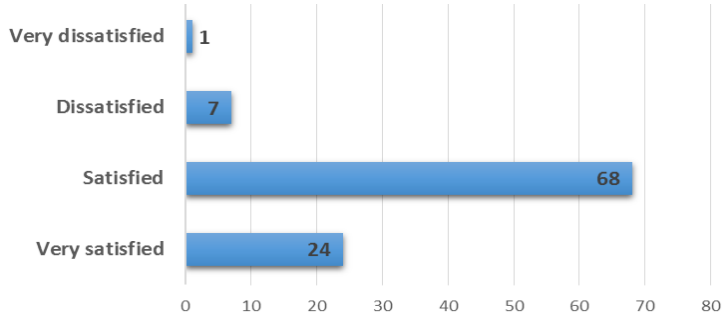


Figure 24: Overall experience

The response to the question on whether they "*Came late to class*" (44%), "*Skipped class*" (51%), and/or "*Turned in assignments late*" (79%) indicated that this had never happened, with some of them indicating that they rarely "*turned in*

assignments that did not reflect their best work". In responding to the question on "*Workload demands*" of their coursework, 24% indicated "*I am meeting all of the demands easily*", 62% of respondents indicated that they were "*meeting all the demands of the coursework, but it was hard work*", 11% indicated "*I am meeting most of the demands, but cannot meet some of the demands*", 3% indicating that they "*could not meet the demands of the coursework*".

A diagram reflecting the levels to which students were meeting their workload demands, is provided in Figure 24:

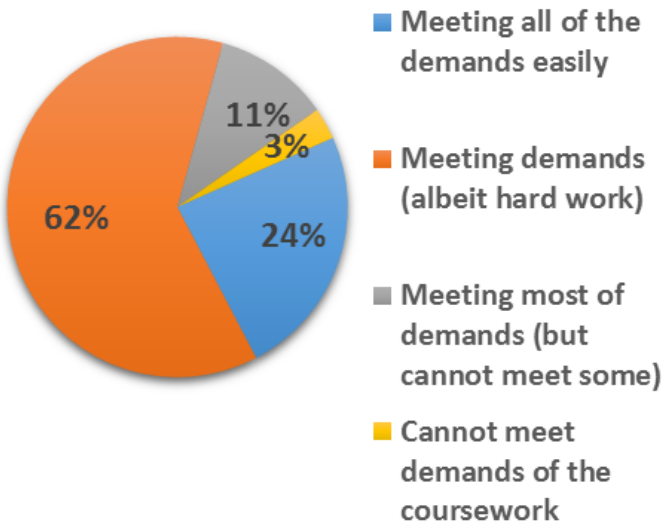


Figure 25: Workload demands

In determining their stress levels in their coursework, 45% indicated that they were experiencing moderately low levels of stress. Respondents felt moderately average stress levels in both the "Course content (amount of course material being covered" (40%) and trying to find a "Balance between social and academic life" (32%). For the course pace (the rate at which the course material was covered) 32% felt moderately low pressure.

In indicating how often they had interacted with their instructors "*during class*" 47% indicated occasionally, 45% never with instructors "*during office hours*"; and/or 59% "outside of class hours". Some respondents (45%), considered it to be of some importance to be involved in non-IT activities such as hobbies, civic or church organisations, campus publications, student government, and social clubs/groups, etcetera on or off campus.

The majority of respondents(47%), indicated that they had no involvement in student IT activities such as computer clubs or societies, 31% indicating they had limited involvement, 21% indicating they had moderate involvement, and, 1% indicating they had extensive involvement.

Figure 26 reflects the levels to which students were involved in extra-curricular IT activities:

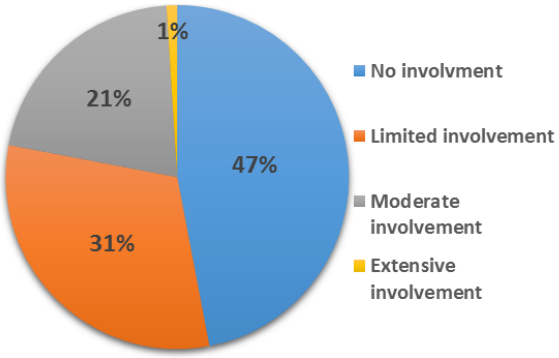


Figure 26: Extra-curricular activities

On coming to the university, 30% of respondents indicated that they had had research experience “in both computer and non-computer related areas”, with a close number of respondents indicating “No experience” (25%), “Yes, in computer related areas” (25%) and “Yes in non-computer areas” (20%).

Before university, 46% of respondents indicated that they had moderate knowledge of the IT profession, 28% indicated they had limited knowledge, 17% indicated they had extensive knowledge, and 9% indicated they had no knowledge. Fifty-five per cent indicated that they had gained moderate knowledge about the IT profession since entering university, with 33% indicating they had gained limited knowledge, 9% gained extensive knowledge, and 3% gained no knowledge. Figure 27 is indicative of this:

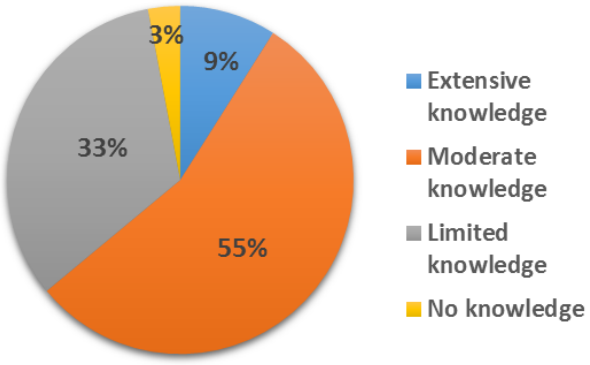


Figure 27: Knowledge of IT

On enquiring from respondents how they gained knowledge of the IT profession, 56% indicated school-related experiences (i.e. teacher, professor or class), 42% from a family member, 25% from a close friend, 6% from being an intern, 6% from being a visitor, and 18% from other sources. Eighty-two per cent indicated that they could see themselves continuing in an IT major, while 4% replied in the negative, and 14% were not certain.

In answering how they envisaged their future after graduation, the respondents indicated that most likely they would do the following, as indicated in Table 23:

Table 23: Future after Graduation

	Definitely Yes	Probably Yes	Not sure
Work in an IT-related job	42%	42%	
Work in a non-related IT job			42%
Go to a graduate school in an IT discipline		30%	
Go to a graduate school outside of IT		25%	
Had no plans			30%

In articulating their concerns about their ability to finance their university education, 44% indicated that they had "*some concerns (but would probably have sufficient funds)*", 26% indicated that they had "*no concerns (confident they would have sufficient funds)*", 22% had "*major concerns (had funds but would graduate with significant debt)*", while 8% had "*Extreme concerns (not sure if I will have sufficient funds to complete university)*".

Student issues with regard to financing their studies are reflected in Figure 28:

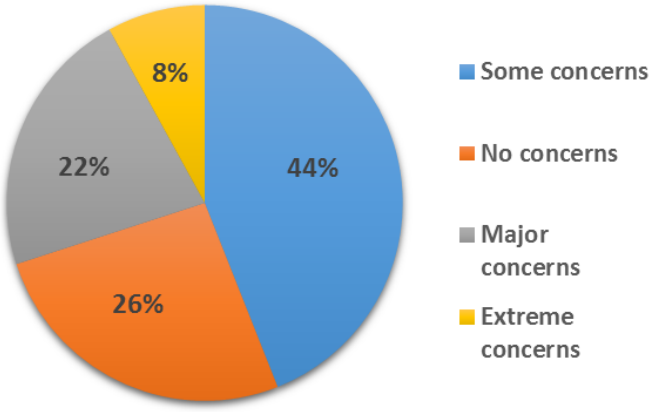


Figure 28: Financing their studies

With regard to their Average Point Score (APS), 1% indicated that the score was "*42 or more*", 7% indicated that their score was "*between 36-41*", 60% indicated that their score was "*between 30 and 35*", 30% indicated that their score was "*between 24 and 29*" and 2% indicated that it was "*less than 24*", all of which are reflected in Table 24:

Table 24: APS scores

APS Scores				
42 or more	36 - 41	30 - 35	24 - 29	Less than 24
1%	7%	60%	30%	2%

With regard to their gender, 78% of respondents indicated that "*they were male*", while 22% indicated that "*they were female*". Their ethnic definition was as follows: 49% of respondents indicated that "*they were Black*", 35% of respondents "*were White*", 3% indicated that "*they were Coloured*", and 4% "*were Indian*" while 9% "*Preferred not to answer*".

A diagram indicating students' race is reflected in Figure 29:

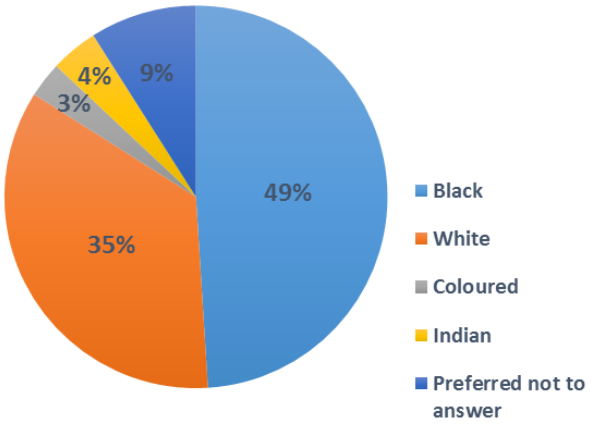


Figure 29: Race

Regarding their age, 1% of respondents indicated that "*they were 17 years old*", 87% were "*between the ages of 18 and 19*", while 12% were "*between the ages of 20 and 23*". There was "*no respondent older than 24 years*". As would be expected, South African students were in the majority, while 6% were foreigners; 36% indicated that English was their first language, while 64% indicated 'No'. 80% of respondents indicated that they were not first-generation students, i.e. first in their family to attend HE. An important statistic was that 64% of respondents indicated that English was not their first language, which accounted for the fact that a large number of students struggled with writing and reading skills.

In describing their income group, 51% indicated that they came from middle income homes, with 30% indicating that they came from upper-middle class income; 18% indicated that they came from low-middle income homes, and 1% indicated that they came from low income homes.

A diagram reflecting students' Income groups is provided in Figure 30:

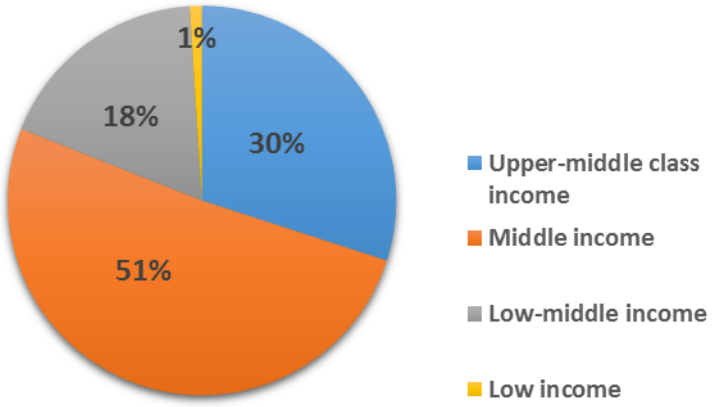


Figure 30: Family income

Regarding the highest level of their mother's education, the statistics indicate that 1% did not finish high school, 17% completed high school, 15% obtained a diploma, 23% finished a bachelor's degree, 16% completed a master's degree, 4% completed a doctoral degree, 12% did not know, and 12% preferred not to answer. This information is plotted on the graph in Figure 301:

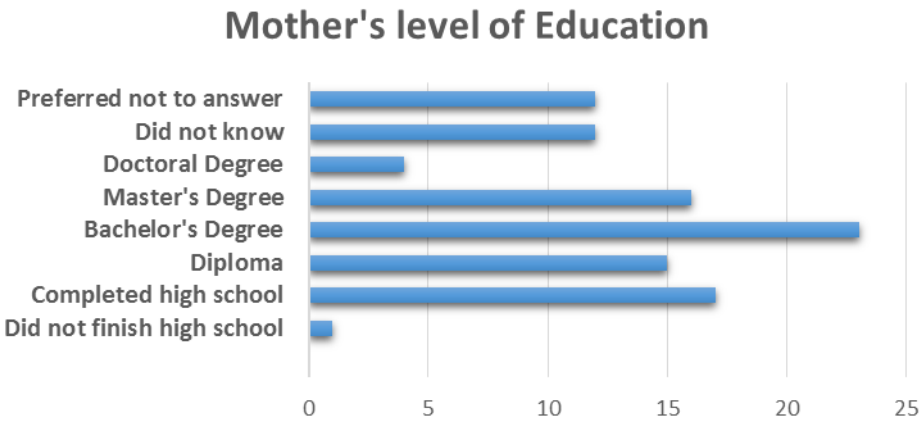


Figure 31: Mother's level of education

Of the 23 design activities shown in Table 25, respondents were requested to rate the six most important activities for a university student:

Table 25: Six important design activities

Design Activity	Percentage
Abstracting	16%
Brainstorming	41% (6)
Building	16%
Communicating	65% (1)
Decomposing	4%
Evaluating	41% (6)
Generating alternatives	15%
Goal-setting	58% (2)
Identifying constraints	19%
Imaging	13%
Iterating	1%
Making decisions	45% (5)
Making trade-offs	3%
Modelling	1%
Planning	57% (3)
Prototyping	15%
Seeking information	33%
Sketching	9%
Synthesising	3%
Testing	33%
Understanding the problem	55% (4)
Using creativity	33%
Visualising	30%
I prefer not to answer	3%

Hence, as indicated above, students rated the six design activities they thought relevant to an IT student as: (1) Communicating, (2) Goal-setting, (3) Planning, (4) Understanding the problem, (5) Making decisions, (6) Evaluating, and (6) Brainstorming (two activities (6) were rated as equally important).

In answer to the question requesting additional experiences in IT that they had not already been asked about many students responded in the negative, with some asking additional questions, or making comments that are provided (verbatim):

- A student indicated that ClickUP was confusing, please make it more straightforward to understand.
- In an entire IT class where every student took IT as subject and passed it in Matric, our lecturers spend half an hour explaining how to copy and paste a URL. It is frustrating and makes respondents feel insignificant to an extent.

- Lectures often start late.
- Students who understand tasks should be allowed to complete it in their own time and not at the pace of the whole class.
- I am amazed at the number of students who want to study at this university, but cannot, due to their low APS scores.
- Being not really interested in IT, I learned to appreciate the programme and to dedicate myself to all of my work. I hope to pick up some useful information that I can use later in my life even if I don't carry on with IT.
- JavaBlock has helped with understanding Programming Logic.
- Team work is essential in the practical lectures. I didn't have IT at school so I have a problem with the practical aspect but still manage to do the work and finish it with the assistance of my team members.
- I see what my friends are doing and I do the same.

5.4 RESPONSES TO THE MINI-ESSAY

After being on campus for a month, students were given the topic, 'The joys and frustrations of being a new first-year student' and requested to write a mini-essay about this experience. The responses to this question (Appendix H) were interesting, but not unexpected from first-year students.

There is no doubt that understanding what students feel and say are important factors that universities should take note of to make the first-year experience valuable. There is sufficient research to indicate that entering university is an extremely stressful and overwhelming time for most students (Teddlie and Tashakkori, 2009), with some who will go on to make a success of the first year, while others are not able to cope. Much of the blame can be attributed to the discord between the expectations of university life and the actual experience (Jardine, 2013).

As the responses represent the voice of students, they have been analysed using the constant comparative method of data analysis (Maykut and Morehouse, 1994). As they point out, "*Words are the way that most people come to understand their situations; we create our world with words; we explain ourselves with words; we defend and hide ourselves with words*" (Maykut and Morehouse, 1994). This

qualitative method allowed breaking down of the data into units and eventually coding the data into themes or categories. The researcher analysed, identified and placed information from the responses according to the category that most appropriately expressed the verbatim view of students. The seventy-four responses have been arranged according to common headings, according to the voice of the students. This comprehensive analysis can be found in Appendix H. However, a summary of these findings is presented by the researcher as indicated below:

5.4.1 Difficulty in finding way around campus

In the responses indicated in the essay, there was no doubt that students were overwhelmed by the university environment, especially being on the Hatfield Campus, despite spending only two weeks there for orientation. By all accounts, once students moved to the Mamelodi Campus, the location of the extended four-year programmes, the situation greatly improved. Students were accustomed to being given a ready-made time-table at school, whereas at UP students were responsible for the compilation of their own time-tables. This proved to be a daunting task that confused many students, even though they were assisted by tutors and lecturers. During the first two weeks of arriving at Mamelodi Campus, it was not unusual to find students still unfamiliar with venuesand laboratories, but as they acclimatised to their new environment, it began to get easier.

As there are so many different E4YPs on the Mamelodi Campus, students sometimes wandered off with groups they did not belong to, but soon realised their mistakes. There were also instances where students delayed so much in looking for the venue that by the time they reached the venue, the lecturer had already commenced with the lesson. In some instances, students chose to remain out of class for fear of arriving late.

Students arrived on campus from all walks of life, from other cities and rural communities, and suddenly found themselves being part of a strange new community. Depending on the personality of the student, and the integration tactics of the university, many students struggled to make friends easily. In some situations it was the first time the student had to interact with students from other races, and finding and making friends became a steep learning curve. However,

within a few weeks, students were able to forge friendships with other students who shared their interests, and in a short time could find and move around the campus with ease.

5.4.2 Meeting new friends

From the responses received it was clear meeting people from diverse communities was initially a problem. Very few students re-united with friends who had been with them at school. There was the possibility that their friends were in other degree courses on the Hatfield Campus. Living in a country that had suffered the ravages of apartheid, there were students who felt comfortable in their own racial groups only. However, this was soon quashed when students realised that they were all at the university with the same aim of studying towards obtaining a degree. Many students spoke of isolation initially, but thereafter the wonder of meeting new people with different world experiences. The lecturers and support staff were also important in ensuring that students settled down in the new learning environment. Before the end of the first semester, students had forged new relationships with individuals from diverse student population.

5.4.3 Distance and transport

It would appear that travelling to and from university to home or alternate accommodation was a major problem for students. There were some students who owned cars and were able to travel on their own and park their cars in a secure environment. However, the majority of students made use of the transport provided by the university. Buses would leave Hatfield Campus from a designated point from 07:00 to 07:30 and transport students to the Mamelodi Campus, a distance of approximately 25 km. If students missed the transport provided by the UP, the onus was on them to find ways and means of arriving at their destination. There were also some students who were transported from the Naledi hostel, approximately 5 km from Mamelodi Campus. This hostel housed students on the E4YPs who qualified for residence accommodation. The vast majority of students travelled from in and around Pretoria, with students who travelled in excess of 60 km per single journey (from Benoni, Tembisa and other outer-lying areas from Pretoria). This necessitated leaving home in the early hours of the morning to take trains and buses/taxis to ensure that they arrived at Hatfield campus in time to board the bus taking them to the Mamelodi Campus. In the afternoon the entire

process was reversed, with students having to travel on the university buses, and then still having to travel long distances to reach home. For many students travelling to campus and back was a gruelling process, which often did not get better until they had completed their compulsory first year on the Mamelodi Campus.

