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# **CHAPTER ONE**

## **INTRODUCTION AND OVERVIEW**

### **1.1 INTRODUCTION AND OVERVIEW OF THE STUDY**

#### **1.1.1 Contextualisation**

Ethiopia is located in the middle of East Africa, with the neighbouring countries Eritrea in the north, Djibouti in the east, Somalia in the south-east, Kenya in the south and the north, and South Sudan in the west. The surface area of Ethiopia is about 1,104,300 square kilometres (World Bank, 2013). With reference to Article 1 of the Constitution of Ethiopia, the political governance of Ethiopia was established by the Constitution on the basis of a federal and democratic state structure (Federal Democratic Republic of Ethiopia [FDRE], 1995:77). In other words, as is stated in Article 45, the country has a parliamentary form of government. The member states are Oromia, Amhara, Tigray, Southern Nations Nationalities and Peoples Region (SNNPR), Gambela, Benishangul-Gumuz, Afar, Harari, and the Somali regions. In addition, the municipalities of Addis Ababa and Dire-Dawa have a special status as regions (Lasonen, Kempainen & Raheem, 2005:45).

Among the important functions and powers of the federal government, is that it is responsible for establishing and implementing national standards and basic policy criteria for public health, education, science and technology, as well as for the protection and preservation of cultural and historical legacies. Similarly, the states are responsible for formulating and executing economic, social and development policies, strategies and the plans of the state (FDRE, 1995:106).

The regular education system of Ethiopia has two major streams, namely a general and a vocational education stream. The general education stream comprises of

eight years of primary education (Grades 1 to 8) and two years of general secondary education (Grades 9 and 10), followed by two years of a second phase of secondary education (Grades 11 and 12). The primary education stage is divided into two phases, namely, a first primary phase (from Grades 1 to 4) and a second primary phase (from Grade 5 to Grade 8). The aim of the first phase is to make the students literate. In the primary school, starting from the first grade, the subjects especially focused on are science, mathematics and language. That is, these subjects are given priority in the textbooks, and they have more teaching periods. In a previous curriculum, science education up to Grade 8 was presented in an integrated form. However, this procedure was replaced by a new curriculum where physics, chemistry, and biology are taught as separate subjects. Furthermore, there are not as many subjects and they are not as unnecessarily varied as in the old system. The new curriculum emphasizes the teaching of English, mathematics, and the natural and social sciences, since these subjects prepare the students for specialized education and training, and for a career (Ministry of Education [MOE], 2002:27-29). General education is completed at the end of the first stage of secondary education (Grades 9 and 10), which is designed to enable the students to identify their areas of interest for further education and training. As indicated, the second stage of secondary education prepares the students for further education and for their careers (FDRE, 1994:14-15).

Technical and vocational training is institutionally separate from the general education system, the two forming a parallel track. This kind of training is provided for those students who leave school at any level of education. More specifically, for those students who leave primary school at a certain age, training is offered in agriculture, crafts, construction work, and basic bookkeeping, in the form of an apprenticeship. For those students who prefer not to continue with general education after their primary education, technical and vocational training is provided in the areas of agriculture, industrial arts, construction work, commerce and home economics (FDRE, 1994:16-17).

The higher education institutes award diplomas and degrees. Diploma programmes generally last for three years after the completion of the first stage of secondary education. In order to be able to pursue university studies, the students have to attend two years of preparatory education in the second stage of secondary education. Thereafter, depending on the field of study, the first-degree courses take three to five years of university or college studies to complete (FDRE, 1994:15; Lasonen et al., 2005:19).The objectives of higher education are to develop the graduates to be research-oriented problem-solving professional leaders in their fields of study, and in respect of the needs of the society in general.

### **1.1.2 The rationale for the study**

Constant changes take place in Ethiopia in the schools, the colleges and the universities in respect of the curriculum, the composition of the administrative and teaching staff, the students, and the learning environment. The aim of the changes is usually to generate improvement. With regard to the above, Evans (in Starr, 2011) points out that it is human to resist change if the individuals who have to apply the change and who experience its consequences have not been involved in its development. The reasons for the resistance to adopt new methods include the fact that major changes demand of people to relinquish feelings of comfort, the accepted values or beliefs, and their familiar practices. That is, a resistance to change occurs due to uncertainty, concerns over personal loss, group resistance, dependence on what is known, mistrust of the administration, and an awareness of weaknesses in the proposed changes (Fullan & Spector, in Lunenburg, 2010:4). Therefore, changes are not always welcomed by the students, the teachers or the administrative bodies.

The general goal of education is to cultivate citizens possessing an all-rounded education, and who are capable of playing a conscious and active role in the economic, social, and political life of the country at various levels (MOE, 2002:15). The government of the FDRE thus proclaimed the education and training policy (ETP) and implementation strategies and programmes, such as the Teacher

Education System Overhauling (TESO). This is a new curriculum devised for reconstructing the teachers' education system. This programme mainly focuses on changing the predominantly-used *teacher*-centered instructional strategies to *student*-centred methods (MOE, TESO Pre-Service Sub-Committee [MOE-TESO], 2003:2). The MOE recommended that all teacher education institutions make use of active learning methods, indicating that teacher-centered methods would inhibit the students' problem-solving capabilities (MOE, TESO Pre-Service Sub-Committee [MOE-TESO], 2003:5). Methods of teaching that employ the students' activity are widely advocated by researchers as facilitating more effective learning than the traditional teacher-centred methods (Saville, Zinn & Elliott, 2005).

However, after the abovementioned paradigm shift was implemented, poor achievement was observed among the students at different levels, especially among university students (Mihirka, Adane & Aneme, 2009). This may, firstly, primarily be because of the teachers' or the lecturers' and the students' resistance towards the newly-introduced student-centred instructional approaches. Such resistance was observed. Secondly, the lack of knowledge of and expertise in the student-centred approaches among the teachers or lecturers and the students may also have played a role. Finally, there may have been a mismatch between the teachers' and the lecturers' teaching strategies and the learning preferences or learning styles of the students.

In respect of Hawassa in particular, and with reference to Lewin's Field-force Theory (D'Agustino, in Lunenburg, 2010:3), the poor achievements of the students after the implementation of the new teaching methods referred to above, could have been influenced by two external forces. The first, the fact that the government's laws and regulations were introduced in a top-down manner by its policy changes could have caused resistance. The second, innovative teaching methods, including the use of technology. According to Lewin (D'Agustino, in Lunenburg, 2010:3), *technology* refers to scientific innovations with the use of computers. However, in this case it refers to scientific innovations in the area of teaching methods in general.

In this regard the active learning/teaching method is a widely supported instructional method (Michael, 2006:159). Therefore, in order to come closer to the recommended methods used globally, the government was compelled to introduce active learning methods into the education system, even though there did not seem to be widespread support for such methods among the teachers and the lecturers in general.

Added to the above may be uncertainty; concerns over personal loss related to the loss of power, respect and quality of work, and personal views about weaknesses in the proposed changes, that could add to resistance (Lunenburg, 2010:4). Uncertainty about the active learning approaches may be a reason for the resistance among teachers and students, specifically because the teaching strategies of active learning are unfamiliar to them (MOE-TESO, 2003:11). The concerns over personal loss may be explained by the fear that if the students did not perform well when the new methods are being implemented, this could impact negatively on the teachers' careers. In addition, such resistance may be caused in teachers who feel threatened by the fear of losing 'authority' in the classroom. This is because the teacher is not seen as the main source of knowledge in the active learning approaches as the knowledge is constructed in the social classroom context (Machemer & Crawford, 2007:9). Finally, as the research results of the MOE indicated (MOE-TESO, 2003), many teachers were aware of their weaknesses in making use of the active learning methods. The teachers' awareness of their own weaknesses in this respect may have arisen from the negative perceptions that the teachers hold towards the implementation of active learning approaches in the classroom, for a number of reasons, that this study aims to ascertain.

Some reasons for the resistance to the active learning and teaching approaches that were indicated by researchers in different contexts relate to the following perceptions, namely that the planning and testing of active learning activities are time-intensive on the staff members who are already overloaded; that active learning activities are too time-consuming in the classroom and create difficulties in covering



the course material; that the approach creates problems in the management of the classroom; that active learning approaches make it difficult to evaluate the students' participation and how effective they executed the activities; that there is a shortage of active learning techniques for attaining high learning levels with sophisticated materials; and that the students lack the skills of working together in groups, as is required in cooperative learning (Cooper, Gerlach & Lord, in Macheimer & Crawford, 2007:11-12).

The lack of knowledge of student-centred teaching methods is a problem not only for the teachers, but also for the students. The students are used to studying as passive receivers of knowledge from their teachers at all educational levels (MOE, 2002:29). Because of that reason the students may also resist the proposed changes.

In this respect Wolfe (2006:79) stated,

*Learners resist active learning because they may be more familiar and more comfortable with passive learning, such as listening to an entire class period of lecturing. Putting learners outside their comfort zones would cause some of them to resist and complain. When active learning involves teamwork, learners would complain.*

Macheimer and Crawford (2007:12) confirm that the paradigm shift places the responsibility for actively learning squarely on the student. The shift challenges the expectations of many students who are used to being passive, learning by means of lectures. This mismatch between the teaching methods and the learning preferences of the students may be one of the main reasons for the low achievement of the students in Ethiopia. Felder and Henriques (1995:28) reviewed studies done previously and found that the matching of teaching styles with learning styles could impact on the students' attitudes towards learning, and thus on the students' performance at the primary and secondary school levels, at university level, and specifically, if they are instructed in a foreign language.

## 1.2 PROBLEM STATEMENT AND RESEARCH QUESTIONS

As the TESO document (MOE-TESO, 2003:2-11) indicated, the paradigm shift from teacher-centred to the students' active learning approaches was introduced into the education system on the basis of findings which indicated that teachers in Ethiopia were using positivist, teacher-centred methodologies throughout the country from lower to higher-grade levels. Since the country was striving to bring development to its people, a change to newer teaching methodologies in line with a constructivist paradigm was necessary. The *constructivist paradigm* asserts that students construct, or reconstruct knowledge, and create their own personal perceptions of lessons that they have been exposed to (Baldwin, 2009:99). The Ministry determined to implement this paradigm for teaching in general, and for teacher education institutions in particular.

From this perspective they intended to incorporate the following changes, namely

- the teaching needed to change conceptions, and practically influence the lives of the communities;
- the teaching needed to use actual life situations in the classroom, and take the students out into the real world;
- teacher education needed to be democratised, i.e., to develop confidence in the teachers, the students and citizens to make decisions, to take initiatives, and to assume control of their surroundings (MOE-TESO, 2003:2).

Thus, the Ministry mandated the student-centred or active learning methods in order to execute the goals of the curriculum change. "A student-centred and equitable curriculum which has a high standard relevance to the society" is one of the minimum criteria and requirements that the MOE of FDRE has set for quality education (MOE, 2002:71). Student-centred teaching for the MOE of Ethiopia is seen as "teaching that is based on the needs of individual students" and active learning means to involve the students in their discovery of knowledge by

themselves, with the guidance of teachers and with methods that promote active learning (MOE-TESO, 2003:1). Hence, the MOE aims to focus on student-centred methods, because student-centred instruction enables solid understanding, it enhances the students' critical thinking abilities, as well as the effective organisation of information (Giles, Ryan, Belliveau, De Freitas & Casey, 2006:214).

Similarly, Paraskevas and Sigala (in Chan & Tang, 2006:43) observed that student-centred, exploratory, and interactive approaches are more conducive to the substantial construction of meaning by the students. As each individual student has his or her own learning style, this will enable the teacher to create an interactive environment between him/her and the students and among the students themselves, which in turn, facilitates intellectual development.

Furthermore, active learning has many advantages. For example, by using simulation it may help the students to make decisions, appreciate the results thereof or respond to their decisions (McKeachie, 2002). This can arouse interest and enhance self-assurance. Active learning offers the students an exercise in thinking, which guides them to improve, and to reach operational judgments. It also helps the students to develop the skills needed for further learning, in contrast to the mere memorisation of information (Clegg, in Wolfe, 2006:78). It forces the students to use their higher-order thinking abilities, such as organising and assessing information, and not the mere rote memorisation of factual information. Active learning increases the students' self-assurance, because once they have conceptualised information, the teacher does not need to tell them what they are required to know – they can become self-dependent learners. It has also been confirmed that students who have been exposed to active learning methods have a superior knowledge of the course content (Felder, 1995:32).

However, in the Ethiopian context, as was mentioned in the previous section, the teachers' experience of the provision of lessons through active-learning methods has been very limited (MOE-TESO, 2003:11), and this change may create feelings

of discomfort. One reason for this may be the large classes. In such instances, as Westwood (2008:17) pointed out, direct teaching or lectures could be more appropriate:

*Direct teaching ... can be implemented with very large groups, such as an audience of several hundred in an auditorium, or much smaller groups such as a single class of students, groups of four or five students, or even in one-to-one tutoring.*

Moreover, the concept of learning styles may also be relevant, and has received much attention in the field of education across all levels, from kindergarten to graduate school (Pashler, McDaniel, Rohrer, & Bjork, 2009). Several of its proponents support the enhancement of academic achievement through matching instructional methods with the students' learning preferences (Hawk & Shah, 2007; Pitts, 2009; Watson, 2001). The well-known hypothesis about the instructional importance of learning styles is called *meshing hypothesis* or *matching hypothesis*. According to the proponents of the matching hypothesis, learning is most effective (instruction is best delivered) when the teaching matches the preferences of the students (Pashler et al., 2009: 105).

To emphasise the importance of learning style, Dunns (in Denig, 2004:100) argues as follows:

*...people are not necessarily intelligent because they have a potential, talent, or innate ability. Rather, people can demonstrate intelligence because of the manner in which they perceive, comprehend, adapt to new situations, learn from experience, seize the essential factors of a complex matter, demonstrate mastery over complexity, solve problems, critically analyse, and make productive decisions.*

Considering the above exposition of the newly introduced active learning methods in Ethiopia, the role of learning styles, and the fact that new approaches may be more easily implemented in private schools that generally have smaller classes, this study identified the following main research problem:

*What are Ethiopian students' preferred learning styles and what are their attitudes towards active learning approaches?*

More precisely, the study aims to answer the following specific research questions:

- What are the learning styles of students at Grade 10 public schools, Grade 10 private schools and at second year university level, and do the students have significant preferences for certain learning styles?
- What are the attitudes of students at Grade 10 public schools, Grade 10 private schools and at second year university level towards active learning approaches?
- Are there significant relationships between the students' learning styles (the four dimensions – active-reflective, sensing-intuitive, visual-reflective, and sequential-global) and their attitudes towards active learning?
- Are there significant differences in the learning style and attitude towards active learning between the different groups of students (e.g., gender, different education levels, and type of school)?

### **1.3 AIMS OF THE RESEARCH**

As stated, the new curriculum changes in Ethiopia were introduced in 2003 in the ETP, with the vision of replacing the rote and passive learning approaches with active, student-focused education (MOE-TESO, 2003:2). However, during the implementation process it was observed that the students and the teachers at the different educational levels encountered problems to familiarise themselves with the new teaching methods.

Therefore the aim of the study was to investigate the students' learning styles and attitudes towards active learning strategies at different educational levels.

More specifically, the aims of the study were:

- to conduct a literature review on learning style theories and the theories of learning, with special emphasis on the social constructivist approaches;
- to conduct a literature review on the research results of other researchers on active learning approaches and the influence of learning styles;
- to determine the learning styles and attitudes towards active learning approaches of students at different levels, namely Grade 10 and second year university level;
- to determine if significant differences existed between the different groups of students (e.g., different education levels, gender, and type of school) in the learning styles and attitudes towards active learning;
- to make recommendations for improved teaching and learning practices.

#### **1.4 SIGNIFICANCE OF THE STUDY**

On the basis of ETP, the FDRE implemented the student-centred approach in the education system of Ethiopia. The MOE accepted that there would be challenges that would need to be faced during the implementation of the education policy. Among the challenges that the education system faced in the successful attainment of the education goals were, namely “the ethical standards of teachers and students, capability, resources, and finance and the readiness of those in charge of implementing the policy” (MOE, 2002:147).

Among the stakeholders who are in charge of implementing the new policy at grass roots level are mainly teachers and students. To facilitate the effective implementation of the policy at this level, the education system would need to identify and address all the challenges. Since this study focuses on an examination of the learning styles and attitudes of students towards active learning methods, it is highly significant for education in general and for Ethiopia in particular.

The study would be of specific significance namely that it would help the policymakers and the administrative bodies of the government at the different levels

to understand the factors that hinder the effective implementation of the educational policy to be able to address these factors in order to attain the goals of the policy. Ultimately, the study could help the teachers to recognise that active learning would benefit the students in developing the skills needed for lifelong learning (Clegg, in Wolfe, 2006:78). Moreover, it could motivate the teachers to improve their approaches to teaching. However, “implementing new teaching techniques is not easy. It requires the instructor to spend time on planning activities and there is a learning curve involved” (Wolfe, 2006:79). Furthermore, the outcomes of the study could help the teachers to make a considerable effort (a) to establish positive personal relationships with other teachers and students; (b) to honour the students’ views and ideas; (c) to stimulate the students’ higher-order thinking skills; and (d) to address individual students’ needs and beliefs (McCombs & Laure, in Pierce & Kalkman, 2003:127). The study could also create an awareness among the students that active learning and student-centred approaches may enhance the students’ self-confidence, since it stimulates self-regulated learning (Pierce & Kalkman, 2003).

In addition to the above, the study may also add knowledge to the matching of styles of instruction to learning styles. Thus, the study could be used as a springboard for further and wide-scale studies that are related to learning styles and student-centred learning, as well as to active learning strategies.

## **1.5 DEFINITION OF THE CONCEPTS**

### **1.5.1 Teaching**

The process of teaching is defined differently by different researchers. For Bengtsson (in Collins & O'Brien, 2003:350), *teaching* is an action planned and carried out by a person so that another person can learn a given piece of information. Teaching can take place on different occasions and at different places, such as at home or on the road, but formal teaching is generally done at established locations by means of a professionally designed curriculum. The school is the most common teaching organisation, but teaching may also take place at, for example, hospitals and other designated places.

Tikva (2009:657) views *teaching* as an educational process that is carried out by a teacher with the motive of producing learning in others. According to him (2009:657), teaching is influenced by the belief that others lack understanding, or that their knowledge is incomplete or incorrect. In accordance with Tikva's (2009) observation, Strauss and Ziv (2004:451) consider teaching to be an activity that aims at bringing about learning in others. However, they argue that teaching does not necessarily result in learning, because teaching is a goal-directed action, and the goal may or may not be achieved. For example, when a language teacher teaches students how to write a coherent paragraph, some students may be able to achieve this objective, while others may not.

### **1.5.2 Learning**

*Learning* is defined differently by different learning theorists, depending on the epistemological positions they hold. Even though there are a variety of learning theories, in this study the term will be defined from the perspective of the major learning theories - behavioural, cognitive and constructivist.



Behaviourists define *learning* as a relatively long-term change in behaviour which results from repeated exercise in that behaviour (Carlile & Jordan, 2005:11; Ertmer & Newby, 1993:53).

According to the cognitivists such as, for example, Wittrock (in Deubel, 2003:67), *learning* is the formation of associations between new knowledge and prior knowledge retained in the long-term memory system. Rumelhart and Norman (in Deubel, 2003:67) define *learning* from three different angles. In the first, they consider *learning* to be the accumulation of knowledge, which comprises the gaining and the recalling of factual material. Secondly, *learning* is considered to be schema-formation processes by means of models and comparisons. Finally, they see *learning* as involving the improvement of previous schema through exercise and by means of the use of concepts.

The constructivists consider *learning* to be a dynamic process where people build (construct) new thoughts or concepts based on their previously accumulated knowledge and experiences (Eryaman & Genc, 2010:536).

### **1.5.3 Teaching methods/approaches**

Teaching methods, teaching approaches and instructional methods are often used interchangeably. According to Alberta Learning (2002:67), *teaching or instructional methods/approaches* are techniques that the teachers use to assist their students to become autonomous and self-regulated. The *instructional methods* become learning methods when the students independently select the appropriate approaches and use them efficiently to perform tasks or to achieve goals. Instructional methods can (a) motivate students and help them to focus their attention; (b) organise information for the sake of understanding and remembering it; (c) monitor and assess learning.

#### **1.5.4 Teacher-centred instructional methods**

*Teacher-centred instructional methods* are processes in the provision of lessons, which are also called *direct instruction*. In this teaching method, the transfer of knowledge is mainly carried out by a teacher. Hence, the teacher maintains full control of the goals and processes of the instruction. That is, the selection of learning materials, and the speed of instructional events are controlled by the teacher (O'Sullivan, 2004:598). This teaching approach is used with the assumption of presenting a lesson in "...a form of explicit instruction that attempts to present information to students in a form they can easily access, understand and master" (Westwood, 2008:9-10).

The epistemological premise of teacher-centred teaching is empiricist, which implies that the acquisition of knowledge is from the experience of the external world through sensation. The explicit goal of teacher-centred teaching is the efficient transmission of knowledge from the teacher to the student. Teachers are said to be teaching when they present students with what they know, and students are said to be learning when they recall the content they have received (Yuen & Hau, 2006:280).

In this study, the term *teacher-centred/traditional teaching* method is used as synonyms when reference is made to the direct teaching method.

#### **1.5.5 Student-centred instruction**

According to Weimer (2013:15), *student-centred instruction* is an approach to instruction dedicated to learning. That is, what the students are *doing* is the essential issue of the teacher. The definitions of student-centred instruction include that it is a kind of teaching that engages students in the strong, complex work of learning; that it inspires and authorises the students by giving them some domination over the learning processes; that it motivates co-operation, recognising the classroom (be it

virtual or real) as a structure where everyone shares the learning agenda; that it encourages the students' reflection on the topic that they are learning and *how* they are learning it; and that it includes very detailed learning-skills instruction.

Accordingly, as explained by Wright (in Collins & O'Brien, 2003:316), *student-centred instruction* is an instructional approach where the students contribute to the content, the tasks, the materials, and the speed of learning. Such an approach to learning puts the student (learner) in the centre of the learning process. In this case, the teachers create an environment for the students, giving them the chance to learn self-reliantly and from each other, and enrich them with the abilities that they need to carry out the activities effectively. This approach includes techniques such as replacing direct teaching with methods of active learning, providing problem-solving exercises that require critical or creative thinking that can be solved by experiences of actual life situations, involving the students in reproductions and role-play, and using learning-based group-work.

The foundation of student-centred instruction is the constructivist epistemology (Daniels & Perry, 2003:105; Hannafin, Hill & Land, 1997:94; Liu, Qiao & Liu, 2006:77; Meece, 2003:113-114; Pillay, 2002:93; Smeets & Mooij, 2001:403; Yilmaz, 2008:37). The constructivist perspective considers knowledge as actively acquired by students from the experiences they have had. Knowledge cannot be transmitted from the knower to the less-aware person. The process of knowledge-construction takes place individually and on the basis of the prior experiences of the person (Maclellan & Soden, 2004:254).

Constructivist teaching and learning begins with providing the students with problems which are realistic and appropriate to the content that is being taught. While investigating possible solutions to the problems, the students creatively construct their own knowledge with the assistance of the teacher and with the cooperation of other students. In the interaction process the students are assessed while they are executing the actual activities (Yuen, & Hau, 2006:280).

### 1.5.6 Active learning

According to Felder (Felder & Brent, 2009:2), “active learning is anything course-related that all students in a class session are called upon to do other than by simply watching, listening and taking notes”. According to Morris and Armbruster (in Collins & O'Brien, 2003:5), *active learning* is the process of learning by means of involving the students in some activity that requires from them to reflect upon their thoughts and how they are making use of those thoughts. It requires the students to regularly examine their own levels of comprehension and abilities of handling ideas or problems in specific subject areas. The knowledge is achieved by involvement or contribution. The process entails keeping the students mentally, and often physically, participatory in their learning through practices that include their thinking, problem-solving and grasping of information.

In active learning instruction, the teachers' roles shift from delivering knowledge to facilitating and supporting learning, and to becoming resource persons (Westwood, 2008:4). The teacher organises the learning environment and creates favourable conditions for the students' involvement, and when the situation is favourable, allows time for the students' reflection while they are engaged in the activities. In respect of learning time, in active learning “... students spend a fair amount of time constructing knowledge” (Petrina, 2007: 108).

In this study, the terms *student-centred*, *indirect instruction* and *active learning* are used interchangeably.

### 1.5.7 Learning styles

Many definitions for *learning styles* are to be found, and at the moment there is no commonly-accepted definition of what a learning style is (Lincoln & Rademacher, 2006). According to Kolb and Kolb (2005), the concept *learning style* explains personal variations in learning based on the students' preference for the following

four learning modes, namely concrete, abstract, active and reflective. The development of individuals' learning preferences is partly based on hereditary factors, particular life experiences, and the demands of the present environment.

Wang, Wang, Wang and Huang (2006:208), by referring to the views of Kolb and Kolb (2005), explain a *learning style* as the sole learning approach accessible to the student during the instructional process. For them *learning style* is one of the determining factors that influence the academic performance of a person. For Dunn (Dunn, Honigsfeld, Doolan, Bostrom, Russo, Schiering, Suh & Tenedero, 2009:136) a *learning style* is "the way individuals begin to concentrate on, process, internalize, and retain new and difficult information."

There are different views on the stability of a learning style. Some researchers, such as Dunns and Gregorc (in Coffield, Moseley, Hall & Ecclestone, 2004(b)), consider *learning styles* as inherited dispositions. Apter et al. (in Coffield et al., 2004(b)) view *learning styles* as *relatively stable* tendencies in learning. Other researchers, however, indicate that any student can experience any teaching style, but can adapt to a particular method of instruction for a specific subject area. Accordingly, some researchers have discovered clear changes in learning styles in the course of time (Price, 2004).

Felder and Silverman developed a model of learning styles consisting of the following four dimensions (Felder & Henriques, 1995:23; Felder & Soloman, 1998):

- Active-reflective: 'Active' students learn by trying things out and working with others. 'Reflective' students learn by thinking things through in isolation, or with one person only.
- Sensing-intuitive: 'Sensing' students think concretely, are practical and are oriented toward facts and procedures. 'Intuitive' students think more in the abstract, and are innovative.

- Visual-verbal: 'Visual' students prefer visual displays (e.g., sketches, pictures or films). 'Verbal' students appreciate written expositions.
- Sequential-global: 'Sequential' students revel in linear thinking-processes and in learning in small ascending stages. 'Global' students think holistically, learning in large leaps (Felder & Spurlin, 2005:103).