5.4.4 Exhaustion (related to time management)

As would be expected, for students who were not acquainted with travelling long distances, this new means of getting to and fro from campus to home, was an exhausting process. Students complained of the large amount of research and other tasks given to them by lecturers. They were unable to complete many of the tasks while at university, and then after they had survived an arduous day, they still had to settle down to completing tasks and other work.

In many instances students were living on their own for the first time. This was a major adjustment for them as they then no longer went home to a warm, cooked meal but had to provide their own supper. They had to shop for their own groceries, then prepare the food, do laundry and other tasks, and then eventually when it was time to do their university tasks, they were too exhausted to settle down to do this.

From the responses received, it was evident that many students went home and first took a nap in order to re-charge their energy so that they could continue with university tasks late into the night. Some students had a hectic social life which further impinged on their time. The overwhelming response from students was that they got too much work to do, and were tired and exhausted and struggled to complete university-related tasks. Most complained about sleep deprivation and extreme tiredness to the point that they were sometimes unable to focus during lectures. Time-management strategies were not implemented; hence students struggled to keep abreast of their studies.

5.4.5 Loneliness (Social Integration)

Settling down and making friends at university was dependent on the personality of the student. Some needed time to form bonds with their fellow students. A stumbling block in most instances was the issue of language. Many students were proficient in communicating in their home languages (Afrikaans, Setswana, etc.), but were not fluent in English, which was the language of instruction and the intermediate language for communication. Until students felt safe they would rather be an observer than a participant in exchanges with other students.

Another problem experienced by students was the lack of finances to purchase books and other necessary materials. This isolated and frustrated the student as he/she was unable to do the necessary work, and felt as though nobody cared about his/her predicament (at school some provisions would have been made). In many instances students struggled to understand what the lecturers were saying or required from them due to their inability to comprehend fully the English language.

Closely related to the lack of monetary funds, was an issue that has also recently been highlighted at HE institutions. It was alarming to note the number of students who arrived at UP not having had something to eat (since perhaps the previous day). UP has noted this problem and identified students through Student Support services. These students are issued with food vouchers that can be cashed in for a meal.

The last factor was that some students were living on their own for the first time. After enjoying the untold freedom of being on their own and making their own decisions, the responsibilities of living on their own become a reality. They had to clean the dwelling, do their own shopping, laundry, sort and pack their own lunches, and had the responsibility of getting up in the mornings with the help of an alarm. For some students the loneliness and drudgery of being on their own became a depressing factor.

5.4.6 Academic and Support Staff

Students had to get used to lecturers, tutors and teaching assistants, and were astute enough to know which lecturers made an effort to present their lectures in an interesting manner. Generally students were happy with the manner in which the lecturers and support staff were willing to assist them, especially on the Mamelodi Campus where the number of students was not vast (no long queues, etcetera). Where students were unable to compile their timetables properly, the lecturing staff and tutors were most willing to assist.

5.4.7 Freedom (Accountability)

For many students the strict discipline of school with regard to wearing uniforms, having their hair cut a certain length, and smoking in fear, was over. Students expressed their happiness at being able to make their own decisions and having the freedom of being away from their parents and other siblings. The road ahead appeared to be difficult, but students were determined to traverse it on their own.

5.4.8 Adapting to new surroundings

After the initial misgivings and sadness of having to attend lectures on the Mamelodi Campus rather than on main campus, students were pleasantly surprised to find the Mamelodi Campus to be a cosy and a safe haven, with friendly and helpful staff and support staff (institutional integration). They could give their parents the assurance that they were well-taken care of in terms of security and amenities. Mamelodi Campus had everything that the Hatfield Campus had, but on a smaller scale. Students were impressed by the neat and pleasant surroundings, and the peace and quiet of the campus. Despite arriving rather lost on the campus, after travelling a long distance, the secondary campus offered lecture halls that were immaculately clean, and infrastructure and equipment that were comparable to those of the Hatfield Campus.

5.4.9 Optimism

Students were optimistic to study for the next year. They acknowledged that it was going to be hectic, and they would have limited time for other activities, but nevertheless were prepared for the challenges that the year offered. They realised that being on the Mamelodi Campus was a stepping stone to obtaining a degree

and making a success of their lives. The disappointment of being on the Mamelodi Campus was fleeting, and students were inspired to be working towards their future endeavours. The idea that they would be building solid friendships with a diverse group of people, was also appealing.

5.4.10 General Problems

As is always the case, the good is balanced out by the bad, and students complained about some isolated problems. These included that the UP portal was sometimes inaccessible (also experienced on Hatfield Campus), the Internet was slow, and a few lecture rooms had projectors that were out of order or focus. Another negative factor was that most students were unable to procure bursaries or loans for their studies, and at certain times of the month were so broke that they arrived on campus not having had anything to eat since the previous evening. Other students complained that the orientation week was too long and boring, and were irritated that some lecturers did not use the full complement of time allocated for their lectures. Students complained that the cafeteria was limited in its choice of food, and also too expensive for the pockets of students.

5.4.11 Conclusion

The analysis of the responses to the mini-essay succinctly encapsulate the fears, optimism and problems that beset most E4YP students, albeit that the responses discussed were from students in the SIT.

5.5 OTHER QUESTIONNAIRES

The responses from questionnaires sent to students in the four-year E4YP who had (1) successfully graduated from UP (Appendix G), (2) were still students at UP on the programme after four years (Appendix E), and (3) had not been successful and were now ex-UP students (Appendix F), are discussed next:

5.5.1 Questionnaire responses from graduates

The researcher was able to deduce the following from the survey responses:

- Respondents were mainly in the 19 to 20 age group when they commenced their first year at university.

- They had registered either for the BSc IT or the BIS Multimedia programmes (both part of the E4YP in IT).
- It had taken students an average of 4½ years to complete the degree.
- All the graduates who had responded were employed in the IT field, and all had jobs closely related to their field of study (e.g. Software Development, Software Engineering, GIS Systems). They noted that studying for this degree was their ideal career choice, and that they had not chosen it as a last resort.
- On requesting respondents to rate the overall experience they had received from UP on a Likert's sliding scale where 1 was poor and 5 was excellent respondents very conservatively placed their experience as average, where none of them indicated that the experience was either poor or excellent.
- When asked about the value they placed on the degree they had obtained from UP, all respondents rated their degree as being either very good or excellent.
- Respondents were also asked if they would recommend UP (and the degree they had graduated in) to a friend. None of the respondents indicated that they would not do so. However, 25% thought UP was average, whereas 50% would definitely recommend UP, and 25% thought UP was really an institution of choice.
- All students indicated that they had chosen UP as their university of choice since it was affordable, centrally located in Pretoria, and also offered the degree programs the student was interested in. None of the respondents lived on campus, while all of them indicated that they lived in a 10 km radius from UP. They agreed that if they had lived on campus, their academic experience would have been enhanced.
- All respondents rated the resources such as computer rooms, library, cafeteria, as being very good, with some teething problems such as it being noisy, difficulty to find a vacant computer, etcetera. Respondents indicated that they were able to get internet access due to the availability of Wi-Fi, even though this proved to be unstable at times.
- The availability of lecturing staff when students required their help out of class times, appeared to be problematic. Some lecturers were always available, others were sometimes available, while in some cases students were just unable to make contact with lecturers due to several constraints.

- The main obstacle in their academic progress was cited as being the financial constraints that they experienced as students. They struggled with not having sufficient money to pay fees and for daily living expenses.
- The high workload, lack of sleep, pressing deadlines and time management, were issues that students struggled with at UP. Consequently respondents were surprised to note that the same issues cropped up in the work-place, but due to having been exposed to these issues previously while at UP, they were able to cope with the situation.
- Respondents attributed their success in achieving their IT degrees to their resilience and determination to succeed. This had been through hard work and perseverance, with the ability to stick to deadlines, sacrificing social interactions, and being passionate and committed to the task of studying.
- With hindsight, though, some students wished they had taken advantage of all the opportunities afforded by UP, achieved better marks and taken better note of the valuable input provided by IT lecturers.
- There were some negative features of UP that were highlighted with respondents complaining about the poor attitude displayed by lecturers who had not adequately prepared for lectures, focusing more on their research than on teaching, and poor lecturer teaching styles. Respondents also complained that food on UP campus was overpriced and unaffordable to some students. On some days the computers remained off-line for hours at a time due to the Internet connections being slow and compromised due to their limited capacity to handle the many users on the Mamelodi Campus.
- Respondents indicated that they were aware that the drop-out rate in the E4YP in IT was high, with a few colleagues having dropped out without graduating. They attributed the poor performance of students to their attitude towards new learning, finding language barriers insurmountable, and the difficulty in understanding the IT and Mathematics modules. However, respondents acknowledged that some students still expected to be spoon-fed as in school, and were lazy, unmotivated and apathetic in their studying. A few colleagues had dropped out of the E4YP in IT, and had transferred to other departments and faculties at UP. Other students who had dropped out of UP went on to study at other institutions such as UNISA (University of South Africa).

- The respondents thought UP could have done some things better or differently while they were students, e.g. the appointment of lecturers who were committed to their task of generating education, providing video tutorials of day lectures for later revision purposes, made more of an effort to provide timeous feedback to students. Respondents also indicated that by the end of their studying time, they were disappointed that only a few lecturers could identify them by name.
- Only 25% of respondents indicated that they would be pursuing post-graduate studies at UP. The rest were either "taking a break from studies", or not interested in furthering their qualifications at that point in their careers. However, all respondents were ambitious and saw themselves prospering in a senior position in an IT environment within the next ten years.
- When asked how UP had assisted them in developing the skills necessary for the workplace, the responses (Table 26) were as follows:

Table 26: Skills important in the work place

Skill/s	Excellent	Good	Average	Poor
The ability to communicate orally.		25%	50%	25%
The ability to communicate effectively in writing.		75%		25%
The ability to work effectively in teams with people from different backgrounds and cultures.	75%	25%		
The importance of ethical judgement and decision-making.		50%	25%	25%
The importance of critical thinking and analytical reasoning skills.		50%	25%	25%
The ability to apply knowledge and skills to real-world settings.	25%	50%	25%	
The ability to innovate and be creative.	25%	50%	25%	
The ability to communicate in English (may be other than your home language).		25%	25%	50%

5.5.2 Questionnaire responses from students still on the programme

Many questions were posed and respondents were required to give their responses in a Likert scale manner of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. Only those that were meaningful have been listed (Appendix I). A synopsis of the responses follows.

5.5.2.1 Summary of findings (current UP students)

The majority of respondents (75%) found their degree course in IT to be intellectually stimulating. This was despite the fact that they had been in the study

programme longer than the specified four-year period. However, a large number of students felt that their studies had put much pressure on them in terms of difficulty, repeated supplementary examinations, etc. The sheer volume of the workload in the degree programme meant that all aspects of IT could not be thoroughly comprehended. Students also agreed that it was more difficult to study if you were a female They were generally outnumbered by male students in the class, some were parents and wives who still had to see to household chores and/or children, others had to work part-time or full-time, whilst some had to take care of aged parents and other siblings.

What was surprising was the responses that agreed that studying IT had positive advantages for them, despite their being well out of the allocated four-year period for studying IT. These students indicated that studying IT had:

- stimulated their enthusiasm for further learning;
- developed their capacity for research and inquiry;
- allowed them to explore ideas confidently with other people;
- developed their ability to use oral, written, and/or visual communication;
- fostered their personal and intellectual independence; and
- enhanced their confidence about tackling unfamiliar problems.

Respondents were non-committal in their responses about the lecturing staff giving them helpful feedback on their progress. They were also not convinced that the lecturing staff limited their examinations to the regurgitation of facts. Students believed that some lecturers did not work hard enough to make their subjects interesting, comment adequately on students' work, or provide timeous feedback. Most importantly, respondents were vehement in their responses that lecturing staff made no effort to understand the difficulties students might be having with their work, and other issues that were relevant to students (transport, accommodation, lack of food). A large number of respondents believed that having a bursary would have been far easier for them to survive financially.

5.5.3 Questionnaire responses from ex-students from E4YP in IT

This questionnaire was very similar to the questionnaire given to the present E4YP IT students (Appendix E). The responses were given in a Likert scale manner of Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree. Only meaningful responses have been listed (Appendix J). A synopsis of the responses is provided:

5.5.3.1 Summary of findings (ex-UP students)

The responses to some of the questions were predictable since these students were the drop-outs from the four-year programme; moving the blame to the university made students feel less accountable for their failure. Part of the problem for choosing IT as a career was that students had the hobbyist idea of IT. They excelled at playing computer games, had good internet (and Facebook and Instagram) skills, a proficiency in the Microsoft Office suite, and then wrongly assumed that doing IT at university would be an easy choice. The questionnaire results show that students strongly agreed that they thought an IT degree would be easy and an automatic choice, since they were highly computer literate. Therefore students were markedly disappointed when the true aspects of IT, including programming language to a high level, were presented to them, and they conceded that the demands of the degree were beyond their capabilities.

Students were in agreement that the lecturing staff were more interested in testing what they had memorised, rather than what they understood. They also contended that feedback given to them was not appropriate as it was given to them in the form of marks, rather than explanations and elucidations. They were of the opinion that more tutor assistance should have been provided to ensure success. The survey revealed that respondents believed that being of a different race had an effect on their learning, and that it was more difficult to study if one was a female. In a positive manner, students were in agreement that the degree course administration was effective in supporting their learning.

The survey brought to the fore several issues. Many of the ex-UP respondents disagreed that the lecturing staff:

- made a real effort to understand the difficulties students might be having with their work, transport problems and accommodation issues;

- worked hard to make their subjects interesting;
- made it clear right from the start what they expected from students;
- listened to their ideas and suggestions.

Students also conceded that they had come to the realisation that the IT-degree did not suit their personality and was just too difficult to complete. According to the respondents, it also did not develop their capacity for research and inquiry, and hence they exited the study direction and moved on to something more beneficial to them.

5.6 SUMMARY OF DATA ANALYSIS

The findings of all of the different data collection instruments are tabulated in Table 27 to 32. The rationale was to eventually extract the similar findings that emerged from all the research collection instruments.

Table 27: Common Findings

	Gender	Age	Racial Component	Home Environment	Language of Instruction
Online questionnaire	√	√	√	√	√
	66% male	18 - 20 yrs.	55% White	72% from urban households	All had basic understanding
Chi-square (or Fisher's exact) results using academic results and info from STARS)	√	√	√		
	There is a significant relationship between outcomes and residence	There is a tendency for a relationship between outcomes and age	There is a significant relationship between results and race		
Mini-essay (Verbatim responses cover the indicated aspects)				√	√
Mini-questionnaire:					
- Present students	√	√	√		

	Gender	Age	Racial Component	Home Environment	Language of Instruction
- Graduates					√
- Ex-students	√		√		

Table 28: Common Findings

	Home Language	Accountable for their success	Goals	Family Support	Financial Support (bursary)
Online questionnaire	√	√	√	√	√
	Only 22% speak English	56% not accountable	48% no pre-existing goals	Only 8% indicated no support	
Chi-square (or Fisher's exact) results (using academic results and info from STARS)	√				
	There is a tendency of a relationship between results and home language				
Mini-essay (Verbatim responses cover the indicated aspects)	√	√	√	√	
Mini-questionnaires:					
- Present students		√	√		√
- Graduates		√	√		√
- Ex-students		√	√		√

Table 29: Common Findings

	Institutional support	Social Integration Levels	Reading, Writing and Test-taking Skills	Future Vision	Time
Management					
Online questionnaire	√	√	√	√	√
	Only 8% say they received support	51% average, 32% not integrated	51% anxious about test-taking skills	Only 10% confident to achieve success	Only 17% unsure how to manage
Chi-square (or Fisher's exact) results (using academic results and info from STARS)		√		√	
		There is a significant relationship between results and social integration		There is a tendency of a relationship between outcomes and future vision	
Mini-essay (Verbatim responses cover the indicated aspects)	√	√	√	√	√
Mini questionnaire:					
- Present students	√	√	√	√	√
- Graduates	√	√	√	√	√
- Ex-students	√	√	√	√	√

Table 30: Common Findings

	Presen-tation skills	Mathe-matical skills	Computer skills	Work full-time or part-time to supplement studies	Accommo-dation
(Residence)					
Online questionnaire	√	√	√	√	√
	20% indicated no skills	42% were competent	Only 16% skilled in computer usage	8% needed to work to supplement studies	61% could not get campus residence
Chi-square (or Fisher's exact results (using academic results and info from STARS)				√	√
				There is a tendency of a relationship between outcomes and bursary	There is a significant relationship between outcomes and residence
					There is a tendency of a relationship between results and residence
Mini-essay (Verbatim responses cover the indicated aspects)				√	√
Mini-questionnaire:					
- Present students	√		√		
- Graduates	√		√		√
- Ex-students	√		√	√	

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Table 31: Common Findings

	Transport	Distance of Accommo-dation	Finding way	Freedom	Academic and support staff	Optimism
Around campus						
Online questionnaire						
Chi-square (or Fisher's exact) results (using academic results and info from STARS)	√	√				
	There is a significant relationship between outcomes and transport	There is a significant relationship between results and distance of accommodation				
		There is a tendency of a relationship between outcomes and distance from accommodation				
Mini-essay (Verbatim responses cover the indicated aspects)	√	√	√	√	√	√
Mini-questionnaire:						
- Present students					√	
- Graduates					√	
- Ex-students					√	

Table 32: Common Findings

	Feedback on work	Degree too difficult	Recommend University to others
Online questionnaire	√		
Chi-square (or Fisher's exact) results (using academic results and info from STARS)			
Mini-essay (Verbatim responses cover the indicated aspects)			
Mini-questionnaire:			
- Present students	√		
- Graduates	√		√
- Ex-students	√	√	

In reviewing Tables 27-32, the researcher looked for commonalities between the findings of all the research collection instruments and noted the factors that impeded the success rate of students on the E4YP in IT. The common factors identified were:

Gender, Race, Home language, Goals, Accountability, Financial support, Institutional support, Social Integration, Reading, Writing and Test-taking, Future vision, Time management, Presentation skills, Computer skills, Fund shortages, Accommodation, Transport, Distance to university, Academic support, and Feedback on work.