### 1.5.8 Attitude

An early definition of *attitude*, given by the well-known social psychologist, Gordon Allport, in 1935, and quoted by Oskamp and Schultz (2005: 8), is “an attitude is a mental or neutral state of readiness, organized through experience, exerting a direct or dynamic influence upon the individual’s response to all objects and situations with which it is related.” In this definition the emphasis is on two ideas, the first, the idea of “readiness for response”, and the second, the idea of “motivation”, or the driving force of an attitude. As Oskamp and Schultz (2005:8) mentioned, Allport refers to *attitude* as “readiness for response” not as *behaviour* or something that a person *does*, but a person’s *preparation* to behave in a certain way. In addition, the fact that it is motivating means it guides behaviour towards a certain goal.

According to Bohner and Dickel (2011:392), an attitude is a person’s evaluation of an object of thought. *Attitudes* include anything held in a person’s mind, ranging from something ordinary to an abstract thought, including things, ideas or people. This definition by Bohner and Dickel (2011:392) pinpoints the evaluative feature of an attitude, which is widely emphasised by many researchers.

Finally, important characteristics of an attitude (learning and consistency), have been indicated in the definition by Fishbein and Ajzen (in Oskamp & Schultz, 2005:8). “An attitude is a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object”.

## **1.6 RESEARCH DESIGN AND METHODOLOGY**

The main purpose of this study was to examine the learning styles and attitudes towards active learning of students at different education levels (secondary and university) in Hawassa, the administrative city of the SNNPR. This was done quantitatively, in order to enable generalisation.

According to Creswell (2009:145), in a quantitative research approach, a study which involves an examination of a trend, an attitude or an opinion of a given population on the basis of sampled data, is known as a *survey* research design. Therefore, the appropriate research design that was selected for this study, to investigate the learning styles and attitudes of the students at secondary and university levels in Hawassa, was a quantitative survey design. The researcher chose a survey design for the following reasons, namely a survey design may enable the researcher to generalise the results to the larger population; it has the advantage of minimising costs; and a rapid turnaround time in data-collection is possible (Creswell, 2009:146). The research design used in this study was also descriptive and exploratory.

According to Neuman (2007:20), suitable methods of data-collection in the abovementioned design are interviews and questionnaires. In this study the data were collected by means of structured questionnaires. Issues of validity and reliability were also addressed (refer to chapter 4).

Also explained in chapter 4 are the convenient and purposeful sampling technique, and validity and reliability.

## **1.7 ETHICAL CONSIDERATIONS**

The procedures of the study considered all the basic and universally-accepted ethical guidelines that are required for high-quality research. Besides the ethical

requirement of the researcher being competent and professional, the research also met the necessary legal and social obligations to the respondents, such as ensuring the anonymity and confidentiality of the respondents, and that no harm would be inflicted upon them. Permission to conduct the research was also obtained from the relevant parties.

These issues will be further addressed in chapter 4.

## **1.8 THE DIVISION OF THE CHAPTERS**

The first chapter introduced the study and explained the background to the investigation. The chapter presented the statement of the problem, specific research questions and the aims of the study, the definitions of the concepts, as well as an outline of the research design and methodology.

Chapter 2 focuses on the conceptual framework of the study, which includes the theories on learning style and learning, with specific emphasis on the social constructivist and active learning approaches.

Chapter 3 presents a review of the literature related to the study. More specifically, it discusses the research results of other research studies on active learning approaches and the influence of learning styles.

Chapter 4 illuminates the research design and data-collection methods in detail. To this end, the chapter presents the sampling techniques, the data-collection methods, the methods of data-analysis, and the validity and reliability of the research instrument. The issue of ethical research methods is also addressed.

Chapter 5 presents and discusses the research results.



In chapter 6 the conclusions are indicated, as well as the limitations and the recommendations of the study.

## **1.9 CONCLUSION**

Chapter 1 provided an overview of the study. The aim of the research was to examine the learning styles and attitudes towards active learning of students at different educational levels. The issue of learning style matched-instruction and active learning approaches has a wide advocacy in the education literature worldwide. The observed resistance towards these significant instructional approaches, which was confirmed by a preliminary literature review, initiated this study.

The next chapter (chapter 2) presents the conceptual framework of the study.

## **CHAPTER TWO**

# **THEORIES OF LEARNING, LEARNING STYLE AND METHODS OF TEACHING**

### **2.1 INTRODUCTION**

In the previous chapter the background to the problem and an overview of the research study were given.

In this chapter the conceptual framework of the study is presented. The most important theories of learning are explained (including the behavioural, the cognitive, and the constructivist theories, learning style theories/models, and the social learning theory). Thereafter the teaching methods that incorporate the active learning methods are discussed, namely cooperative learning, problem-based learning, discovery learning and discussion methods. This is followed by an explanation of the theories on attitudes towards learning, and the relationship between learning styles and active learning.

### **2.2 THEORIES**

According to Maxwell and Mittapalli (2008:877), the concept *theory* is commonly used in daily conversations and in educational discussions, but its exact meaning is unclear. In both the abovementioned cases, *theory* implies a prototype or set of thoughts and statements that are related to actual events.

A theory can enable the conceptualisation of relevant events, or provide a basis for the implementation of the theory in different situations, because theory is an integrated, comprehensible body of statements that offer a rationally reliable picture

of a given matter. Thus, *theories* are structures designed by people to reveal the theorists' conceptualisations of what the organisation of the issue or the matter looks like (Littlejohn, 2009:958). Theories can be modified with time through scientific investigations and developments (Littlejohn, 2009:958; Wilkins, 2006:2185).

### **2.3 THEORIES OF LEARNING**

According to Eryaman and Genc (2010:535), a *learning theory* is a set of organised ideas and explanations of how people gain knowledge, develop skills, and build capacities. Thus, *learning theories* mainly deal with how learning takes place. That is, they embody all aspects of the teaching-learning process, namely how human beings acquire knowledge, the teaching strategies that are used, the cognitive and affective aspects of the students and the teachers related to learning and teaching, the learning environment, and other variables that influence learning.

For Hohn (2005:284), theories about how learning takes place started from the time of the early Greek philosophers. For example, Aristotle speculated about how certain factors affect memory, and he termed it 'the law of association'. The early debates of philosophers on the acquisition of knowledge were the foundation of today's theories of learning (Ertmer & Newby, 1993:54).

According to Young and Wasserman (2005:169), theories of learning perform several important functions. *Theories* encapsulate practical data and direct practical processes, and simplify the understanding of general laws. Learning theories help teachers to design curricula and to plan instruction for an effective teaching-learning process. Learning theories can, therefore, be considered as frameworks for curriculum development and implementation. A *curriculum* serves as a guide for selecting the necessary skills and capabilities for learning. Thus, there is a strong association between a curriculum and learning theories (Eryaman & Genc, 2010:535).

It is difficult to organise learning theories into categories. Some researchers classify learning theories chronologically from the earliest times. Others use the popularity of the theories as a base for the classification of the theories (Russ-Eft, 2011:120; Westen, 2002:13). Some researchers classify *theories of learning* under the following three schools of thoughts, namely experimentation, Gestalt psychology, and biological evolution.

The first of the abovementioned theories, experimentation, advocates that one has to conduct a scientific experiment in order to comprehend a process. This school of thought includes the philosophies of Aristotle, and the conditioning theories, namely the classical conditioning of Watson, the instrumental conditioning of Thorndike, and the operant conditioning of Skinner (Hohn, 2005:284-285).

The second school of thought, the Gestalt psychology, states that learning does not essentially happen gradually, but can occur with sudden flashes of insight. This school of thought includes the works of Koffka, and Bruner's discovery-learning.

The third school of thought (biologic evolution) includes the notion of Darwin that people adapt to a changing environment. In order to completely understand the learning processes and purposes, the goals and motives of the students have to be taken into consideration (Hohn, 2005:284-285).

A number of researchers classify learning theories into descriptive and prescriptive types (Ullrich, 2008:27). On the one hand, the descriptive types of learning focus on *how* learning takes place, and on developing prototypes of learning which describe and infer learning outputs. In the category *descriptive learning theories* the behaviourist, cognitive, and constructivist theories are found. The *prescriptive learning theories*, on the other hand, aims to explain which activities need to be carried out to attain specific results.

In the next section specific learning theories are explained in more detail, and their relevance to this research is indicated.

### **2.3.1 The behaviourist theory of learning**

Behaviourists try to explain human behaviour on the basis of stimulus-response associations, without any consideration of the internal mental processes. To them the internal mental processes are not very important because they cannot be objectively studied. There is also a strong relationship between events in the external world and observable behaviour. In other words, objects or situations in the surrounding area (stimuli) control behaviour by means of the learning that has occurred (Eryaman & Genc, 2010; Ullrich, 2008:27; Westen, 2002:13-14).

The behaviourists also assert that learning can only be studied by observing situations in the surroundings, and by measuring the organisms' responses to the situations (Halpern & Donaghey, 2002: 1460; Ponticell, 2006:605). Furthermore, according to the behaviourists, learning can be enhanced by means of reinforcing positive responses and ignoring or punishing unwanted ones. On the basis of this perspective, Skinner developed programmed instruction that is also useful for computer-aided instruction. He proposed learning principles that include shaping, immediate feedback and continuous positive reinforcement. Thus, these three principles guide students through the learning material in steps, providing instant correction, and regularly reinforcing the positive outcomes (Ullrich, 2008:37). Because a student is seen as a passive receiver of knowledge, the lessons have to be broken down into small parts and presented to the student with the provision of reinforcement (Eryaman & Genc, 2010:535; Russ-Eft, 2011:121). This approach strongly influenced teaching in Ethiopia for many years.

According to Eryaman and Genc (2010:535), the behaviourist curriculum is developed based on direct learning objectives and clearly specified learning attainments. The behaviourists contend that anything that cannot be measured

cannot be reliable, and thus should not form part of a curriculum. Thus, the behaviourist curriculum encourages organised learning with pre-set objectives and reinforcements when the goals are achieved.

The behaviourists are criticised for not considering the environment in which learning takes place, nor the prior experiences of the students. Eryaman and Genc (2010:535) state that post-modern critical pedagogues do not agree with how the behaviourists develop the curricula that are characterised by “behavioural lesson plans, context-free objectives, instrumental and external evaluation, and dualistic curriculum frameworks”. Such curricula separate the teachers from the students, and meaning and the context in which meaning is formed, subjective students and objective knowledge, as well as learning and the situation in which learning takes place. Critical theorists do not believe curricula are value-neutral. Thus, such behaviourist curricula are not suitable for multi-cultural societies.

However, the behaviourist theory has ruled formal teaching for a long time, and is still a major stance in many schools in respect of the management of students and how they are taught (Jenkins, 2006). The behaviourists played a big role in the advancement of teaching and learning in general and in classroom instruction in particular. Regarding its positive contributions to the field of education, Ponticell (2006:605) states that teachers have been taught the importance of reinforcement by means of material matters, tokens of respect and esteem, the chance to participate in enjoyable activities, pleasant feelings, or positive feedback on high-quality learning performance. The teachers also understand that learning is more likely to occur in contexts that provide positive outcomes for learning.

This approach is consequently relevant to this study where learning styles and attitudes towards learning are investigated.

Two prominent behaviourist theories are discussed next. These are classical conditioning and operant conditioning.

### **2.3.1.1 Classical conditioning**

*Classical conditioning* was developed by the Russian physiologist, Ivan Pavlov (in Halpern & Donaghey, 2002:1459). He trained a dog to respond to the ringing of a bell in respect of being given food. After the repetition for some time, the dog salivated when the bell rang. On the basis of the experiment, Pavlov came up with a general learning principle for human and animal learning. In the classical conditioning model, an unconditioned stimulus (UCS) has the natural capacity to produce an unconditioned response (UCR). If a neutral stimulus (one that does not produce the UCR), is paired with the presentation of the UCS over a successive repetition, it will produce a conditioned response (CR), even in the absence of UCS (Halpern & Donaghey, 2002:1459).

### **2.3.1.2 Instrumental or operant conditioning**

Operant conditioning happens when a certain consequence follows a given behaviour. When a certain response is frequently followed by a desirable consequence, there is a chance that the response will be repeated. However, when the response is followed by an unpleasant or neutral consequence, there is a chance that the behaviour will decrease. Thus, a subject 'operates' or acts in the environment that is likely to produce a desired consequence (Blackbourn, & Chessin, 2006:190).

Observation has indicated that this learning principle is often relevant in Ethiopian schools within the context of classroom discipline.

On the basis of independent experiments, Thorndike and Skinner developed many learning principles (Blackbourn, & Chessin, 2006:190). These learning principles include, for example, extinction, stimulus-generalisation, stimulus-discrimination, reinforcement, and others.

Despite their many similarities, significant differences exist between operant and classical conditioning. Firstly, the behaviour in operant conditioning is voluntary (emitted), whereas the behaviour in classical condition is reflexive (elicited). Secondly, in respect of operant conditioning the response or behaviour comes first, and thereafter the conditioning stimulus occurs. In classical conditioning, the conditioning stimulus is presented first in order to get the response (Halpern & Donaghey, 2002:1459).

### **2.3.2 The cognitive learning theory**

#### **2.3.2.1 The cognitivist view of learning**

The cognitive learning theory was developed because of the weaknesses of the behaviourist learning theory, and is thus of greater importance for this study. The behaviourists failed to explain the learning process beyond the stimulus and response connections. They were unsuccessful in considering mental phenomena such as thinking and remembering. In contrast to the behaviourists, the cognitivists view students as active processors of information who acquire new knowledge, associate it with past knowledge, and systematise this information for retention and retrieval. The cognitivists also state that learning can occur in the absence of observable behaviour (Anderson, Reder & Simon, 1997; Halpern & Donaghey, 2002:1461). The cognitivists observe behaviour practically, but only to make predictions about internal cognitive phenomena. In contrast to the behaviourists who emphasise behaviour, the cognitive perspective focuses on meaning and semantics (Winn & Snyder, in Yilmaz, 2011:205).

The cognitive theories consider learning as an internal mental process. That is, the cognitivists mainly emphasise the acquisition of knowledge and how people receive information from external environments, and analyse and arrange the information in the memory or mental structures for future use. They believe this process enables people to understand the world, and to solve problems. Of importance for this study



is the fact that they indicate that students have to actively participate in their learning in the form of actual life situations in order to construct knowledge. In this learning process, students' previous knowledge and experiences are crucial for understanding new knowledge. That is why teachers are encouraged to assist the students to construct the necessary prior knowledge before the actual lesson (Eryaman & Genc, 2010:535).

In accordance with the above, Yilmaz (2011:205) described learning according to the cognitive views as (1) active processes, which include receiving information and rearranging it with the prior knowledge accumulated in the cognitive structures and retaining it for future; (2) the fact that the students are personally involved in the interactive learning process to construct knowledge; and (3) that learning becomes meaningful when it is related to the students' prior knowledge. In other words, for instruction to be effective, the lessons have to be connected to the previous experiences in the students' mental structures or schema.

### **2.3.2.2 The implications of the cognitive learning theories**

The basic characteristics of classroom instruction, according to the cognitive theories, can be summarised as follows (Ertmer & Newby, 1993:60):

- Instructional processes should centre on the active participation of the students, that is, instruction should be student-centred.
- Instruction should be meta-cognitive, that is, the students have to be trained to identify their own cognitive processes and learning styles to carry out self-directed learning and assessment.
- The lessons have to be hierarchically sequenced to lead the students to identify the required relationships among the lesson contents (cognitive task-analysis procedures).

- The instruction should focus on structuring, categorising, and ordering information to maintain maximum information-processing by using cognitive strategies like advance organisers.
- The learning environments should encourage and inspire the students to relate new information to previously constructed knowledge. The instruction should facilitate the retrieval of prerequisite abilities and incorporate actual life activities and authentic examples.

The abovementioned characteristics are in line with the changes advocated for Ethiopian schools and universities, as explained in the first chapter (see sections 1.1.2 and 1.2).

### **2.3.2.3 Piaget's theory of cognitive development**

Some researchers classify cognitive theories of learning into diverse categories, such as information-processing theories, schema-theories, cognitive developmental-theories and the triarchic theory of intelligence (Eryaman & Genc, 2010:535-536). Others classify cognitive theories into two categories, namely the individual cognitive, and the socio-cultural (e.g., Vygotsky). The individual cognitive category is based mainly on Piaget's theory (Duffy & Cunningham in Deubel, 2003:67).

According to Piaget, people evolve through four cognitive developmental stages as they grow older. The stages are sequential in nature. He indicated them as the sensorimotor, pre-operational, concrete-operational and formal-operational stages. Each stage is characterised by unique cognitive functioning that arises from the individual's level of developmental maturation. According to Piaget, every individual passes through these cognitive developmental stages. The information that is learned in each stage is assimilated and accommodated into the cognitive structures, called 'schemata', that are specific to the given stage.

Piaget suggested that as individuals develop they adapt to the changing environment through the process of assimilation (receiving the new information by modifying it) and/or accommodation (by modifying one's own cognitive structures or schemata). Assimilation and accommodation enable a person to keep a balance between the cognitive structures and the changing environment. When there is new incoming information, this causes a dis-equilibration, but through assimilation and accommodation the equilibration is re-gained (Horn, 2006:176).

Piaget established that cognitive development is constructive by nature. He emphasised the individual's active involvement in the construction of knowledge. That is, knowledge or intelligence is constructed through the process of active and continuous interaction between individuals and their surroundings. It is from this perspective that Piaget's constructivism developed (Carpendale, Müller & Bibok, 2008:798).

Carpendale et al. (2008:803) pointed out that Piaget's theory of cognitive development has the following educational implications:

- His theory suggests that teachers need to consider a child's cognitive developmental stage during instruction or curriculum development.
- His theory recommends the active participation of the child in the process of the construction of knowledge, and discourages the repetition of information, or passive learning.

In the context of this study, this is an important recommendation.

- His theory shows that the teachers play a significant role in establishing conditions that help the children to develop insight.
- He also suggested that there are two forms of relationships, that of constraint and that of cooperation. In the first case only one party, the authority, offers a dominating view, and the student accepts this view with respect. In the

second case, both parties present their views to each other, and both respect and accept the other's stance. This kind of relationship is vital for the development of knowledge in all contexts, including in the Ethiopian context.

#### **2.3.2.4 Vygotsky's theory of social cognitive development**

Vygotsky's theory of socio-cultural development (in Parke & Gauvain, 2009:299) advocates that cognitive development is mainly the outcome of the children's involvement with more knowledgeable persons in their cultural groups. For example, when the children and their parents cooperatively engage in solving problems, they participate in activities which enhance the children's capabilities. According to Vygotsky, children also obtain social input by means of interactions with well-informed groups of the society. These knowledgeable persons, including teachers and peers, direct the existing skills towards higher-level and more complex mental abilities. Thus, Vygotsky accepted the influence of social and cultural situations, even though he believed in the influence of inborn capabilities like attention, perception and memory.

Similarly to Piaget, Vygotsky believed in the construction of knowledge. However, Vygotsky focused mainly on the roles of language and culture in the construction of knowledge (Eryaman & Genc, 2010:537; Parke & Gauvain, 2009:299), and Piaget on the child's active interaction with the external world (Carpendale et al., 2008:798). Even though Vygotsky emphasised the significance of culture and language to socially construct mental structures (Eryaman & Genc, 2010:537), he also supported the children's active involvement in their environments (Keenan & Evans, 2009).

One of the important concepts of Vygotsky's theory is the zone of proximal development (ZPD). This refers to the students' performance of given activities on their own, in comparison to when they are assisted by teachers (Powell & Kalina, 2009:244). This concept of ZPD is two-dimensional. Firstly, it indicates how cognitive development takes place in the process of social interaction with the guidance of

knowledgeable individuals. Secondly, it gives a cue for measuring the students' academic capability under the most favourable situations (Parke & Gauvain, 2009:300).

According to Vygotsky (in Liu & Matthews, 2005), learning is widely regarded as state-dependent and domain-bound practices. That is, the students are expected to be accustomed to their learning locality. Suitable knowledge, based on their current perceptions, should be acquired, with support. The students should also actively participate in their existing learning situations.

Teachers and researchers have drawn important teaching methods from Vygotsky's theory. One of these is 'scaffolding'. *Scaffolding* is an interactive teaching method where the teachers regulate the extent and sort of assistance they provide in phases to help the child to gradually achieve that which is being taught (Keenan & Evans, 2009:174; Parke & Gauvain, 2009:300).

Other concepts that have been developed from Vygotsky's theory are, amongst others, reciprocal teaching, collaborative or cooperative learning, communities of students, guided participation, and others (Keenan & Evans, 2009:176-177; Parke & Gauvain, 2009:301; Powell & Kalina, 2009:243), all of which are important for the effective learning by Ethiopian students.

- *Reciprocal teaching* is a tutorial method of employing peers to enhance discussions about the content that is being learned, for example, in teaching reading comprehension, which is above the student's ability, but within his/her ZPD.
- *Cooperative learning* is a collaborative method that helps the students to learn in organised, small peer-groups to achieve certain learning objectives on their own.
- *A community of students* is a method of classroom instruction where students collaborate in class projects with the teachers' facilitation.

- *Guided participation* refers to learning situations with frequent assistance by older members of a peer-group or by the teachers or students by supervising the students' participation in their daily activities.

In line with the above, Yilmaz (2011:207) summarises the instructional implications of Vygotsky's social cognitive theory as follows:

- The instruction should offer the students actual conditions in life that will help them to overcome confusion.
- The instruction should focus on advancing the students to the border of the ZPD.
- In the instructional sessions, the composition of the members should be diversified according to their stages of development, and they should be able to mutually reach an answer.
- The instruction should facilitate individualised testing, in order to enable the teachers to examine if the students have solved problems within the ZPD, or have failed to do so.

All of the above are important in the Ethiopian context. It should not be difficult for teachers to relate the learning material to actual life conditions. However, individualised instruction would be difficult in large classes.

### **2.3.3 The constructivist learning theory**

*Constructivism* is an umbrella term for various views on learning (Gijbels, Van de Watering, Dochy & Van den Bossche, 2006) which focus on how students create meaning, and which argue that this knowledge-construction process requires active engagement by the student. Constructivism offers a theory of how we learn, grounded in philosophy, and has led to the development of several educational applications, e.g., problem-based learning (Loyens, Rikers & Schmidt, 2008).

To discuss all the contributors of constructivism is beyond the scope of this study. Only a few prominent persons who laid its foundation, and whose ideas are important for this study, will be referred to.

Bruner, a founder of constructivism, considered Immanuel Kant as the pioneer of constructivism, because Kant considered the student as a creator of experience, rather than a passive receiver of information. Individuals develop their own meanings in order to construct their own truths, on the basis of their involvement in cognitive actions (Jenkins, 2006).

Jenkins (2006) places John Dewey in the second position in the history of constructivism, because he was the first person who formally attempted to bring the concept of constructivism into educational settings. Jenkins also views Piaget as important because of his elaborate explanations of the impact of language and experience on a child's development.

According to Karagiorgi and Symeou (2005:18), the literature mentions different kinds of constructivism, such as radical, social, physical, evolutionary, post-modern and information-processing, among others.

For the purpose of this study, only two core forms of constructivism will be explicated, namely social constructivism and radical constructivism.

Regarding *social constructivism*, Gergen (in Geelan, 1997:18) suggests that knowledge does not exist within the perceiving person or within the physical world, but within societies. In a person's culture, language is one of the most important tools to construct meaning (Karagiorgi & Symeou, 2005:18). This observation stresses the significance of the social situation in which learning occurs, although it does not consider the internal mental learning processes. The attention in social constructivism is mainly on the production of meaning as moulded by social practises (Hwang, 1996:348).

In respect of *radical constructivism*, Hwang (1996:348) points out that the focus is on the procedures of internal knowledge-construction, and it disregards the effect of social situations in the course of knowledge-construction. Von Glasersfeld (in Hwang, 1996:348) insists that to know is "not to possess 'true representations' of reality, but rather to possess ways and means of acting and thinking that allow one to attain the goals one happens to have chosen." At this point the emphasis is on the meaning-making actions of the individual's thought processes.

On the basis of Piaget's theory of cognitive development, Von Glasersfeld (1995:51) defined *radical constructivism* by means of the following two principles:

1. *Knowledge is not passively received, either through the senses or by way of communication; knowledge is actively built up by the cognizing subject.*
2. *The function of cognition is adaptive, in the biological sense of the term, tending towards fit or viability; cognition serves the subject's organization of the experiential world, not the discovery of an objective ontological reality.*

According to Quale (2007: 232-233), the first principle above illustrates the possibility of learning in the form of knowledge-construction. However, he criticises the second proposition, as it seems to endorse the idea that learning cannot provide us with knowledge of the reality. If so, he argues, it seems to contradict the foundations of the natural sciences.

Different types of constructivism share some common elements, as pointed out by Gordon (2009:40). This study will make use of the social constructivist theory as its theoretical framework because it is currently the most accepted and widely-endorsed learning theory.



Thus, the learning processes and teaching methods in Ethiopia will be scrutinised from this perspective.

The constructivist accepts multiple realities and not one single reality. Constructivists posit that an objective, external world for everyone to see does not exist, but is in the eye of the observer. In other words, reality is subjectively constructed by individual minds. Adherents of this paradigm do not make law-like statements, but rather address sense-making in this world, in social and historical contexts (Hwang, 1996:346).

According to Brooks and Brooks (in Yuen & Hau, 2006), constructivist teaching employs the following guiding rules for teachers, namely (1) present problems of incipient importance to the students; (2) organise ideas from the general to the specific; (3) appreciate the students' positions and consider their assumptions; and (4) evaluate student learning within frameworks.

Of great importance for this study is the fact that the constructivist position supports teaching methods that focus on the *students*. The students participate actively in learning and in the building of their own ideas and abilities. They acquire knowledge by being actively involved in their social and natural situations. In the teaching-learning process the teacher participates as a mediator and a supporter, rather than as a lecturer. In constructivist classrooms social interaction, language and communication are given significant positions. Group-work, discussions and cooperative learning are highly encouraged (Westwood, 2008:4). In the school environment, the information offered to the students in the form of speech or written discourse may, however, not be conceived as it was meant by the presenter.

Some principles that can be drawn from the constructivist perspective of teaching and learning are general, and others are specific to classroom instruction. Even though the essence of the principles overlaps, different researchers prefer to use different terms or phrases. Some of the frequently-used phrases are “implications of

constructivism for school practice” (Jenkins, 2006), “constructivist learning environment features” (Loyens & Gijbels, 2008) and “constructivists’ educational prescriptions” (Lamon, 2002).

Jenkins (2006:197) summarised the basic premises of the constructivist theory in the form of general constructivist principles which can be applied in education as follows:

- Knowledge is generated by both the external world and the subjective internal world of the student.
- The students’ general and domain-specific knowledge regulate the meaning that they derive from their experiences.
- The students are active participants in the construction of meaning from external realities.
- There are multiple interpretations of ‘truth’ in classrooms.
- Learning involves the understanding of concepts and procedures at increasing levels of complexity. As the students advance in their learning, they form more accurate understandings of content and processes.

Important implications of the abovementioned principles for this study are as follows:

- Since students interpret new information using previous knowledge, learning has to be related to the knowledge that the students already possess (Lamon, 2002:1464; Loyens & Gijbels, 2008:352).
- Constructivist learning requires physical or mental activity by the students (Jenkins, 2006:198; Lamon, 2002:1464).
- Classroom learning requires the provision of real-life and authentic problems to stimulate critical thinking (Lamon, 2002:1464; Loyens & Gijbels, 2008:353).
- The curriculum should focus on the students’ prior knowledge, what they are curious about, and on the teachers’ learning objectives (Lamon, 2002:1464).

- When the students are engaged in the learning process there could be some incompatible issues in their discussions. Differences can occur between individuals in a classroom until they reach a cognitive settlement after considering the others' outlooks (Lamon, 2002:1465).
- Constructive assessment mainly comprises formative assessment which involves progressive observations and continuous feedback to students while they are in collaborative activities. Thus, assessment is incorporated into everyday instruction (Jenkins 2006:198; Lamon, 2002:1465).
- Information and technology communication-tools are used to stimulate the mental processes of the student who is actively involved in problem-solving. This allows for teacher-reflection and tutoring in order to enhance learning (Lamon, 2002:1465).
- The teacher is an expert student who directs the students into implementing cognitive strategies like self-assessing, asking analytical questions, and reflecting.
- The teachers also allow the students to be aware of their own way of learning and to help them to become self-regulated students (Loyens & Gijbels, 2008:352).
- Collaborative learning is given prime importance to attain multiple representations of the school content (Jenkins 2006:198; Loyens & Gijbels, 2008:352).

In the next section the learning theories are addressed.

### **2.3.4 The social learning theory**

Even though historically there are different contributors to the observational learning theories, the likes of Thorndike, Watson, Miller, Dollard and Skinner, Bandura is the prominent social learning theorist (Olson & Hergenahn, 2009:325-327). Thorndike and Watson posited the idea that learning does not take place through vicarious, but only through direct experience. However, Miller, Dollard and Skinner believed that

people learn certain behaviour from others through observation (Olson & Hergenhahn, 2009:325-327).

The *social* learning theory can be classified as both behaviourist and cognitive. On the one hand it supports the use of reinforcement that is a significant principle in the behaviourist theory, such as Skinner's classical conditioning. On the other hand the social learning theory also explains some aspects of the cognitive theory, including attention, remembering and information-processing (Halpern & Donaghey, 2002:1462). The social learning theory asserts that persons learn from one another while functioning in groups. In groups, observing others' activities is a human tendency, especially when the behaviour attracts the attention of the observer. The observer considers that person as a model of specific behaviour. According to Bandura, people learn not only from social interaction with living persons but also from models on television or film shows, books and oral narrations.

The procedure in observational learning is: (1) the individual pays attention to a particular behaviour which attracts his or her interest; (2) he/she encodes the information to retain it in the memory and to retrieve it later; (3) he/she performs the behaviour with a certain degree of accuracy; and (4) he/she repeats the behaviour with an optimum level of perfection, when needed (Ponticell, 2006:605).

According to Bandura (Russ-Eft, 2011:123), teaching has to incorporate the following four steps, namely (1) describe the desired behaviour to the students; (2) allow the model to display the behaviour; (3) provide an opportunity for the students to repeat it; and (4) give the students practice, reinforcement and feedback.

According to the social learning theorists, technological innovations influence human activity and growth. Technological innovations contribute to personality and behavioural changes in respect of social aspects and mental processes. These aspects or processes include, namely task preference, relationships with models, social support and punishment contingencies, individual values for ethical conduct,

shared standards, self-governing capabilities, individual and joint goals, and the relative importance of a particular duty (Denzine, 2008:921).

Learning is seen as different from performance; learning refers to the acquisition of new behaviours. Direct or vicarious reinforcement and punishment influence performance, but not learning. Performing the learned activity is a function of incentives in the environment, the comparative evaluation of the behaviour personally and by others, and the degree to which people see the activity as pleasing, important or beneficial (Denzine, 2008:922).

### **2.3.5 Preferences of learning theories in the humanities and in the natural sciences**

The three learning theories (behaviourism, cognitivism and constructivism) can be arranged on a continuum according to their placement of the teacher and the observable behaviour, or the student and internal cognitive aspects. Thus, behaviourism is on one end of the continuum, and cognitivism and constructivism are on the other end. That is, behaviourism supports the teacher-centred instructional framework (as was previously used in Ethiopia), and both cognitivism and constructivism advocate a student-centred approach (Yilmaz, 2011:211) (as is now advocated in the country).

The influence of the cognitive theories in education was high in the 1950s and 1960s, and was known as the 'cognitive revolution' (Ponticell, 2006:605; Yilmaz, 2011:205). Similarly, the influence of constructivism became significant during the 1980s (Petrina, 2007:177; Ponticell, 2006:606). The shift from behaviourism and cognitivism to constructivism was considered as a paradigm shift from an objectivist perspective to a subjectivist viewpoint (Liu & Matthews, 2005: 387).

Even though constructivism is accused of 'fuzziness', it is viewed as a solid theory of learning (Powell & Kalina, 2009:241). Firstly, the 'fuzziness' relates to the difficulty of

differentiating whether constructivism is a philosophical position or a theory of learning (Colliver, 2002:49). Secondly, many branches of constructivism are difficult to distinguish due to overlapping meanings and the lack of empirical evidence of their practical importance (Gordon, 2009:40). However, constructivism is flourishing and gaining considerable recognition across many fields of studies, according to Fox (2001:23) and Gordon (2009:40), particularly in the realm of teacher education.

The literature widely supports the fact that constructivism exerts a major influence in modern science and mathematics education. In addition, it also has substantial impact on the literary, artistic, historical, and social sciences, and other fields of education (Matthews, 1997:5). Therefore, several researchers agree that constructivism must be considered at different levels and in all disciplines.

For example, Colliver (2002:50) suggests that,

*Constructivism most certainly should be taught. In all disciplines, subjects, and topics, students should be made aware that the knowledge they are learning is a human social construction. At least, they should be told that this is the current perspective on knowledge...*

Similarly, Haney, Lumpe and Czerniak (2003:266) state that constructivist positions regarding learning have gained recognition among teachers as a framework for comprehending and explaining learning and for preparing instructional situations. Constructivism has also become an important aspect of educational transformation and has been considered in different national science education reforms in the United States.

However, according to the report of the MOE of FDRE (2002:147), in respect of implementing the constructivist paradigm in the Ethiopian educational system, the Ministry faced a lack of readiness from important stakeholders at the basic implementation level (students and teachers). This challenge was assumed to arise

from a resistance to change transferred from top-to-bottom policy directions and strategies (see sections 1.1.2 and 1.2).

### **2.3.6 Learning style theories/models**

*Learning styles* is defined as the students' preference for learning approaches due to individual variations in acquiring new information or competencies in different ways (Dunn et al., 2009). Milgram, Dunn and Price (in Honigsfeld & Schiering, 2004:488) pointed out that investigations have been conducted on the issue of learning style-matched instruction, and it gained recognition in the United States and other parts of the world because the approach considered the students as individuals.

Numerous theories exist on learning styles (Bostrom & Lassen, 2006:181; Coffield et al., 2004(a) & (b); Hadfield, 2006). However, in this study the focus is on the theories of Dunn, Kolb and Felder-Silverman, because of their popularity (Duff, 2004:699; Hawk & Shah, 2007:2; Henson & Hwang, 2002:712; Kayes, 2005:249; Wang et al., 2006:208). Currently there are many models of learning styles which have similar constructs, even though the theoretical frameworks and combinations of scales may vary from model to model. For example, as Felder and Spurlin (2005:103) pointed out, Felder and Silverman's (1988) active/reflective dimension is similar to Kolb's same dimension, and 'active' and 'reflective' students are related to the extrovert and introvert type of students in the Myers-Briggs Type Indicator (MBTI).

The different models are explained next.

#### **2.3.6.1 The Dunn and Dunn learning style model**

The Dunn and Dunn (in Dunn, 2003) learning style model consists of 21 elements which are classified into five major categories, namely environmental, emotional, sociological, physiological, and psychological constructs.

- The *environmental* construct comprises four parts, namely sound, light, temperature, and design.
- The *emotional* construct contains four factors, namely motivation, persistence, responsibility and structure.
- The *sociological* dimension includes six aspects, namely favour to study alone, in pairs, with peers, as part of a team, with adults (instructors or teachers), and in a single or varied pattern.
- The *physiological* component consists of four elements, namely perception, intake, time, and mobility.
- The *psychological* component consists of different elements, for example, global-analytic processors and impulsive-reflective constructs (Dunn, 2003:2).

The Dunns (in Dunn, 2003:2) learning style model is based on five basic theoretical premises, namely (1) most individuals have the capacity to learn; (2) different learning styles are affected by different learning situations, resources, and methods; (3) everyone has his/her own strengths; (4) the students' learning styles can be measured reliably; (5) if provided with the preferred learning situations, resources and methods, students can score high in attitude and achievement tests.

Dunn and Dunn (Lovelace, 2005:177) pointed out that students have different preferences when acquiring information. Even though students may learn easy material with the teaching methods that are prescribed by the teacher, their acquisition capacity will increase if they can implement their own learning styles when learning new and difficult material. The students are not affected by *all* the learning style elements. Out of the 21 elements of the model, a person can be influenced by six to 14 elements, for example.

Penger and Tekavcic (2009:5) pointed out that among the five major categories of the Dunn Model of learning styles one or two of them are normally dominant. This dominant style refers to the best way for that person to learn new and difficult information. The student may not always use the same learning style for different



tasks. He or she may use one style to learn one task, or may combine different styles to learn another.

Even though the Dunn Model asserts that students' achievements are greatly affected by relatively stable characteristics, recently Coffield et al. (2004(b):4) claimed that the learning styles of the students changed considerably as they progressed through the developmental stages from adolescence to adulthood. This indicates the importance of involving the students that are at different education levels, as is the case in this study.

### **2.3.6.2 Kolb's learning style model**

Kolb's (Duff, 2004:700; Kolb & Kolb, 2005:194) learning style model, which is also called the *experiential learning theory*, defines *learning* as a process where the students sequentially pass through four phases, namely concrete experience (CE), reflective observation (RO), abstract conceptualisation (AC), and active experimentation (AE). During the *concrete experience* phase, the students consolidate the practical data from numerous viewpoints. It implies learning through the senses and reflecting on it to form abstract concepts. Here the students develop generalisations to help them consolidate their experiences into meaningful theories or principles. Finally, from the generalisations formed at the AC stage, the students acquire guidance to apply the experience in new and difficult conditions.

From the abovementioned four phases, Kolb formulated two orthogonal dimensions of learning, namely the 'grasping experience' dimension, which is constructed from concrete experience and abstract conceptualisation, and the 'transforming experience' from reflective observation and active experimentation (Duff, 2004:700; Kolb & Kolb, 2005:194). During the learning experiences, a student starts to use two modes of learning over the others; they are inclined to adapt to either CE versus AC or RO versus AE. This inclination of the students is indicated as the preferred *learning style*.

Kolb and Kolb (2005) defined four distinctive learning styles by combining the four learning modes as follows:

- *Diverging* is formed from CE and RO dimensions, and refers to students who prefer to learn by creating and generating new ideas and imagining possibilities.
- *Assimilating* is formed from RO and AC dimensions, and relates to students who prefer to learn by focussing on diverse sources of information, logic, and the step-by-step organisation of information.
- *Converging* is formed from AC and AE dimensions, and refers to students who prefer to learn through solving hands-on problems, making decisions, and working with problems, rather than interacting with persons.
- *Accommodating* is formed from AE and CE dimensions, and indicates students who prefer to learn by being involved in activities, in taking risks, and by assuming leadership positions (Kayes, 2005:250).

Kolb (in Koob & Funk, 2002) suggests that learning is a developmental procedure that follows a clockwise direction from CE, through RO, AC, AE, and back to CE, where the development remains cyclic.

According to Kolb and Kolb (2005:194), researchers of the experiential learning theory include John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire and Carl Rogers.

The theory is based on the following six hypotheses that are common to these researchers:

- Learning is best viewed as a *process*, and not in terms of results.
- Learning is best facilitated by examining the students' current ideas about a topic so that they can be tested and integrated with new, more developed ideas.

- Learning requires the resolution of conflict between opposing modes of adaptation to the world. Conflict and disagreement facilitate learning, and motivate the student to move back and forth between opposing beliefs.
- Learning is a holistic process of the adaptation of the total person to the world.
- Learning results from synergetic transactions between the student and the environment.
- Learning is a process of creating knowledge. Social knowledge is personally created by the student in contrast to the ‘transmission’ model of learning, as was previously used in Ethiopia (see section 1.1.2).

As Hickcox (2002:123) suggested, applying experiential learning principles enhances the teaching-learning process. Students participate in active learning activities through hands-on methods in their subject areas.

### **2.3.6.3 The Felder-Silverman learning style model**

Felder (1996) and Felder and Henriques (1995:21-25) believed that students vary in learning styles. They saw learning styles as the strengths and choices of learning modes where the students receive information and cognitively process it. On the basis of the differences between the students’ preferences, Felder and Silverman developed a learning style model, which consists of four dimensions:

- The first dimension is active-reflective. ‘Active’ students learn by trying things out, and are interested in working with others, while ‘reflective’ students learn by thinking things through, and favour working in isolation or with a single known partner.
- The second dimension is sensing-intuitive. ‘Sensing’ students are concrete thinkers, practical, and oriented toward facts and procedures, while ‘intuitive’ students are more abstract thinkers, innovative, and oriented toward theories and basic meanings.

- The third dimension is visual-verbal. 'Visual' students favour visual displays like pictures, charts, graphs and demonstrations, or any other visually-presented material, while 'verbal' students enjoy written and articulated explanations (Felder & Henriques, 1995:23; Felder & Soloman, 1998).
- The fourth dimension is sequential-global. 'Sequential' students prefer linear thinking processes and learning in small ascending steps, whereas 'global' students are holistic thinkers, and learn in large leaps (Felder & Spurlin, 2005:103).

Felder and Henriques (1995:21) argue that students' learning capacities are partly affected by their inherited ability and previous readiness, as well as the congruence of their learning styles with the teachers' teaching style. In addition, Felder (1993) proposed that matching a teaching style with a learning style leads to a deeper understanding and more positive attitude towards the subject.

Felder and Soloman (in Felder, 1996) later developed an instrument which enabled the teachers to classify the students into the four dimensions of the Felder-Silverman learning style model. Such classification helps curriculum designers and teachers to match teaching styles with learning styles, which improves the students' learning, their satisfaction with their instruction, and their self-confidence.

The Felder-Soloman Index of Learning Styles (ILS) does not only show the four dimensions (with opposing sides on a continuum – active-reflective, sensing-intuitive, visual-verbal and sequential-global), but it also further sub-categorizes the dimension. For example, the active-reflective dimension is sub-categorized into strong-active, moderate-active, balanced, moderate-reflective and strong-reflective sub-categories. Similarly, the remaining dimensions of the ILS also follow the same sub-categorization format. Students who prefer the 'strong' category of the dimension may face difficulty in learning in a situation other than that situation. Learners who prefer the 'moderate' category of the dimension may more easily learn in a situation that favours this dimension. Finally, learners who identify themselves

to the balanced category can learn in a fairly well-balanced manner from the two sides of the dimension (Felder & Soloman, 1994; 1998). According to the researchers of the ILS, among the three sub-categories, a balance of the two is desirable, because if one tries to do something before thinking it through, he or she may start things too early and get into difficulties while, if he or she takes too much time to think about it, he or she may not perform the activity at all (Felder & Soloman, 1993:7; 1998).

#### **2.3.6.4 Matching teaching styles with ILS learning style dimensions**

The advocates of learning styles usually claim the matching of teaching styles with learning styles (Hawk & Shah, 2007; Pitts, 2009; Watson, 2001) because it may enhance academic achievement. Furthermore, some researchers propose different types of teaching styles that correspond to the learning style dimensions of a given learning style model. For example, Felder and Silverman (1988:675) proposed the following associations:

**Table 2.1: Dimensions of Learning and Teaching Styles\***

Preferred Learning Style		Corresponding Teaching Style	
Sensory	} perception	concrete	} content
intuitive		abstract	
visual	} input	visual	} presentation
auditory		verbal	
inductive	} organization	inductive	} organization
deductive		deductive	
active	} processing	active	} student participation
reflective		passive	
sequential	} understanding	sequential	} perspective
global		global	

\*The table was taken from Felder and Silverman 1988:675

Similarly, Felder and Henriques (1995:28-29) suggested the following different teaching strategies in order to address a variety of learning styles, especially in the teaching of a foreign language:

- Balance concrete and conceptual information to help ‘sensing’ and ‘intuitive’ learners respectively. This suggestion may work for every subject and at every grade level. But ‘balance’ does not necessarily mean making equal proportion; at lower grade levels the ‘sensing’ side may be emphasized, but to attract the interest of the ‘intuitors’ occasionally doing something is necessary.

- Balance structured teaching approaches (help more deductive and sequential learners) with unstructured activities (more suitable for 'inductive' and 'global' learners).
- Make liberal use of visuals (photographs, drawings, sketches, cartoons, films, videotapes, and live dramatizations) to advantage the 'visual' and 'global' learner.
- Use drill exercises to provide practice in basic vocabulary and grammar (helps 'sensing' learners) but don't overdo it (it may affect the 'intuitors').
- Do not cover the whole period lecturing and writing on the board. Vary activities. Assign brief writing exercises (helps 'reflective' learners). Give tasks to be done in small groups; recommend dialogues and mini-dramas; hold team competitions ('active').
- Give students the opportunity of cooperating work at least on few assignments (very essential for 'active' learners). It is difficult for 'active' learners to learn without interaction.

### 2.3.7 Summary of learning theories

To sum up:

- Behaviourism is a school of thought in psychology that rejects the study of the mind in favour of the observation of behaviour (Schunk, 2012:73). Thus, behaviourists define *learning* as the attainment of new knowledge due to an association of stimuli and responses (Eryaman & Genc, 2010:535).
- Cognitive perspectives of learning stress cognitive aspects that regulate learning. These aspects mainly involve memory processes. This cognitive process starts from receiving external environmental stimuli through the senses, and thereafter transforming the sensory impulse into neural messages so that the sensory system can process it. The neural message is then compared with prior stored knowledge and interpreted in order to reflect on, respond to and/or be stored for future use. According to Weinstein and Acee (2008:164), these cognitive aspects

take place in a person's mind before, during, and after learning. The storage of information can be for a relatively long period. The retrieval of information is easier if it is rehearsed and linked with previous knowledge, and when the students are assisted to use cues to enhance their memory (Ponticell, 2006:606).

- Most researchers (Fox, 2001:23; Gijbels & Loyens, 2009:500; Loyens et al., 2008:446; Saunders, 1992:136) consider constructivism both as a learning theory (since it explicates how people learn), and as an epistemological position, because it is grounded in philosophy, similar to other learning theories. The basic premise of the constructivist theory is that students make sense of new ideas that they encounter during instruction or in actual life situations through interpreting it on the basis of previous experiences, and reflecting on it.

In Table 2.2 a comparative overview of the theories of learning is presented in accordance with the following questions:

1. How do the learning theorists define or explain learning, or how does learning occur?
2. What kinds of learning environments affect learning?
3. How do they view the cognitive processes?
4. What is the role of the teacher?
5. How do they see the student?
6. What kinds of instructional framework do they follow?
7. What kinds of learning/teaching strategies do they advocate?



**Table 2.2: Comparisons between behaviourism, cognitivism and constructivism**

	How learning occurs	The learning environment that influences learning	Views of the cognitive processes	The teacher's role	The student's role	The instructional framework	Learning/teaching strategies they advocate
<b>Behaviourism</b>	Through conditioning (Eryaman & Genc, 2010:535)	Environmental stimuli (Eryaman & Genc, 2010:535)	Gives less emphasis to mental processes (Eryaman & Genc, 2010:535)	Take control over the learning process and direct the student towards the desired learning goal (Carlile & Jordan, 2005:15)	The student is essentially passive, responding to instructions (Carlile & Jordan, 2005:15; Eryaman & Genc, 2010:535)	Teacher-centred (Yilmaz, 2011:204)	Reciprocal teaching, anchored instruction, inquiry learning, discovery learning, and problem-based learning (Yilmaz, 2011:204)
<b>Cognitivism</b>	Through the process of receiving, interpreting, encoding, and retaining into the long-term memory (Carlile & Jordan, 2005:17)	Prior knowledge and experiences play an important role in learning (Eryaman & Genc, 2010:535)	Emphasis on information-processing (receiving sensory input, processing, retention and retrieval) (Hohn, 2005:287; Yilmaz, 2011:205)	Take control over the learning process and direct the student towards the desired learning goal (Carlile & Jordan, 2005:18)	The students are actively involved (Eryaman & Genc, 2010:535; Yilmaz, 2011:205)	Student-centred (Yilmaz, 2011:211)	Value the inquiry or question-and-answer method (Powell & Kalina, 2009:245).  Cognitive apprenticeship, inquiry learning, reciprocal teaching, discovery learning, and problem-based learning are the most typical teaching methods originated on a cognitive outlook of learning (Yilmaz, 2011:208-209).

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Constructivism</b></p>	<p>Individuals construct new ideas or concepts (Eryaman &amp; Genc, 2010:536)</p>	<p>Past knowledge and/or prior experiences (Eryaman &amp; Genc, 2010:535; Loyens &amp; Gijbels, 2008:352). Social environment and social interaction (Hohn, 2005:287). Active participation in problem-solving. The provision of real and authentic problems (Eryaman &amp; Genc, 2010:536; Loyens &amp; Gijbels, 2008:353).</p>	<p>Cognitive constructivists focus on mental structure and information-processing (Eryaman &amp; Genc, 2010:536)</p>	<p>The teacher is not in charge of the students' learning, rather acts as a facilitator or mediator (Carlile &amp; Jordan, 2005:19)</p>	<p>Recognizes the students as active creators of their own knowledge (Eryaman &amp; Genc, 2010:535; Hohn, 2005:287; Loyens &amp; Gijbels, 2008:352;</p>	<p>Student-centred (Yilmaz, 2011:211)</p>	<p>Group-work, discussion and cooperative learning are widely encouraged (Westwood, 2008:4)</p>
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In the next section the paradigm shift to active learning in accordance with socio-constructivist learning, is further explained.

## **2.4 A PARADIGM SHIFT TO ACTIVE LEARNING**

As indicated in chapter 1 (see sections 1.1.2 and 1.2), in the Ethiopian education system there has been a paradigm shift from passive, teacher-centred approaches, to active learning approaches.

The reasons for such a shift are discussed next.

### **2.4.1 Societal changes**

According to one theory, paradigm shifts occur as a result of fundamental changes that a society passes through (Reigeluth, 1994:3, 4). These changes take place in the economic, political, social and educational domains during societal transformations from the agrarian age to the industrial age, and thereafter to the information age. The education systems of the time needed to satisfy the societal needs of that age (Watson & Reigeluth, 2008:42).

The industrial age required a kind of knowledge that enabled the workers to perform specific types of work. Thus, education was standardised and classified into different areas of specialisation. According to Reigeluth (1997:203), *standardisation* refers to the process of designing a curriculum that helps to create learners who are all similar. The education system in the industrial age was, therefore, characterised by a curriculum that required of all students to learn the same content and carry out similar kinds of activities as if they possessed the same interests, prior knowledge, and potential.

The researchers argue that this system is no longer appropriate for the information age. Primarily, learners differ from one another in their rate and interest of learning,

and have different previous experiences. The information age requires customisation, integration and process-inclination (Kemp, 2006:21). Therefore the education system should be changed to being learning-focused or attainment-based. Such a system requires individual-based development rather than group-based development, and the role of the teachers change from transmitting knowledge to monitoring and facilitating the students' learning (Kemp, 2006:21; Reigeluth, 1994:7; 1997:204; Watson & Reigeluth, 2008:42). This requires a paradigm shift from teacher-centred teaching to student-centred approaches in order to satisfy the needs of the individual learners (Lee, 2006:22; Watson, 2006:24; Watson & Reigeluth, 2008:43).

Similarly, there is a need for the transformation of the administrative system of the education sector from a hierarchically structured leadership which is highly controlled. In this system, the students have no right to participate in team management. All the individuals at the lower level of the hierarchy have to conform to the ideas of the management. In general, this structure is confrontational (Reigeluth, 1994:6-7). This kind of administrative process is not desirable in the education system of the information age. It has to be transformed "from top-down control to empowerment with accountability, from compliance to initiative" (Kemp, 2006:21).

Furthermore, according to Kemp (2006:21), information-age education should do the following:

- consider the students' involvement, interests, needs, capabilities and enthusiasm for learning;
- implement learning-based instruction by changing the focus from the teachers' transmission to the learners' involvement in guiding their own learning; and
- support all the stakeholders to develop their outlook towards teaching-learning.

Another theory is that of neuroscience and cognitive neuroscience.

## 2.4.2 Neuroscience and cognitive neuroscience

A second theory that provides a theoretical basis for learner-centred and constructivist theories, is the neuroscience and cognitive neuroscience theory. More specifically, there are twelve principles of brain-based learning that are compatible with active learning (e.g., problem-based learning and cooperative learning approaches), because they respect individual variations in learning, consider the socio-cultural contexts, and provide authentic and challenging learning environments that are non-threatening (Gulpinar, 2005:302-303).

The twelve principles of the brain-based learning theory were developed by Caine and Caine (in Gulpinar, 2005:302) and should guide contemporary teaching and assessment processes.