However, from the study of the literature, and confirmed by this study, the above problems are not exclusive and/or different to those experienced by all first-year students entering university. The researcher has tabulated the factors and listed at least one citation that confirms the presence of the problem:

Table 33: Factors identified in this study

Factor/s identified in this study	Mentioned in the literature
Gender	All women grow up in a society that privileges their male counterparts in the labour market, as well as their traditionally cultural lives. However, according to Tinto (2015), women earn their bachelor degrees more frequently than men, despite the challenges they face.
Race	While individual universities work hard to absorb and integrate the different cultures into its university culture, "leveraging that diversity in large classes" (Center for Teaching, 2010) can be a challenge to educators.
Home language	"Degree programmes at universities of applied sciences are further distinct from most other university curricula in that they incorporate obligatory English language courses for all students. In this way, students are enculturated into global career-field communication through specialised English language teaching" (Psonder et al., 2016).
Goals	According to Tinto (2015), "events during study at the institution can influence students' goals and motivation, because the goal itself may vary in both character and intensity".
Accountability	"This is not to say that students do not have expectations of the institution; they do. But they talk more clearly (and more repeatedly) about the need for understanding their role vis-à-vis learning and performing than they do about the responsibilities of their lecturers"(Cross et al., 2009).
Financial support	"Finance has become the crucial aspect of the university experience. University costs have risen with the trend of privatisation and the increase in fees, although we have yet to capture one of the most dramatic effects of austerity, namely, the real-life implications of transferring the public costs of HE onto young people and their families" Antonucci (2016).
Institutional support	"Involve students with other students, faculty, and staff, paying particular attention to those activities that are directed towards student learning. Students who are actively involved with peers, faculty and staff – especially in learning activities – are more likely to learn, persist, and graduate. The focus of the classroom is important, because for the many students who commute or work while enrolled, the classroom is the only time they are sure to be on campus" (Tinto, 2004).
Academic and Social Integration	"At no time is support, especially academic support, more important than during the critical first year of college, when student success is still so much in question and still very responsive to institutional intervention. And in no place is support more needed than in the classroom where success is constructed one course at a time" (Tinto, 2012). For learning to be effective, Tinto (2012) postulates "that the student has to be integrated socially and academically".
Reading, Writing and Test-taking skills	According to Shalem et al (2013), "the notion of *discontinuity* is used to describe the difficulty students experience (particularly the average and the low-achieving students) with regard to academic writing in comparison to their experiences of school writing".
Future vision	"Students are prepared to take responsibility for their own learning, provided that they feel supported (academically and socially) by the institution. Having a sense of purpose and belief in one's ability is related to student commitment and satisfaction" (Mendoza et al., 2016).
Time management	"Time management plays a vital role in improving student's academic performance. Each & every student should have time management ability which includes setting goals & priorities, using time management mechanism (such as making a "to do list") and being organized in using

Factor/s identified in this study	Mentioned in the literature
	time. Time management is only possible through self-motivation" (Kaushar, 2013).
Computer skills and Presentation skills	"When carefully designed and thoughtfully applied, technology can accelerate, amplify and expand the impact of effective teaching practices. However, to be transformative, educators need to have the knowledge and skills to take full advantage of technology-rich learning environments" (Thomas, 2016).
Fund shortages	"While for many students a part-time job provides opportunities to gain relevant work experience or to save additional funds to broaden their future experience, for others who need to work to cover living costs, it can also have significant implications for their ability to engage in the value-added, self-directed elements of their studies and therefore, potentially, on their final outcomes" (Crockford et al. 2017).
Accommodation	Unavailability of residence accommodation was a challenge for the first-year students. Tinto (1987) concluded in his study "that students who reside off-campus are disadvantaged when compared to their on-campus counterparts. He found that the former group spent less time on campus creating relationships with other students and staff and clearly had fewer opportunities to engage in quality interactions. Thus, these students are less likely to make a strong commitment to their studies".
Transport/ Distance to university	"Tuition costs are rising at alarmingly high rates. Add to this the cost of meals, supplies, transportation, and textbooks, and you have a university student's worst nightmare. University students drop out of school each year because they cannot afford the price" (Monaghan, 2017).
Academic support	"It has been found that students under-utilise academic support services), particularly those who are most in need" (Freitas, 2015).
Feedback on work	"The most important aspect of assessment was receiving feedback clarifying things they did not understand. Being good at explaining things was the most important teaching quality. Reasons and expectations were also found to differ depending on students' gender, age group, caring responsibilities, application route, fee status and whether English is their first language" (Balloo et al., 2017).

5.7 CONCLUSION

The data from the different data analysis instruments has been tabulated in the tables above. This information was cross-examined to identify the common problem areas indicated by students in the E4YPs for IT. These included the quantitative analysis of:

- The online questionnaire
- Statistical analysis, using the Chi-square and/or Pearson p-value scores.

The researcher made use of qualitative analysis and provided the analysis of

- mini-essays; and
- mini-questionnaires (Graduates, current UP students, ex-students).

The researcher is of the belief that a detailed analysis of the findings has been given using data collected from the different data collection instruments. Tentative findings and recommendations are outlined for further discussion in the next section.

The last and final chapter discusses the findings of the research and makes recommendations for future research. Finally, the researcher does an evaluation of this study.

Chapter 6: Recommendations and Conclusion

6.1 INTRODUCTION

The final chapter of this thesis demonstrates how the research questions posed in Chapter 1 have been answered. It also provides a summary of the research contributions of the study. Finally, a discussion of the problems and/or limitations of this study is included, as well as recommendations for future research.

6.2 EVALUATION AND RESEARCH – FRAMEWORK

The researcher has used a methodology based on the research process “Onion” as expounded by (Saunders, 2011) and discussed in Chapter 4.

As part of this process the thesis follows a mixed methods approach where data was gathered mainly by using online questionnaires, mini-questionnaires, mini-essays, and statistical analysis leading to Chi-square test scores or Fisher’s Exact (p-value) scores. Saunders (2011) notes that using mixed methods of data analysis has advantages in that it allows one to use various methods for different approaches. The data is analysed in the previous chapters with the intention of looking at how the students on E4YP in IT viewed their first-year journey.

The three theories discussed and utilised are the Expectancy-value theory, Ecological theory, and mainly Tinto’s Student Integration Model, including Tinto’s other research on student retention and attrition. These theories provided a layered set of lenses to view the university students’ experience of E4YP in IT (applicable to all students in the FYE). The researcher is aware that there has been much critique of Tinto’s models by other theorists. A common critique is that

Tinto's model is "*too homogenous (White, young American first-year students); its inability to explain racial minority student retention; studying only the attrition of older students; and, neglected the widened community of students that resulted from increased access*" (Pather and Chetty, 2016).

However, according to the researcher, Tinto's (1975) model is the appropriate lens through which this research has been conceptualised. Tinto's assertion is that integration must take place in both the social and academic terrains if the student is to become properly integrated into the university environment. Tinto's (1993) theory of student departure suggests four distinct features in the process of student departure:

- Student entry characteristics;
- Initial commitment to goal and institution;
- Social and academic integration; and
- Subsequent commitment to goal and institution.

Tinto (1975) hypothesises that the above factors influence students' entry characteristics and their commitment to the goals of the institution. In retrospect, the researcher, after viewing Bourdieu's (1984, 2001, 2011) model, concurs with Pather and Chetty (2016) that an amendment could be made to Tinto's (1975) model by incorporating the theory of 'habitus' and 'capital' (Bourdieu's, 2011). This should offer insight into understanding social interactions and can be described as "*a set of values, practices and norms which people assimilate as part of who they are and how they operate*" (Bourdieu, 2011). This is in keeping with the findings of this study as the researcher was interested in determining students' progress in the E4YP in IT. By integrating Tinto's model (1975) with Bourdieu (2011), the new integrated model will take into account the fact that students have different life-experiences and cognitive and non-cognitive features, all of which shape the student's experience at university as being either a negative or a positive experience. In the graphical representation (Figure 32) the model acknowledges that students come into the academic arena with multi-layered identities (student, parent, family member, employee and career) that all influence academic performance in programmes such as the E4YP in IT.

In the graphical representation (Figure 32), the model includes aspects of Tinto's SIM model (1975) and integrates it with Bourdieu's theory of 'habitus' and 'capital (2011); it a holistic picture of a student's first-year experience (Pather and Chetty, 2016). The new integrated model identifies four sets of variables that have an impact on the FYE:

- *Students' habitus':* is one of Bourdieu's most influential yet ambiguous concepts. It referes to the physical embodiment of cultural capital to the deepy ingrained habits, skills, and dispositions that we possess due to or life experiences; Habitus also extends to our 'taste' for cultural objects such as art, food and clothing
- *Students' capital:* Bourdhow ieu extended the idea of capital to categoriese such as social capital, cultural capital, fianancial capital and symbolic capital
- *Students' social and academic integration:* contribute mainly to the understanding of students'envolvement in academic and social capital play in the way theyexperience university life and social capital.
- *Individual students' first-year experience*: (FYE) was established to help student regotiate the transition from school to university and make use of the many resources and faculty cultures

The integrated model by Pather and Chetty (2016) is depicted in Figure 32:

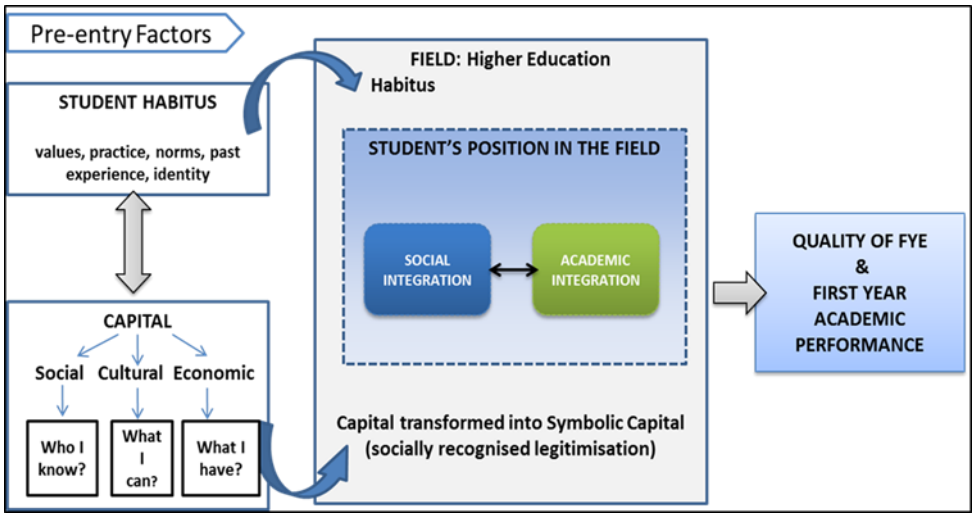

Figure 32: An integrated model of the FYE

There is no doubt that students come into the HE sector with different world experiences and characteristics, which Bourdieu (1984, 2001, 2011) collectively refers to as the student's habitus and capital. Students filter their new experiences through their existing experiences, and decide whether the new environment is hostile or favourable. Subsequently, their different experiences from their capital and habitus may positively and/or negatively influence their integration into higher education (Pather and Chetty, 2016).

There is no doubt that the interaction between the student and the academic institution can impact students "*sense of belonging, and sense of fit*" Tinto (1987), and when students "*sense incongruence between the academic institution and/or their academic community and how they perceive themselves, this could result in alienation and increased likelihood of drop-out*". It is not expected of the student to compromise who they are in order to fit into the 'fabric' of the institution. Tinto (1975) refers to the isolation and loneliness students suffer in the absence of sufficient interactions whereby integration can be achieved. Contrary to this, if students perceive the academic institution as positive, and have enculturated into the society of the university, they will go on to make the FYE a positive and successful one for themselves.

6.2.1 Answering the research questions

The following section provides answers to the research questions, based on the findings of the study:

6.2.1.1 How do students identify themselves as IT students?

According to Gee (2000) "when a human being acts and interacts in a given context others recognise that person as acting and interacting as a certain 'kind of person'. Being recognised as a certain 'kind of person' in a given context, is what is meant by identity". In trying to compartmentalise students as IT students, it must be acknowledged that they are a subset of the cohort of students classified as first-year experience (FYE) students. The majority of students are confident and eager to commence their first-year of study, in the IT or other E4YPs being conducted on the Mamelodi Campus. This concurs with the findings of the study. The common data that has emerged from the different data analysis tools reveals that the identity of the IT student is very similar to his/her counterpart in other

modules. However, there are a few cleary distinguishable traits that separate the E4YP in IT students from others students in the FYE.

It is clear that the development of identity can be problematic in many ways for some students. Mostly, there is this struggle to integrate their learning experiences with the perception of who they are and what they would like to achieve. There is no doubt that the first-year IT student has many emotional issues to resolve. However, the generic features of an IT student is listed below. The student:

- is in the 18 to 20 age group;
- speaks English as a second or third language;
- is most likely to be male (Black males are in the majority, closely followed by White males);
- Makes up a small contingent of female students;
- at least 72% live in middle-class urban areas and ;
- has a basic working knowledge of English usage;
- some students may know ‘application software programs’ (Microsoft Office). However, there also exists a large number of students are not familiar with Computer literacy;
- may or may not be able to use the Internet;
- will mainly not have use of personal laptop and are dependent on the resources of the institution;
- will have a cellphone and be adept at sending emails, FaceBook or Instagram;
- an extremely small percentage will know how to ‘code’ (have experience of programming). The large majority of students will be learning about programming for the first time.
- is clearly identified as an individual in the E4YP in IT, and at the same time, as a member of a community of other first year students.

Astin (1993) notes that university students “*who feel a connection with the university and other students, and have a greater likelihood of persisting to graduation*”. For some students, the first-year experience proves to be a “*good experience that is characterized by freedom, independent thought, growth in confidence, and intellectual and personal discoveries*” (Wintre and Yaffe, 2000).

For others it is an experience characterised by loss of confidence, failure and disillusionment.

In a similar fashion the first-year IT student has many of the above characteristics, as he/she is inherently considered to be part of the FYE. Prensky (2001) states that the majority of students entering the university today "*spent their entire lives surrounded by and using computers, videogames, digital music players, video cameras, cell phones, and all the other toys and tools of the digital age*". By implication, some IT students come to the university with full knowledge of IT and its applications, while others have proven potential, and with relevant bridging courses in IT, can be transformed into attaining success in the E4YP for IT. However, this is debatable because in reality it does not happen, as lecturers have to commence with programming from the 'embryonic' stage. Those students that have done programming in school have used another programming language.

6.2.1.2 How do students' IT skills and knowledge develop and/or change over time?

> When students arrive at UP, very few (perhaps 15%) are able to code and design programs. As a group, known as the E4YP students in IT, these students then learn the new language of programming, and by the end of the first semester, clear improvement can be seen. In this journey of learning to program, team-work greatly contributes to their success. By the end of the first year, students are able so submit mini-projects on their own. Their confidence level increases and so does their prowess in programming.

The main aim of the extended curriculum programmes was to identify at-risk students, place them in the E4YPs, with the sole intention of trying to increase the throughput rate of students who have been disadvantaged due to no fault of their own. Similarly, E4YPs in IT were thus designed to equip students with the necessary tools to allow them to complete their IT degrees successfully. It was noted that in some cases students did not have the skills and competencies needed to be successful in the normal curriculum, but had proven potential. Through the UP providing relevant pre-tertiary development (bridging) and

combining this with mainstream study, students were able to improve their skills and abilities in order to be successful.

The analysis has revealed that many IT students struggle with skills such as reading, writing and test-taking. Students were also nervous and unsure when it came to presentation skills. This can also be attributed to students not being comfortable to speak in English. The high level of English usage is also problematic, especially when students are unable to comprehend and answer questions adequately. This leaves the student lagging behind their counterparts who fare better in English usage. Being able to manage their time properly is a crucial feature of university success. Hence, it is alarming to note that less than 20% of students are able to manage their time properly so that they can cover all aspects of the IT curricula, and still have time for extra work.

When students arrive at UP, very few (perhaps 10-15%) are able to code, or have some experience in programming. These students then learn the new language of programming albeit with great difficulty at first, but by the end of the first semester, clear improvement is evident. By the end of the first year as their confidence levels increase, students are able to code and design mini-projects. This is a milestone for the student who had not been exposed to programming per se previously.

It was interesting to note that close to 40% of students conceded that their Mathematical skills were above average. This is contrary to the reality that most students are not able to continue with the IT degree due to their poor performance in Mathematics. Furthermore, Prensky's (2001) notion that all first-year students are "*Natives of technology*" and are "*technology savvy*" cannot be confirmed as the data has revealed that students have shortcomings with regard to their skills in IT.

Finally, a noticeable feature of students for whom IT-knowledge develops and changes over time, is that good students take hold of ideas and opportunities that guide them to their destination. Successful IT students have revealed that they are flexible and able to adapt to all situations such as different instruction and learning styles.

However, it is appropriate to mention at this point that during the twelve months spent on the Mamelodi Campus, at least 80% are able to progress to the Hatfield campus for the last six months (of phase 1). They then they joined the mainstream first-year IT three-year programme in the second semester. However, their progress from that point onwards seems perilous, as the graduation rates after four years appear not to be worth the time and effort invested in running the E4YP in IT degree programme.

6.2.1.3 What do IT-students find difficult and how do they deal with this?

Notwithstanding the fact that they have arrived at an institution that has no connection to their previous experiences, IT students, like all other students, have to face the following problems:

- IT Curriculum: Students find difficulties with the new language of programming and "conceptual difficulties with elements of the curriculum that require abstract and logical thinking", Bennedsen and Caspersen (2007), and all aspects associated with coding. On commencing with the first semester students will encounter module units such as "Computer Systems, Data Communications and Computer Programming" (Bennedsen and Caspersen, 2007). Undoubtedly, most students would be in unfamiliar territory as the computing modules are foreign to the student's frame of reference.

As a result some students apply superficial rote-learning which is not applicable to programming. Most alarming is that a large number of students in the last semester of their first phase (when they are on the Hatfield campus), do not fare well. They continue to fail IT modules which are detrimental to their progress in the degree. In some instances, students are able to overcome this difficulty and continue albeit at a slower pace. The entire process is a 'stop' and 'go' depending of their proficiency in the module. In other instances, they come to the realisation that IT is not within their capability and leave voluntarily. For other students who continue to fail a module more than three times, the university applies the 'exclusion-policy' forcing students to leave the study direction. This process of

some passing and the majority failing modules in the E4YP in IT, has had drastic consequences for the study programme.

- Diversity issues: A large number of students come from rural or township schools, or ex-Model C schools, or Afrikaans only schools, and have not had sufficient experience of interacting with other racial groups (Crede et al., 2015). To add to this, they feel inferior and inadequate in an IT subject that they have not been exposed to previously, and for which knowledge of IT is not a criterion for entrance to the degree.

- First in the family: There is the possibility that the student is the first in his/her family to access higher education, and therefore has no role model to emulate, or who can assist the student in general university-related issues. As the statistics indicate, for many students the first year of study is the first time they venture so far beyond the confines of their homes, without close parental guidance, and often find that they are ill-equipped to handle the challenges of the FYE (Scott, 2009).

- Financial: High poverty rates definitely have an impact on academic ability, socio-economic status, and other factors that could lead to student regress (Feldman and Zimbler, 2011). The data analysis has indicated that there are students who have to work full-time or part-time to supplement their income.

- Accommodation: A major factor is that IT students, like many other students in the FYE, are unable to qualify for accommodation in university residences, as this is reserved for high-achieving students. Hence students have to commute to and from campus for long hours, and cannot spend the requisite number of hours doing IT-related projects and tasks. The findings have revealed that there is a significant relationship between the success rate of students who have campus residence and those who do not. Obviously, students who are secure in the knowledge that they have good and proper accommodation will settle down and prosper, compared to students who have to travel long distances, or still do not have suitable accommodation long after being accepted as a student at UP. The factors of proper accommodation and distance to travel to accommodation are ‘flagged’ as

being pertinent to student success. Many IT students also have the problem of coming from low socio-economic homes, where parents are unable to supplement the financial aid received through the university's financial aid scheme (NFSAS) and subsequently cannot afford the basic necessities, let alone a laptop to practise on. Furthermore, faced with the problem of finding suitable accommodation, students have to resort to living in informal settlements, sometimes far from the university, leading to other problems such as having to travel, and/or not having electricity to use laptops at home.

6.2.1.4 How does student appreciation, confidence and commitment to IT change as students navigate their education?

Most E4YP in IT students settle down after the first six months and further navigate their education with caution. By this time the huge workload, and the difficulty of Mathematics and Computer Science modules cause panic in some, but they reconsider their attitude to try and be successful. The next six months are a crucial time, and would indicate if students are going to persist in taking an IT degree, or be excluded from the IT program, or have to resort to transfer to another programme, or end up being part of the attrition statistics of UP. At this point, students are advised to use the academic support provided for their convenience, get extra aid and support from the SIT counsellor, or approach the academic aid departments on the campus for career guidance.

An interesting aspect of the findings is that a large number of IT students (56%) hold the institution (UP) accountable for their success at university. The blame for not providing the support that students say they require, is attributed to the institution. This is despite the case of students being informed in writing that such services are provided for their use. However, in perusing the common findings, it has been found that students do not set goals for achievement when they enter university. In viewing the results for *Future vision*, only 10% of students had goals and had confidence in their ability to achieve success.

Despite the measures taken by UP to integrate students into the institution, a large number of students indicate that they only arrived in time for lectures and did not participate in the social and extra-curricular activities organised by UP. Hence they

are not integrated into the social environment of the university. A significant relationship exists between students who have integrated successfully into the institution, and those who have not.

Finally, students attribute their failure to the insufficient academic support they have received from the IT lecturing staff. There seems to be much debate here as to how the academic staff should conduct themselves. It was noted that students believed that lecturers should be sourced from a pool of dedicated staff with the patience, skills, and special attitude needed to cope with students on an E4YP in IT. Quality control of the learning material must also be done regularly; progress must be assessed and monitored continuously. Throughout the year lecturers should monitor students and check that students meet certain levels of academic performance. Failing to do so will mean that students are not monitored and mentored, and will eventually become drop-outs.

During the period 2011-2014 it was noted that a substantial number of students who had registered for the E4YP in IT had not completed the programme in the stipulated time of four years. Students had either the modules Mathematics (WTW) or Computer Science (COS), which were still outstanding and prevented them from meeting the criteria for moving to the next year. From a perusal of the academic records of students, it is apparent that some students who perform poorly in the so-called problematic subjects, change direction by either following another degree in the SIT that does not require programming such as BIS (Information Science) or BCom, or disappeared from the EBIT Faculty radar, implying that they have changed to another degree programme, or dropped out of university (either voluntarily or involuntarily). The students who persevered and were resilient took much longer (on average 4½ years), with others taking five or six years to complete the degree. In many cases, due to the continuous failing of modules, the EBIT Faculty applied the exclusion policy and these students formed part of the drop-out statistics of UP.

6.2.1.5 How does this in turn impact on graduates of the programme, and how how they make decisions about further participation in IT after graduation?

The majority of graduating students in the E4YP in IT took more than the stipulated four years to graduate. However, after discussion with these students

(through the medium of a questionnaire), it appeared that they were all gainfully employed in the IT industry. The necessary IT skills such as coding, debugging and writing simple programs were not a problem. However, even though it was not difficult to find a position, they struggled with other issues. According to Begel & Simon (2008) new graduates of IT struggled in adjusting to the workplace environment due to a lack of some skills - communication, collaboration, technical skills, cognitive skills and orientation skills. These skills pivot around:

- Communication: Graduates now need to interact with people from all walks of life. One of the problems is they do not have the confidence of knowing "when to" and "how to" ask question. Hence, this lack of not asking questions at the right time can lead to bigger problems. Also they sometimes had difficulty in understanding the language of abbreviations or pronunciations used by their native English speakers (Begel & Simon, 2008).

- Collaboration: Inundated with new infrastructure in a new environment, graduates sometimes struggled to "know when they do not know" something (Begel & Simon, 2008). Hence, they only have "partial knowledge of a tool or some code". Graduates should be reminded that they work as part of a team and that collaboration does not equate to being inefficient.

- Technical skills: Graduates should understand that the technical skills learnt at a HE institutions can differ substantially to what technical skills on-the-job training offers.

- Cognitive skills: Graduates struggled to "collect, organise and document the wide range of information that they needed" (Begel & Simon, 2008). Obviously then, the new graduate was not confident of what details had to be stored and filed, or discarded. Some of their knowledge is "built haphazardly and piecemeal fashion" as the graduate seldom understands everything told to him by the 'teacher'.

- Orientation: According to Begel & Simon (2008), graduates had difficulty orienting themselves "in the low information environments in their project team, codebase, and resources". Coupled with "confusing and poorly

organised documentation", novices found it difficult to "navigate or engage" effectively.

Despite the above issues that are resolved in a short time, graduates were happy in the workplace and felt that UP had groomed them adequately. However, all the graduates had indicated that for the moment, they were happy to progress in their careers by initially 'learning the ropes'. None of them seemed interested in pursuing further study in IT-related courses. The logical conclusion for that could be that they would rather adjust to the workplace before attempting to study further.

6.2.1.6 What are the specific pre-entry factors that influence students' first-year experiences?

Using the outcomes received from the data analysis tools, the following aspects featured and definitely affect a student's progress through the FYE. These experiences are not unlike those experienced by students in any of the other E4YPs. However, the data to answer this queston was specifically gathered from students on the E4YP in IT. The specific pre-entry factors that influenced the students' first-year experiences were the following: academic aptitude, high school academic achievements, family background, skills and abilities, prior schooling, gender, race, home language, goals, accountability, financial support, skills in reading, writing and test-taking, time management, and exposure to the IT environment, all of which was verified by Elkin et al. (2000).

However, good progress in school with high APS score, is recognised by many researchers as the most reliable predictor of academic achievement and cognitive persistence (Astin, 2017; Conley, 2010). Academic readiness is further defined by Conley (2010) as "the ability of a student to enrol and succeed in college credit courses without the need for developmental education (that is, non-credit bearing courses that prepare students for English and Mathematics, etcetera).

Hence, Tinto (1975, 1987) further indicated that students entered university life with "different levels of initial commitment to the institution". His theory of SIM (1975), posited that all students go through the process of "*separation, transition*

and *incorporation".* The *separation* phase is of consequence, as it is usually during this initial phase that students exit the institution. They cannot contend with the issues that plague them and resort to rather dropping out.

A detailed account of this is provided in Section 6.3.

6.2.1.7 Does student readiness for university directly affect academic performance, and/or the likelihood of withdrawal?

According to the researcher's interpretation of the results of the statistical information (STARS combined with Academic results) the likelihood of successfully predicting risk or failure, at least for this group of E4YP in IT students, could not be properly verified. In rating the reasons from highest to lowest, the highest scores proved to be the ones that were common to all students on the FYE.

A 'dangerous' time for student persistence is usually "during the first year and the first semester in particular looms important to scholars and practitioners, because approximately three-fourths of all dropouts leave at some time during the first year" (Tinto, 1987).

Academic readiness helps provide students with "early momentum towards long-term university success" (ACT, 2013). By definition, the ACT "is a standardised test designed to show universities how prepared a student is for HE by measuring reading comprehension, knowledge of writing conventions, and computational skills". ACT is not an acronym but gets its name from the verb "take action, do something".

According to ACT (2013), it highlights the importance of readiness for persisting in university to timely degree completion. It is suggested that:

- Being better prepared academically for university improves a student's chance of completing a degree;
- Using multiple measures of college readinesss better informs the likelihood od a student persisting and succeeding at university;

- Academic readiness reduces gaps in persistence and degree completion among racial/ethnic and family income groups;
- Early monitoring of readiness is associated with increased university success; and
- Helping more students become ready for first-year university study will ensure students graduate and become part of a highly-skiled and productive workforce.

6.2.2 Evaluation of Research

6.2.2.1 Does the thesis describe an important problem addressed by clearly formulated questions?

The research questions described in Chapter 1 were answered and substantiated with various references to previous research. The researcher indicated that the strategies "*would contain clear objectives, derived from one's research questions, specify the sources from which she intended to collect data, and considered the constraints that one would inevitably have*" (Saunders, 2011). Hence, the researcher tried to provide a clear idea of the manner in which findings were reached.

6.2.2.2 Was the mixed methods approach appropriate?

This method provided the researcher with the opportunity of gaining an understanding of the research from different points of view. According to Creswell,(2013), the mixed methods design preserves the integrity of findings of different types of study by using the appropriate type of analysis that is specific to each type of finding. The results retrieved from the different data collection instruments produced responses that could be deemed significant in explaining risk for withdrawal. In this regard the approach was suitable for research in the E4YP in IT.

6.2.2.3 How were the settings and subjects selected?

The researcher's choice of design was determined by the research questions and the purpose of the study (Swanepoel et al., 2000). As the E4YPs are all housed on the extended degree campus (Mamelodi Campus), it was the only setting

available for the researcher. The students in the E4YP for IT automatically became the researcher's subjects.

6.2.2.4 What was the researcher's perspective, and has this been taken into account?

At all times, the researcher attempted to provide an educated perspective based on knowledge acquired from previous literature. An intensive account of the literature review helped in forming the final analysis.

6.2.2.5 What methods did the researcher use for collecting data, and are those described in sufficient detail?

The researcher made use of surveys, document analysis and statistical analysis. As indicated previously, these were analysed qualitatively (mini-essays and questionnaires to present, ex, and graduate students); and, quantitatively (online questionnaire, chi-square analysis). Extensive use was made of information gleaned from the university's databases (such as academic results) which were integrated with the STARS scores for individual students. The results of all these measures were collated, from which fairly accurate deductions were made.

6.2.2.6 Are the results credible, and if so, are they clinically important?

The results are based on findings developed from the responses received from the various data collection instruments and was substantiated by an in-depth literature review. This was done in order to ensure the credibility of the data. The results can contribute to further academic research about E4YPs in IT.

6.2.2.7 Are the findings of this study transferable to other HE settings?

It is believed that the findings of this study can be used to act as a cautionary warning-bell to other academics undertaking to teach students on the E4YPs. The researcher has constantly noted that the data revealed that problems experienced by students on the E4YP in IT are not exclusive to IT only, but directly affect the bigger set of UP students on the FYE.

6.3 CONTRIBUTION OF THE RESEARCH

While this research does not generate a theory, it provides data that can inform the growing body of knowledge on the FYE, with emphasis on the E4YP in IT. Hence, by taking Tinto's (1975; 2000) model of SIM, and incorporating it with Bourdieu's (1984; 1999; 2011) theory of capital and habitus (See Figure 32), a better understanding of students' academic and social integration is forged, shaping their new experiences, removing the sense of isolation experienced by most first-year students, and allowing them to integrate more easily into the university environment. The successful integration can also serve as a foundation when they traverse from the second year onwards (Pather and Chetty, 2016). The research has also brought forth the following aspects as identified in this diagram:

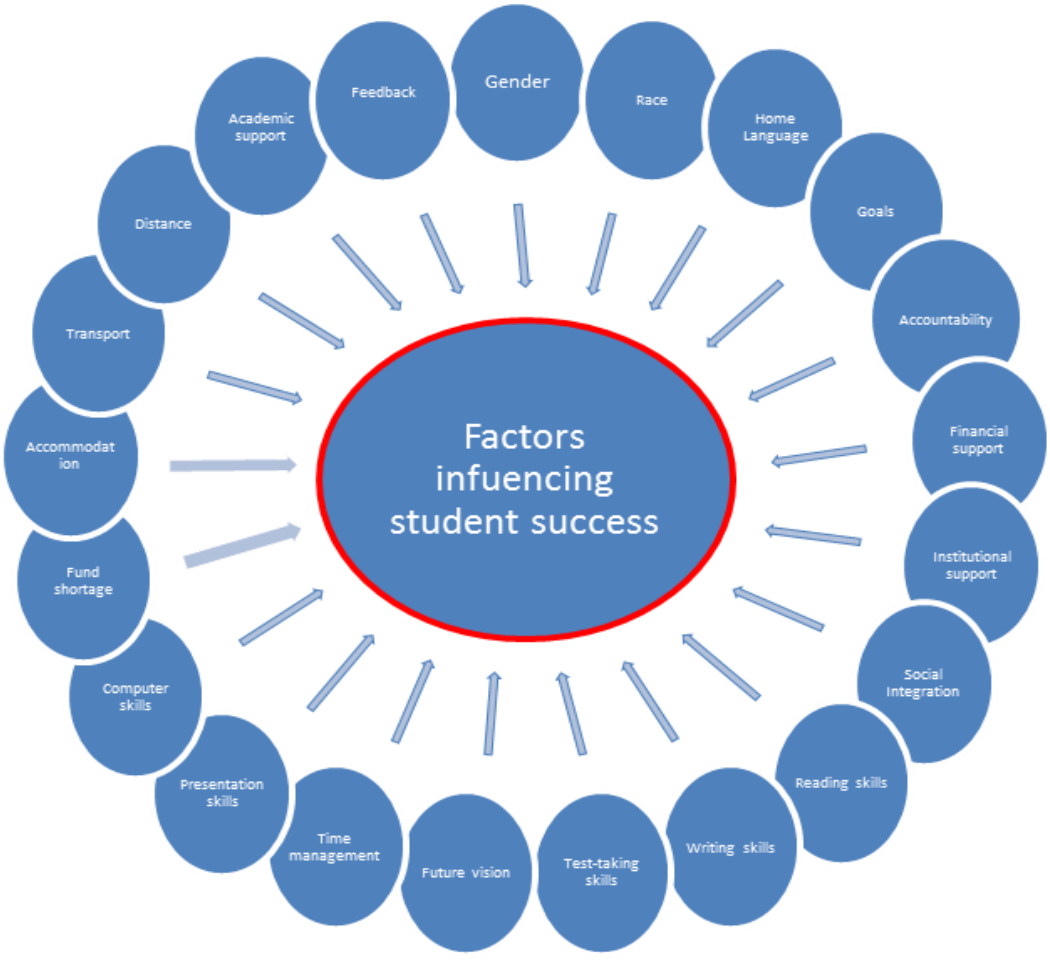

Figure 33: Factors influencing success

With reference to the diagram, the factors influencing student success are discussed in detail:

6.3.1 Gender

There are many factors that motivate women to pursue qualifications in IT. Mostly women are driven by the same factors that attract men to careers in IT. These include the following as indicated by Dlodlo and Khalala (2008):

- having a passion for problem-solving;
- regarding IT as a rewarding and lucrative career;
- viewing IT as a route to rewarding job opportunities;
- developing proficiency in Mathematics and Computer Science; and
- having a passion for working with people.

However, women reach the glass ceiling more quickly than men and find that they are no longer promoted while their male colleagues with similar qualifications are promoted over them. The literature has noted that companies prefer to employ men as they do not seem to have the same responsibilities in terms of maternity leave, and juggling work and home (Dlodlo and Khalala, 2008).

Many of these problems relating to gender can be eradicated if they are curtailed in the school environment. Over the years, the notion that Mathematics and Science Education is of benefit to males only has resulted in few women entering the IT arena. However, women must be given adequate support at school and university level to access the IT environment. Despite the imbalance between males and females in IT, females have proven that they are just as capable as their male counterparts and must therefore be given every opportunity to excel (Goy et al., 2017).

6.3.2 Race

The student population at universities normally constitute a mixture of diverse racial and socio-economic backgrounds. This would account for differences in background, in the way students think and act, the areas and countries that they come from, their interests and general way of life (Center for Teaching, 2010). While individual universities work hard to absorb and integrate the different cultures into university culture, "*leveraging that diversity in large classes*" (Center for Teaching, 2010) can be a challenge to educators.

It then becomes the task of the university to “help students cope with difficulties, to motivate them to engage meaningfully in learning, and learning to instruct diverse groups of students” (Center for Teaching, 2010). It is important that universities inculcate in their students an appreciation of “human differences, commitment to democratic values, a capacity to work effectively with people from different backgrounds to solve problems, and in so doing create a well-developed sense of identity” (Kuh et al., 2011b). It is most important for students to be satisfied with their HE experience, and feel comfortable and confident in the learning environment (Tinto, 1975; 2000). Students must be assured that they are not alone when they are scared and confused, or have a lack confidence in being a university student for various reasons. HE institutions have measures in place to assist students from diverse backgrounds who need assistance.

6.3.3 Home Language

The literature on STEM highlights the overall graduating rates of students, and the disparity between the graduating rates of White and Black students. Many students arrive on a university campus with a sense of trepidation, feeling alienated, lonely and intimidated by the culture of the university they find themselves in. A study by Czerniewicz and Brown (2005) on higher education students and academic staff’s access to and use of computers in five South African universities found that 39% of respondents spoke English as a home language and 54% spoke other languages. Hence, the language of instruction has the effect of either being a bridge or a barrier to communication.

6.3.4 Goals

There is no doubt that students who perceived an emphasis on mastery of goals in the lecture room reported using more effective strategies, enjoyed being challenged, and had a positive attitude to class. They believed that success followed from one’s efforts at setting goals (Ames, 1988). A very small number of students enrolling at South African universities will actually ever obtain a degree. Students are advised not to enrol because 1) their parents force them to, 2) all their friends are enrolling, 3) they feel as though they do not have alternatives. If students study at a university for all the wrong reasons they are not committed, and begrudging being at university is an expensive time-waster. Hence it is critical

that students set goals for themselves, with more realistic sub-goals, and strive to attain these. The key to attaining goals is to be punctual and present, as substantial research has indicated that students who attend classes attain significantly better marks than their colleagues who do not.

6.3.5 Accountability

There is a notion that students should also be held accountable for their own learning. Instituting teaching skills to students will not solve problems if students do not have 'buy-in'. The perceived "*locus of control for learning*" must be shifted to give students more independence and self-responsibility (Knight and Yorke, 2003). Lecturers must "*create flexible spaces in which students choose when and where they learn*" (FLN, 2014). Technology (games and animations) must be introduced and sustained to arouse student interest and curiosity,

6.3.6 Financial Support

There is no doubt that while some students do not have to concern themselves with university fees or finance issues, a great number of students face overwhelming university costs (not just tuition fees but also the long-term issues such as lack of accommodation). Hence, due to financial constraints, first-year students tend to focus on daily life management as they adapt to needs in their new and unfamiliar environment.

6.3.7 Institutional Support

While some student arrive on campus ready to confront the many challenges, others are hesitant and remain estranged from the university environment. Educators must be aware that students are ready for transformative experiences at different points in their academic career. All universities are concerned with students integrating with the university and therefore provide several platforms for students to socialise and meet other people with the same interests (Means and Pyne, 2017). It is advisable for first-year students to build and nurture positive networks.

6.3.8 Social Integration

A wake-up call for most students is when they receive the first poor grades compared to the excellent grades they received while at secondary school. It is essential that universities provide coping skills for these new experiences and encourage student-student, and lecturer-student rapport. Some students are natural extroverts and can meet and form relationships more quickly than others who are shy and introverted. South African university campuses are usually interesting as there are normally university museums, art galleries and sports boutiques to explore. It is of the utmost importance that first-year students explore their new surroundings and get to know others who have the same worldview and goals to succeed. Meeting more like-minded persons and experiencing many new and exciting things is also part and parcel of the FYE adventure.

6.3.9 Reading, Writing and Test-taking Skills

There is no doubt that students have a naïve sense of what is expected of them as students. Therefore it will greatly assist students if educators could clarify expectations for learning, be sensitive to the variety of ways that students excel at reading and writing, and include a variety of types of learning experience, and teach in a variety of learning styles. Students need to be challenged in the lecture room and seek ways and means to improve the proficiency in their weaker skills.