The principles are:

1. *All learning engages the entire physiology.*
2. *The brain/mind is social.*
3. *The search for meaning is innate.*
4. *The search for meaning occurs through patterning.*
5. *Emotions are critical to patterning*
6. *The brain/mind processes parts and wholes simultaneously.*
7. *Learning involves both focused attention and peripheral perception.*
8. *Learning is conscious and unconscious.*
9. *There are at least two approaches to memory (a rote learning system, and a spatial/contextual/dynamic memory system).*
10. *Learning is developmental.*
11. *Complex learning is enhanced by challenge and inhibited by threat associated with helplessness and fatigue.*
12. *Each brain is uniquely organised (Gulpinar, 2005:303).*

On the basis of these twelve principles, three basic elements of teaching which can optimise instruction were synthesised. In *comfortable attentiveness*, the learning situation should be puzzling but non-intimidating, with manifold social relationships. In *blended involvement in diversified experience*, the teachers need to create the best learning opportunities. They do this by preparing diverse and authentic experiences; and by involving the learners in situations that help them make sense of their experiences through reflection, investigation, and the construction of meaning from the whole learning process. The *active processing of experience* requires of students to constantly and actively analyse and organise their experiences to form, refine and organise their 'mental models'.

The learner-centred psychological principles provide a third basis for active learning, and are explained next.

### **2.4.3 Learner-centred psychological principles**

A third theoretical base for active learning is *learner-centred psychological principles* which were synthesised from various research findings of psychology by a task-force of the American Psychological Association. These learner-centred principles refer to different factors which were composed under five domains, namely (1) cognitive and meta-cognitive factors which relate to the intellectual aspects of learning; (2) affective factors which are the emotional effects of learning; (3) developmental factors that refer to individual variations in development; (4) the individual and social factors include the effects of a student's own self-evaluation, as well as the evaluations of others of learning; and (5) individual differences with regard to family circumstances, cultures, and other practices that influence learning (Alexander & Murphy, 1998:28).

The abovementioned five domains contain twelve interrelated principles that should be considered in order to optimise learning (Alexander, & Murphy, 1998:27; McCombs, 1997:1-2).

The twelve learner-centred psychological principles are the following:

#### **2.4.3.1 Cognitive factors**

Principle 1: The nature of the learning process.

Learning is a natural and intentional process carried out by individuals. It is also a process of finding and constructing meaning from perceptions developed through experience.

Principle 2: Goals of the learning process.

The students construct sensible and organised pictures of knowledge that can help them to succeed in learning through their lifetime.

Principle 3: The construction of knowledge.

The students associate new knowledge with previous experiences in a personal meaningful manner.

Principle 4: Higher-order thinking.

In the process of learning the students make use of strategic thinking, such as reasoning, problem-solving, and concept-learning that may help them to achieve their learning goals, and to implement their knowledge in new ways.

#### **2.4.3.2 Affective factors**

Principle 5: Motivational influences on learning.

The type and amount of learned material and the extent of remembering are affected by motivation. Motivation is influenced by the students' interests, beliefs, aims and preferable ways of thinking.

Principle 6: Intrinsic motivation to learn.

Individuals are naturally interested to learn, but strong emotional states and negative feelings inhibit their learning interest.

Principle 7: Characteristics of motivation-enhancing learning tasks.

Intrinsic motivation is promoted if tasks are seen as important, are of an appropriate level of difficulty, are related to authentic situations, and satisfy the students' needs.

#### **2.4.3.3 Developmental factors**

Principle 8: Developmental constraints and opportunities.

The students go through stages of physical, intellectual, emotional and social development that are influenced by biological and environmental conditions.

#### **2.4.3.4 Personal and social factors**

Principle 9: Social and cultural diversity.

Learning is enhanced by interpersonal interaction in diverse learning situations which consider culture and family background, among others.

Principle 10: Social acceptance, self-esteem, and learning.

Learning and self-esteem are enhanced when there are positive interpersonal relationships that nurture caring and trust, and the students' abilities are accepted.



#### **2.4.3.5 Individual differences**

Principle 11: Individual differences in learning.

Irrespective of the students' background (e.g., gender, religion, ethnicity, and social and economic background), they have individual learning style and instructional style preferences. These variations result from genetic factors and environmental effects.

Principle 12: Cognitive filters.

The students' beliefs, thinking and perceptions vary due to prior experiences, and are the foundations for their construction of knowledge and interpretation of material.

In conclusion, learner-centred psychological principles are synthesised from research findings in psychology and other related fields. They are consistent with the constructivist learning theory that is widely and strongly advocated by researchers and educators for active learning.

The next section explains the teaching methods that incorporate active learning methods.

### **2.5 TEACHING METHODS THAT INCORPORATE ACTIVE LEARNING METHODS**

The following methods are characteristic of student-centred approaches that Ethiopian teachers are expected to use.

The student-centred method places the students at the centre of the instructional process. Of particular importance to this study, is the fact that, according to Brown (2001:46-47), the student-centred methods emphasise or consider the students' desires, styles and aims. The teaching methods permit some regulation to the student (such as group-work or strategy-training). The syllabi encompass discussions with and the contributions of the students, and do not assume objectives

beforehand. The teaching methods permit the students to be original and creative, and to improve their capabilities and self-esteem. Similarly, Bonwell and Eison (in Keyser, 2000:35) stated that teaching methods that enhance active learning allow the students to actively participate in the instructional process. There is little focus on imparting facts and more on building the students' capabilities. The students are involved in tasks (e.g., reading, writing and conversing), and there is scope for the students' assessment of their own attitudes and values.

In line with the above, a number of teaching strategies that use active learning are explained in the next sections. These strategies are cooperative and collaborative learning; problem-based learning; discovery learning; inquiry-based learning and discussion methods.

### **2.5.1 Cooperative and collaborative learning**

In cooperative learning, as the name implies, the students work in groups with carefully structured activities, and they define common learning goals. The students are grouped according to a variety of learning capabilities so as to benefit from one another. Sometimes they are requested to present their work to the teacher on the basis of the responsibility they took in the group. In the process of interaction in the group, interpersonal support and evaluation may be involved (Felder & Fuller, 2000:133; Keyser, 2000:35; Petrina, 2007:96; Prince, 2004, 223).

In some commonly-used models, cooperative learning encompasses five principles, namely individual responsibility, reciprocal support, direct encouragement of interaction, the proper sharing of personal capabilities, and the continuous evaluation of the team members' engagement. Usually the expected environment is a sense of cooperativeness and a sharing of mutual incentives in order to promote common learning goals instead of a competitive atmosphere (Prince, 2004:223).

Some researchers distinguish between *cooperative* learning and *collaborative* learning. For example, Oxford (in Brown, 2001:47) defines *cooperative learning* as group-work, which is characterised by teacher-dominated recommendations of the classroom activities. The students are under the teachers' direct command in respect of how they carry out the activities and perform collectively in the group, and the group is formed in an organised manner. *Collaborative learning*, on the other hand, is group-learning that involves students organised with other more able members, such as teachers and advance-thinking peers who can offer support and direction. According to Brown (2001), the collaborative learning method was developed by social constructivists in order to encourage groups of students to avoid the usual gap between students and teachers (Brown, 2001:47).

Cooperative learning is an active instructional method (Felder & Brent, 2007:34), and has its foundation in the constructivist learning theory. Furthermore, Russ-Eft (2011:123), in referring to Vygotsky, pointed out that, according to the social constructivists, learning takes place when a person interacts with others, and this contributed to the idea of cooperative learning.

The cooperative learning/teaching method is not only based on the constructivist learning theory but also on diversified theories of Psychology, Anthropology, Sociology, Economics, Political science, and other social sciences. Research offered substantial proof of the beneficial use of cooperative learning over competitive and individualistic efforts. There are different varieties of the cooperative learning method, and they can be used in diversified learning programmes and fields of studies (Johnson, Johnson & Stanne, 2000).

Cooperative learning methods have a positive influence on the affective aspects of the students, and increase learning and satisfaction with the performance within a group. In respect of the cognitive aspects, cooperative learning was found to increase the students' academic achievement. It also improved the understanding and the critical thinking capabilities among higher education students, in comparison

to students who learnt through traditional instructor-guided lectures (Felder & Brent, 2007:34). Felder and Fuller (2000:133) also pointed out that properly applied cooperative learning instruction results in improved information-gain and storage, advanced-level thinking abilities, and enhanced social relationship skills.

## **2.5.2 Problem-based learning**

*Problem-based learning* (PBL) is a teaching method where problems that are related to the lesson topic are presented during the first session of the instructional process, and are used to initiate the learning that follows in an authentic situation. PBL is always an active learning method and is frequently accompanied by cooperative or collaborative teaching/learning methods (Prince, 2004:223). As Nilson (2010:187) puts it, case methods and problem-based learning provide the students with problems that occur in actual life situations and are unrestricted (have a variety of proper answers), which provide the students with the opportunity to struggle with doubt and uncertainty.

According to Nilson (2010:187), PBL can be used in any subject area in the social sciences (Psychology, History, Philosophy, Business, Law, Educational administration, Medicine, Nursing, and the Clinical fields) and in the natural sciences (Biology, Physical Science, and Engineering), as long as the teacher presents the students with authentic, uncertain and challenging problems.

In PBL, the problem has to be pertinent to the students' field of study and the relevant learning topic. The students may not even be aware of the problem. The teachers can start off with student discussions about the nature and structure of the problem, based on the students' previous experiences. As a group, the students examine the problem, produce likely clarifications, construct ideas based on collective contributions, and ascertain what basic points to consider in the future (Yew & Schmidt, 2012:372). In order to handle such instant confrontation with new problems, Nilson (2010:187) presented steps to be followed during PBL interactions.

The steps are:

1. Group members evaluate the problem and define the terms that they do not comprehend.
2. The students examine and explain the problem, perhaps with the support of the teacher.
3. The students assess and gather their previous knowledge that may help to resolve the problem. This may also mean rejecting unwanted information given in the problem which may not aid the solving of the problem.
4. The students find a new understanding of what they need to gain to solve the problem.
5. The students structure and sequence the learning content and plan objectives for the work done outside the classroom. (The teacher may or may not provide the students with references.)
6. The students share the workload among the group members.
7. The students personally carry out the delegated work in order to meet deadlines.
8. The students frequently meet to exchange the outcomes reached by each member, and to do additional investigations if needed.
9. The students combine their recently achieved and prior experiences into one best-likely solution, thus qualifying PBL as a constructivist method.
10. Finally, the students write their report to present their results.

From their review of the literature, Yew and Schmidt (2012:371-372) concluded that PBL was a constructivist method of instruction. This method provided the students with a learning environment that enabled meaningful learning through authentic problems. This environment allowed the students to construct knowledge collectively with the group members, and helped them to direct their own learning.

PBL was originally developed in medical schools and became a very popular teaching method in healthcare institutions. But now educators use it at different levels of education, and in different fields of study. The increased interest of teachers has been stimulated by the fact that PBL is related to active and collaborative learning in association with the constructivist learning perspectives which consider learning as collectively and activity constructed through social relations (Hmelo-Silver, 2004:237; Yew & Schmidt, 2012:372).

PBL gained widespread support from different fields of study around the world regarding its benefits on a cognitive and affective level. In 1995, researchers from the University of Texas (in Lieberman, Stroup-Benham & Litwins, 2001:84) reported favourable changes in the cognitive behaviour of students when the teachers used PBL strategies along with the traditional lecture method. The approach reduced the students' dependence on the mere memorisation of factual information, and they showed progress in their reflection on the learning material and on how they learn. As regards the affective aspects, the students experienced greater satisfaction with their learning than with previous learning practises where they were passive. Gijbels, Dochy, Van den Bossche and Segers (2005:27) confirmed that several researchers indicated that PBL revealed promising improvement among higher education students regarding their problem-solving capabilities – which is what the wider societies require from the graduates. However, the results were not conclusive in respect of the acquisition of knowledge.

Other research results were also favourable for PBL. In a comparative study with medical students who attended PBL classes and others who attended standard curriculum classes, the results showed that on the different performance measures, the PBL students performed significantly better than the students who attended the traditional curriculum classes (Distlehorst, Dawson, Robbs & Barrows, 2005:294).

### 2.5.3 Discovery learning

Chen and Honomichl (2008), as well as Lefrancois (in Mayer, 2004:14) agree that discovery learning is constructivist in nature. *Discovery learning* is a teaching method that requires the students to be engaged in knowledgeable participation and active investigation to gain knowledge. From a classroom perspective, it refers to a kind of instructional programme where the students are motivated to actively search and analyse the ideas, answers, or plans presented during the instructional session (Chen & Honomichl, 2008:256).

According to Alfieri, Brooks, Aldrich and Tenenbaum (2011:2), *discovery learning* occurs when the students are not provided with the necessary information that helps them to capture the basic ideas, or when the students are not simply presented with the learning material. Sometimes the students are provided with explicit instruction. In other instances they receive only the minimum explanations. Similarly, in some cases, the students get little assistance, while in other cases they are given a lot of guidance during the learning process. The provision of guidance can take different forms, such as providing the students with manuals, simulations, feedback, and exemplary problems.

According to Chen and Honomichl (2008:255), discovery learning is essentially part of the constructivist perspective of education. Piaget advocated that children acquire knowledge by behavioural and cognitive involvement with their environment. He suggested that the teachers should guide the students to use *discovery* as an instrument for constructing knowledge.

Another constructivist who supported the concept of discovery learning was Bruner (in Hohn, 2005:286), who saw this kind of learning as a way of improving academic creativity, perseverance, and learning motivation. For him, discovery learning considers the well-known saying of the Gestalt psychology that the whole is greater than the sum of its parts. This implies that learning is more than the collection of

information, and responding to it. Human beings possess the cognitive capabilities of examining their surroundings in relation to their prior experiences to form higher-order conceptions. Thus, Bruner suggests that the teachers should provide the students with unfinished material or presentations that they need, and thus gain further comprehension through their struggles. Hands-on learning activities are also emphasised.

#### **2.5.4 Inquiry-based learning**

*Inquiry-based learning* is also called *inquiry-guided learning*, *inquiry learning*, and *guided inquiry* (Nilson, 2010:175). Thus, in this study the terms were viewed as synonyms. According to Woolfolk (in Powell & Kalina, 2009:245-246), *inquiry learning* is an instructional strategy where the teacher provides the students with challenging problems, and require them to solve the problems by collecting information related to the problems, and examining the final outcomes. Likewise, Lee (2011:151) defined *inquiry guided learning* as a sub-set of active learning, which enables the student to gain new knowledge and skills by examining questions and problems through different means and criteria of inquiry in a given field of study. According to Haslam (1997:117), the strategies that inquiry-based teaching methods use, are:

- appreciating and including the students' ideas and questions;
- frequently using open-ended questions, and asking the students to explain their ideas;
- motivating the students to evaluate their own ideas, to propose answers, to speculate about causes, and to infer effects; and
- motivating self-analysis, gathering information to scaffold ideas, and modifying ideas in line with new understandings and new indications.

From a theoretical position, inquiry-based learning is well-matched with the constructivist perspective. Research conducted on this method in the fields of psychology, education, and neuroscience in respect of learning and its effects on



educational practice, have gained greater reliability over a decade (Lee, 2012:6). Inquiry-based learning repeatedly found positive outcomes in the areas of critical thinking, problem-solving, taking responsibility for learning, and an interest in lifelong learning. In addition, it was also related to the ability to formulate good questions, to examine and deduce evidence, and to choose and justify the best solutions to a problem (Lee, 2011:152).

### **2.5.5 Discussion methods**

A *discussion* is defined as a creative conversation about ideas and outlooks, or a cooperative investigation of problems. Petrina (2007:97) states that discussions arise among persons who are gathered to communicate verbally with one another about a certain issue or occasion of common concern. Group-discussions can include the entire class, or smaller groups of students. However, groups of two to six students are preferable for effective work (Alberta Learning, 2002:71).

Group-discussions assist the students to learn to convey their ideas, and to reflect on views that oppose their own ideas. Such group-discussions are useful for considering others' viewpoints and for building competent problem-solving abilities (Alberta Learning, 2002:71).

According to Nilson (2010:127-128), a strategic and controlled discussion learning method can be used to promote any kind of learning outcome, but with less efficiency in the case of knowledge learning that requires memorisation. More specifically, the discussion method is particularly effective for learning in the following situations:

- assessing and changing attitudes, beliefs, values, and behaviour;
- assessing unique concepts;
- deep-processing of information;
- critical thinking;
- problem-solving;

- active listening;
- interacting verbally;
- using the learning in other situations;
- information retention; and
- learning further about a lesson topic.

Discussions require the teachers' guidance into the right direction. The teachers therefore need to be well-prepared to direct the discussions and to keep them relevant (Nilson, 2010:127).

## **2.6 THE RELATIONSHIP BETWEEN LEARNING STYLES AND ACTIVE LEARNING**

The Greek philosopher, Hippocrates, recognised the existence of individual differences in people, and classified people into four categories or typologies, namely sanguine, phlegmatic, melancholic, and choleric (McAdams, 1997:7). During the 19<sup>th</sup> century, major contributions in the area of individual differences emerged from the fields of developmental psychology and psychological measurement or psychometrics. The pioneer in this field was the British biologist, Sir Francis Galton, who tried to develop an intelligence test on the basis of his findings on the effect of heredity on intelligence. Later his work was further improved on by Binet and Cattell (Hampson, 1996:320; Strickland, 2001:187). The issue of individual differences was significantly considered in the fields of developmental psychology, psychological testing and personality psychology.

According to Pashler et al. (2009), learning style theories historically descended from Jung's theory of personality. The learning style measurements of some of these theories originated from the Myers-Briggs Type Indicator test (a personality test based on the Jungian type theory of personality).

A learning style is relevant for individualised instruction. *Individualised instruction* is a teaching strategy that personalises instruction by providing appropriate instruction according to the needs of the student. This emerged out of a concern for individual differences in the classroom. Accordingly, Mahmoudi (2012:107) promoted individualised instruction with the aim of helping the students to learn what they need to know by using their own learning styles and by learning at their own pace. Thus, it is clear that the notion of *learning style* and *student-centred instruction* in educational practice is a result of recognising individual differences in learning.

Furthermore, the concern of addressing individual differences in classroom learning also brought active learning methods into the teaching-learning scenario as an instructional strategy. Even though active learning is not the same as learning style and student-centred instruction, they are interrelated. *Learning style* refers to individual differences in the preference for a mode of instruction that leads to the effective learning of that specific student. The supporters of the concept of *learning style* insist that assessing the learning style of each student and providing instruction according to the student's preference lead to high cognitive and affective outcomes for the student (Pashler et al., 2009:105).

According to Cannon and Newble (in Lea, Stephenson & Troy, 2003:321), *student-centred learning* (SCL) refers to methods of thinking and learning that emphasise the students' responsibilities and participation in the learning process, rather than the teachers' teaching methods. SCL therefore focuses on the students' responsibilities and behaviour, in contrast to the teacher's control, and to how content is covered.

Lea et al. (2003:322) indicated the principles of student-centred instruction, namely that student-centred instruction

- depends on active learning;
- emphasises deep learning and understanding;
- increases the student's responsibility and accountability;
- requires student autonomy;

- creates an interdependence between the teachers and the students;
- establishes mutual respect between the students and the teachers;  
and
- requires reflection on the teaching and learning processes on the part of both the teacher and the student.

As indicated above, *learning style* and *student-centred instruction* are based on the same theoretical position, namely constructivism. Individualised instruction addresses individual variations among students. Therefore, learning style-matched instruction, student-centred instruction and active-learning instruction are all interrelated teaching and learning strategies. The aim of such teaching and learning is to satisfy the needs of the individual students (Fischer & Rose, 2001; Guild, 2001; Subban, 2006).

## **2.7 CONCLUSION**

This chapter presented the conceptual framework of the study. Theories of learning, learning styles and teaching methods were explained and their relevance for active teaching and learning in Ethiopia was pointed out.

In the next chapter the results of research on relevant issues related to teaching and learning will be presented.

## **CHAPTER THREE**

# **EMPIRICAL EVIDENCE ON TEACHING METHODS, LEARNING STYLES AND THE ATTITUDES OF STUDENTS AND TEACHERS TOWARDS ACTIVE LEARNING**

### **3.1 INTRODUCTION**

The learning theories were explained in the previous chapter. In particular, the focus was on the behaviourist, cognitive and constructivist learning theories, the teaching methods that incorporate active learning methods, and a paradigm shift to active learning.

Chapter 3 presents a literature review of empirical evidence on teaching methods, learning styles and attitudes towards active learning. To this end, the literature on the following is critically reviewed, namely teaching methods in the natural and social sciences, and student-centred instructional methods.

### **3.2 TYPES OF TEACHING METHODS**

Generally speaking, the preference of a specific teaching method is problematic by nature. In the first place, the different types of teaching methods cannot be clearly distinguished from one another, because the activities which are incorporated in a certain kind of teaching method can also be observed in another method. Secondly, providing a unanimously agreed-upon definition of any given teaching method is difficult. Yuen and Hau (2006:288) therefore suggested that teachers should rather focus on the advantages and limitations of the various approaches to teaching and learning. This implies that the teachers should be cognisant with the characteristics of the teaching methods they use. To achieve certain ends, the teachers should

choose the right means. In addition, the existing multitude of teaching methods need not be considered as mutually exclusive, since the teaching can be eclectic.

Regarding the preference of teaching method, major problems occur in respect of conducting research on this issue. According to Prince (2004:2), many learning outcomes are difficult to measure. Examples include outcomes such as the ability to solve problems and to engage in lifelong learning. It is difficult to find data on these kinds of learning outcomes, with the result that research on such variables is vulnerable to misinterpretation. Prince (2004) also pointed out that research in the area of teaching methods are confronted by several problems, which include the definition of the core constructs that the researcher is examining, the problem of the interpretation of results, and the problem of deciding whether the changes observed are due to experimental interventions, and whether they are significant or not. Therefore, the users and implementers of research findings (teachers, researchers, and policymakers), should take considerable care when interpreting research reports.

However, in general, teaching methods can be classified into two main types, namely teacher-centred approaches and student-centred teaching methods, as mentioned before (see section 1.2).

In the case of teacher-centred teaching, the engagement of the teachers is extensive and they assume a dominant role in the instructional process. According to Miller (2008:965-966), some of the teacher-centred teaching methods are expository and interactive-expository. In an *expository* teaching strategy, a teacher orally guides the students to engage in the learning situation. Such an approach includes the traditional lecture method and mini-presentations. The *interactive-expository* techniques are structured in a similar way, but supplementary techniques, such as interactive questioning, modelling, and a high degree of student reply are added to the teaching process.

The student-centred methods are currently widely accepted because of their advantages over the traditional teacher-centred methods (Matthews, 1997:5; Michael, 2006:159; Saville et al., 2005) and their considerable influence in science, the social sciences and the humanities, specifically (Matthews, 1997:5) (see section 3.2.1). In student-centred teaching methods, the teacher assumes the position of spectator, leader, facilitator, or even moderator during the learning process, allowing the learning situations to happen within and among the students (Miller, 2008:964-965). These student-centred methods can be adapted to different subject areas, as is explained next.

### 3.2.1 Subject-area teaching methods

Selecting teaching methods requires different considerations. Basic considerations include the students' grade levels, their previous knowledge of the subject, the nature of the subject, and/or the nature of the content. Usually, in lower-grade levels, hands-on or active teaching methods are used, due to the limited attention-span of the students (Morra, Gobbo, Marini, & Sheese, 2008:22; Pierce & Kalkman, 2003:127). In addition, in the early stages of their development the children understand their surroundings mainly through their senses and motor abilities. Their cognitive functioning is at a stage of processing information from direct sensori-motor experiences (Harris, 2006:276).

There are several ways of classifying instructional objectives, including Bloom's taxonomy. The way the students perform in respect of the given content, is called the *behavioural construct* while the content that requires the students to acquire knowledge is called the *cognitive domain*. Content may relate to the affective domain, e.g., attitudes and values. Other content may require of students to perform with muscular involvement, and is called the *psychomotor domain*.

Any given lesson need not be taught with a single method of teaching. According to Nilson (2010:106-7), interactive lectures and recitation focus on the knowledge level

only. In contrast, directed discussion, writing/speaking exercises, classroom assessment techniques, group-work or learning, student-peer feedback, cookbook science labs, just-in-time teaching, inquiry-based or inquiry-guided, project-based learning, and role-play and simulations are more effective for comprehension. Finally, writing/speaking exercises, case methods, inquiry-based or inquiry-guided, problem-based learning, and project-based learning are effective for the application, analysis, synthesis and evaluation level of cognitive processing. Thus, almost all of the student-centred methods mentioned above (which are similar to the types of teaching methods used in 'active' learning as explained in section 3.2), are effective for the development of higher-level learning outcomes.

Objectives can be classified into three domains across all subject areas and education levels, namely the cognitive, affective and psychomotor domains. The nature of the subject and the topic may be largely based on the cognitive and less on the affective and psychomotor/kinaesthetic domains, or *vice versa*. For instance, physical education courses are kinaesthetically dominated, while the practical parts of medicine and law require the application of knowledge to new and complex situations (Nilson, 2010:26).

Teaching methods that are most effective for science and mathematics, as well as for the social sciences and humanities, are outlined in the next sections.

### **3.2.1.1 Teaching methods in science and mathematics**

Usually science and mathematics are perceived as difficult subjects for different reasons, and many students therefore do not enrol for these subjects. For example, Osborne, Simon, and Collins (2003:1061) state that it is difficult for students to memorise the periodic table, and they also do not see its relevance in their everyday lives. Moreover, the concepts of science are too abstract.



An important influencing factor in a student's decision to pursue science or not is the teaching methods that are used. Osborne et al. (2003:1073) say that the absence of good teaching is one of the decisive factors for students' aversion to science. Tobias (in Osborne et al., 2003:1068) identified different reasons why students abstain from enrolling in science when starting higher education. Among others, there are too many 'how much' questions, and a lack of sufficient discussion of 'how' or 'why'. This indicates the absence of participatory teaching methods.

Several researchers propose active learning methods for the teaching of science (DiCarlo, 2006:291; Ebert-May, Brewer, & Allred, 1997:601 & 606). DiCarlo (2006:291) considers learning as not a matter of committing a collection of information to memory, but of acquiring the capacity to use resources to find, assess and use information. To this end, Ebert-May et al. (1997:601) state that the learning of science demands the active involvement of both the student and the teacher to aid the constructive process.

### **3.2.1.2 Teaching methods in social studies and the humanities**

According to Ediger (2009:324), social study courses should be designed to meet the cognitive, affective and psychomotor needs of the student.

The following psychological learning principles should be incorporated, namely

- all the students should be engaged in progressive learning activities;
- the students should understand the reasons for the experiences that are provided;
- provisions should be made for the different learning styles of different students;
- meaning and understanding should be emphasised; and
- the teachers should plan for challenge and for success in their instruction.

The above principles imply the use of hands-on teaching methods, based on authentic tasks, using a variety of instructional strategies that could satisfy the interests of different students. The teaching should also encourage the students to apply their knowledge in practice in actual life situations.