6.3.10 Future Vision

It has been found that many FYE students do not have an idea of what their future goals are. They are short-sighted in thinking they will set goals once they graduate. Academics must therefore assist students in making commitments in terms of their progress. With a clear idea of what awaits them at the end of their studies, students should perform better and not drop-out as an opportunity to do something else.

6.3.11 Time Management

Being prepared in advance and having strong time management skills can help first-year students plan their work in good time, know exactly how many hours they have to work, and how many they have free. It is hoped that with successful time-management training, students can have a successful first year.

6.3.12 Presentation Skills

According to Brookfield (2017), during the learning process "*teachers become facilitators and students, at times, become each other's teachers*". Students should assume the role of lecturer and take their colleagues through the lecture. Then read out aloud (from notes or a PowerPoint presentation) and in so doing, identify their own faults. The basic idea is that "*students learn by doing, and learn by doing with other people*" (Brookfield, 2017). This also develops the confidence levels of students.

6.3.13 Computer Skills

Sometimes just making it to university is overcoming a major challenge. In some township schools there are no computer rooms or access to the internet. When students arrive at university, especially in the IT lectures, they are initially totally at a loss. The way around is to ask for assistance from lecturers, assistant lecturers and tutors in the course.

If students feel that they are not equipped or comfortable in the E4YP in IT, it would be foolish to spend the entire year doing something that they are not passionate about. Being forced to study in an inappropriate study direction will result in a lack of goal commitment due to poor career choice and a lack of academic preparedness can only lead to failure (Moodley and Singh, 2015). Immediately the student arrives on campus, the first thing that will 'strike' will be the large workload and a non-existing social life. As a struggling student, full-time or part-time work must be sought so that the student is able to continue with his/her studies.

6.3.14 Funds Shortage (Financial)

A shortage of funds is a reality facing most FYE students. The cost of university education is expensive and if a student is unable to secure a NSFAS (National Student Financial Aid Scheme) bursary, just the simple act of living becomes extremely difficult. Institutions are aware of this problem and try to rectify it through the issue of NSFAS bursaries. However, due to the constraints of the fund, coupled with the large number of students who require the bursary, all students who apply will not necessarily be successful. Hence, the mass exodus of students who "express unaffordability as being a paramount factor" (Moodley and Singh,

2015). Many students are unable to afford the basic resources such as tuition and textbooks.

6.3.15 Accommodation

Accommodation is the bane of every student who has not been allocated accommodation at one of UP's hostels. Over the years, hostel accommodation has been reserved for students who have produced excellent/good results at school. Unfortunately then, the majority of students have to find alternative accommodation in the vicinity of the university. Private accommodation is expensive, and sometimes not within walking distance to campus. Therefore students have to wake up early, sometimes changing two or three different modes of transport to arrive at UP in time for their lectures. The challenge would be for pupils at school to try their utmost to achieve good results so that they become part of the hostel community of students. A new phenomenon has also been noticed where students do not have accommodation but sleep in the university's passageways, bathrooms and libraries. In order to eradicate this problem, universities have to make campus accommodation a serious issue in their planning strategies.

6.3.16 Transport

Due to students not being able to get UP hostel accommodation, many of them resort to living in flats, boarding houses and hostels around the university. In some instances students live more than a 10 km distance from the university. This implies a greater cost for them so they either have to use a taxi, or other types of transport to get them to lectures in time. Some students leave during the early part of the morning and travel several kilometres before reaching campus. Many student end up living in informal settlements due to flat or other rental being too expensive. They are further disadvantaged in that they may not be able to afford to have breakfast before coming to class. These students are distinguishable since they are always sleepy, irritable, tired and disinterested in the lectures.

6.3.17 Distance to University

The distance to UP is daunting for most students. Some are able to walk the distance, while others have to take two to three different modes of transport before

getting to campus. Others who live further are at the mercy of heavy traffic, and if they have the money, can take the Gautrain and other private means. The distance to university is a significant factor in determining success or failure, as rushing to and fro from campus and back are not factors that encourage student integration.

6.3.18 Academic Support

Students arriving at the portals of the university do so from a myriad of situations. Some arrive from rural schools, some from urban and township schools, while a large percentage come from ex-model C schools, and some from private schools. There is every chance that the E4YP student will not be familiar with the customs of the university, or what is expected of them, or have no clue how to meet those expectations. According to Moodley and Singh (2015), many students voiced their opinion with regard to attitude and behavior of academic staff (verbatim):

- Content was very difficult to understand which made me doubt my capabilities;
- It was difficult to determine what the lecturer required in the assessments; Lecturers were not open enough to help us through understanding difficult content;
- Too large classes made it difficult to interact with the lecturer;
- In class they taught us how to cook mutton curry but expected us to make biryani in the exams;
- Difficult as it was, we either needed better lecturers or ones that could make us understand difficult concepts;
- Assessments were not properly guided; I did not know what the lecturer expected when, for example, answering a question in an assignment; Sometimes it was easier reading from the text book than listening to the lecturers with their foreign accents which made understanding information very difficult;
- I was terrified to approach my lecturers because I felt they were far too aloof, it's as if they wanted us to fail;
- I was scared to ask the lecturer to simplify certain things as it would make me look stupid.

Thus, it is the function of academics to ensure that students listen attentively in class, have the ability to learn from discussions, the skill to answer comprehensions, prepare for examinations; and the confidence to ask questions and/or clarification. These are the types of skill that will allow the student to make a successful transition from secondary school to university. It is also important to be sensitive to the way students learn and can excel at learning. Academic staff must include a variety of learning experiences in courses so that all students can relate to something. Students should be assisted in encountering complex, real-life problems where right or wrong and "*it's all just opinion thinking"* do not suffice (Center for Teaching, 2010). Helping students through this is challenging, but a necessary phase if students are to progress.

Students must be motivated to make use of the campus academic support services as a means in which to improve their results. It is unfortunate that university students under-utilised academic support services, especially students who would benefit from the support (Friedlander, 1980; Walter & Smith, 1990). Hence, it is suggested that that *"(1) institutions should deliver academic support intrusively—by initiating contact with students and aggressively bringing support services to them, rather than offering services passively and hoping that students will come and take advantage of them on their own accord; and (2) institutional support should be delivered proactively—early in the first year of college in order to intercept potential first-year attrition, rather than responding reactively to student difficulties after they occur"* (Cuseo, 2012).

6.3.19 Feedback on Work

A large number of students hail from secondary schools where they have excelled and obtained high marks. There being such a disparity in the way that students perform from secondary school to university, it is only fair that feedback on their work be provided timeously. A good practice would be to provide feedback to students early and often, so that they are able to determine their progress early in the semester, and make the necessary changes accordingly. This will give the student a good idea of where he/she is compared with his peers. Feedback must always be presented in a supporting and encouraging manner (Center for Teaching, 2010). Feedback, according to Jonsson (2013), is only relevant "*if it is actually used to alter the gap between current performance and the performance*

aimed for". It is exceptionally beneficial to students that feedback should not only be given by means of a grade or mark, but rather that it is specific with regard to their weak points, pinpointing this with strategies on how to improve. Giving students too much feedback is also counter-negative, as students become overwhelmed by all the comments and tend to ignore them.

The perceived "*locus of control for learning*" must shift to giving students more independence and self-responsibility (Knight and Yorke, 2003). This could include peer and self-assessment. Lecturers must be cognisant of the following principles as indicated by the Center for Teaching (2010)(*verbatim*):

- Feedback must be provided early and often.
- Pose complex, real-life problems that student's experience.
- Minimise memorisation and encourage critical thinking.
- Teach critical thinking rather than regurgitation of facts.
- Clarify expectations for learning.
- Clarify strategies for learning.
- Prepare for emotional reactions.
- Teach according to a variety of learning styles to accommodate the diversity of students (coming from a mix of racial and socioeconomic backgrounds).
- Have students write letters to their successors advising them of the success and pitfalls they have experienced as E4YP students.
- Encourage first years to engage in relevant ways with their education.
- Be aware that there is a big difference between a first-year student and a second-year student.

However, acceptable means of feedback can be provided by using rubrics. By definition Brookhart and Nitko (2013) indicate that "rubrics provide a set of criteria that is used to assess a student's performance on a complex learning task. The strength of the rubric is that it makes the grading criteria transparent to both the evaluator and the student". Explicit feedback is regarded as an important aspect of the learning process. The timing of the feedback is dependent on the goal of the lecture. Generally the feedback is immediate so that students do not repeat their errors each time. Typically a rubric contains three elements:

- criteria that need to be observed.
- Descriptions of the various levels of mastery according to each criterion.
- A type of scoring system to indicate the level of proficiency obtained in doing the task.

The main reason why feedback should be provided is summed up succinctly by Carless (2006) who state that "*we learn faster, and much more effectively when we have a clear sense how well we are doing and what we might need to do in order to improve*".

6.4 FUTURE RESEARCH

In the literature there seems to be a general consensus that student dropout is a world-wide phenomenon and has many social implications. It is a personal loss for the student in particular, society in general, and comes with a colossal financial implications for the university that has no chance of recouping the resources given to students who do not return the next year. According to Moodley and Singh, (2015), only 5% Black and Coloured students graduate from South African universities, which is obviously a cause of concern. However, these researchers contend that the problem of student retention "*is a challenge encountered by universities globally*".

The literature concurs that the quality of accommodation, or lack of accommodation, is a direct cause of stress in students. Within the context of South African universities, (Moodley and Singh, 2015) concur with the researcher's findings that "*stress factors such as accommodation issues, financial difficulties in addition to the academic demands, wrong subject choices, proficiency in the medium of instruction*", make it difficult for students to progress through to the next year. The incidence of race (language) and gender also shapes the students' cultural background and has an effect on their enculturation into the academic environment.

Furthermore, South African universities are fully cognisant of the fact that the lack of finances plays a mammoth role in whether students are able to stay the full course at university. Hence, in 2012, NSFAS was redeveloped to "identify potentially eligible students from Grade 9" and provide career guidance and

relevant information on studying at university (Ministerial Statement on Student Funding 2012; Moodley and Singh, 2015). According to the funding model, students who have been identified will “qualify for loans and will receive the Full Cost of Study (FCS) as defined by the means test to cover tuition, residence fees, meals and transport, and private accommodation, where applicable” (Moodley and Singh, 2015). As can be imagined, this will be a motivation for students to excel so that they can be beneficiaries as offered by the fund.

The attendance of lectures is also a problem experienced by most South African universities. Absenteeism, and not being able to obtain information first-hand, is a major reason why students on the E4YP in IT struggle through the modules. However, in a study conducted by Bati et al. (2013), student absenteeism is attributed to factors such as “*low motivation levels, difficulty in adapting to the university environment, mandatoriness of lectures, whether the lecture notes prepared and materials presented are adequate for the learning process, lecturer-student quality, the scope and difficulty of the subject, the possibility of learning about the same subject outside lectures, stress, time management and difficulty travelling to the university*”. Furthermore, intrinsic motivators such as “*student interest, the desire to be successful and prove themselves, ability to make use of resources, attitudes and supportiveness of educators*” all exert an effect on lecture attendance (Bati et al., 2013; Bati et al., 2015). It was also noted that “*academic motivation and self-concept positively predicted attitudes to study*” (Green et al., 2012). Another factor in particular, “*poor self-motivation, leads to a decrease both in academic performance and in interactions with lecturers*” (Bati et al., 2013; Bati et al., 2015).

This research was carried out mainly through the lens of Tinto’s theories on student retention, and it has brought forth guidelines for lecturers to follow in the teaching of the FYE students. The model as indicated in Figure 32, is applicable to students in the E4YP in IT with a minimum amount of adaptation.

The researcher expresses the immense pleasure and joy in having had the opportunity of lecturing to students in the E4YP in IT, who if not through this extended program, would not have been given the opportunity to study IT. However, the massive financial investment of money and resources in the E4YP

in IT programme, did not translate into sufficient students graduating in IT at the end of the four/five year period. The findings are conclusive – students move in a few directions after having registered for the E4YP in IT. Some students pass the first year and then struggle to pass modules (at Hatfield campus) for the last part of phase 1; or they fail the first year due to constantly not achieving in either Mathematics or Computer Science (both problematic for most students); or lastly, they take the option of moving to a department in SIT where this knowledge is not required. Other students use the programme as a 'stepping-stone' to other departments in EBIT, or other faculties at UP. The last group comprises of students who 1) after failing modules several times, are eventually excluded from the faculty; or 2) students who voluntarily drop-out of the programme due to disinterest, or other issues such as finance and accommodation.

Consequently the E4YP in IT was terminated by SIT at the end of 2015 (when the researcher had almost completed with the data gathering for this research). An executive decision was made by the EBIT faculty to discontinue the E4YP in IT due to its failure to produce sufficient graduates in IT. Having weighed the costs of running the programme in comparison with the students who eventually graduated in the E4YP in IT, running the programme proved to be a substantiated loss for the SIT.

In so doing, from that point onwards, students who did not qualify for the three-year programme in IT have now been denied the opportunity to study towards a qualification in Information Technology at UP. The door has been shut - for students who do not meet the criteria of the mainstream three-year programme in IT, mostly not through their own fault but due to the gaps in their knowledge (of STEM) from the poor-level post-apartheid education they received from their schools.

It is the hope of the researcher that other institutions still continue to '*fly the flag'* of the E4YP (especially in IT), as it is really an opportunity for most students, some of whom eventually long after the four-year stipulated period has lapsed, still 'stutter' and continue with the programme, graduate and become good computer scientists in the workplace.

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APPENDIX A: Application to EBIT for approval of a research project

UNIVERSITY OF PRETORIA FACULTY OF ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY FACULTY COMMITTEE FOR RESEARCH ETHICS AND INTEGRITY	
APPLICATION FOR APPROVAL OF A RESEARCH PROJECT	
This application form must be read with the Regulations for Research Ethics and Integrity and completed. Important: Each item must be completed.	
Date of submission	
1. DETAILS OF APPLICANT	
1.1 Applicant's surname	Naidoo
1.2 Applicant's initials	S
1.3 Applicant's title (prof, dr, mr, ms, other)	Mrs
1.4 Postal address (where approval is to be sent)	92 Taj Street, Laudium, Pretoria. 0037
1.5 E-mail address	snaidoo@cs.up.ac.za
1.6 Telephone	(012) 420 5232
1.7 School in Faculty (Engineering, Built Environment or Information Technology)	School of Information Technology
1.8 Department	Department of Computer Science
1.9 Study leader/promotor (if the applicant is a student) name, address, e-mail address	Prof C de Villiers
1.10 Names, addresses, e-mail addresses and capacity of co-researchers/ students/ lecturers involved with the project	Carina.DeVilliers@up.ac.za
2. RESEARCH PROJECT DETAILS	
2.1 Title of research project	Exploring the Information Technology experience
2.2 Furnish as brief outline the following so that the relevant ethical aspects can be identified clearly: Statement of the problem	

Statement of objectives Experimental methods/ measuring instruments Materials/Apparatus Profile of research subjects/target group/animals/environmental factors
Will look at how Information Technology students experience their education, how they gain knowledge of what Information Technology is, and what their post-graduation plans are. The research question will focus on four primary areas that will investigate what IT graduates need to succeed in an increasingly complex world: *Skills and knowledge:* How do students' IT skills and knowledge develop and/or change over time? *Identity*: How do students come to identify themselves as IT students? How do student appreciation, confidence and commitment to IT change as they navigate their education? How does this in turn impact how these students make decisions about further participation in IT after graduation? *Education:* What elements of students' IT education contribute to changes observed in the question related to skills, knowledge and identity? What do students find difficult and how do they deal with the difficulties they face? *Workplace:* How do students and early career IT graduates conceive of their IT future? What IT skills do early career IT graduates need as they enter the workplace? Where did they obtain these skills? Are there any missing skills? Four-year longitudinal study of *xx* IT students in various IT degrees in one institution and interview of over *xx* practicing IT graduates in a range of professional settings. Taken together, these components will be designed to expand our understanding of the undergraduate IT experience and the transition from school to the workplace. This is the preliminary phase of a PhD (IT). Registration will be in January 2012, but I want to get data from this year's students.

2.3 Is a research questionnaire/ survey/interview used? (Yes or No)	Yes
2.4 If yes, have you submitted this with your application? (Yes, No or Not Applicable)	Yes

3. RESEARCH SUBJECTS

If the project involves people, either individually or in groups, complete this section

3.1 Does the study involve people as informants, or does it involve people as research subjects? (Tick one)	Informants	X	Research subjects	

3.2 Describe possible safety and health implications that participation in project may pose
none

3.3 Expected duration of participation of subjects in the project	1 hour
3.4 Describe the manner in which confidential information will be handled and confidentiality assured	
Questionnaires will be anonymous	
3.5 Remuneration offered to subjects for participation	No
If the project involves animals, complete this section	
3.6 Describe possible safety and health implications participation in the project may hold	
N/A	
3.7 Expected duration of participation by animals in the project	N/A
3.8 Care/housing/feeding of the animals during the project	N/A
4. ENVIRONMENTAL IMPACT If the project may have a potentially detrimental environmental impact, complete the following	
4.1 Potential impact on the environment	N/A
4.2 Expected duration of the impact	N/A
4.3 Locality of the project	N/A
4.4 Preventive measures	N/A
5. DISSEMINATION OF DATA	
Method of publishing/application of the results	PhD thesis and journal articles
6. SUBMISSION CHECKLIST	
6.1 Have you submitted the Declaration by the Researcher? (See the website for this form)	Yes
6.2 Have you submitted an example of the informed consent form to be completed by each participant? (See the website for an example)	Yes; will be part of the ClickUP questionnaire

APPENDIX B: Informed consent form

Informed consent form
(Form for research subject's permission)

(Must be signed by each research subject, and must be kept on record by the researcher)

Title of research project: ……

I …… hereby voluntarily grant my permission for participation in the project as explained to me by ……

The nature, objective, possible safety and health implications have been explained to me and I understand them.

I understand my right to choose whether to participate in the project and that the information furnished will be handled confidentially. I am aware that the results of the investigation may be used for the purposes of publication.

Upon signature of this form, you will be provided with a copy.

Signed: _____ Date: _____

Witness: _____ Date: _____

Researcher: _____ Date: _____

APPENDIX C: Researcher Declaration

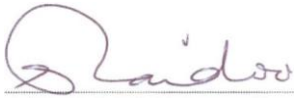
APPLICATIONS MUST INCLUDE THE FOLLOWING STATEMENTS

Hereby I, Saloshana Naidoo in my capacity as researcher, declare that Research subjects will be informed, information will be handled confidentially; research subjects reserve the right to choose whether to participate and, where applicable, written permission will be obtained for the execution of the project (example of permission attached).

No conflict of interests or financial benefit, whether for the researcher, company or organisation, that could materially affect the outcome of the investigation or jeopardize the name of the university is foreseen.

Inspection of the experiments in loco may take place at any time by the committee or its proxy.

The information I furnish in the application is correct to the best of my knowledge and I will abide by the stipulations of the committee as contained in the regulations.

Signed: 

Date: 24-10-2011

APPENDIX D: Online questionnaire

Questionnaire:

1. What degree are you currently registered for:
    - Bachelor of Information Technology (BIT)
    - Bachelor of Computer Science (BSc CS)
    - Bachelor of Science (IT)(3yrs)
    - Bachelor of Science (IT)(4yrs)
    - Bachelor of Information Science (BIS Multimedia)(3yrs)
    - Bachelor of Information Science (BIS Multimedia)(4yrs)
    - Bachelor of Commerce (Informatics)

2. What is your current academic standing:
    - First year
    - Second year
    - Third year
    - Fourth year

3. When you entered this institution were you:
    - A first-time university student
    - Returning student
    - A transfer student
    - Other: [ ]

4. What were you most interested in majoring when you first came to university? (Choose one)
    - Arts and Humanities
    - Computer Programming/Information Technology
    - Engineering
    - Maths and Natural Sciences
    - Law and Social Sciences
    - Other: [ ]

5. What is your current major? (Select one)
    - Computer Science
    - Multimedia
    - Informatics
    - Other: [ ]

6. What is your second choice of a major? (Mark one or Not Applicable (N/A))
    - Computer Science
    - Multimedia
    - Informatics
    - Other
    - Not Applicable (N/A)
    - Undecided
7. Do you intend to complete a major in Information Technology (Computer Science, Informatics, Multimedia)?
    - Definitely not

- Possibly not
- Not sure
- Probably yes
- Definitely yes

8. Do you intend to practice, conduct research in, or teach Information Technology (Computer Science, Informatics, Multimedia) for at least 3 years after graduation?
    - Definitely not
    - Possibly not
    - Not sure
    - Probably yes
    - Definitely yes

9. We are interested in why you are or were studying Information Technology (Computer Science, Informatics, Multimedia)?

	Not a reason	Minimal Reason	Moderate Reason	Major Reason	Unsure
IT plays an important role in solving society's problems	O	O	O	O	O
IT professionals make more money than most other professions	O	O	O	O	O
My parent(s) would disapprove if I chose a major other than IT	O	O	O	O	O
IT professionals have contributed greatly to fixing problems in the world	O	O	O	O	O
IT professionals are well paid	O	O	O	O	O
My parent(s) want me to be an IT professional	O	O	O	O	O
An IT degree will guarantee me a job when I graduate	O	O	O	O	O
A lecturer, academic advisor, teaching assistant or other university affiliated personnel has encouraged and/or inspired me to study IT	O	O	O	O	O
A non-university affiliated mentor has encouraged and/or inspired me to study IT	O	O	O	O	O
A mentor has introduced me to people and opportunities in IT	O	O	O	O	O

10. Please indicate how strongly you disagree or agree with each of the statements:

	Disagree strongly	Disagree	Agree	Agree Strongly
Creative thinking is one of my skills	O	O	O	O
I am skilled at solving problems that can have multiple solutions	O	O	O	O
A mentor has supported my decision to major in IT	O	O	O	O

11. Rate yourself on each of the following traits as compared to your classmates. We want the most accurate estimate of how you see yourself.

	Lowest 10%	Below Average	Average	Above Average	Highest 10%
Self-confidence (social)	O	O	O	O	O
Leadership ability	O	O	O	O	O
Public speaking ability	O	O	O	O	O
Maths ability	O	O	O	O	O
Science ability	O	O	O	O	O
Communication skills	O	O	O	O	O
Ability to apply maths and science principles in solving real world problems	O	O	O	O	O
Business ability	O	O	O	O	O
Ability to perform in teams	O	O	O	O	O
Critical thinking skills	O	O	O	O	O

12. How important do you think each of the following skills and abilities is to becoming a successful IT professional?

	Not Important	Somewhat important	Very Important	Crucial
Self-confidence (social)	O	O	O	O
Leadership ability	O	O	O	O
Public speaking ability	O	O	O	O
Maths ability	O	O	O	O
Science ability	O	O	O	O
Communication skills	O	O	O	O
Ability to apply maths and science principles in solving real world problems	O	O	O	O
Business ability	O	O	O	O
Ability to perform in teams	O	O	O	O

13. Please rate your satisfaction with this institution on each aspect of campus life listed below. (Mark N/A if you do not have experience with this aspect).

	Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied	N/A
Quality of instruction	O	O	O	O	O
Availability of lecturers	O	O	O	O	O
Quality of advising by lecturers	O	O	O	O	O
Academic advising	O	O	O	O	O

14. During the current university year, what portion of your lecturers have used the following teaching/lecturing methods?

	None	Very Little	Less than half	About half	More than half	All or nearly all
Individual projects	O	O	O	O	O	O
Team projects	O	O	O	O	O	O

15. Please rate the overall quality of your university experience so far:
    - o Very dissatisfied
    - o Dissatisfied
    - o Satisfied
    - o Very satisfied

16. Think about the Computer Science, Informatics or Multimedia classes you are taking/have taken during the current university year. Indicate how often you:
    (Mark N/A if you have not taken any of the mentioned classes)

	Never	Rarely	Occasionally	Frequently	N/A
Came late to class	O	O	O	O	O
Skipped class	O	O	O	O	O
Turned in assignments that did not reflect your best work	O	O	O	O	O
Turned in assignments late	O	O	O	O	O

17. Think about the EOT classes (not Computer Science, Informatics or Multimedia) you are taking/have taken during the current university year. Indicate how often you:
    (Mark N/A if you have not taken any EOT classes).

	Never	Rarely	Occasionally	Frequently	N/A
Came late to EOT class	O	O	O	O	O
Skipped EOT class	O	O	O	O	O
Turned in EOT assignments that did not reflect your best work	O	O	O	O	O
Turned in EOT assignments late	O	O	O	O	O

18. How well are you meeting the workload demands of your coursework?
    - o I am meeting all of the demands easily
    - o I am meeting all of the demands, but it is hard work
    - o I am meeting most of the demands, but cannot meet some of the demands
    - o I can meet some of the demands, but cannot meet most of the demands
    - o I cannot meet any of the demands

19. How stressed do you feel in your coursework right now?
    - o No stress
    - o Moderately low stress
    - o Moderate stress
    - o Moderately high stress
    - o High stress

20. During the current university year, how much pressure have you felt with each of the following?

	No pressure	Moderately low pressure	Moderate pressure	Moderately high pressure	High Pressure
Course content (amount of course material being covered)	O	O	O	O	O
Course pace (the rate at which the course material is being covered)	O	O	O	O	O
Balance between social and academic life	O	O	O	O	O

21. During the current university year, how often have you interacted with your instructors (lecturers, tutors, teaching assistants) in your Computer Science, Informatics and Multimedia classes (e.g. in person, by phone, e-mail, etc).
(Mark N/A if you have not taken any Computer Science, Informatics or Multimedia classes this year).

	Never	Rarely	Occasionally	Frequently	N/A
Instructors during class	O	O	O	O	O
Instructors during office hours	O	O	O	O	O
Instructors outside of class or office hours	O	O	O	O	O

22. Some people are involved in non-IT activities on or off campus, such as hobbies, civic or church organisations, campus publications, student government, social clubs/groups, sports, etc. How important is it for you to be involved in these kind of activities?
    - Not important
    - Somewhat important
    - Very important
    - Essential

23. How often are you involved in the kinds of non-IT activities described above?
    - Never
    - Rarely
    - Occasionally
    - Frequently

24. What is your level of involvement in student IT activities such as computer clubs or societies?
    - No involvement
    - Limited involvement
    - Moderate involvement
    - Extensive involvement

25. Since coming to the University, have you had any research experience(s)? (Mark one)
    - No
    - Yes, in computer related areas
    - Yes, in non-computer related areas
    - Yes, in both computer and non-computer related areas

26. Before university, how much knowledge did you have about the IT profession?
    - No knowledge
    - Limited knowledge
    - Moderate knowledge

- Extensive knowledge

27. Since entering the university, how much knowledge have you gained about the IT profession?
    - No knowledge
    - Limited knowledge
    - Moderate knowledge
    - Extensive knowledge

28. How much exposure have you had to a professional IT environment as a visitor, intern, or employee?
    - No exposure
    - Limited exposure
    - Moderate exposure
    - Extensive exposure

29. How did you gain your knowledge about the IT profession? (Mark all that apply)
    - From being a visitor
    - From being an intern
    - From being an employee
    - From a family member
    - From a close friend
    - From school-related experiences (i.e. a teacher, professor or class)
    - Other: [ ]

30. Do any of your immediate family members (parents, siblings) hold an IT degree?
    - No
    - Yes

31. Do you see yourself continuing in an IT major?
    - No – I am NOT majoring or planning to major in Computer Science
    - Yes
    - Maybe

32. Do you see yourself pursuing a career in IT?
    - Definitely not
    - Probably not
    - Not sure
    - Probably yes
    - Definitely yes

33. How likely is it that you would do each of the following after graduation?

	Definitely not	Probably not	Not sure	Probably yes	Definitely yes
Work in an IT job	O	O	O	O	O
Work in a non-IT job	O	O	O	O	O
Go to a graduate school in an IT discipline	O	O	O	O	O
Go to a graduate school outside of IT	O	O	O	O	O

34. Do you have any concerns about your ability to finance your university education?
    - None (I am confident that I will have sufficient funds)
    - Some (but I probably will have sufficient funds)

- Major (I have funds but will graduate with significant debt)
- Extreme (not sure if I will have sufficient funds to complete university)

35. What is your Average Point Score (APS):
    - 42 or more
    - 36
    - 30
    - 24
    - Less than 24

36. Your gender:
    - Female
    - Male

37. What is your racial or ethnic definition? (Mark all that apply)
    - Black
    - White
    - Coloured
    - Indian
    - *I prefer not to answer*

38. How old are you? (Mark one)
    - 17 or younger
    - 18 – 19
    - 20 – 23
    - 24 – 29
    - 30 – 39
    - 40 – 55
    - Over 55

39. Are you:
    - A South African citizen
    - Not a South African citizen

40. Is English your first language?
    - Yes
    - No

41. Are you a first-generation university student (i.e. first in your immediate family to attend university)?
    - Yes
    - No

42. Which of the following best describes where you are living now while attending university?
    - University residence
    - Residence (house, flat or commune) within **walking distance** of the university
    - Residence (house, flat or commune) within **driving distance** of the university
    - Other: [ ]

43. Would you describe your family as: (Mark one)
    - High income
    - Upper-middle income
    - Middle income
    - Lower-middle income
    - Low income

44. What is the highest level of education that your mother completed? (Mark one)
    - Did not finish high school
    - Completed high school
    - Attended university but did not complete degree

- Completed a Diploma
- Completed a Bachelor Degree (e.g. BA, BCom, BSc, etc.)
- Completed a Master's Degree (e.g. MA, MBA, MSc, etc.)
- Completed a Doctoral Degree (e.g. PhD, DEd, etc)
- Do not know or not applicable
- *I prefer not to answer*

45. What is the highest level of education that your father completed? (Mark one)
    - Did not finish high school
    - Completed high school
    - Attended university but did not complete degree
    - Completed a Diploma
    - Completed a Bachelor Degree (e.g. BA, BCom, BSc, etc.)
    - Completed a Master's Degree (e.g. MA, MBA, MSc, etc.)
    - Completed a Doctoral Degree (e.g. PhD, DEd, etc)
    - Do not know or not applicable
    - *I prefer not to answer*

46. Of the twenty-three design activities shown below, please put a check mark next to the SIX MOST IMPORTANT activities for a university student:
    - Abstracting
    - Brainstorming
    - Building
    - Communicating
    - Decomposing
    - Evaluating
    - Generating alternatives
    - Goal-setting
    - Identifying constraints
    - Imagining
    - Iterating
    - Making decisions
    - Making trade-offs
    - Modeling
    - Planning
    - Prototyping
    - Seeking information
    - Sketching
    - Synthesizing
    - Testing
    - Understanding the problem
    - Using creativity
    - Visualizing
    - I prefer not to answer

47. Is there anything you want to tell us about your experiences in IT that we haven't already asked you about?

APPENDIX E: Student questionnaire

I greatly appreciate your co-operation in returning this questionnaire.

The confidentiality of your responses is assured. Your name or student identification number does not appear on the form and your personal details are never linked to your answers. Please place a tick in the column that applies to you.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	I find my studies intellectually stimulating.					
2	There is a lot of pressure on me as a student in this degree course.					
3	The lecturing staff give me helpful feedback on how I am going.					
4	The workload is too heavy.					
5	The degree courses have helped me develop my ability to work as a team member.					
6	I have usually a clear idea of where I am going and what is expected of my degree course.					
7	The degree course administration is effective in supporting my learning.					
8	The lecturing staff of this degree course motivate me to do my best work.					
9	The degree course has stimulated my enthusiasm for further learning.					
10	As a result of my degree course, I feel confident about tackling unfamiliar problems.					
11	My degree course has stimulated my enthusiasm for further learning.					
12	It is always easy to know the standard of work expected.					
13	The lecturing staff seem more interested in testing what I have memorised than what I have understood.					
14	Where it was used, Information Technology helped me to learn.					
15	I am generally given enough time to understand the things I have to learn.					
16	The lecturing staff make a real effort to understand the difficulties I may be having with my work.					
17	Feedback on my work is usually provided only in the form of marks.					
18	The degree course has helped me to develop my problem-solving skills.					
19	My lecturers are extremely good at explaining things.					
20	Lecturing staff base their examinations on questions about facts					
21	The lecturing staff work hard to make their subjects interesting.					
22	The degree course has improved my skills in written communication.					
23	My degree course has helped me to develop the ability to plan my own work.					

24	The sheer volume of work for this degree means it all cannot be thoroughly comprehended.					
25	The lecturing staff made it clear right from the start what they expected from students.					
26	To do well in this degree all you need is a good memory.					
27	The lecturing staff put a lot of time into commenting on my work.					
28	I feel part of a group of students committed to learning.					
29	Being of a different race has affected my learning.					
30	It has often been hard to discover what is expected of me in this degree course.					
31	I feel my learning would have been better if I had stayed at the university residence.					
32	I have learned to explore ideas confidently with other people.					
33	I have struggled with English lectures since it is not my first language.					
34	Students' ideas and suggestions are listened to during the course.					
35	I feel I belong to the university community of students.					
36	I am able to explore academic interests with staff and students.					
37	My degree course is developing my capacity for research and inquiry.					
38	My degree course is encouraging my development of relevant, ethical, social and professional perspectives.					
39	ClickUP and other faculty sites supported my learning.					
40	My degree course is developing my ability to use oral, written and/or visual communication.					
41	If I had a bursary it would have been far easier for me to survive financially.					
42	Being able to communicate online with staff has helped my learning.					
43	My degree course is developing my ability to use information effectively.					
44	It is more difficult to study if you are a female.					
45	Travelling to and from university has affected my ability to learn.					
46	My learning on this degree course has been supported by contact with the wider community.					
47	The degree course is fostering my personal and intellectual independence.					
48	The facilities (lecture rooms, labs, workshops) are sufficient for my learning.					
49	I will complete this degree with ease.					
50	Overall, I am satisfied with this degree course and the progress I am making.					

THANK YOU!

APPENDIX F: ex-Student questionnaire

I greatly appreciate your co-operation in returning this questionnaire.

The confidentiality of your responses is assured. Your name or student identification number does not appear on the form and your personal details are never linked to your answers. Please place a tick in the column that applies to you.

Registered for …….

Changed to: …….

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	I found my studies intellectually stimulating.					
2	There was a lot of pressure on me as a student in this degree course.					
3	The lecturing staff gave me helpful feedback on my progress.					
4	The workload was too heavy.					
5	The degree courses had helped me develop my ability to work as a team member.					
6	I did not have a clear idea of where I was going and what was expected of me in my degree course.					
7	The degree course administration was effective in supporting my learning.					
8	The lecturing staff of this degree course motivated me to do my best work.					
9	The degree course stimulated my enthusiasm for further learning.					
10	As a result of my studies at UP, I feel confident about tackling unfamiliar problems.					
11	My degree course stimulated my enthusiasm for further learning.					
12	It was always easy to know the standard of work expected.					
13	The lecturing staff seemed more interested in testing what I had memorised than what I understood.					
14	Where it was used, information technology helped me to learn.					
15	I was generally given enough time to understand the things I had to learn.					
16	The lecturing staff made a real effort to understand the difficulties I may be having with my work.					
17	Feedback on my work was usually provided only in the form of marks.					
18	The degree course helped me to develop my problem-solving skills.					

19	My lecturers were extremely good at explaining things.					
20	Lecturing staff based their examinations on questions about facts.					
21	The lecturing staff worked hard to make their subjects interesting.					
22	The degree course improved my skills in written communication.					
23	My degree course helped me to develop the ability to plan my own work.					
24	The sheer volume of work to be completed in this degree means it could not be thoroughly comprehended.					
25	The lecturing staff made it clear right from the start what they expected from students.					
26	To do well in this degree all you needed was a good memory.					
27	The lecturing staff put a lot of time into commenting on my work.					
28	I felt part of a group of students committed to learning.					
29	Being of a different race affected my learning.					
30	It has often been hard to discover what was expected of me in this degree course.					
31	I feel my learning would have been better if I had stayed in a university residence.					
32	I learned to explore ideas confidently with other people.					
33	I struggled with English lectures since it is not my first language.					
34	Students' ideas and suggestions are listened to during the course.					
35	I felt I belonged to the university community of students.					
36	I was able to explore academic interests with staff and students.					
37	My degree course developed my capacity for research and inquiry.					
38	My degree course encouraged my development of relevant, ethical, social and professional perspectives.					
39	ClickUP and other faculty sites supported my learning.					
40	My degree course developed my ability to use oral, written and/or visual communication.					
41	If I had a bursary it would have been far easier for me to survive financially.					
42	I thought doing a computer degree would be easy since I was computer literate (knew Microsoft Word, Excel, etc.).					

43	The degree course did not suit my personality.					
44	It is more difficult to study if you are a female.					
45	Travelling to and from university affected my ability to learn.					
46	I think had I worked harder I could have made a success of this degree course.					
47	The degree course fostered my personal and intellectual independence.					
48	The facilities (lecture rooms, labs, workshops) were sufficient for my learning.					
49	This degree course was just too difficult to complete.					
50	I have moved on to doing something more meaningful.					

THANK YOU!

APPENDIX G: Graduate questionnaire

I greatly appreciate your co-operation in returning this questionnaire. The confidentiality of your responses is assured. Your name or student identification number does not appear on the form and your personal details are never linked to your answers.

Name …….. Gender ……..….. Race ……..

In which year and how old were you when you enrolled at the University of Pretoria (UP)?
Click here to enter text.

Name the undergraduate degree for which you were registered.
Click here to enter text.

How long did it take you to complete the degree?
Click here to enter text.

Are you employed? In what field or industry are you employed?
Click here to enter text.

Is your job in keeping with the degree you achieved?
Click here to enter text.

Was this degree your ideal career choice, and if not, what would you have preferred to do?
Click here to enter text.

For Numbers 7 - 9 use the sliding-scale from 1 - 5 (1 being poor, 5 being excellent).

How would you rate the overall experience you received from UP?
Click here to enter text.

How do you view the value of your undergraduate degree from UP?
Click here to enter text.

Would you recommend UP (and the degree you achieved) to a friend?
Click here to enter text.

For Numbers 10.1 – 10.8 use the sliding-scale from 1 - 5 (1 being poor, 5 being excellent).

How has UP assisted you in developing the following skills necessary in the workplace? Click here to enter text.

The ability to communicate orally. Click here to enter text.

The ability to communicate effectively in writing. Click here to enter text.