Yilmaz (2008:36) indicated that the basic goal of teaching social studies in secondary schools is to help the students become accountable, analytical, insightful, and active citizens, who can make knowledgeable and rational decisions about public matters locally or globally. He stated that students needed to develop positive attitudes toward participatory democracy and to participate in public issues to everybody's benefit. In order for the students to be active and participatory citizens, they need to be actively involved in issues that required questioning, thinking and reasoning. Since student-centred instruction facilitates the construction of meaning and understanding during each phase of the learning process, it can be used as an instrument to fulfil the aims of social studies education.

However, Yilmaz (2008:48) pointed out that student-centred instruction still remained on the margins of social studies teachers' range of instructional techniques. This confirms the much older finding of Cuban (1991), who observed that social studies instructional sessions were characterised by teacher-centred instructional practices. The result was that most students found the subject unexciting, tedious and trivial. Therefore, researchers suggested student-centred instruction to change the situation. More recently, Yilmaz (2008:47) suggested that the teachers of social studies should implement progressive learning theories to accomplish the goals of social studies in secondary schools. The progressive learning theories that he refers to are the constructivist and cognitive learning theories. According to him, student-centred instruction is based on the constructivist theory, and it shows great promise to help teachers design engaging and interesting learning opportunities.

A number of student-centred instructional methods are explained below.

### **3.3 STUDENT-CENTRED INSTRUCTIONAL METHODS**

As mentioned in section 2.6, the emergence of learning style-matched instruction and active learning in the teaching and learning context, is from the emphasis given to individual students' needs.

In the next section the issue of individualised instruction is considered.

#### **3.3.1 Individualised instruction**

Considering individual differences in instruction is important, because they are expressions of the uniqueness of individual personalities and of individual identities (Joyce & Weil, 1996:385). Similarly, Grasha (2002:44) pointed out that the most important issue for teachers is not to consider which way of thinking is better than the other, but to contemplate the students' individual mental abilities and learning styles. These differences should be encouraged in order for the students to profit from their own talents. According to the constructivist view (see section 2.3.3), all of the students cannot learn in exactly the same way because of their differences in attitudes, values, and experiences. That is, students construct their own knowledge on the basis of their prior knowledge by their active involvement with the new learning content. The curriculum, therefore, has to be arranged in such a way that it allows for the effective interaction of individual students with the learning material (Jenkins, 2006:196).

Accordingly, the curriculum change implemented in Ethiopia in 2003 was intended to satisfy the students' individual learning preferences by varying the teachers' teaching methods (MOE-TESO, 2003:2).

In general, students have dominant learning styles by means of which they acquire better learning, and they need to learn to capitalise on that style. However, most students also have secondary learning styles to reinforce their initial learning and for

the further acquisition of knowledge (Denig, 2004:103). Therefore, teachers should vary their teaching style to accommodate their students' varied styles.

However, since learning styles vary from student to student, it is impossible to provide individualised instruction which fits all the students in a classroom at the same time. Coffield et al. (2004b:133) noted that it could be a difficult undertaking to teach many students in a class through individualised instruction in respect of the teachers' time, and the monitoring and supporting of individual learning programmes. Lazear (in Brualdi, 1996:4) pointed out that

*...it is impossible, as well as impractical, for a teacher to accommodate every lesson to all of the learning styles found within the classroom. Nevertheless, the teacher can show students how to use their more developed intelligences to assist in the understanding of a subject which normally employs their weaker intelligences.*

In consideration of the above, Felder and Henriques (1995:29) recommended that the teachers continuously change their teaching methods and approaches to include different strategies, even though it may hinder the covering of the syllabus. They suggested that the different strategies should be tested from time to time during instruction. In this way, teaching styles that are both effective for the students and comfortable for the teachers could be developed. Hunt (1997) also stated that strategies should be devised to satisfy all the preferences of the students. Thus, it is suggested that the teachers should vary their teaching methods to meet the preferences of all the students in the classroom (Sadler-Smith & Smith, 2004:408).

### **3.3.2 Mode of instruction and learning style**

The question can be asked if all the students learn equally well through the use of one or more learning preferences. To answer this question, the different researchers have a variety of arguments. According to the constructivist view, students learn through the active involvement with their environment (Ryan & Cooper, 1998:308).

However, this theory clearly indicates variations among students due to their biological endowment, as well as their interaction with their social and physical environment. Thus, learning style is a combination of various biological and experiential variables that contribute to learning (Rochford, 2003:667). This means that learners are not uniform in the way they process and organise information in a specific learning situation, due to differences in cognitive style and instructional preferences (Sadler-Smith & Smith, 2004:396). This is in accordance with the constructivist views and learning style theories that point to individual variations. Instruction, therefore, has to be diversified to address the students' prior knowledge, values and attitudes.

The introduction of learning style theories into the theories of learning is primarily due to the strong claim of the theorists and proponents that teaching through learning style-matched methods could improve the students' learning performance and achievement. However, the results on this issue are sometimes contradictory. Roberts and Newton (2001) conclude that it is difficult to assume that learning style-matched instruction results in the improved achievement of the students, or has nothing to do with the students' learning performance. This is due to the fact that the teaching-learning process is highly complex, and that learning is the result of many factors that include gender and subject matter, the social and physical environment, inheritance and prior knowledge. They also added that matching one learning situation or task with a learning style may not be effective for another learning task. Thus, it is concluded that learning style-matched instruction could be considered as one of the factors that affect the students' learning. It contributes a certain percentage of the variance, although the specific impact needs to be investigated by means of empirical studies on a large scale.

Reinert (2002) conducted a study on the influence of visual aids in learning. This study on individual learning styles in the Edmonds School District indicated that one type of learning style which is effective for some students would not be equally effective for other students and would not necessarily lead to better achievement.

A mismatch of learning style with teaching methods is not the only reason for low achievement, although findings indicate its significant effect on students' achievement and interest. According to Felder and Spurlin (2005:103), the amount of knowledge acquisition (and thus achievement), is partly affected by the students' learning styles, their natural potential, and the teaching methods used. They further noted that if learning styles are *not* matched to teaching methods, it could possibly lead to student failure. This is because the students are inclined to become uneasy, bored and absent-minded in class, achieve low results in tests, become disheartened about the subject, the syllabus and themselves, and may change subjects, or even drop out of school (Felder & Spurlin, 2005:103).

With language instruction, Felder and Henriques (1995:28) found, matching teaching styles with learning styles can significantly increase academic attainment. In addition, it can enhance the students' learning interest and their performance at all educational levels.

Varying teaching strategies for lower grade levels could create new learning opportunities, because it is the time to harmonise the students' inborn tendencies with their sociological and environmental components. On the other hand, if a teaching method is not carefully selected, it may also create a difficult situation. According to Felder and Silverman (1988:674), and Felder and Henriques (1995:21), changing teaching methods is not a mistake in itself, but a sudden introduction of unfamiliar instructional methods can lead to conflict with the developed cognitive style of a student.

### **3.3.3 Active learning versus learning style-matched instruction**

As indicated in chapter 2 (see section 2.6), both active learning and learning style-matched instruction advocate the active construction of knowledge by the students, a key principle of the constructivist theory, though they vary in their principal

premise. That is, active learning emphasises the active involvement of all students, whereas learning style-matched instruction indicates that each student has his/her own learning style that is not necessarily *active*. Learning style proponents appreciate the predisposition of the student, whether active or passive, as in the case of listening to conventional lectures.

In line with the above ideas, Wolfe (2006:79) warns teachers to consider individual differences when trying to implement active learning instruction, because students differ from one another in learning style. For example, according to a learning style questionnaire developed by Neil Fleming (in Wolfe, 2006:79), there are four learning styles, namely visual, auditory, reading, and kinaesthetic. On the other hand, Kolb's Learning Style Inventory (LSI) focuses on four different kinds of learning styles that relate to the following types, namely abstract, concrete, reflective, and active. Wolfe suggests a consideration of various learning approaches that can accommodate these different learning styles.

Moreover, regarding the implementation of active learning and learning style-matched instruction, contradictory findings exist. For example, on the one hand, a large number of researchers, which include Cotton, De Vita, Felder and Soloman, Grasha, Gross Davis, Honey and Mumford, Kolb, and Smith (in Auster & Wylie, 2006:340), acknowledge a variation in student learning styles and the matching of teaching strategies with student learning styles. On the other hand, contemporary studies indicate that the mismatching of teaching and learning styles expand the students' abilities (DeVita and Smith, as cited in Auster & Wylie, 2006:340). These research findings show that by using different kinds of teaching strategies, the teachers can address different types of learning styles, and also motivate their students to think of and learn novel approaches (De Vita, Keyser, and Smith, as cited in Auster & Wylie, 2006:340). Such contradictions require further empirical investigation.

However, in this study the intention was not to compare and contrast the advantages of learning style-matched instruction against the active learning-teaching strategies or *vice versa*, as indicated by the research questions stated in section 1.2. Rather, the researcher employed a learning style inventory to identify the students' learning styles and attitudes towards active learning approaches. More specifically, the study made use of the Felder-Silverman learning style questionnaire to investigate the aforementioned Grade 10, and university level students, and to test for significant differences between the groups.

### **3.3.4 Learning styles inventories**

As was mentioned in section 2.3.6, several learning style theories and inventories have been developed (Coffield et al., 2004(a) & (b)). The purpose of the learning style inventories is to identify the learning styles in line with the theory that the inventory was based on. In turn, identifying the students' learning styles enables one to match the instruction with the students' learning preference, which enhances the students' learning and achievement (Felder & Soloman, in Felder, 1996; Hawk & Shah, 2007; Pitts, 2009; Watson, 2001).

The widely-used learning style instruments are Dunns' Learning Style Inventory (LSI), Kolb's Learning Styles Inventory (KLSI) and Felder and Soloman's Index of Learning Styles (ILS), because they were developed from popular learning style theories (Duff, 2004:699; Hawk & Shah, 2007:2; Henson & Hwang, 2002:712; Kayes, 2005:249; Wang et al., 2006:208). The different instruments have various dimensions measuring different constructs; however, they could have similar constructs (Severiens & Ten Dam, 1994:494).

Merely mentioning some results from several findings in respect of the students' learning style preferences and gender variations and by using Kolb's learning style inventory, Severiens and Ten Dam (1994:487) found that men were more likely to prefer an abstract conceptualisation style of learning than were women. Based on



Entwistle's Approaches to Studying Inventory (ASI), they found differences between the gender groups regarding the affective components of approaches to studying. In addition, they found that men were more inclined towards abstract conceptualisation than women. But those studies did not explain the nature of the relationship between gender and learning styles very well (Severiens & Ten Dam, 1994:498).

In the Ethiopian context, there were no findings on the students' learning styles using ILS. But Geche (2009) studied the students' learning styles in the area of mathematics using LSQ. At the 'global' level, ILS was widely used in the area of engineering (for example, Livesay, Dee, Neuman & Hites, 2002) and business economics (for example, Van Zwanenberg, Wilkinson & Anderson, 2000).

Felder and Brent (2005:61) reviewed studies that were done using different versions of the ILS. They found variations in the ILS dimensions from year to year and from study to study. In general, the participants in those studies were very 'active' and 'sequential'.

Some specific results of research that was done are presented below.

- A study conducted at the University of Sao Paulo by Kuri and Tiruzzi (2002), as was discussed by Felder and Brent (2005), among freshmen mechanical engineering students, showed 47% 'reflective'; 67% 'sensing'; 84% 'visual' and 45% 'sequential' learners (55% 'global' learners).
- The findings by Livesay et al. (2002) at Tulane, among second year engineering students, indicated 62% 'active', 60% 'sensing', 88% 'visual' and 48% 'sequential' learners.

Though studies on gender variations that were assessed by the ILS were very limited (Felder & Brent, 2005:68), a number of studies outside the United States and the U.K. (which were not included in Felder and Brent's review) are mentioned below.

- D'Cruz, Rajaratnam and Chandrasekhar (2013:323) conducted a study among medical students in Tamil, to investigate the strengths of the learning preferences of boys and girls using the ILS, and found no significant differences between the genders groups.
- At AMA International University at Bahrain, Gappi (2013:74) carried out a research study on freshman boys and girls using the ILS, and found no significant gender differences in their learning style preferences. In addition, he (2013:72) found the majority of the respondents were fairly well-balanced on the four dimensions of the ILS.

### **3.3.5 The status of student-centred instruction in Ethiopia**

Endawoke (2004:35-38) conducted a study on in-service teacher trainees at Bahr Dar University, and revealed that almost all the teachers in the study supported the traditional teaching method or conventional teaching. The study indicated that trainee teachers who came from all over the country preferred to use the conventional instruction methods. However, they had little knowledge of the student-centred approach.

Contrary to the above, Tuji (2006:22) found that primary school teachers supported the importance of active learning strategies, although their attitudes were negative towards some components of active learning instruction. This included their disapproval of classroom interaction that is carried out by the students' self-monitored learning, or the notion of students taking responsibility for their own learning. This is also referred to as *independent* learning or *self-regulated* learning.

According to Aga's (2005:63-4) study at Addis Ababa University, lecturers in the Department of Business Education frequently used the traditional lecture methods, whereas the students preferred active learning instruction.

Therefore, it can be hypothesised that the dominant teaching method in Ethiopia is teacher-centred, even if the teachers appreciated the contributions of active learning instruction in the development of higher level thinking.

In another study which was mainly based on observation, Kenea (2009:83-4) showed that the education system in Ethiopia was significantly dominated by teacher-centred instructional methods. In this regard, he noted the following constraints to student-centred instruction, namely economic problems (a lack of enough instructional inputs), large class sizes, poorly organised textbooks, and the low language proficiency of the teachers. Additional issues included policy-related problems (the general directions given by the government to guide the educational system that encouraged appropriate instructional strategies), training-related issues (the nature of teacher education programmes), and school-related issues (such as the lack of a monitoring and evaluation system, the lack of professional development programmes, and a dearth of qualified teachers and administrators).

Tuji (2006:23-4) conducted a small-scale study in upper primary schools in a small town, making use of observation, questionnaires and focus-group interviews. He found that the implementation of active learning pedagogies was very low. Like Kenea, Tuji pointed to several obstacles thwarting the use of student-centred instruction. These obstacles included a lack of adequate knowledge and skills on active learning instruction, a scarcity of teaching materials and resources, the teachers' huge workload, and large class sizes. The lifelong teacher-centred approaches experienced by university students also caused many of them to resist active learning or student-centred instruction (Kenea, 2009:106).

This finding points to the need to investigate students' learning styles and their attitudes towards active learning in different levels and contexts in Ethiopia.

Most proponents of active learning instruction claim its strength is related to a good acquisition of knowledge, higher academic achievement, increased comprehension,

retention, transfer of learning, and the development of higher-level thinking skills, among others (Felder & Brent, 1996a: 43). However, it requires resources and training, which are not readily available in the Ethiopia (Tuji, 2006:23-4).

The question arises what the effects are of active learning on students' learning outcomes. This question is addressed in the next section.

### **3.3.6 The effects of active learning on the students' learning outcomes**

According to Lea et al. (2003:322), there exists evidence that a student-centred approach to teaching is more effective than a teacher-centred approach. In a study which involved student-centred methods and emotional literacy in group-work, Crick, McCombs, Haddon, Broadfoot and Tew (2007:305) observed a significant increase in the students' attainment of knowledge.

Similarly, Felder, Woods, Stice, and Rugarcia (2000:9) strongly argue that active or student-centred learning is more helpful than passive or encyclopaedic teacher-centred strategies. Students gain information and skills by means of exercise and reflection, not by looking at and listening while others are telling them how to perform activities. Lectures may be effective to support the recall of short-term factual information, but active learning has repeatedly verified its superiority in developing the long-term retention of information, a deep understanding of the content, problem-solving abilities, interest in learning, and curiosity about a subject. Felder et al. (2000:8) also pointed out that in higher education the usual method of teaching is the conventional lecture. The lecturers transmit knowledge while the students passively absorb it. However, research shows that if the goal is to retain information for a long time, to improve the students' problem-solving abilities, or to initiate their attention on a subject and inspire them to a deep understanding, active learning instruction is more fruitful than the traditional lecture method.

In line with the above, from different research reports it has become evident that the student-centred teaching method increases the retention of knowledge and a deeper conceptualisation, in contrast to the teacher-centred approach. The student-centred approach also facilitated an appreciation of the course being taught (Felder and Brent, in Lea et al., 2003:323; Michael, 2006:160).

A study done with undergraduate students at the Hong Kong Poly Technique University showed that different forms of active learning (games, role-play, simulations, discussions and debates, student presentations, videos, library exercises, the use of flip charts, and hand-outs), contributed to the development of the students' critical thinking and problem-solving abilities, which were the learning qualities that the researchers aimed to develop. The students also acquired self-regulated characteristics. In addition, the experience of the students and their participation in real-life situations, such as during learning practice in the industry, could be important to prepare them for their future careers. Furthermore, active learning that helps the students to develop their critical thinking and problem-solving abilities, could be important to assist them in handling the changing roles that they face with regard to their future professions (Sivan, Leung, Woon, & Kember, 2000:388).

In another study, Kim, Sharma, Land, and Furlong (2013:231) created active learning environments with a small group by using real-life activities. They found that those students who had been engaged cognitively in the activities developed high learning and critical-thinking abilities. Furthermore, from a survey and interview data, they gathered that active learning enhanced the students' engagement in different aspects of critical thinking that were necessary in the field of geo-science, namely applying, analysing, evaluating, and synthesising what they had learnt to address authentic problems. However, the positive learning outcomes that are reported in these studies are also related to other methodological issues. For example, the students reported that small-group learning was important for developing the ability to address a problem from various perspectives, and to apply scientific concepts to

actual life situations. This is attributed to the fact that such situations provide the students with the opportunity to communicate, reflect, and think about different options and various views. Similarly, Yuen and Hau (2006:288) realised that using previously acquired knowledge in assignments might help to simplify the transfer of knowledge. This is facilitated by a constructivist learning approach.

According to Yuen and Hau (2006: 288), teaching in line with the constructivist philosophy has many advantages in comparison to conventional teacher-centred teaching. Firstly, in their study they found that knowledge gained through constructivist teaching was more effective with regard to critiquing, generating, and retaining knowledge. Secondly, they found that active learning approaches required time for the students to think about and collectively construct knowledge, eased the process of innovative knowledge-construction, created situations for a deeper processing of knowledge, activated the students' previous knowledge-base, and was more enjoyable for the students than teacher-centred methods. In another study, Kember and Leung (2005:167) observed that students who were involved in different forms of active learning strategies showed more efficiency in their creative abilities than those who had participated in traditional teaching with the use of conventional lectures.

Studies by Lea et al. (2003:331) with undergraduate and postgraduate university students, using focus-group discussions and questionnaires, revealed that though most of the students testified that they were not familiar with the idea of active learning, such a student-centred approach was considered positively as supportive of learning. Nevertheless, some students were also sceptical about student-centred learning, suspecting that the approach was motivated by hidden political agendas. Regarding the interpersonal communications between teachers and students, Kember and Leung (2005:166-167) found that active learning approaches helped to enhance their interpersonal interaction. Strong relationships, in turn, were motivational for teachers to utilise different types of teaching strategies that comprised active student involvement.

Studies by Lea et al. (2003:323) indicate that the implementation of student presentations, quizzes and continuous assessment, instead of the conventional lecture and final examination-approach, improved the students' involvement and their interest in learning, and therefore also their results. Felder and Brent (in Lea et al., 2003) also pointed out that a student-centred teaching approach improved the students' motivation to learn. Similarly, Michael (2006:160) reported that properly-applied student-centred instruction had the capacity to increase the students' motivation to learn. In addition, Crick et al. (2007:305) indicated that students who learn with teachers who had high student-centred initiatives demonstrated a maximum level of motivation, learning power, and feelings of emotional security in school.

Active learning methods are more pleasant for both the students and the teachers. When using the lecture method, it is difficult to keep a class attentive and interested for the entire class period. As research indicates, in most cases the attention of students starts to decline after 10 to 20 minutes, and they become bored (Felder et al., 2000: 9). At the end of a lecture, the students manage to memorise about 70% of the lesson presented in the first 10 minutes, but only 20% of the lesson that was presented during the last 10 minutes.

### **3.3.7 Challenges with the implementation of active learning**

Lea et al. (2003:322-223) found that there was a significant gap between what has been indicated orally and the actual status of the implementation of active learning. Several institutions said that they were performing student-centred learning - however, they were not implementing it in practice. For example, based on observations of a sample of educators, Farrington (in Lea et al., 2003) judged that the learning-teaching process remained firmly under the teachers' control, even though many teachers reported that they were implementing student-centred instruction.

Alemu (2010) who investigated the use of active learning approaches in the teaching of mathematics at universities in Oromia, Ethiopia, came to a similar conclusion. He found that, although the use of active teaching/learning is emphasised in Ethiopian policies, the traditional lecture methods dominated most classrooms. Little use was made of methods such as cooperative learning, inquiry-based learning, discovery learning, problem-based learning and the discussion methods. The lecturers identified the following as obstacles to using a more active approach, namely a lack of time, the lack of resources for problem-based learning, the lack of administrative support, the rigidity of the time-table, the large amount of content to be covered, and their own negative attitudes to active learning. Alemu (2010) recommended more training and support for the lecturers.

According to Felder and Brent (1996b), one of the likely reasons for the gap between the actual implementation of student-centred instruction and the rhetoric, is the substantial amount of energy that this mode of instruction requires. Especially university professors are under so much pressure to conduct research and write articles that it leaves them with limited time for planning their teaching, and for investigating which teaching methods work best. The other problem is that student-centred learning requires more resources (especially during the initial periods) than the other methods.

According to Lea et al. (2003:323), higher education institutions currently enrol many students with different capacities, e.g., mature students, international students and students with disabilities. This situation has a substantial effect on the instructional processes used within these institutions. Teaching students with different abilities and learning needs requires much effort. Implementing active learning approaches in such situations can be difficult.

Hectic weekly schedules, declining interest, and anxiety about self-directed learning, are key factors hindering the students' learning performances during the implementation of active learning. Other constraints include a lack of guidance from



teachers, detached teachers, a lack of flexibility in module choice or of other external commitments, the shortage of resources (such as books and computers), and peer pressure in respect of entertainment rather than for involvement in learning activities (Lea et al., 2003:328).

Sadler (2012:737-742) investigated the challenges that novice higher education lecturers experienced after having implemented active learning for two years.

He found the following:

- The knowledge gap between students and lecturers created variations in the teaching methods that were followed.
- The level of the students' past experiences influenced their participation in the learning process. On familiar topics the students' active involvement was high. When the topics were unfamiliar they depended more on the passive reception of information from the lecturers.
- The lecturers lacked a wide repertoire of instructional skills, such as asking questions to check the students' understanding, handling the students' classroom interactions and behaviour, and preparing activities that helped to achieve a specific learning outcome.
- The lecturers lacked knowledge on specific content areas. When the lecturers experienced their own lack of knowledge in specific areas, they tended to use the traditional lecture methods in order to avoid difficult questions that could be raised by the students.
- The lecturers who taught 'hard' disciplines like physical sciences, engineering and medicine used teacher-focused approaches, while those who taught 'soft' disciplines like the social sciences and humanities used student-focused approaches (Lindblom-Ylanne, Trigwell, Nevgi, & Ashwin, 2006:294).

In addition to the above, Auster and Wylie (2006:347-348) reported the general concerns of some lecturers regarding the implementation of active learning methods. The lecturers thought that active learning could only be effective in small groups;

that lectures were the sole method to cover the compulsory content of their courses; during class discussions the students went off the track and it was difficult to bring them back to the point; creating active learning situations required too much energy and preparation; and creating active learning conditions required inherited skills that were not simple to develop.

Accordingly, Felder and Brent (1996a:44-46) identified the following concerns of the lecturers:

- Active learning took too much time and it was difficult to finish the syllabus on time.
- If the teachers did not engage in lecturing, they could lose control over the class.
- The students were not willing to read the material not covered during the lecture which led to a poor understanding of the concepts.
- Some of the students did not do the exercises given by the lecturer.
- It was very difficult to engage the students in groups to do their work.
- Some students tried to get credit for the work that they did not do in respect of group homework, presentations, and projects.
- Some teams who relied on the work of one or two members on quantitative problems faced difficulties in individual tests.
- The work of many of the cooperative teams was superficial and inadequate.
- Some teachers doubted whether active learning could work in classes with only a small number of students.
- Some students were not interested in active learning, regardless of the efforts of the lecturers in accordance with expert recommendations. These students were more interested to learn by means of traditional instruction.

According to Felder and Brent (1996b), student-centred instruction is very challenging for the students. It requires of the students to shoulder the responsibility of working independently with little explanation of the course content; to solve

difficult problems; to participate with other students in different kinds of activities (such as addressing a variety of unusual writing tasks); and using self-directed and/or group-based learning.

From a survey study which was conducted with elementary and secondary school teachers and with teacher educators, Niemi (2002:771-772) investigated three main classes of obstacles that hamper the implementation of active learning in the teaching-learning processes of teacher education.

- Student-teachers were *externally* motivated, in that they only studied for grades and certification. Some students were not motivated to improve their teaching expertise, nor were they certain whether they were going to carry on with their studies to become teachers in the future, so they were not devoted to pursue their studies with a definite goal. Although this finding was applicable to the minority of student-teachers, it impacted on the study culture of the teacher education institution.
- The students experienced 'time stress' and as a result their acquisition of the required skills was superficial. This was also related to the teacher education curriculum, which was overloaded with several small courses.
- The variation of the student teachers' earlier learning experiences and learning styles was also influential.

According to Niemi (2002:772), obstacles in the applications of active learning from the student teachers' perspectives included the use of little interactive teaching methods that caused the students and the teachers to be passive; poorly-qualified teacher trainers; the perceived time-pressures of active learning which led to fatigue; and the passivity of the student teachers and their lack of meta-cognitive skills.

Niemi (2002:774) summarises some of the responses from primary school teachers and students in a study that he conducted. According to the teachers' perspectives, the obstacles to implement active learning were, namely too much content in the

curriculum and the shortage of time; large class sizes; unsuitable learning situations and resources; the students' lack of understanding of their meta-cognitive abilities; the negative attitudes of some teachers towards active learning; and the parents' traditional expectations regarding teaching and learning. The students' perspectives of active learning hindrances were related to the following, namely poor training; a lack of sufficient time; the large class sizes; weak learning situations and resources; the students' lack of understanding of their meta-cognitive abilities, and problems within the peer groups; the lack of the teachers' willingness to change their traditional ways of teaching; their lack of interest in the students' learning; and the lack of support from the parents. These issues were, however, not considered in this study.