The ability to work effectively in teams with people from different backgrounds and cultures. Click here to enter text.

The importance of ethical judgement and decision-making.
Click here to enter text.

The importance of critical thinking and analytical reasoning skills.
Click here to enter text.

The ability to apply knowledge and skills to real-world settings.
Click here to enter text.

The ability to innovate and be creative.
Click here to enter text.

The ability to communicate in a language other than your home language.
Click here to enter text.

Did you have a choice of universities to attend, and if so why did you choose UP?
Click here to enter text.

Where did you live while at UP?
Click here to enter text.

Was transport an issue in travelling to and from the University? Click here to enter text.

What were the facilities at UP like? Were there computers, good library facilities, etc.?
Click here to enter text.

Did you have Internet access?
……
Click here to enter text.

Did you get the help you required from the lecturers in your department?
Click here to enter text.

Did you personally have to overcome any obstacles in attending university?
Click here to enter text.

Did you have financial difficulties in paying for your studies, or did you have a bursary?
Click here to enter text.

Do you think UP prepared you adequately for the work environment? Please provide reasons for either your Yes or No answer.
Click here to enter text.

Why do you think that you were successful in achieving your degree?
Click here to enter text.

What do you *think* you learned well?
Click here to enter text.

What do you *wish* you had learned better?
In general, name some positive features of being a student at UP.
Click here to enter text.

Are there negative features? Please mention these.
Click here to enter text.

Do you know if a significant number of your colleagues had dropped out without graduating?
Click here to enter text.

Why do you think they dropped-out?
Click here to enter text.

Do you know if other colleagues who studied with you, but dropped-out of UP, went on to study and obtain degrees elsewhere? Mention the field of study if you know.
Click here to enter text.

What do you think UP could have done better/differently while you were a student?
Click here to enter text.

Do you intend studying further at UP?
Click here to enter text.

What do you expect to be doing in 10 years' time?
Click here to enter text.

THANK YOU!

APPENDIX H: Responses to the mini-essay

These are the comprehensive responses of students with regard to their “Joys and frustrations of being a first-year student”. As this is the voice of students, the responses have been analysed using the constant comparative method of data analysis of (Maykut and Morehouse, 1994). As they point out, “Words are the way that most people come to understand their situations; we create our world with words; we explain ourselves with words; we defend and hide ourselves with words” (Maykut and Morehouse, 1994). This qualitative method allowed the researcher to break down the data into units and eventually code the data into themes or categories. The researcher has analysed, identified and placed information from the responses according to the category that most appropriately expressed the verbatim view of students. Hence, the seventy-four responses have been arranged according to common headings, in the voice of the students, i.e. verbatim, and are as follows:

Difficulty in finding way around campus

- I remember not knowing where my classes are and it became so late that I could not attend and I was stuck outside.
- Frustrating to be in a new city and a new country.
- Surprised by the sheer scale of the Hatfield Campus
- Hard to find your way through the university but fortunately have a friend in second year to help me.
- Came into an unknown environment but made a lot of friends and I am coping with the work and work load.
- A few upsets – did not know left from right around the campus.
- Not knowing where classes etc. were, but a few days of class soon sorted that out.
- There was a time around campus where I didn’t know where the bathrooms were and that was the most stressful thing to happen to a first-year student. Knowing your way around campus is the key. Fortunately, one of the lecturers came to my rescue, helped me figure out my time-table and showed me a way around campus.

- I was lost, confused and irritated, but very excited to start the next chapter of my life.
- Finding classes brought some hilarious moments – on the first day my friend and I followed the wrong group on the Hatfield Campus (instead of the Mamelodi campus), so we were completely lost, but it was rather funny.
- I got lost a couple of times during the orientation week and didn't attend some of the classes because I got lost. Luckily, I could catch up quickly.
- Coming to University from home was the scariest experience I had ever experienced as this was the first time that I had been out of home.
- Finding your way from one lecture to the other in time also frustrates you as you then tended to bunk the lecture once we noticed we were late for it.
- On the first day I followed the wrong orientation group. Fortunately, a friend from the day house figured I should have been in his group.
- I was in a new province, a new city, and was living alone for the first time, in an environment that was new and scary.
- I have always been able to adapt to change very quickly. This was probably attributed to the fact that I have never stayed in one place for a long time.
- First week was frustrating because I knew no one and didn't know where to go to find information or help. I got lost a couple of times during orientation on main campus and didn't attend some of the classes because of lack of knowledge.
- It was a wonderful and enjoyable moment because I found myself in a different world. Fortunately I met one student on my first day who quickly introduced me to his friends and soon I'd met a whole bunch of people.
- At first confusion because I didn't know where to go or how to get there which was pretty funny actually.
- I had trouble getting used to the new city and confusing streets of Pretoria.
- I am originally from PE, I knew no one in or around Pretoria but I now have met many friendly people.
- As the classes started I failed to attend my first lecture due to being late.
- At times I was extremely frustrated because I didn't know where to go or what to do.

- Everything seemed unclear and disorganised and it felt as if I was going nowhere slowly.
- I found out I was in the wrong group at first and even on the wrong campus. Instead of being on the Mamelodi Campus, I was busy running around on the Hatfield Campus dazed and confused.
- It has been nothing but anxiety for me, I didn't know what to expect and if I was going to cope with all the pressure and work load.
- I've made a few friends and I'm also getting familiar with the campus.
- Getting lost on the first week resulted in me missing a test.
- I felt displaced as I hadn't given myself enough time to adapt to my new environment besides home.
- I had difficulty understanding the time-table and figuring out the venues.
- The experience was a bumpy ride for me. At first, I was scared and didn't know what to expect but soon realised my fears were unnecessary.
- I had difficulty understanding the time-table and figuring out the venues.

Meeting new friends

- Excited at first to meet new people, a whole new area to explore, completely new experience compared to high school.
- Met people I knew from my previous school.
- The best thing about university is that the people are diverse in personality and physical appearance and are willing to help out.
- We all made new friends, all composed of different diversities.
- It has been an enjoyable experience, meeting new people and meeting my lecturers have been really fun.
- Opportunities I have had to meet new people and be able to make friends with them.
- I have had lots of fun at university with all the different diversities and cultures which I have enjoyed thus fair. First weeks were great because I made lots of friends, understanding better the field of study that I was in. The vibe at UP was incredible and spontaneous.
- I made lots of new friends. It's very different from school and I like the new adventures.
- It's been exciting to meet new friends and to hear where they come from.

- Suddenly I realised that I was alone and that I now had to make new friends which was as struggle as I had had the same friends for five years and all of a sudden I had to make new ones.
- The first days were exciting because there were so many people from different backgrounds engaged in one environment.
- I didn't have problems fitting in as I'm a type of person that can blend with anything.
- I met new people, lecturers and fortunately everybody I met was friendly and kind.
- We have the opportunity to meet and interact with new friends from different walks of life.
- Nevertheless, I met new people, made friends and created a bit of fun memories for myself.
- I enjoyed making new friends.
- Being at UP (TUKS) is great because of the diversity of people here.
- My first few weeks were very exciting. I have made lots of new friends.
- It has been a wonderful experience. I have met a wide variety of people and cultures.
- I enjoyed meeting up with new people coming from different kinds of environments.
- I have met people I think I can call friends.
- I have enjoyed meeting new people. It has been fun, and stimulating to interact with many people of different race and cultures.
- The most ecstatic moment was meeting all these wonderful people, acquainting myself with new friends.
- By the end of two weeks I had a good set of friends at Mamelodi Campus and felt fairly settled in.
- I began meeting new friends and experiencing student life, needless to say it has been an overwhelming experience thus far.
- People greet each other easily, make friends in the hundreds.
- I've now met lots more people all doing my degree and they are making my varsity experience all the more enjoyable.
- The best part is mingling with people who have the same mission and drive that you do, the challenges of excelling in the course.

- Meeting new people from different backgrounds, but who are brought together by the yearning for knowledge
- However, I had the opportunity to meet new people especially those in the residence that I lived.
- At the Mamelodi Campus I met friends with the same aspirations like me.
- I was scared when I saw so many new faces and realised that I would have to be with them for the whole year.
- I kept asking myself if I will be able to make new friends and most importantly if I will be able to pass my course.
- A week into varsity was great but I started thinking about the things I used to do with my friends in Johannesburg. That's when I felt lonely even though I had a bunch of new friends.
- During orientation I felt displaced as I hadn't given myself enough time to adapt to my new environment besides home.

Distance to travel

- The biggest problem is that I live in Benoni and have to drive to Pretoria every day. Waste of time which I could use to study.
- The only qualm is the distance I have to travel to university due to the fact that I live in Benoni.
- Despite the tiring driving, I am enjoying myself and feel that the next four years or more – when I do my honours and master's – are going to be enjoyable and a great experience.
- Missing the bus from home means that I am late for a lecture,
- With time I started to settle but what stressed me a lot was that I had to travel each and every day from Tembisa to Hatfield, and from Hatfield to Mamelodi.
- Past two weeks were frantic as I was commuting from Johannesburg to Hatfield.
- It was strenuous and exhausting for the reason that I had to wake up in the early hours of the morning 3:00 in order to make it to main campus on time to be able to catch the bus to Mamelodi.
- Every day I wake up at 05:00 in order to get to the Gautrain which I take to Hatfield Station, then walk all the way to the Prospect gate to catch the bus to Mamelodi Campus. I then repeat the process going home every day.

- I have to wake up at 04:30 every day and take a 3 km walk to main campus and take a bus to Mamelodi Campus.
- The distance from where I stay and campus is very far and I therefore have to travel a lot and that takes a toll on the body and energy levels.
- It is tiring because my Monday to Friday lectures start at 08:00 and end at 16:50.
- I have the unfortunate luck of living far from campus. I have to get up at 04:30 in order to get onto the bus. If I miss the bus, I have to take a taxi which means it reduces my budget for buying books which are expensive.
- The classes are different from what I'm used to, and I literally couldn't believe that I would be sitting at the Mamelodi Campus until about 17:00. Luckily I'm not alone.
- I know that the 'flame is dull' because we are at the Mamelodi Campus. You know what they say: it's not main campus.
- When I heard I was going to Mamelodi, I wasn't sad or excited because I knew it was going to be different. I must add that Mamelodi Campus is very clean and the classrooms aren't dirty or unkempt.
- I must say I am happy here because I can park my vehicle inside of the campus and the staff here are friendly and the security is also great. I was amazed by the nice layout of the campus and I got even more thrilled when I saw the staff working hard to keep it as clean as possible.
- One thing I did not really understand was the Mamelodi Campus issue. I did not understand why we had to be separated from the others but then again I thought to myself because the university clearly stated the admission requirement before I even applied. But the drive to campus irritated me.
- The first time I heard that I was studying at Mamelodi, I thought it might have been a joke, but when I arrived here after being frazzled in the traffic, I soon realised that the staff is friendly and the security is tight.

Exhaustion (related to time management)

- A big adjustment for me so far was living on my own which I am slowly getting used to and coming to enjoy, but I'm so tired.
- Student life is more fun than I expected but the days are just sometimes too long.
- A really busy time for me. It was also very confusing and tough.

- I then moved into my new flat. It was a tiring day.
- Every time I go home I'm always exhausted. I usually sleep for the first three hours when I get home, the first thing I do when I wake up is eat, then get down to business. Coming off a gap year, it has been difficult getting back into the mode of school again.
- There isn't much I can complain about besides the tons of work we are given, but I guess that's what varsity is about and I just have to work hard to make it through.
- I was undergoing a lot of tension, stress and pressure when I had to find the time to fix my documentation at main campus, finding accommodation and travelling back home.
- I was constantly kept busy and I was exhausted.
- The past weeks at TUKS have been very long.
- These weeks have taken their toll on me as I have had to adjust to the day lengths, varsity day and times that I have to wake up.
- The volume of work is also overwhelming.
- The only thing I am very frustrated with is the lack of enough sleep (and food). I have to get up early to get to campus on time, so I feel drained most of the day. Sometimes I feel weak with hunger but there's nothing that I can do.
- There are also days when my allowance runs out before the end of the month. For the remaining days until my next allowance, I have to live off my friends.
- Yesterday at supper, it was the last meal that I had for the day. This morning I came to campus with an empty stomach. Life at university is very hard, and I don't want to ask my Mum for more money. It is also a struggle for her to keep me on campus.

Loneliness (Social Integration)

- I also feel left out in class because I do not have any textbooks and time is ticking by fast. The most frustrating moments are the thrills of knowing that you are now independent and all the work given to you is your own responsibility as to when, how and where you do it and no one is pushing you to do it like in school.
- The most frustration I had was when I attended class because I was struggling to understand as I was not used to the teaching method the

lecturers used, but what I realised so fast was that I needed to communicate better and be a hard worker.

- There are still days when the full reality of where I am still gets to me, but I am learning to cope with being on my own.
- I will have full responsibility and will have to do things on my own. I was also exposed to living alone without my parents around me all the time which gave me some sort of independence, something I've never really experienced before. But it was really scary not knowing anyone.
- I thought I would be sad and miss home and my family but between orientation and day house activities, I had no time for such things.
- The joys of being a student is that one gives you instructions and doesn't care if you study, there are dates and times that are your own responsibilities. I need to get used to keeping to this.
- Living on your own is really hard but I'm learning to adapt quickly. Laundry is also such a tedious task.
- I recall a few days back I was nervous almost half of the time I spent on campus, had a low self-esteem but now everything is going well.
- I also had to deal with the fact that I was alone and had to take responsibility because my mother and father were not here to do that for me anymore. I also had to get used to taking responsibility for my own work and time-table which was a frustrating experience.
- Struggling to wake up at 04:45 every day with only my alarm to wake me up. A huge step in my life, however; I seem to be adjusting well. I'm excited about my course and definitely feel I have chosen the right career path.
- Despite my general unhappiness of being on campus, I am gradually coming to terms with the way I will have to live my life this year.
- I was also afraid but I just told myself that I am going to survive and there is nothing that can stop me.
- I was scared at first as I didn't know what to expect of the University and how the people would treat us.

Academic and Support staff

- Contact time with lecturers longer that experienced in high school.

- Lecturers are friendly, while they maintain their strict nature. Some lectures are better than others. One can tell when the lecturer has put effort into the lecture.
- I really started enjoying the lecturers, tutors and lecture assistants, as they are really passionate about what they do and that really motivated me to attend lectures every day.
- The lecturers and tutors are kind, caring and willing to assist any individual on campus at any time.
- I have found the lectures to be interesting. It is reassuring to see that the lecturers can make the subjects interesting.
- The lecturers did not disappoint my expectations as they did inform me about the requirements of the module.
- Timetables were arranged. Classes were attended, with the help of the university staff we got prepared properly for the upcoming weeks.

Freedom (Accountability)

- Nice not to wear uniforms and to be able to smoke without fear.
- Another thing that is great is that there is no school uniform.
- I am looking forward to the challenge of the next four years. I will have good times, as well as bad times, but I know that I will ultimately step out into the world as a strong-willed and well-educated citizen.
- In March I will be moving into my own flat where I will be staying alone.
- At the end of the first week my father left for PE. I had to do some shopping on my own for the first time and was shocked at how much everything cost.

Adapting to new surroundings (i.e. Mamelodi Campus) (Institutional Integration)

- Mamelodi Campus is easier to find your way on as it is a lot smaller.
- I enjoy travelling and attending here at Mamelodi Campus, it suits me better, as I find a lot of students studying at Hatfield are already having a tough time.
- The first day we went to Mamelodi Campus was interesting as I saw the campus for the first time.
- It was peaceful and well laid out and a pleasant change to the busyness found on the Hatfield Campus.

- I was a bit worried about Mamelodi Campus, will it be safe, or is there a danger risk for us? But it is a great campus and the people are friendly and support you where you need support.
- On my first trip to Mamelodi Campus I was not very happy. I found it difficult to find.
- I really felt welcome and realised that it was time to live a new different life from the time I have been living while I was at secondary.
- No time for grocery shopping and other activities when I only arrived home at six pm.
- The daunting task waking up at six every morning, then travelling to Mamelodi Campus.
- A big call to make but personally I enjoy it much more here rather than the hustling and bustling of Hatfield Campus.
- I was kind of disappointed to be at the Mamelodi Campus because everybody I know is at the main campus but I've learnt to enjoy the quiet less busy environment on this campus.
- Another issue is waking up in the mornings to catch the Mamelodi bus at Hatfield. We had to stay at Mamelodi Campus until about 16:30, but CSC at Hatfield Campus closed at 16:00. It was also not enough time to look for accommodation as I had to travel back to Johannesburg and prepare my work for the next day. It was really a hard time.
- Then came my first day at Mamelodi Campus. The campus was not as bad as the name had led me to think but I was still not happy about the thirty minute bus ride every day.
- Driving between Mamelodi Campus and home is far and there is so much traffic.
- Once I figured out how things worked around the campus that's when I started enjoying myself here on the Mamelodi Campus.
- I wanted to know all the buildings and venues on the Mamelodi Campus so that I did not get lost on my way to lectures and tutorials.
- One thing I did not really understand was the Mamelodi Campus issue. I did not understand why we had to be separated from the others but then again I thought to myself because the university clearly stated the admission requirement before I even applied.

Optimism

- Nevertheless, I am enjoying every moment of being a university student.
- The week has been hectic, but I'm excited to learn, during lectures and practical periods, I have discovered and learnt so much, made many notes and already have a couple assignments due.
- I really have settled on Mamelodi campus and enjoying my studies here.
- I'm prepared for any challenges that I'll be given and grab them with both hands.
- Now it's time for the hard work to begin and to get my degree.
- I was really eager to start class.
- I have settled and enjoy my studies here and am prepared for any type of challenges that I'll be given.
- The joy of being a tertiary scholar, being able to complete my studies at such a fine institution is most definitely a privilege.
- It is a worthwhile experience and I am looking forward to this year although I know it's going to be a tough journey.
- Regardless it has been an enjoyable experience.
- At the end of the first week I am inspired to work harder for my own future.
- I have learnt so much already and looking forward to learning more.
- Now it's time for hard work.
- Two weeks down the line and I am stronger than before. I believe that my development is essential and through this campus I will get exactly that.
- My experiences have been wonderful and hope my future experiences will be mind-blowing.
- For now I am happy with where I am and where I am going.
- Excited to finally get closer to my dreams.
- Things are now looking good and everything is going well.
- Orientation showed that university can be great, of only you are well dedicated, driven and diligent.
- My first weeks were very exciting and all my problems seemed to vanish.
- Not forgetting the amazing facilities such as the sports campus.
- Pleased at the availability of different facilities to suit every student's needs, and the cafeteria food was also nice.
- I was really worried about how I was going to cope.

- I've had an incredible start to my academic career here at UP and I hope everything stays positive for me throughout my academic years here.
- Frustration is having to wait all the time breaks between classes and free times.
- The food is great and the people studying with me are friendly as well.
- I was happy when I saw everyone being nice to each other and to me as well.
- I even appreciated it more when I had to go into the lecture halls for the first time in my life.
- I quickly warmed up to the fact that I won't be on the same campus as my friends, and in the end made so many new friends.

General Problems

- Also struggled with the UP portal which didn't allow me to partake in some of the lectures and search for work.
- Lecture halls here are slightly uncomfortable and the projectors in some halls are out of focus and could do with some adjusting.
- I am a slow student and really struggle to keep up.
- One of my major worries is that I do not have any financial sponsor up to now.
- The orientation week was hard – hordes of information, tests and constant queuing were definitely a schlep.
- We spent most of the time sitting on the grass and not having anything better to do because our classes were more or less 30 minutes long. It was depressing.
- Being a resident student in TUKS Naledi, we were not given enough time to sleep because of initiation, and when we finally did sleep we had had to wake up early for class.
- I have the most annoying and frustrating roommate.
- I have been frustrated with the constant tutorials on using ClickUP in every lecture. It feels like an incredible large waste of time, and it gets repetitive.
- Lectures that end prematurely have been a frustration. It's annoying to wait two hours before a lecture starts, especially if that lecture starts at three and ends at five. It means we sit and do nothing from one to three.

- The food court is very small and doesn't cater for all students and doesn't have the basics that a shop would have.
- I've noticed as well that I'm spending way too much on food etc. on campus. I'm going to start packing lunch instead off buying food on campus.
- The cafeteria is different from main campus as there is no Steers or Oom Gert's to relieve stress with a pint.
- The points taken from the responses to the mini-essay very succinctly encapsulates the fears, optimism and problems that beset most first-year students, albeit that they are in the SIT.

APPENDIX I: Responses from student questionnaire

Questionnaire responses from students still on the programme

Many questions were posed but respondents gave their responses in a Likert scale manner of Strongly Disagree, Disagree, Neutral, Agree, Strongly agree. In analysing the responses, the researcher discuss only those that are noteworthy:

Q1 I find my studies intellectually stimulating.

Five per cent indicated that they agreed, while 75% strongly agreed to this statement.

Q2 There is a lot of pressure on me as a student in this degree course.

All students agreed that this was a common problem.

Q3 The lecturing staff gave me helpful feedback on how I am going.

Seventy-five per cent of respondents were neutral (noncommittal) regarding this question.

Q10 As a result of my degree course, I feel confident about tackling unfamiliar problems.

Seventy-five per cent of respondents agreed that that this was as a result of their studies.

Q11 My degree course has stimulated my enthusiasm for further learning.

Seventy-five per cent of respondents agreed that this stimulation occurred.

Q16 The lecturing staff make a real effort to understand the difficulties I may be having with my work.

Seventy-five per cent of respondents strongly disagreed that this was the case.

Q20 Lecturing staff base their examinations on factual questions.
Seventy-five per cent of respondents were non-committal (neutral) in answering this question.

Q21 The lecturing staff work hard to make their subjects interesting.
Seventy-five per cent of students disagreed with this statement.

Q24 The sheer volume of work to be got through in this degree means it can't be thoroughly comprehended
Seventy-five per cent of respondents strongly agreed with this statement

Q27 The lecturing staff put a lot of time into commenting on my work.
Seventy-five per cent of Respondents strongly disagreed with this statement.

Q32 I have learned to explore ideas confidently with other people.
Seventy-five per cent respondents agreed with this statement.

Q37 My degree course is developing my capacity for research and inquiry.
Seventy-five per cent % of respondents agreed with this statement.

Q40 My degree course is developing my ability to use oral, written and/or visual communication.
Seventy-five per cent respondents agreed with this statement.

Q41 If I had a bursary it would have been far easier for me to survive financially.
Seventy-five per cent respondents strongly agreed with this statement.

Q44 It is more difficult to study if you are a female.
Seventy-five per cent respondents agreed with this statement.

Q46 The degree course is fostering my personal and intellectual independence

Seventy-five per cent respondents agreed with this statement.

APPENDIX J: Questionnaire responses from ex-students

This questionnaire was very similar to the questionnaire given to the present E4YP in IT students and can be found in the Appendix I. The responses were given in a Likert scale manner of Strongly Disagree, Disagree, Neutral, Agree, Strongly agree. In analysing the responses, only those that were meaningful have been listed:

Q7 The degree course administration is effective in supporting my learning.
Seventy-five per cent respondents agreed with this statement.

Q13 The lecturing staff seem more interested in testing what I have memorised than what I have understood.
Seventy-five per cent respondents agreed with this statement.

Q16 The lecturing staff make a real effort to understand the difficulties I may be having with my work.
Seventy-five per cent respondents disagreed with this statement.

Q17 Feedback on my work is usually provided only in the form of marks.
Seventy-five per cent respondents agreed with this statement.

Q21 The lecturing staff work hard to make their subjects interesting.
Seventy-five per cent 75% of respondents disagreed with this statement.

Q25 The lecturing staff made it clear right from the start what they expected from students.
Seventy-five per cent 5% of respondents disagreed with this statement.

Q29 Being of a different race has affected my learning.
Seventy-five per cent respondents agreed with this statement.

Q34 Students' ideas and suggestions are listened to during the course.

Seventy-five per cent respondents disagreed with this statement.

Q37 My degree course is developing my capacity for research and inquiry.
5% of respondents disagree with this statement.

Q42 I thought doing a computer degree would be easy since I was computer literate (knew Microsoft Word, Excel, etc.).
Seventy-five per cent respondents strongly agreed with this statement.

Q43 The degree course suited my personality.
Seventy-five per cent respondents disagreed with this statement.

Q44 It is more difficult to study if you are a female.
Seventy-five per cent respondents agreed with this statement.

Q48 I needed to have more tutor assistance.
Seventy-five per cent respondents agreed with this statement.

Q49 This degree course was just too difficult to complete.
Seventy-five per cent respondents strongly agreed with this statement.

Q50 I have moved on to doing something more meaningful.
Seventy-five per cent respondents strongly agreed with this statement.

APPENDIX K: Bivariate analysis between Outcomes and selected variables

Available from the researcher.

APPENDIX L: Bivariate analysis between Results and selected variables

Available from the researcher

APPENDIX M: STARS2013 Handbook

Report - Lemmens

Stars Handbook explanation (Lemmens)

Motivational factors:

1. **Planning Sten:**

The ability to plan your studies by setting goals. The goals that are measured here are referred to as target goals for learning. The target goals indicate a specific level of performance by which a student can evaluate his or her performance. The second levels of goals that are measured are more general and indicate the reason a student is pursuing a task. A combination of target goals not only indicates the specific learning goals that students set, but also indicates beliefs about ability, competence, success and effort.

The scores on the report range from one to ten (**1 – 10).**

Low scores (1-4) thus indicate students' perceived inability to set target goals. Such student will also have low beliefs about their ability to achieve academically and will invest less effort in their work.

Students with **average scores (5-7)** set intermediate goals and have realistic efficacy beliefs.

High scores (8-10) indicate a student that set challenging target goals for their studies and would have high efficacy beliefs about their ability to be successful and will invest the necessary effort.

2. **Locus of control:**

The level of personal responsibility you take for your actions. Causes of success or failure that relate to locus indicate origins of factors within the person (internal) or the environment (external). Students, who believe that the cause of success or failure is stable, believe that the outcome will be the same when performed at a later time, while students who believe the cause is unstable will believe the outcome will be different each time. Those students, who believe that the cause is controllable, believe that they can change the factors that cause success or failure.

The scores on the report range from one to ten **(1 – 10).**

Low scores (1-4) thus indicate an external locus of control where other people are made responsible for the students' academic success, believe the outcome to be unstable and therefore attributed to luck – over which a student has no control.

Students with **average scores (5-7)** usually indicate that they take responsibility for their achievements but attribute a bit of luck toward the outcome.

High scores (8-10) indicate an internal locus of control where the student takes personal responsibility for his or her personal development; believe the outcome to be unstable and therefore attributed to effort – over which the student has much control.

3. **Self-efficacy sten:**

The perception of your ability to achieve your academic goals. The field specifically refers to efficacy expectations, or the student's belief that he or she can accomplish a task, and an outcome

expectation, or the belief that a given action will lead to academic success. The proposition here is that efficacy judgements indicate if a student expects to be able to do the task and does not indicate how well the student will do on the task. The strength of the efficacy belief is measured here.

Scores range from one to ten (1 – 10).

Low scores (1-4) on this scale indicate low self-efficacy beliefs about achieving academic goals and being successful and could point to some indication of anxiety to perform academically.

Average scores (5-7) indicate realistic academic efficacy beliefs for success.

High scores (8-10) indicate high academic efficacy beliefs for success and some of these students could be unrealistic in their beliefs.

4. Leadership

The perception of your leadership ability. This field shows intent to become a leader and normative beliefs about the student's leadership ability – thus if friends or family think this student has leadership abilities. Leadership ability has been associated with autonomy and the ability to organise and influence others. This scale does not measure actual leadership experience but intent and ability to do so. Leadership experience is associated with academic success.

The scores range from one to nine **(1 - 9).**

Low scores (1-4) indicate a student who does not want to take up a leadership position and who has low normative beliefs of his or her leadership ability.

Average scores (5-6) indicate a student who does not pro-actively pursue leadership opportunities but would probably take up a position when asked to do so. Such a student also has average normative beliefs of his or her leadership ability.

High scores (7-9) indicate a student who really wants to take up a leadership position and has high normative beliefs of his or her ability to be a leader.

Academic Involvement

5. Test taking skills:

The perception of your ability to be free of anxiety during tests and your levels of concentration during tests. This field measures students' perceived anxiety and concentration levels during test and exams. Test anxiety is associated with low efficacy expectations and with ineffective and inefficient learning strategies. Deficient learning strategies also coincide with poor concentration levels. Other factors such as perceived ability or a poor history on taking test could also influence levels of concentration.

The scores range from one to ten **(1 – 10).**

Low scores (1-4) indicate students that are very anxious during tests and exams and have difficulty concentrating. These students most probably have poor learning strategies (compare scores with *Test taking skills* needed and *Engagement*).

Average scores (5-7) indicate some levels of anxiety during exams and fluctuating levels of concentration.

These students have questionable learning strategies. **High scores (8-10)** indicate students that are virtually free of anxiety during tests and exams and can fully concentrate during tests and exams. These students usually have good learning strategies.

6. **Engagement:**

The level to which you anticipate to be involved with your studies and lecturers. This scale firstly measures students' perceptions on the number of hours they perceive as needed to be successful at their studies and their intent to spend time on their studies. Secondly the scale refers to the expected interaction between the student and lecturer. Research on engagement is clear in that the time one invests in studies is positively related to academic success, conditionally that effective learning strategies are used.

Score range between one and ten **(1 – 10).**

Low scores (1-4) indicate students that have unrealistic low expectations of the time that is needed to be successful academically and they have a high dependency on the lecturer to support them.

Average scores (5-7) indicate more realistic expectations of the time necessary to be successful academically and they would have some dependency on lecturers to support them.

High scores (8-10) indicate students that expect to invest much time into their studies and will probably need limited support from lecturers.

7. Pleasure reading:

The level to which you finds pleasure in reading. This scale assess whether students actually make time to read, even for pleasure, in order to determine indirectly 1. Their attitude toward reading and 2. Their reading behaviour. This scale does not determine reading comprehension directly or the topic/genre of book that is read.

The sores range from one to **nine (1-9).**

Low scores (1-4) indicate to students who read very few book.

Average scores (5-7) indicate to students who read some books for pleasure.

High scores (8-10) indicate to students who read books often for pleasure. High scores could lower academic success because the time spent on reading books for pleasure limit involvement in studies.

Well-being

8. General well-being:

The perception of your emotional and physical health. This field only measures emotional and physical wellness but if sociability and vocational identity is included in the interpretation it would provide a broader perspective on the wellbeing of a student. Emotional wellbeing refers to being satisfied with oneself and being free from stress. Physical wellbeing is a general rating of one's physical health over the last month.

The scores range from one to nine **(1 – 9).**

A **low score (1-4)** indicate the possibility of emotional and/or physical distress.

An **average score (5-7)** indicate a healthy person.

High scores (8-10) indicate wellness with minimal feelings of stress and being content with oneself.

Integration and Support

9. **Institutional Support**

The sufficiency of information from the University of Pretoria before enrolling. Information from the university helps students to make decisions regarding their choice of institution and programme. It is also their first encounter with the university and therefore leaves an impression on the student that influences students' commitment toward the institution.

Scores range from one to nine.

Low scores (1-4) indicate that the student received insufficient information from the university and could experience a mismatch between their expectations of the university and specifically their programme and what they would actually experience on campus and in class.

Average scores (5-7) indicate that the student received some information on the university and their programme.

High scores (8-10) indicate that the student received enough information on the university and the programme. Such a student will probably be motivated to study at UP and the programme that was chosen.

10. Financial Support

The level of financial support you have for your studies. Financial difficulty has a direct influence on students' ability to continue with their studies. The question that probes the *source of finance for studies* should be read in association with this question.

The score range from one to **nine (1-9).**

Low scores (1-4) indicate a student who has doubts about funding his/her studies and most probably has to work to finance his/her studies. Such a student is at risk for withdrawal early in the year.

Average scores (5-7) indicate a student who has some financial support and would have to work part- time if necessary. Such a student is slightly at risk for withdrawal, but an economic downturn could change the student's status to high risk for withdrawal.

High scores (8-10) indicate a students with no financial concerns.

11. Family Support

The level of family support during your studies. This field specifically measures the parental or family support that students experience for their studies and any family responsibilities that might interfere with academic involvement and persistence.

The scores range from one to nine **(1-9).**

Low scores (1-4) indicate that a student has minimal support from parents or family members

and most probably have family responsibilities that could interfere with their studies. Such students do not have a 'safety net' when they experience challenges at university and are at risk for withdrawal.

Average scores (5-7) indicate that a student has some parental or family support for their studies and/ or has some level of family responsibilities.

High scores (8-10) indicate full parental or family support for their studies and no family responsibilities.

12. Sociability

The extent to which one can relate easily to others. This field measures the extent to which a student is open to meet other people. The expectation to meet new people shows intent that could facilitate social integration and help students to adapt to their new environment and increases the probability that a student will persist.

The scores range from one to **ten (1-10).**

Low scores (1-4) indicate students that do not expect to meet new people and become involved in organised student activities.

Average scores (5-7) indicate students who expect to meet new people and to become involved in organised social activities to some extent.

High scores (8-10) indicate students who expect to meet many people and become extensively involved in organised student activities. Students with low and high scores are presumably at risk for poor academic success.

Vocational Identity

13. Career exploration:

The extent to which you have explored your career field. This field refers to students' beliefs that the programme is related to their interests and career choice.

The score range from one to nine (1-9).

Low scores (1-4) indicate a student who did very little exploration about the programme enrolled for and who is very uncertain if the programme is related to their interests and career goals.

Average scores (5-7) indicate that a student did some career exploration and could be experiencing some uncertainty if the programme is related to their interests and career goals.

High scores (8-10) indicate a student who had sufficiently explored the programme enrolled for and who has certainty about their interests and career goals.

14. Career guidance:

The extent to which career guidance was sought after.

Scores range from one to three (**1-3).**

Scores of one (green bar) indicate that a student does not need any career guidance.

Scores of two (yellow bar) indicate that the student needs career guidance to some extent.

Students with scores of three (red bar) need career guidance to a great extent and can be directed to the applicable support services.

Academic skills needed

Scores range from one to three.

Scores of one (green bar) indicate that a student does not need support for this academic skill.

Scores of two (yellow bar) indicate that the student needs support for this academic skill to some extent.

Students with scores of two can be advised to use the self-service facility of the VUMA portal (http://www.vuma.ac.za/drupal/). Students with scores of three (red bar) need support for this academic skill to a great extent and can be directed to the applicable support services.

Goal Orientation
15. Goal achievement:

The belief in your ability to find ways to solve problems and achieve your goals. This field indicates a belief in one's ability to find ways to solve problems and achieve goals, to have a positive outlook, and inner resources. Scores range from one to ten. Low scores (1-4) indicate low levels of inner resources to find ways to achieve goals, and students tend to be influenced by external events and have difficulty to cope. Average score (5-7) indicate to students who perceive to have some levels of inner resources and are at times influenced by external events and have some difficulties to cope.High scores (8-10) indicate high levels of inner resources i.e. high levels of optimism, a positive outlook and a strong belief in one's own ability to find specific ways to achieve goals.

16. Future vision:

The level to which you are optimistic based on the belief that the future holds promise and your goals will be reached. Scores range from one to seven. Low scores (1-3) indicate low optimism, not being able to envisage a positive future and have clear goals. Average scores (4-5) indicate some optimism toward the future and that goals will be reached. High scores (6-7) indicate a strong belief in a positive future, clear goals and an ability to envisage a positive future.

17. Hope agency: The ability to imagine actions and behaviour to reach your goals. Hope agency is closely related with self-efficacy beliefs, but focus on one's ability to reach goals despite the circumstances. A further difference is that students become change agents in pursuit of their goals. The scores range from one to nine. Low scores (1-4) indicate students who do not pursue their goals. Average scores (5-6) indicate to students who pursue their goals to some extent. High score (7-9) indicate to students who actively pursue their goals.

18. Hope pathway: The ability to find ways or routes to your goals. The scores range from one to nine. Low scores (1-4) indicate students who have no options available to pursue their goals. Average scores (5-6) indicate students who has some options available to pursue their goals. High score (7-9) indicate students who have many options available to reach their goals.

19. Optimism: The level to which you expect good things to happen to you. The scores range from one to nine. Low score (1-4) indicate students who are pessimistic about the future. Average scores (5-6) indicate students who are somewhat optimistic toward the future. High

score (7-9) indicate students who are optimistic and hopeful about the future.

20. Self-motivation: The level to which you take responsibility and action. This field refers to the tendency to avoid responsibility, not taking action, easily influenced to change goals, easily negatively influenced by events, and doubts own ability to be effective. Scores range from one to ten. Low scores (1-4) indicate students who do not take responsibility to act, are easily influenced by outside forces, and have a low belief in their own ability. Average scores (5-7) indicate students who take responsibility to some degree, are not easily influenced by outside forces and have average beliefs in their ability. A high score (8-10) indicate students with high self-efficacy and self-motivation.

21. Hopefulness: The level to which you are positive about the future. Scores range from one to ten. Low scores (1-4) indicate students with feelings of despondency, depression, and a pessimistic outlook. Average scores (5-7) indicate students who are somewhat despondent about the future. High scores (8-10) indicate positive feelings about the future and these students do not feel as if they are at the mercy of others.

22. Agency: The ability to formulate goals and work toward them. This scale is closely related to self-efficacy beliefs. Scores range from one to nine. Low scores (1-4) indicate students that are currently unable to focus and work toward goals. Average scores (5-7) indicate students that have ill-defined goals but are making attempts to work toward their goals. High scores (8-10) indicate students that are currently able to formulate goals and work fully towards them.

General

23. First programme choice: Indication of the students that are enrolled for their first choice or not.

24. Residence: Indication of the students that are living in UP residence or in private accommodation.

25. Transport: Indication of sufficiency of transport to travel to and from university or not.

26. Parent/s has/have a degree: Indication of the students whose parent/s has/have a university degree qualification or those students who are first generation students.

Student background Information

27. Gender: Differentiation of the students based on gender.

28. Race: Differentiation of the students based on race.

29. Home environment: Character of the home environment where student lived with their family.

30. Distance of accommodation: Distance students have to travel from their current place of residence to the campus.
31. Home Language: The language that is spoken in the students' family home.

32. Preferred language: The preferred language of education that students wish to use at the University of Pretoria.

33. Admission Point Score: A metric score based on the six best subject of the National Senior Certificate.

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