As indicated, the issue of time was often mentioned. According to Yuen and Hau (2006:288), student-centred instruction usually takes up additional time in comparison to teacher-centred instruction. Thus, the teachers may be worried that the students would learn less by means of a constructivist teaching approach.

From this review the researcher can conclude that most of the challenges mentioned above are not directly related to the nature of the active learning-teaching methods, but that they are caused by three main sources. These sources are, namely school-related factors (such as the lack of resources, poorly-organised schedules, the lack of a conducive teaching environment, and an irrelevant curriculum that does not address the needs of the students); teacher-related factors (such as poor training in active learning strategies, the lack of experience, and the lack of enough time to prepare the lessons according to the active learning approaches); and student-related factors (such as a lack of enough experience in active learning, the lack of interest, and the lack of self-confidence for involvement in active learning).

The above exposition indicates that the negative attitudes of the teachers and the students to active learning play an important role to hinder its implementation.

This issue is addressed in the next section and will also be investigated empirically.

### **3.4 ATTITUDES TOWARDS STUDENT-CENTRED INSTRUCTION**

As mentioned in chapter 1 (see section 1.1), with the intention of enhancing learning in particular and bringing comprehensive change in the approach to teaching, in the political system (greater democratisation) and in the community in general, FDRE introduced educational reform in line with education worldwide.

The reform involved a paradigm shift from a teacher-centred, positivist approach, to a student-centred approach which is based on the constructivist learning theory. The Ethiopian government recognised and addressed this widely advocated theory of learning as the current global trend in educational practices. However, the implementation of the student-centred paradigm seemed to be facing problems, as revealed by different stakeholders. In particular, the problem may be related to the negative attitudes of students and teachers.

As will be indicated in the next sections, the findings on the students' and the teachers' attitudes towards active learning are seemingly diverse and not well-documented. Hence, as its main research question (see section 1.2), this study investigated the issue at different educational levels.

#### **3.4.1 The teachers' attitudes towards active learning**

Since the student-centred approach epistemologically rests on constructivist views (Lea et al., 2003:322; Yilmaz, 2011:211) which are widely advocated (Matthews, 1997:5), student-centred approaches reign superior over other teaching methods. However, research on the teachers' attitudes towards student-centred instruction is not conclusive (Machemer & Crawford, 2007:10).

Yilmaz (2008:43-44) conducted a research project on the teachers' attitudes towards student-centred teaching. He made use of middle and high school teachers of social studies as respondents. He determined that these teachers indicated positive attitudes towards student-centred instruction. The reasons why they favoured student-centred instruction were because student-centred instruction was attractive, connecting, challenging, and applicable to the students' actual life situations. In addition, the social studies teachers showed favourable attitudes towards constructivist approaches because constructivist teaching allowed them different opportunities for student learning; enabled teaching and learning processes to be life-long and attractive; forced the students to be active; and allowed the students to participate in the learning process.

Even though the paradigm shift from teacher-centred to student-centred teaching, in line with constructivist teaching, is generally said to be more interesting (Yuen & Hau, 2006:288), the paradigm shift leads to a shift in the teachers' roles from knowledge transmission to learning facilitation, supporting and promotion. This may lead to dissonance in professional teacher identities, which may have been built over a long period (Beijaard, Verloop & Vermunt, 2000:752). In addition, according to Drew and Mackie (2011:459-460), active learning may be difficult for some teachers because they are unfamiliar with the method. Even though they are key agents in discussing and endorsing active learning matters, they do not take a principal position. This may create negative attitudes towards active learning among the teachers.

In accordance with the above, Drew and Mackie (2011:460) reported that the teachers actively acquired different roles and responsibilities in line with active teaching. This change in roles could prove difficult for some teachers. The roles include those of promoter, examiner, leader, visionary, researcher, model producer, tutor, and collaborator. In this respect, active learning/teaching can be both challenging and fascinating for the teachers.

If the students are uncooperative when the lecturers start using active learning methods, and their course-end evaluation initially decreases, the lecturers may develop negative attitudes towards active learning. It is then tempting for the lecturers to give up and to return to their traditional teaching methods (Felder & Brent, 1996a:43).

### **3.4.2 The students' attitudes towards active learning**

Lea et al. (2003:331) conducted a study with undergraduate and postgraduate psychology students regarding their attitudes towards student-centred instruction. The study employed both qualitative and quantitative methods, using focus-group discussions and questionnaires to gather the data. The study revealed that the students generally showed favourable attitudes towards student-centred instruction. However, they commented negatively on the adequacy of the resources to implement this method and the lecturers' commitment to carry out the teaching practice with genuine interest. Thus, some students believed that the student-centred instruction was related primarily to political intentions, or for research purposes.

Lord (in Kinchin, Hatzipanagos & Turner, 2009:46) pointed out that student-centered instruction is related to the quality of learning, and the arousal of favourable student attitudes. In studies by Jungst, Licklider and Wiersema (2003) and Qualters (2001), it was ascertained that the students generally showed positive attitudes towards active learning, particularly when they were aware of the reason why the active learning techniques were being used. In contrast, some student perceptions in respect of active learning/teaching methods were poorer in comparison to traditional lecture methods (Lake, 2001).

From qualitative data obtained through focus groups, the students agreed with the notion that the learning and teaching processes were on a continuum. That is, the student-centred learning instruction was at one end, and teacher-centred instruction

was at the other end of the continuum. The students believed that there should be a balance between the two approaches. If the teacher-centred approach was dominant, the teaching could be very prescriptive. However, if the student-centred approach was dominant the teaching could be excessively 'open', and the students would feel uneasy and insecure (Lea et al., 2003:326). Lea et al. (2003:331) further found that the students viewed the traditional pedagogical prototypes of teaching as less inspiring and less effective than the student-centred methods.

A quasi-experimental study with undergraduate freshmen science students by Oliver-Hoyo and Allen (2005:949) identified which active learning methods positively affected the students' attitudes. These active learning environments included four elements, namely cooperative learning, hands-on activities, real-world applications, and engaging technology. The interaction of these elements facilitated significantly positive changes in the students who had been exposed to the approach.

Furthermore, by implementing different types of active learning activities during seminar sessions with undergraduate students at the Hong Kong Poly Technique University, Sivan et al. (2000:387) investigated the importance of active learning for student course performance and learning processes. They identified a significant enhancement of interest in the subject being taught. Similarly, Michael (2006:160) explained that well-implemented student-centred instruction can create more positive attitudes towards the subject being taught.

As has been mentioned (see section 3.4.1), similar to the issue of the teachers' attitudes towards active learning, evidence regarding the attitudes of the students towards active learning is not conclusive.

Thus, this study is geared towards the investigation of the students' attitudes towards active learning at different educational levels in Hawassa, Ethiopia.



### **3.5 SUMMARY**

This chapter presented empirical evidence of the effect of different teaching methods with the focus on student-centred instruction, and of the teachers' and the students' attitudes towards active learning. Currently there are many different teaching methods which can be considered in teaching. As several researchers and educationalists agree, teachers need to choose between these methods on the basis of grade levels (Pierce & Kalkman, 2003:127), level of cognitive development, prior knowledge, the subject area, the nature of the content, and behavioural constructs (Nilson, 2010:106-7).

Teacher-centred methods emphasise the cognitive domain, and thus the memorisation of facts. This causes student boredom and a lack of interest in learning in both the natural and the human sciences. Thus, the researchers suggest active learning strategies. These strategies are based on sound psychological learning principles (Ediger, 2009:324; Yilmaz, 2008:47). Active learning enhances the cognitive abilities, such as critical thinking, problem-solving, the activation of prior knowledge, knowledge-construction, the deep processing of knowledge, insight, and the long-term retention of information (Felder & Brent, 1996a:43; Kim et al., 2013:231; Felder & Brent, in Lea et al., 2003:323; Michael, 2006:160; Sivan et al., 2000:388; Yuen & Hau, 2006: 288).

Research results regarding the teachers' and the students' attitudes towards active learning (in Ethiopia and internationally), are inconclusive. Some research results report that the teachers indicated positive attitudes towards student-centred instruction (Yilmaz, 2008:43-44), whereas other studies revealed that the teachers showed resentment towards active learning because of the impact it has on the roles they have to play (Yuen & Hau, 2006:288). Similarly, some studies found that the students generally revealed favourable attitudes towards active learning (Lake, 2001). However, because of a lack of resources at school and a lack of commitment

from the teachers, many students were sceptical towards student-centred approaches (Lea et al., 2003:331).

Concerning the challenges related to the implementation of active learning approaches, a number of researchers pointed out several concerns. Most of these concerns are related to a lack of knowledge of active learning, and limited experience in the use thereof.

### **3.6 CONCLUSION**

Chapter 3 presented empirical evidence of the use of different teaching methods in various subject areas, and of the students' and the teachers' attitudes towards active learning. The chapter presented the effects of individualised instruction, the relationship between active learning and learning styles-matched instruction, the effects of active learning on the students' learning outcomes, challenges with the implementation of active learning, and the status of student-centred instruction in Ethiopia.

In chapter 4 the researcher will explain the research design that will be employed in the study to answer the research questions stated in section 1.2.

# CHAPTER FOUR

## THE RESEARCH DESIGN

### 4.1 INTRODUCTION

In chapter 3 the researcher discussed the literature that dealt with empirical evidence on the types of teaching methods that teachers use, student-centred instruction in particular, and attitudes towards active learning.

Chapter 4 explains the research design in detail. The explanation includes the ethical considerations of the study, the hypotheses that were stated in relation to each research question, the research design, population and sampling, the instruments for data-collection, validity and reliability, the pilot study, and methods of data-analysis.

### 4.2 ETHICAL CONSIDERATIONS

According to the American Heritage Dictionary, a system of *ethics* is a set of “standards governing the conduct of a person or the members of a profession” (in Goodwin, 2010:40). In conducting research in psychology and education, the ethical considerations are very critical for the well-being of the respondents and for the proper handling of the data so that the research results may be valid and reliable. Research making use of human respondents, in particular, requires consideration in respect of judging the benefits and costs of the research to the respondents, their informed consent and the handling of the respondents during and after the study has been completed (Goodwin, 2010:46).

#### **4.2.1 Judging the benefits and the costs of the research**

Researchers usually have certain expectations of the individuals that participate in a study. At the very least, the respondents spend their time in participating in an experiment, or in responding to written or oral questions asked by the researcher. Even if it is not intentionally intended to inflict harm on the respondents, with their mere enthusiasm to achieve scientific results, researchers may sometimes put respondents at risk. In order to avoid this, and to ensure the safety of the respondents, research that is registered at certain higher education institutions is required to be monitored by the legal body that has been constituted by that institution (Goodwin, 2010:46-48). In this case the researcher has been obliged to obtain approval for his research design, including for the data-gathering procedures, the instruments, and the sampling techniques, from his promoter, as well as from the Ethical Review Board of the College of Education at the University of South Africa. This approval was granted (see Appendix B for the ethical clearance certificate).

#### **4.2.2 Informed consent**

*Informed consent* means telling the respondents and also their parents (if the respondents are younger than 18 years old) in advance what will happen in the study and how the results will be used (Abelson, Frey & Gregg, 2004:xii). Informing the respondents about all the procedures and the purpose of the research could influence their involvement in the research. It may influence the results of the research negatively or positively (Ferguson & Bibby, 2004:120). Sometimes, in the case of research in social psychology, revealing all the details of the study to the respondents could lead to the concealment of the true behaviour of the respondents (Goodwin, 2010:51-52). In such situations it may be rational to conceal certain aspects of the research from them. In this case, it would be necessary to share the research intention with the relevant Ethics Committee and obtain advice about the ethics of such an approach before launching the research. The respondents should,

however, be fully briefed at the end of the research project (Ferguson & Bibby, 2004:120).

Since this study did not involve any deception, all the procedures and goals of the research were shared with the respondents and the parents of those children who were younger than 18 years, and their consent was requested. The respondents were also informed that they have the right to withdraw from the study at any time without any kind of penalty. Finally, after the study was completed, the research results would be communicated to the relevant interest groups in the form of a summary.

#### **4.2.3 Anonymity and confidentiality**

*Anonymity* is one of essential principles of research ethics. This means that the respondents would remain unidentified throughout the study, if possible, even to the researcher. *Confidentiality* refers to respondents' right to obtain the assurance that "identifying information will not be made available to anyone who is not directly involved in the study" (Trochim, 2006:24). The reason why the anonymity of the respondents is assured is to try and ensure that the individuals disclose what they actually think and feel. This is particularly true when they are asked about sensitive issues (Abelson et al., 2004:139).

During the discussion with the respondents about the procedures and goals of the research, they were encouraged to complete the questionnaires without any reservation, because they were told that this would be done anonymously.

### **4.3 RESEARCH QUESTIONS AND HYPOTHESES**

The main aim of this study was to investigate the students' learning styles and attitudes towards active learning methods.

Accordingly, the following variables were identified as being important for the study:

- learning styles (according to the Felder-Silverman Learning Style Model, the students' learning styles were categorised into active-reflective, sensing-intuitive, visual-reflective, and sequential-global dimensions);
- attitude (classified from positive to negative);
- gender, either male or female;
- grade level, which includes Grade 10 and second year university level;
- type of school, either public/governmental or private/non-governmental.

The above variables were examined in order to answer the research questions stated in sections 1.2 and 1.3.

The main research question of the study is:

*What are Ethiopian students' learning styles and attitudes towards active learning approaches?*

On the basis of the main research question, the following specific research questions and hypotheses were stated:

Specific research question 1:

What are the learning styles of students at Grade 10 public schools, Grade 10 private schools and second year university-level, and do the students have significant preferences for certain learning styles?

Hypothesis:

Grade 10 public school students, Grade 10 private school students and second year university-level students have significant preferences for certain learning styles.

Justification: "Learning styles are conceptual, cognitive, and behavioural patterns which are exposed to time and duties", according to Ballone and Czerniak (2001:3) so that, depending on the personal experiences and duration of specific learning

situations, the students' learning styles will vary from student to student on the four dimensions, namely active-reflective, sensing-intuitive, visual-verbal, and sequential-global.

Specific research question 2:

What are the attitudes of students at Grade 10 public schools, Grade 10 private schools and at second year university-level towards active learning approaches?

Hypothesis:

The students' attitudes can vary on a continuum from extremely negative on the one end to extremely positive on the other end. It can be hypothesised that some groups of students may have significant preferences for certain learning styles above others - in regard of being 'active' or 'reflective', 'sensing' or 'intuitive', 'visual' or 'verbal', and 'sequential' or 'global'.

Justification: A number of researchers have conducted studies on the students' preference of learning styles, and came up with different results. For example, Livesay et al. (in Felder & Brent, 2005:61) conducted a study in respect of second year engineering students' preference of the ILS dimensions, and the results showed significant preferences towards the 'active' (62%), 'sensing' (60%), and 'visual' (88%) dimensions rather than towards the 'reflective' (38%), 'intuitive' (40%), and 'verbal' (12%) dimensions; and showed no significant difference between the 'global' (48%), and the 'sequential' (52%) dimensions. In another study, Rosati (in Felder & Brent, 2005:61) conducted a study in respect of fourth year engineering students' preference of the ILS dimensions, and the results revealed significant preferences towards the 'active' (72%), 'sensing' (58%), 'visual' (81%), and 'sequential' (63%) dimensions, rather than towards the 'reflective' (28%), 'intuitive' (42%), 'verbal' (19%), and 'global' (37%) dimensions.

Specific research question 3:

Are there significant relationships between the students' learning styles and their attitudes towards active learning?

Hypothesis: There is a significant relationship between the learning style preference of students and their attitudes towards active learning.

Justification: As Dewar and Whittington (2000), and Nussbaum (2002) indicated in their studies (in Jeong & Lee, 2008:653), the active/reflective dimension of individual learning styles may have a direct effect on the active learning with regard to attitude to collaborative learning. Students with active learning styles like cooperative problem-solving practices, and thus prefer to brainstorm in a group, and to develop ideas by participating in physical activity. Thus, students with active learning styles could have positive attitudes towards active teaching methods.

Specific research question 4:

Are there significant differences in the learning style and attitude towards active learning between the different groups of students (e.g., gender, different education levels, and type of school)?

The following hypotheses may be stated from this research question:

Hypothesis 4a: Regarding students' learning styles

There are significant differences in the learning styles of male and female students, of the students at different grade levels and of the students attending different types of schools (public and private).

Justification: Some researchers indicate that the learning style preferences of males and females differ. For example, a quantitative meta-analysis of Kolb's Learning Style Inventory and the "Entwistle's Approaches" showed that men were more interested in abstract conceptualisation than women (Severiens & Ten Dam, 1994:498) (see section 3.3.4).



In respect of learning style variation across grade levels, the students may shift from one type of learning style to another as time passes (Coffield et al., 2004(b):4; Price, 2004). Grade 10 and second year students were chosen because these groups of students are old enough to be able to understand the questions in the questionnaire, and would be able to reflect on what learning styles they adopt, and what teaching methods they prefer and enjoy. At the same time, the gap between the two groups was wide enough to be able to accommodate differences that may develop with age.

Observation has indicated that the private schools in Ethiopia, in general, have better qualified teachers, are better resourced and have smaller classes than the public schools, thus the use of teaching methods in the two school types may be different. From this it follows that the learning styles may also be different between the school types (see section 4.4.2 and Hypothesis 4b below).

#### Hypothesis 4b: Regarding students' attitudes

There are significant differences between the male and female students towards active learning, between the students at different grade levels and between the students at different types of schools (public versus private schools).

Justification: Regarding gender variation in attitudes towards active learning, as studies indicated, female passivity is often appreciated in some cultures in the schools. Therefore, girls in junior and high schools are less probable to take part in class discussions. In the case of group-work, the girls are less probable to be chosen as leaders and presenters of the groups' ideas than the boys. That is, men's behaviour patterns are frequently very active, but women's are often described as passive (Rolon, 2012: 953). Thus, boys could have more positive attitudes towards active learning than girls.

As Gottschall and Garcia-Bayonas (2008), Luntungan (2012: 50) and Sadi and Cakiroglu (2011:95) reported, the teaching methods used in the classrooms affect

the students' attitudes towards the class. That is, students who participated in small group cooperative learning showed more positive attitudes towards active learning than those who learned in a lecture group. Moreover, in respect of the differences in attitude towards active learning by school type, as was mentioned in section 4.4.2, the private school population has been characterised by having teachers who are better qualified than the public school teachers, and are also better resourced. Thus, the teachers could use a greater variety of instructional methods. Therefore, the students from these two school types could differ significantly in their attitudes towards active learning.

## **4.4 THE RESEARCH DESIGN**

### **4.4.1 A quantitative research approach and design**

Research methods in the social sciences are often quantitative. A quantitative research approach involves the gathering of numerical data, such as average scores from different respondents on some type of behaviour or activity, or the calculation of percentages of people who exhibit a given behaviour or perform a certain task. This data can be presented in the form of graphs and tables (Goodwin, 2010:89).

A *research design* is a plan for achieving the research purposes and for solving the research problems. More specifically, it is the main guideline that indicates the techniques and processes for gathering and examining the data. Furthermore, it illustrates whether the data are gathered in a way that is suitable for the questions asked (Adams, Khan, Raeside & White, 2007:81). The *research design* indicates the variables that are studied, the sampling procedures, the research context, the data-gathering approaches, and the data-examining techniques (Kalaian, 2008:724).

This study employed a survey design. A survey design is classified under non-experimental or descriptive research, which is a quantitative design. It is a scientific investigative technique to gather data from respondents, using questionnaires. It is

among the commonly used non-experimental research designs used in the social sciences to gather information from a relatively small group of people taken from the population (Kalaian, 2008:725-728). The study was also descriptive and exploratory. It was said to be descriptive because descriptive statistics, such as average scores or correlation was used. It was exploratory because research on learning style and attitudes towards active learning had not yet been conducted in the particular setting that it was used in this study. Thus, the design was a survey, but it was also descriptive and exploratory.

Important variables include 'learning style' and 'attitude towards learning'. When hypotheses with regard to the significance of the differences between different genders, grades and school types were tested, gender, grade and school type were the independent variables, while 'learning style' and 'attitude towards learning' were the dependent variables.

#### **4.4.2 The population**

In Hawassa there are 21 secondary schools (7 public and 14 private schools) and one university. The study involved Grade 10 public secondary schools, Grade 10 private secondary schools, and second year university students. Primarily, the study involved public and private schools because both populations have different characteristics. As noted, private schools generally appointed more experienced and better qualified teachers, since they were more able than public schools to negotiate better salaries and other allowances for the teachers. Secondly, private schools generally also have better facilities. Thus, private schools are better able to provide quality education in general, and active learning approaches in particular.

The choice of the grade levels was done on the basis of the characteristics of the students at the grade levels. Secondary school students were chosen because of the adolescent age of the students. It is at this age that their cognitive development allows them to think abstractly (Slavin & Whitten, 2006). This may indicate that they

will properly respond to the questionnaires. Grade 10 was selected to allow for a relatively wide gap between the primary and the secondary school levels. However, Grade 10 was not yet on the senior secondary level. According to the curriculum in Ethiopia, the senior secondary level is a preparatory level, which means that it has both the secondary school and university characteristics. Second year university students were included because at this level students should be familiar with university instruction.

The number of Grade 10 students by school type and gender are presented in Table 4.1 according to the statistical abstract (Hawassa City Administration Education Department [HCAED], 2013/14).

**Table 4.1: The number of Grade 10 students in Hawassa city by school type and gender**

School Type	Grade 10	
	M	F
Private	1096	884
Public	2363	2273
Total	3459	3157

Table 4.1 indicates that there are a few more boys than girls in both school types.

#### **4.4.3 Sampling**

Generally speaking, sampling is the procedure of choosing elements for research from a population so as to make inferences about that population if the sample is representative of the population. Samples can be chosen in different ways (Tucker, 2005:385). However, in this study, purposive sampling was used. *Purposive sampling* is a deliberate, non-probability and convenient sampling method (Kothari, 2004:15). Purposive sampling also involves different sub-types, such as different

genders or grades (Adams et al., 2007:90). Thus, as Battaglia (2008:646) noted, it is often called an *expert* sample. A purposive sample is not representative of a population, and therefore generalisations will be made with extreme caution.

The sampling method is also convenient. Researchers differ from one another in their views of and description of purposive and convenient sampling. For example, Battaglia (2008:148) considers *convenience sampling* as different to *purposive sampling*, but Soriano (1995:39) considers *convenience sampling* as also being based on the researcher's judgement. Convenience sampling can also be seen as selecting a school that is accessible and conveniently located for the researcher, for example in the same city as where the researcher is located.

As noted, (HCAED, 2013/14) Hwassa city has 21 secondary schools, of which 7 are public (public schools are also known as *government schools* or are managed by the government) and 14 private. Of the 7 public schools, two secondary schools are located in the semi-urban area which was recently included within the newly delineated city administration zone. The sample did not include these schools because the population may have had different characteristics to the other schools which are located in the urban section. Of the five remaining public secondary schools, one school, and of the 14 private secondary schools, three schools were purposely selected for inclusion in the sample. More private schools than public schools were selected since the number of students was less in the private schools than in the public schools. For ethical reasons, the schools were not identified in print. The schools were called School A, B, C, and D. The numbers of the students in each selected school is presented in the Table 4.2 and 4.3.

**Table 4.2: The number of Grade 10 students in the three selected private schools in Hawassa**

	<b>Grade 10</b>	
<b>Secondary Schools</b>	<b>M</b>	<b>F</b>
School A	39	52
School B	123	67
School C	48	47
<b>Total</b>	<b>376</b>	

**Table 4.3: The number of Grade 10 students in one selected public school in Hawassa**

	<b>Grade 10</b>	
<b>Secondary School</b>	<b>M</b>	<b>F</b>
School D	429	412
<b>Total</b>	<b>841</b>	

According to Bartlett, Kotrlik and Higgins (2001:46), the determination of sample size requires a consideration of the roles of the variables in the study. If a categorical variable plays a principal role in data-analysis, the researcher should use categorical sample size formulas. Since many of the relevant variables in this study were categorical, it was appropriate to use a categorical sample size formula. Cochran's sample size formula for categorical data, presented by Bartlett et al. (2001:46), is as follows:

$$\underline{n}_0 = \frac{(t)^2 * (p)(q)}{d^2}$$

Where  $t$  = the critical value for the alpha level of 0.05 in each tail (two-tailed test) is 1.96 (when performing a two-tailed test alpha is divided into half and 0.025 area is placed in each tail)

$p$  = maximum possible proportion (0.5)

$q$  = 1- maximum possible proportion (0.5)

$(p)(q)$  = estimate of variance = 0.25 (produces maximum possible sample size)

$d$  = acceptable margin of error for proportion being estimated = 0.05

$n_0$  = required return sample size according to Cochran's formula

The required return sample size is calculated by using the above formula

$$n_0 = \frac{(1.95)^2 * (0.5)(0.5)}{0.05^2} = 380$$

In order to calculate the required sample size Cochran's (in Bartlett et al., 2001:46) correction formula should be used to calculate the final sample size.

$$n = \frac{n_0}{(1 + n_0/\text{population})}$$

On the basis of this formula, the sample sizes that were taken from the selected secondary schools by gender and school type are given in Table 4.4. These samples were collected by allocating the number of individuals to the selected schools according to their proportions.

**Table 4.4: The sample size of Grade 10 public and private schools by gender**

<b>Grade Levels</b>	<b>M</b>	<b>F</b>
Grade 10 private school	135	116
Grade 10 public school	202	198
Total	337	314

The total sample size should then be at least 337 plus 314 which is 651. However, by discarding questionnaires with problems the actual sample size obtained were 649. Furthermore, the second year students in one college<sup>1</sup> at Hawassa University were included in the study.

**Table 4.5: The second year students at Hawassa University by gender**

<b>College</b>	<b>M</b>	<b>F</b>
E	283	152
Total	435	

From the total of 435 second year students of the selected college at Hawassa University (Table 4.5), 271 (158 male and 113 female) students finally participated in the study.

This means that in total, for the entire study, 649 secondary school students and 271 university students (920 students in total) participated in the study.

#### **4.4.4 The data-collection instruments**

The study used two questionnaires integrated into one questionnaire with different sections (See Appendix A). The first section (questions 1 and 2) determined the students' gender, grade level and school type. The two following sections were used to determine learning style (Index of Learning Styles [ILS]), and the students' attitudes toward active learning (SATAL). These were determined by questions 3 to 46, and 47 to 106 respectively.

Both the secondary school students and the university students responded to the English version of the questionnaire.

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<sup>1</sup> At the Hawassa University structure the term “college” is used to refer to a “faculty” level at other universities.



#### 4.4.4.1 Index of Learning Styles

The ILS was developed by Richard M. Felder and Barbara Soloman (Felder & Solomon, 1994). It was used to identify the students' preference of learning styles. The questionnaire was developed on the basis of a model of eight variables constructed on four dimensions. The dimensions are active-reflective, sensing-intuitive, visual-verbal, and sequential-global. Each dimension runs horizontally and independently with no clear influence on the other dimensions (i.e., it is orthogonal). However, as research by Felder and Spurlin (2005: 108) on the validity of the instrument indicated, three of the dimensions (active-reflective, sensing-intuitive, and visual-verbal) are fairly orthogonal (independent), whereas the sequential-global and sensing-intuitive dimensions appear to be correlated moderately.

The questionnaire consisted of 44 items - 11 items were constructed to measure each dimension, and is presented as Section B of the questionnaire. The students responded to each item by selecting one of two options. For example, the item "I understand something better after 'I have tried it out' or 'thought it through'" are the two options between which the students should choose.

The items measure the different dimensions, as shown in Table 4.6.

**Table 4.6: The distribution of items on each dimension in the questionnaire**

<b>Dimensions</b>	<b>Number of items</b>
Active-reflective	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Sensing-intuitive	14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
Visual-verbal	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
Sequential-global	36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46

According to Felder and Soloman (1994), the interpretation for each dimension is as follows:

- If the score on a scale is 1-3, the respondent is fairly well-balanced on the two dimensions of that scale.
- If the score on a scale is 5-7, the respondent has a moderate preference for one dimension of the scale and will learn more easily in a teaching environment which favours that dimension.
- If the score on a scale is 9-11, the respondent has a very strong preference for one dimension of the scale. The respondent may have real difficulty in learning in an environment which does not support that preference.

#### **4.4.4.2 The students' attitudes towards active learning**

Section C of the questionnaire on the students' attitude towards active learning (SATAL) was developed on the basis of the review of related literature (see section 2.5.1 to 2.5.5). The attitude section of the questionnaire uses a Likert-type response scale, as follows: 0 = not applicable; 1 = definitely disagree; 2 = disagree; 3 = neutral; 4 = agree, and 5 = definitely agree. The questionnaire contains 60 items that focus on six constructs, namely cooperative learning, problem-based learning, self-directed learning, discussion methods, discovery learning, and inquiry learning. The number of the items corresponding to each construct is presented in the Table 4.7.

**Table 4.7: The number of items under each construct in the questionnaire**

<b>Constructs</b>	<b>Number of items</b>
cooperative learning	47, 48, 49, 50, 51, 52, 53, 54, 55, 56
problem-based learning	57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73
self-directed learning	74, 75, 76, 77, 78, 79, 80, 81, 82
discussion methods	83, 84, 85, 86, 87, 88, 89, 90
discovery learning	91, 92, 93, 94, 95, 96, 97, 98, 99
inquiry learning	100, 101, 102, 103, 104, 105, 106

#### **4.4.5 The data-collection procedure**

The data-collection process was carried out in 2014 in the selected secondary public and private schools in Hawassa city and at Hawassa University. The data-gathering process was conducted during class-time with the permission of the schools, and the college. This was done after a detailed explanation of the research goals and purposes of the research was given to the students, and after obtaining the school students' and their parents' informed consent. The data were collected by using the abovementioned ILS and SATAL questionnaires. The students were also given clear verbal instructions on how to complete the questionnaires.

#### **4.4.6 Validity and reliability**

“The term validation usually refers to the processes of establishing the validity and reliability of an instrument” (Cheung, 2013:233).

These important psychometric qualities are discussed next.

#### 4.4.6.1 Validity

According to Messick (in Moss, 2010: 1590), *validity* is defined as an integrated, evaluative decision of the extent to which practical evidence and theoretical foundations substantiate the sufficiency and suitability of interpretations and measures based on test scores or other kinds of measurements. With regard to ILS, factor analysis results concluded that the scales of the model measured separate qualities according to its theoretical prediction. This means that the ILS has construct validity. Other types of questionnaire validity relevant to this research are content validity and face validity (Carmines & Woods, 2004:1172).

- *Content validity*: is the extent to which an assessment instrument covers the content area that it is intended to measure. An assessment is said to have high content validity when the content of the assessment matches the goals of assessment and with dominant concepts of the subject area measured (Sireci, 2003:1076). The content validity of the learning style questionnaire has been evaluated several times since it has been used by various researchers worldwide.

The content validity of the 'attitude towards active learning' section is based on the judgments of experts about the relationship between the contents of the test items and the defined domain (De Gruijter & Van Der Kamp, 2007:105).

- *Face validity*: is a part of content validity and, according to researchers (Mokkink, Terwee, Patrick, Alonso, Stratforth, Knol, Bouter & De Vet, 2010:743), it refers to, "the degree to which a measurement instrument, indeed, looks as though it is an adequate reflection of the construct to be measured". It deals with whether items in an assessment tool, on the face of it, appear to address the constructs/variables under investigation. In this study, for example, relevant experts (such as the researcher's promoter and the Ethical Clearance Committee), agreed that the items of the SATAL tested

the students' attitude towards active learning. In this way the items were considered to be suitable to measure the intended variable, and therefore had face validity (Cappelleri, Zou, Bushmakin, Alvir, Alemayehu & Symonds, 2013:34).

#### **4.4.6.2 Reliability**

Reliability, according to Gushta and Rupp (2010:1238), is a required property of the scores or responses obtained from assessment tools such as multiple-choice formats of achievement tests and of Likert-type scales of survey questionnaires such as used in this study. Reliability is used to quantify the level of accuracy of the measurement instruments over several repeated administrations or replications and, thus, the credibility of the scores or responses obtained by the assessment tool.

With regard to the ILS, the following has been noted in the literature. According to Felder and Spurlin (2005), the test-retest reliability coefficients of the instrument were between 0.7 and 0.9 and all the coefficients were significant at 0.5 level. Zywno (2003) indicated that a test-retest reliability depicted a strong to moderate correlation coefficient for the scales.

Reliability can also measure the internal consistency of a questionnaire. This is the degree to which the items in a multi-item assessment tool measure a similar construct (Cheung, 2013:253; Ebel & Frisbie, 1991:81-85). The internal consistency of the assessment instrument (questionnaire) used in this research, is estimated by a split-half method called the Cronbach alpha method (Cheung, 2013:254). This internal reliability of the dimensions ranged from 0.53 to 0.70, which is within the acceptable limits for an exploratory study.

However, before the questionnaire could be used with the sample, a pilot study was conducted.

#### 4.4.7 The pilot study

Before despatching the questionnaires to obtain the data for the main study, a pilot study was conducted. The questionnaire was administered to about 10 students who would not participate in the main study. Their age group was similar to the youngest group relevant to this study. The purpose of the pilot study was (1) to scrutinize the effectiveness of the questionnaire items in respect of the appropriateness of the wording and the clarity of the items; (2) to determine how much time was needed to complete the questionnaire. To this end, according to the responses from the pilot test respondents, the modifications that have been done on the learning style questionnaire and the attitude questionnaire are given in Table 4.8.

**Table 4.8: The parts of the attitude questionnaire where the modifications were made after the pilot test**

Item no.	Words and phrases requested by the pilot test respondents for modification (on the attitude questionnaire)	Modifications incorporated
56	Team-work <u>enhances</u> my understanding of the learning tasks.	Team work <u>increases</u> my understanding of the learning tasks.
58	Problem-based learning helps me to connect my <u>prior</u> knowledge with new information.	Problem-based learning helps me to connect my <u>earlier</u> knowledge with new information.
59	To solve a problem I can combine ideas from different <u>disciplines</u> .	To solve a problem I can combine ideas from different <u>subjects</u> .
71	Learning through problem-solving improves my <u>reflection</u> on the learning material.	Learning through problem-solving improves my <u>thinking about</u> the learning material.

**Table 4.9: The parts of the learning style questionnaire where the modifications were made after the pilot test**

Item no.	Words and phrases requested by the pilot test respondents for modification (on the learning style questionnaire)	Modifications incorporated
11	have "group brainstorming" where everyone contributes ideas = 1	have everyone to contribute ideas = 1
12	<u>Outgoing</u> = 1 <u>Reserved</u> = 2	easy to talk to = 1 shy to speak to others = 2
14	I <u>would rather</u> be considered Realistic = 1 <u>Innovative</u> = 2	I <u>prefer to be</u> considered Realistic = 1 <u>Inventive</u> = 2
22	I consider it higher praise to call someone Sensible = 1 Imaginative = 2	I like to be called Reasonable = 1 Creative = 2
36	understand details of a subject but may be <u>fuzzy</u> about its overall structure = 1 understand the overall structure but may be <u>fuzzy</u> about details = 2	understand details of a subject but may be <u>confused</u> about its overall structure = 1 understand the overall structure but may be <u>confused</u> about details = 2
40	<u>lay out</u> the material in clear sequential steps = 1	<u>put</u> the material in clear sequential steps = 1
41	<u>in fits and starts</u> . I'll be totally confused and then suddenly it all " <u>clicks</u> " = 2	<u>Sometimes</u> , I'll be totally confused and then suddenly I <u>understand</u> = 2

Secondly, to assure the important psychometric property of the instruments (ILS and SATAL), the reliabilities of these instruments were computed from the sample and the final data. The reliabilities obtained from the sample data were 0.664 and 0.969; and the reliabilities obtained from the final data were 0.588 and 0.935 respectively.

As for Cheung (2013:254), this coefficient between 0.5 and 0.7 for ILS is within the acceptable limit, whereas the alpha coefficient of 0.9 for SATAL is very high.

Finally, the time needed to answer the questionnaire was indicated as between 34 and 44 minutes.

#### **4.4.8 Data-analysis**

Quantitative statistical analysis is mainly classified into descriptive and inferential statistics. Both types of statistics were used in this study. *Descriptive statistics* is a technique that describes a group of data for a given category or sample to explain one of the characteristics of that category only. That is, it permits the researcher to use the data to generally characterise the specific group that is investigated, irrespective of predicting about another group from which the data were not obtained (Black, 2002:97; Burton, 2000:363). It is an important tool to understand and condense the data.

Descriptive statistics, such as average scores, can be presented in the form of a table or a graph (Adams et al., 2007:171-172). *Inferential statistics*, on the other hand, enables the researcher to predict or deduce some conclusion about the characteristics of the population from which the sample was drawn (Burton, 2000:363).

Descriptive statistics was used to analyse the demographic data of the students (gender, grade levels and school type). Descriptive statistics (frequency and average scores) was also used for research question 1 that focuses on the learning styles of the different groups. (Inferential statistics were also used to test hypothesis 1.)

The descriptive statistics of the attitude scale (composite scores and mean) were also calculated to determine students' attitude towards active learning for research question 2.



In the case of research question 3, point-biserial correlation (including its level of significance test) was computed between the students' response on the learning style dimension (e.g., active-reflective learning styles) and their attitude scores (Kraemer, 2004). This enabled the researcher to determine the extent of the relationship between the students' learning styles and their attitudes towards active learning (which reconsidered research questions 1 and 2).

#### **4.4.8.1 Analysis of variance (ANOVA)**

ANOVA was used to test the significance of the differences between the means of the students' attitudes towards specific learning methods (self-directed learning, problem-based learning, discovery learning, the discussion method, cooperative learning and inquiry learning) under research question 2. According to Cornfield and Tukey (in Gelman, 2005:2), among other functions, ANOVA involves the comparison of mean scores, together with F-tests, which permit the testing of a nested sequence of models. The ANOVA procedure involves an estimation of the significance of the difference between means of groups of data, and the difference within groups of data, and then comparing the between-group difference to the within-group difference (Trumpower & Atas, 2014:297). That is, the ANOVA shows whether the observed difference between groups is because of the effects of random factors or of the actual hypothesised effect. Thus, the ratio of between-group to within-group difference shows the actual hypothesised effect in relation to the effect of random factors. This ratio is known as the F-ratio.

The ANOVA can be classified as one-way, two-way and multiple. A one-way ANOVA is used to analyse the impact of one nominal variable as independent variable on a quantitative variable as the dependent variable. A two-way ANOVA is used to test the effect of two independent, nominal variables on one dependent, quantitative variable. And when the intention is to see the effect of three or more independent variables on a single quantitative variable, it can be called *three-way* or *multiple analysis of variance* (Iversen, 2004:12-15; Lesik, 2009:309). In this study a

one-way analysis of variance was conducted. The nominal variables (gender, grade levels and school types) were used as independent variables, and the students' average attitudes towards active learning were the dependent variable. These nominal variables were considered separately against the students' attitudes because there was no hypothesis stated about their inter-related effect on the dependent variable, due to the absence of adequate support in the literature.

Regarding specific research question 4, in order to explore the significance of the differences between boys and girls, and the students of different grade levels and types of schools, the means of the attitude scores was computed first. To determine the significance of the differences between the gender groups and types of schools, an independent sample t-test was calculated. To examine the significance of the differences among the grade levels and school types, a one-way analysis of variance (ANOVA) was explored and one of the ANOVA assumptions (homogeneity of variances) found violated. Thus, instead of ANOVA, the alternative statistical measure – Kruskal-Wallis was used. Likewise, to determine the attitude of the students towards specific active learning methods ANOVA was used even if the homogeneity assumption was violated because the results of ANOVA and Kruskal-Wallis were the same. That is, the assumption violation did not affect the result, so that it indicated the ANOVA is a robust statistical method (Field, 2009:382-391). In this case ANOVA was preferred because it allows for *post hoc* tests. Finally, all the tests were conducted on the 0.05 level of significance.

#### **4.4.8.2 Correlation analysis**

For research hypothesis 3, correlation was used, as indicated. Correlation is one of the descriptive statistics which is used to test the degree of the relationship between two or more variables (usually indicated as the X variable or the predictor variable, and the Y variable or the criterion variable) (Sheskin, 2003). This measure is also called *product moment* or *Pearson product moment* correlation (Kotz, Read, Balakrishnan, & Vidakovic, 2006:1). Pearson's *r* is called the *product-moment*

*correlation* because it is computed from the product (multiplication) of the deviations of the two variables (Chen, & Popovich, 2002:10). Pearson's  $r$  is about the linear relation between the variables and may well be stated as a coefficient of a linear correlation (Kotz et al., 2006:1).

The correlation coefficient or the value achieved by calculation is denoted by the letter  $r$ . The  $r$  value always lies between -1 and +1. The magnitude shows the level of the relationship and the sign indicates the direction of the relationship. If the coefficient approaches 1 (in any of two directions), this depicts a strong relationship, and if it approaches 0, it shows a weak relationship. With regard to its sign, a negative sign indicates an inverse relationship. This means that as the value of one variable increases the value of the other variable decreases. Likewise, the positive sign shows a direct relationship. That means that both variables either increase or decrease (Sheskin, 2003). In this research, the focus was on the correlation between 'learning style preference' and the 'attitude towards active learning' of the students, and whether this correlation was significant or not.

#### **4.4.8.3 Chi-square analysis**

Hypothesis 1, which is based on Question 1, states that the different groups have significant preferences for certain learning styles above others. This hypothesis was tested by means of chi-square analysis. To run the chi square tests on the Statistical Packages for the Social Sciences (SPSS) version 20, both cross-tabulation and non-parametric chi square tests were employed at different situations. The different groups were the students at grade 10 public schools, grade 10 private schools, and second year university students. The dimensions are in terms of being active-reflective, sensing-intuitive, visual-verbal and sequential-global.

With regard to research question 4 that focuses on the significance of the differences in learning style between the different groups of students, chi square analysis was also conducted, in addition to Kruskal-Wallis.

## **4.5 CONCLUSION**

This chapter dealt with the research design. The researcher explained ethical issues during data-collection, the measuring instruments that were used in the data-collection, the data-collection procedures, and the data-analysis techniques.

In the next chapter (Chapter 5) the results will be presented. The results will also be discussed and interpreted in the light of the theoretical framework presented in chapters 2 and 3.

## **CHAPTER FIVE**

### **THE RESULTS AND A DISCUSSION OF THE RESULTS**

#### **5.1 INTRODUCTION**

In Chapter 4 the research design was discussed. This included the types of variables, the research questions with their related hypotheses, the data-collection instrument and the methods of data-analysis, and the ethical considerations of the study.

The study aimed to investigate students' learning styles and attitudes towards active learning, and to ascertain whether they had significant preferences over others. The correlation between learning style and attitude towards active learning was also determined. In addition, the study examined whether significant differences existed between students of different genders, levels of education and type of school as regards the abovementioned variables.

In chapter 5 the researcher aims to answer the research questions by presenting the results in the form of tables and figures. The tables and figures illustrate which kinds of learning styles were dominant, the students' attitudes towards active learning, and the status of these two variables across grade levels, school types and gender groups. Finally, a discussion of the results and a summary of the main results will be presented.

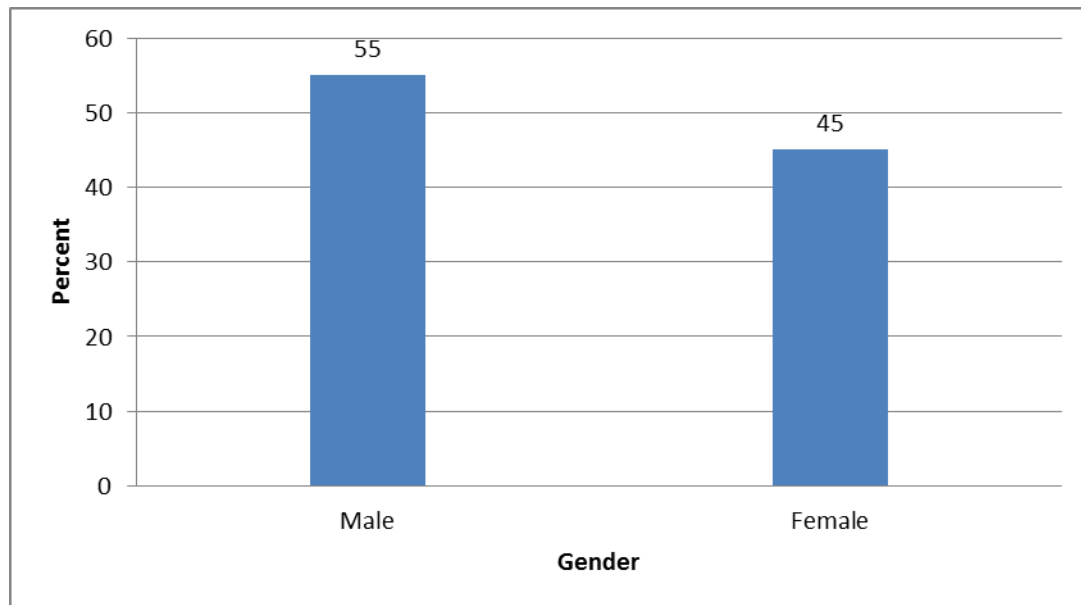
## 5.2 THE RESULTS

### 5.2.1 Demographic data of the respondents

The demographic data of the whole sample of 920 respondents were captured from items numbers 1 and 2 of the questionnaire (see Appendix A). The data are presented in Tables 5.1, 5.2 and 5.3.

**Table 5.1: The sex of the respondents**

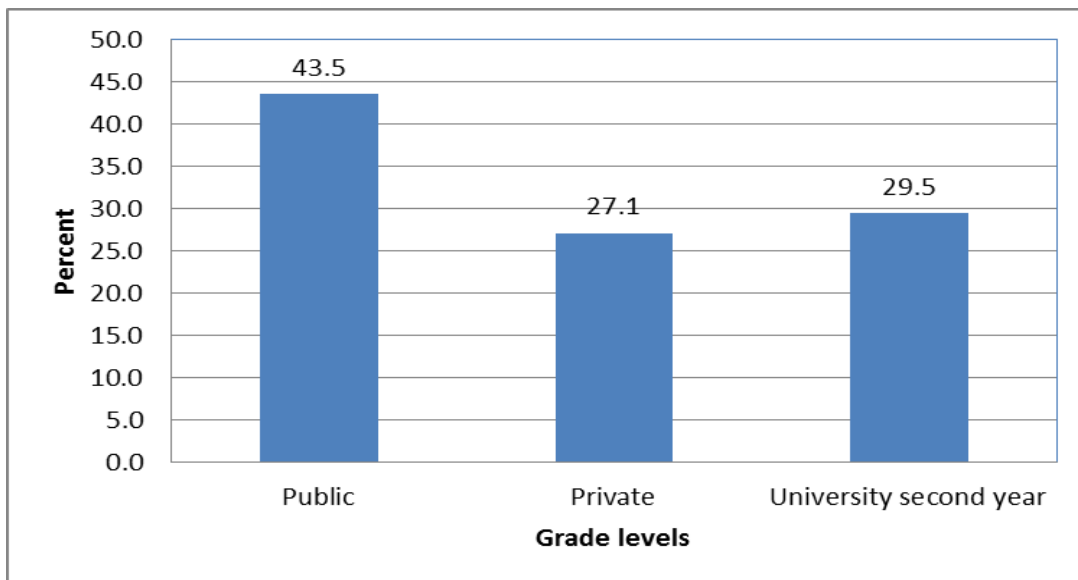
	Frequency	Percent	Valid Percent	Cumulative Percent
Male	506	55.0	55.0	55.0
Valid Female	414	45.0	45.0	100.0
Total	920	100.0	100.0	



**Figure 5.1: The sex of the respondents**

**Table 5.2: The grade levels of the respondents**

	Frequency	Percent	Valid Percent	Cumulative Percent
Public	400	43.5	43.5	43.5
Private	249	27.1	27.1	70.5
University second year	271	29.5	29.5	100.0
Total	920	100.0	100.0	



**Figure 5.2: The grade levels of the respondents**

As indicated in Table 5.1 and Figure 5.1, 55% of the respondents were males and 45% were females. The largest portion of the respondents was from the public (government) schools (43.5%), about one quarter of the respondents were from private schools (27.1%), and just more than a quarter (29.5%) were university second year students.

## **5.2.2 Research question 1: The learning styles of the respondents**

Specific research question 1: What are the learning styles of students at Grade 10 government (public) schools, Grade 10 private schools and second year university level?

It was hypothesised that some groups of students may have significant preferences for certain learning styles above others –in regard of being active or reflective, sensing or intuitive, visual or verbal, and sequential or global (see section 4.3).

The learning styles of the respondents were determined by using Felder-Soloman's ILS (see section 4.4.4.1). To determine the students' learning styles, these researchers' key of calculating the four dimensions and the sub-categories of the learning styles was implemented. The learning style items in the questionnaire comprise of items numbers 3 to 46 (see Appendix A, section B). The results are presented in Tables 5.3 to 5.5 and Figures 5.3 to 5.5 by sub-category, which indicate the students' preferences as strong, moderate or balanced (see section 5.2.2.1).

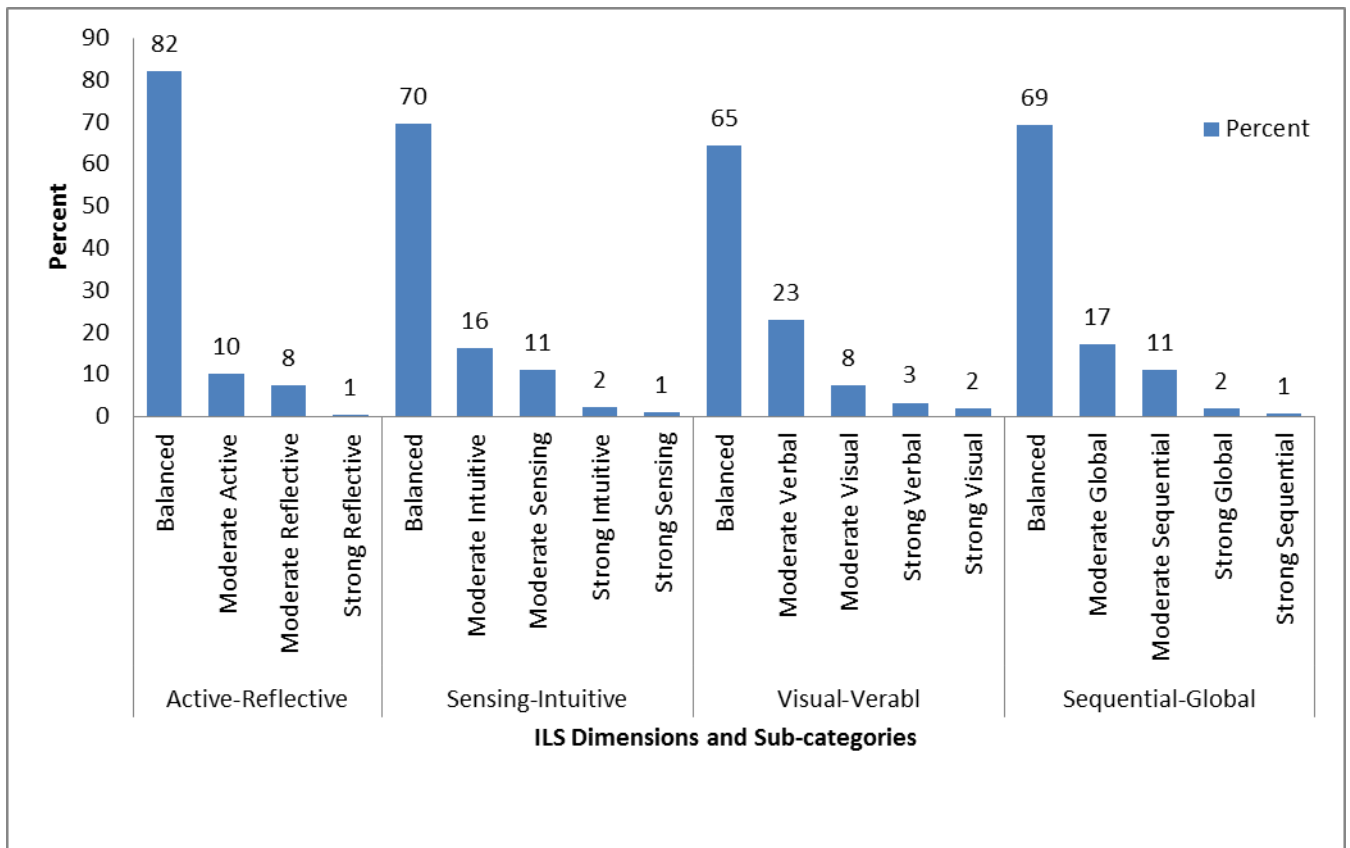
### **5.2.2.1 The learning styles of the respondents by categories (strong, moderate and balanced)**

Table 5.3 and Figure 5.3 illustrate the preferences for learning styles of students on four dimensions at grade 10 public (government) schools. These preferences can be strong, moderate or balanced.



**Table 5.3: The learning styles of Grade 10 public school students**

	Active-Reflective				Sensing-Intuitive					Visual-Verbal				Sequential-Global					
	Balanced	Moderate Active	Moderate Reflective	Strong Reflective	Balanced	Moderate Intuitive	Moderate Sensing	Strong Intuitive	Strong Sensing	Balanced	Moderate Verbal	Moderate Visual	Strong Verbal	Strong Visual	Balanced	Moderate Global	Moderate Sequential	Strong Global	Strong Sequential
Frequency	328	40	30	2	278	65	44	9	4	258	92	30	13	7	277	68	44	8	3
Percent	82	10	8	1	70	16	11	2	1	65	23	8	3	2	69	17	11	2	1



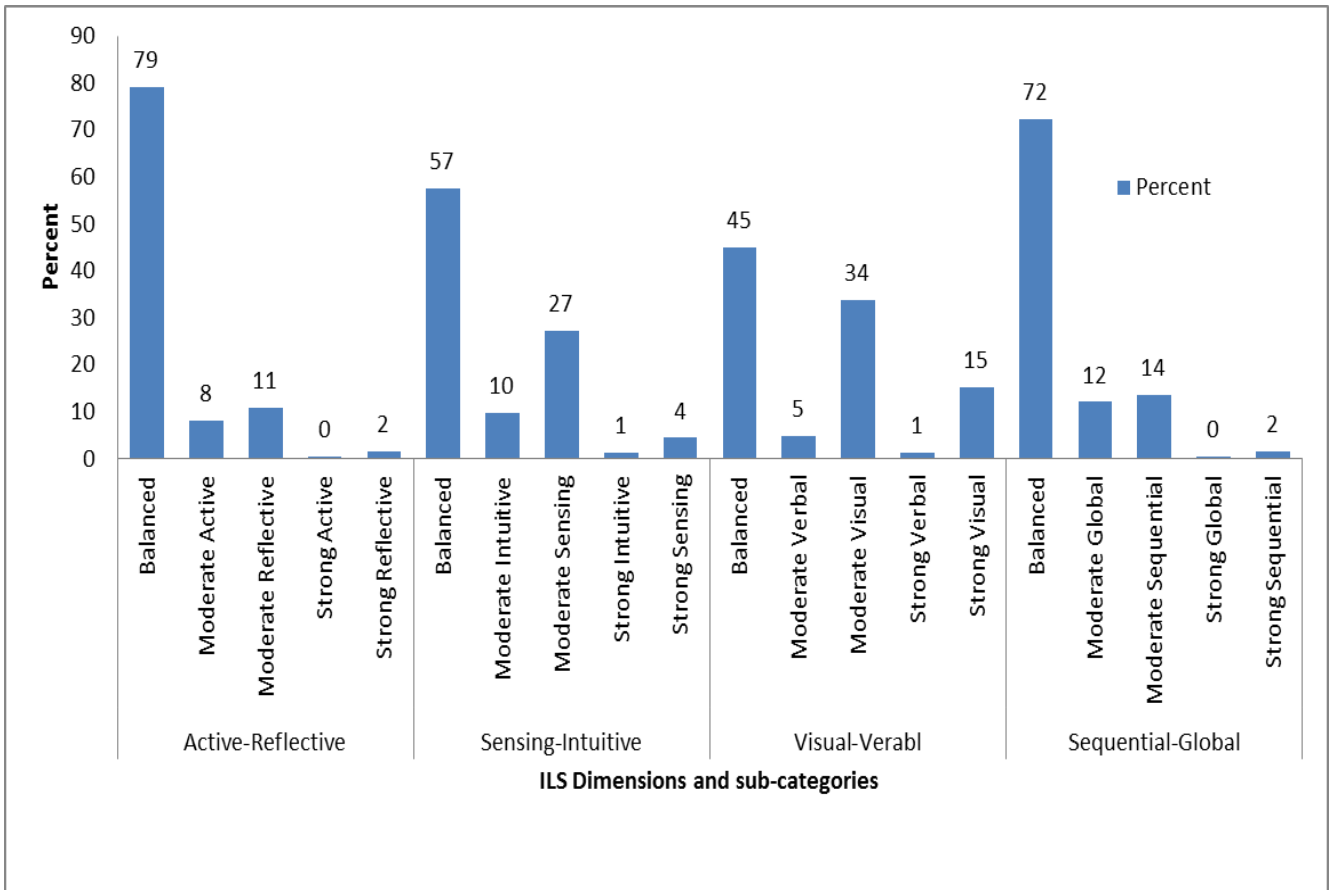
**Figure 5.3: The ILS dimensions and sub-categories of the Grade 10 public school students**

Table 5.3 and Figure 5.3 indicate that the vast majority (between 65% and 82%) of the students in grade 10 public schools preferred the *balanced* category of the ILS dimensions. This means that they are balanced in their preferred learning style between being active-reflective (82%), sensing-intuitive (70%), visual-verbal (65%) or sequential-global (69%). The second strongest preference was for the *moderate* sub-categories of the four dimensions (between 10 and 23%). The ‘strong’ sub-categories of all the dimensions were the least preferred options (preferred by between 1% and 2% of the sample).

Table 5.4 and Figure 5.4 illustrate the preferred learning styles of students at grade 10 private schools in terms of being strong, moderate or balanced on the ILS dimensions.

**Table 5.4: The learning styles of Grade 10 private school students**

	Active-Reflective					Sensing-Intuitive					Visual-Verbal					Sequential-Global				
	Balanced	Moderate Active	Moderate Reflective	Strong Active	Strong Reflective	Balanced	Moderate Intuitive	Moderate Sensing	Strong Intuitive	Strong Sensing	Balanced	Moderate Verbal	Moderate Visual	Strong Verbal	Strong Visual	Balanced	Moderate Global	Moderate Sequential	Strong Global	Strong Sequential
Frequency	197	20	27	1	4	143	24	68	3	11	112	12	84	3	38	180	30	34	1	4
Percent	79	8	11	0	2	57	10	27	1	4	45	5	34	1	15	72	12	14	0	2



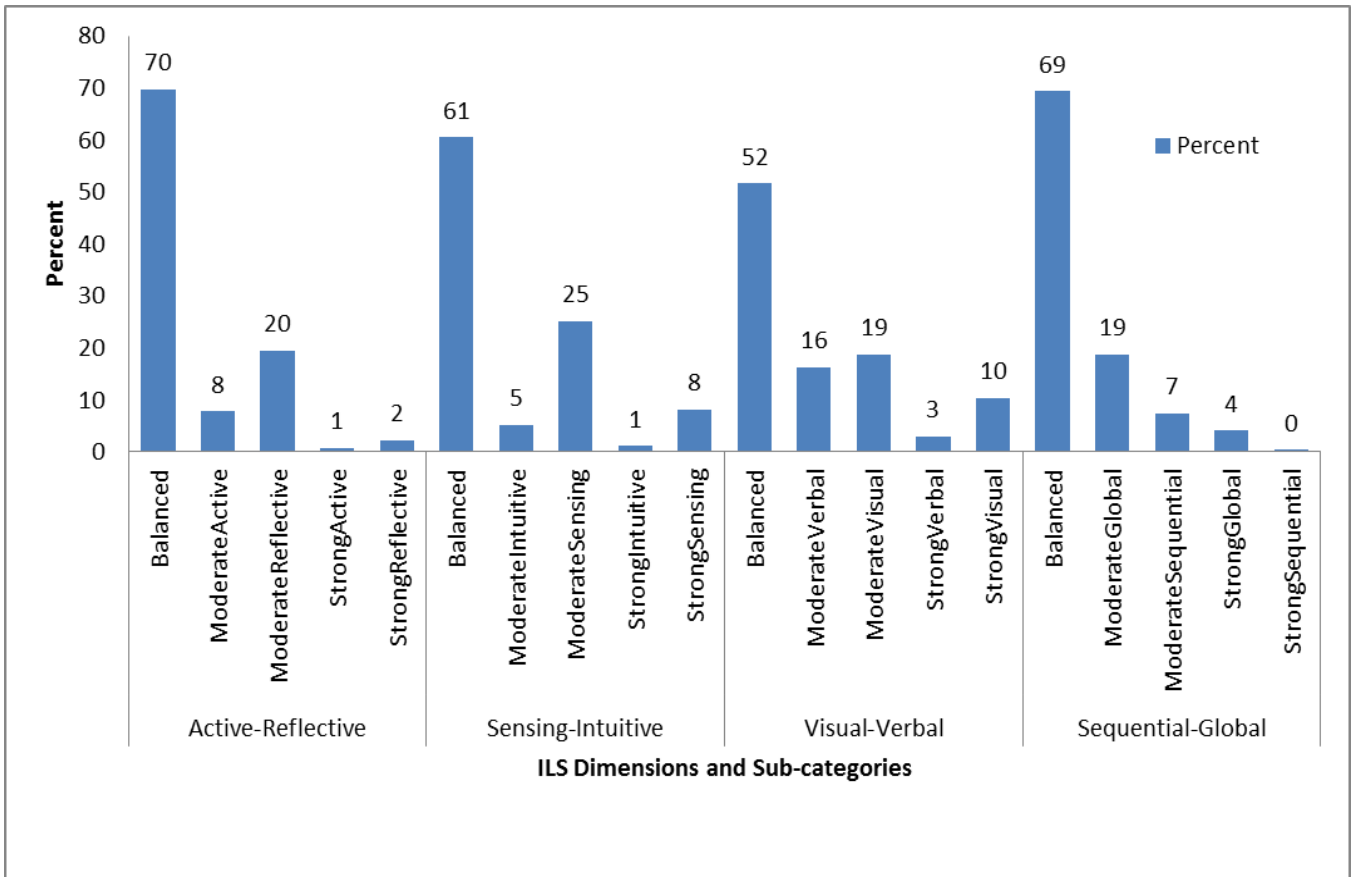
**Figure 5.4: The ILS dimensions and sub-categories of the Grade 10 private school students**

As Table 5.4 and Figure 5.4 show, the majority of the students once again preferred a 'balance' between the different sub-dimensions, namely between being active-reflective (79%), sensing-intuitive (57%), visual-verbal (45%) or sequential-global (72%), although these percentages were lower than those of the public school students. Similar to the public school students, the private school students did not have a 'strong' preference for a specific learning style. In particular, the percentages for 'strong active' and for 'strong global', were 0%.

Table 5.5 and Figure 5.5 illustrate the learning style preferences of second year students at university in terms of the ILS scales.

**Table 5.5: The learning styles of second year university students**

	Active-Reflective					Sensing-Intuitive					Visual-Verbal					Sequential-Global				
	Balanced	Moderate Active	Moderate Reflective	Strong Active	Strong Reflective	Balanced	Moderate Intuitive	Moderate Sensing	Strong Intuitive	Strong Sensing	Balanced	Moderate Verbal	Moderate Visual	Strong Verbal	Strong Visual	Balanced	Moderate Global	Moderate Sequential	Strong Global	Strong Sequential
Frequency	189	21	53	2	6	164	14	68	3	22	140	44	51	8	28	188	51	20	11	1
Percent	70	8	20	1	2	61	5	25	1	8	52	16	19	3	10	69	19	7	4	0



**Figure 5.5: The ILS dimensions and sub-categories of the second year university students**

In accordance with the school students, the majority of the university students preferred the ‘balanced’ category on the four dimensions of the ILS, as Table 5.5 and Figure 5.5 show. Of this group, 70% were balanced in their preference for being active or reflective; 61% for being sensing or intuitive, 52% for being visual or verbal, and 69% for being sequential or global in their learning style. The second most preferred learning style was for being moderately *reflective* rather than moderately *active* (20% vs 8%); moderately *sensing* rather than moderately *intuitive* (25% vs 5%); moderately *global* rather than moderately *sequential* (10% vs 7%). They were balanced between being moderately *verbal* and *visual* (16% and 19%). There were no strong preferences. Strong *sensing* emerged the highest (8%).

Section 5.2.2.2 illustrates the results of the three groups in terms of the dimensions (active-reflective, sensing-intuitive, visual-verbal and sequential-global) only. The hypothesis 1 that states that the different groups have significant preferences for certain learning styles above others, are tested by means of chi-square analysis.

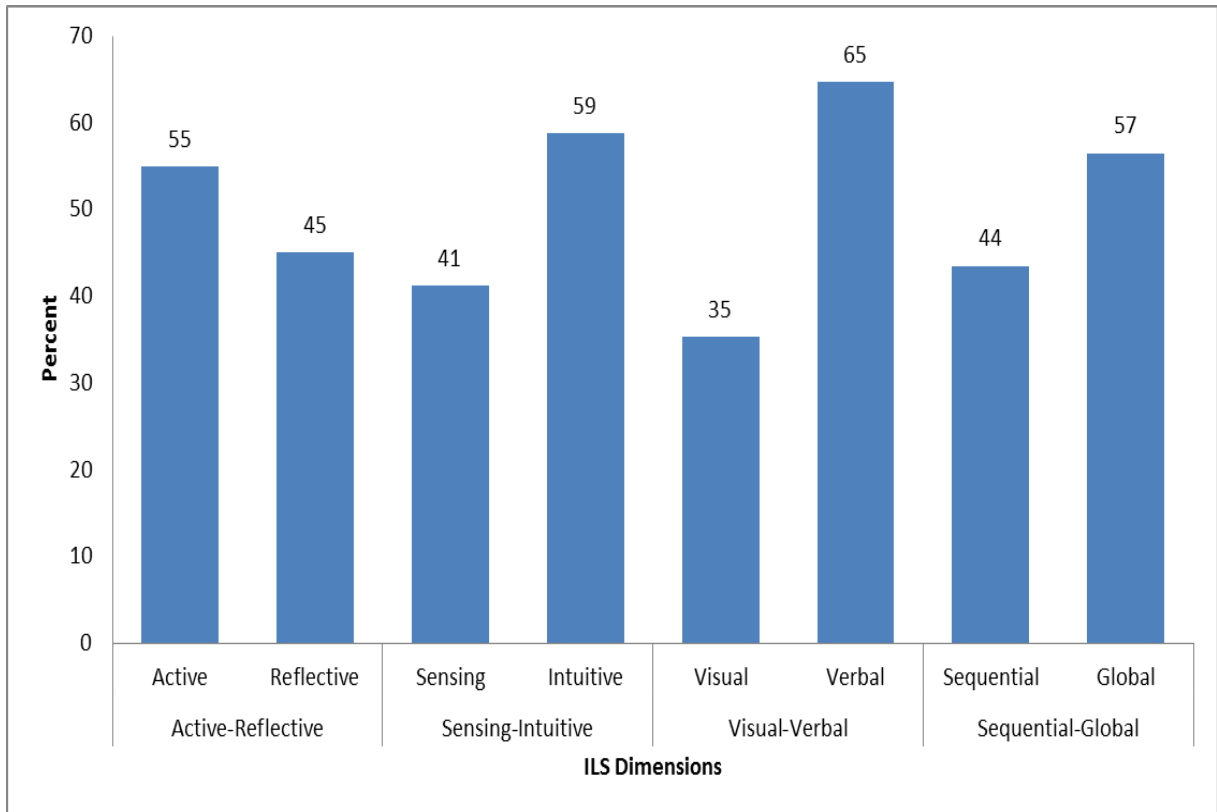
### 5.2.2.2 The learning styles of the respondents by dimensions ('active'- 'reflective', 'sensing'-'intuitive', 'visual'-'verbal' and 'sequential'- 'global')

Table 5.6 and Figure 5.6 illuminate the learning style preferences of students at grade 10 public schools, and to what extent the students had significant preferences for certain styles above others. The focus is on the ILS dimensions *per se*, in other words, on being active- reflective, sensing-intuitive, visual-verbal or sequential-global.

**Table 5.6: The learning styles of the students at Grade 10 public schools (by dimensions)**

	Active-reflective		Sensing-intuitive		Visual-verbal		Sequential-global	
	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
Frequency	220	180	165	235	141	259	174	226
Percent	55	45	41	59	35	65	44	57
$\chi^2$	4.000a		12.250a		34.810a		6.760a	
Df	1		1		1		1	
P	.046		.000		.000		.009	

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 200.0.



**Figure 5.6: The ILS dimensions of the Grade 10 public school students**

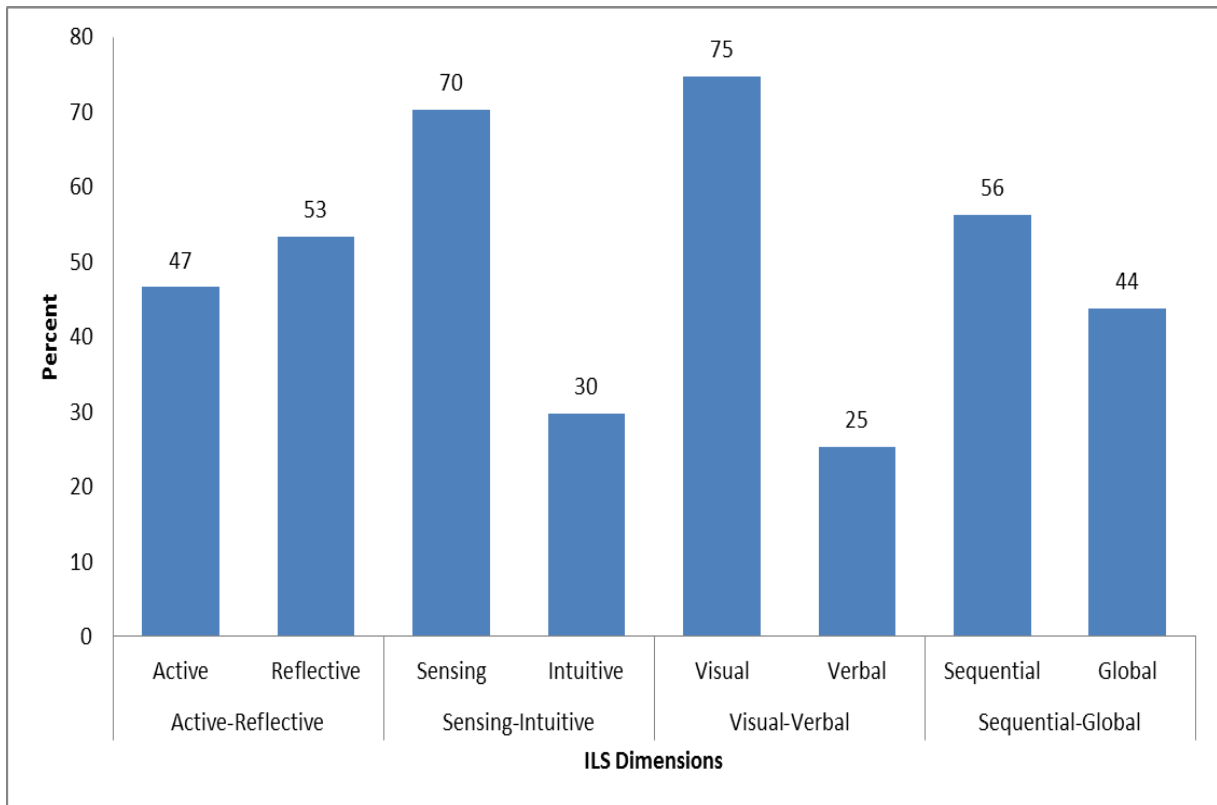
Table 5.6 and Figure 5.6 indicated that the preference of grade 10 public school students were significant on the 1% level for intuitive, verbal and global categories rather than sensing, visual and sequential categories at  $\chi^2$  (df=1) = 12.25,  $p < 0.01$ ;  $\chi^2$  (df=1) = 34.81,  $p < 0.01$  and  $\chi^2$  (df=1) = 6.76,  $p < 0.01$  respectively. However, their preference for an *active* rather than a *reflective* learning style was not as strong but still significant on the 5% level:  $\chi^2$  (df=1) = 4,  $p < 0.05$ .

Table 5.7 and Figure 5.7 indicate the learning style preferences of students at grade 10 private schools.



**Table 5.7: The learning styles of the students at Grade 10 private schools (by dimensions)**

	Active-reflective		Sensing-intuitive		Visual-verbal		Sequential-global	
	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
Frequency	116	133	175	74	186	63	140	109
Percent	47	53	70	30	75	25	56	44
$\chi^2$	1.161a		40.968a		60.759a		3.859a	
Df	1		1		1		1	
P	.281		.000		.000		.049	



**Figure 5.7: The ILS dimensions of the Grade 10 private school students**

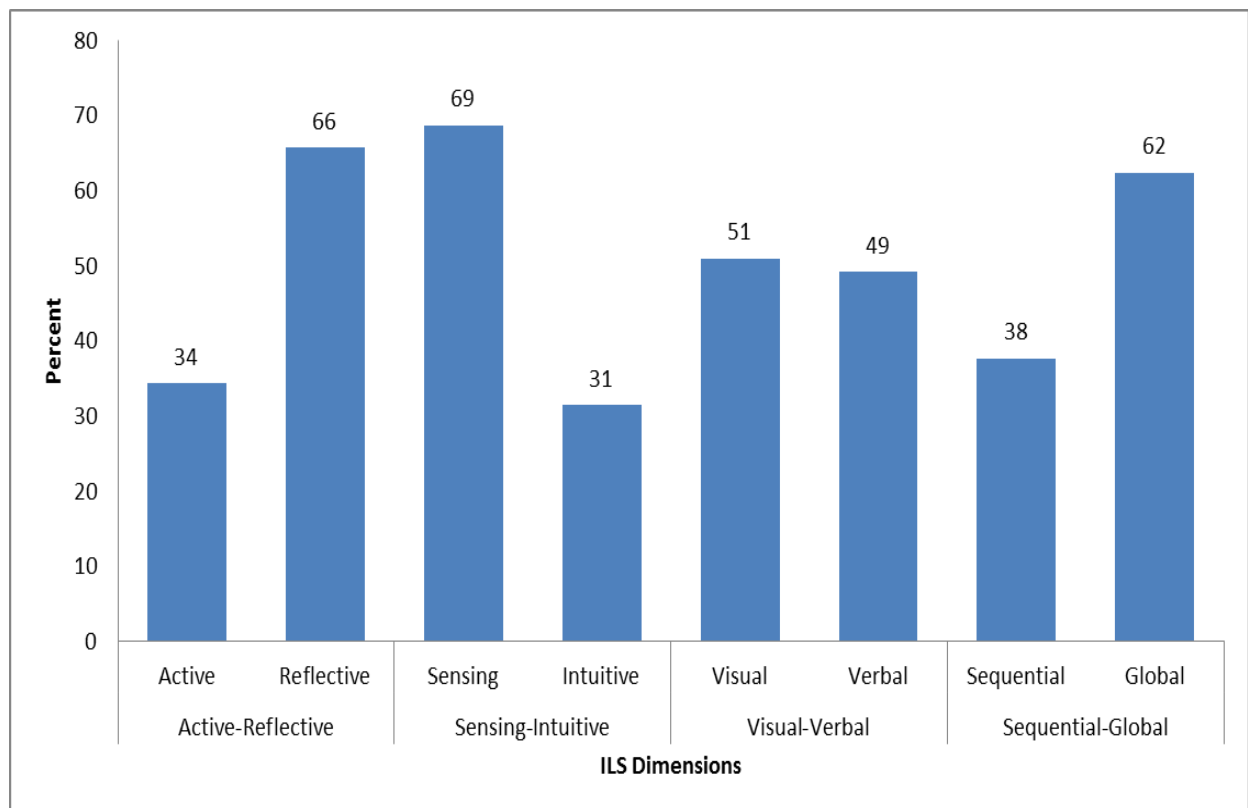
Table 5.7 and Figure 5.7 show the preferences of grade 10 private school students. The table and the figure show that they did not have a significant preference for an active or a reflective learning style, since  $p > 0.05$ . Their preference for a sequential rather than a global learning style was also on the 5% level of significance, indicating that it was not a very strong preference:  $\chi^2 (df=1) = 3.859$   $p < 0.05$ . However the

group had a significantly strong preference for a sensing rather than an intuitive learning style at  $\chi^2$  (df=1) = 40.968,  $p < 0.01$ , as well as a visual rather than a verbal learning style at  $\chi^2$  (df=1) = 60.759,  $p < 0.01$ .

Table 5.8 and Figure 5.8 indicate the learning style preferences of second year university students.

**Table 5.8: The learning styles of second year university students (by dimensions)**

	Active-reflective		Sensing-intuitive		Visual-verbal		Sequential-global	
	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
Frequency	93	178	186	85	138	133	102	169
Percent	34	66	69	31	51	49	38	62
$\chi^2$	26.661a		37.642a		.092a		16.565a	
Df	1		1		1		1	
P	.000		.000		.761		.000	



**Figure 5.8: The ILS dimensions of the second year university students**

Table 5.8 and Figure 5.8 indicate that the preference of second year university students on the visual-verbal dimension was not significant at  $\chi^2$  (df=1) = 0.092,  $p > 0.05$ . However, this group of students significantly preferred the reflective, sensing and global category styles over the active, intuitive and sequential categories at  $\chi^2$  (df=1) = 26.661,  $p < 0.01$ ,  $\chi^2$  (df=1) = 37.642,  $p < 0.01$  and  $\chi^2$  (1) = 16.565,  $p < 0.01$  respectively.

The results of research question 2 are presented in the next section. This question focussed on the attitudes of the students towards active learning (see sections 1.2 and 4.3).

### **5.2.3 Research question 2: The attitudes of the students towards active learning by grade levels**

Section C of the questionnaire consisted of 60 items that measured the students' attitudes towards active learning (see Appendix A). For each item in the questionnaire the students responded on a five point Likert scale with the following indications: 0 for 'not applicable'; 1 for 'definitely disagree'; 2 for 'disagree'; 3 for 'neutral'; 4 for 'agree' and 5 for 'definitely agree'.

The scores for their attitudes towards active learning were calculated by tallying the abovementioned weights assigned for each response on the Likert scale. That is, the respondents' level of agreement for each item was added to get their total score. Finally, the average score of the total scores was calculated for each scale in the questionnaire. Since the questionnaire comprised 60 items, the maximum possible points were 300 (i.e., if the respondent select the 'definitely agree' response for each item, which has 5 points) and the lowest points could be 60 (i.e., if the respondent select the 'definitely disagree' response for each item, which was assigned with point 1.) (No students selected 0 – 'not applicable' for any of the items).

The results of the grade 10 students in public and private schools, university second year and the whole group are illustrated in Table 5.9. The other tables that indicate the students' attitude toward specific active learning methods will follow thereafter.

**Table 5.9: The mean scores of attitudes towards active learning of the different student groups**

<b>Group</b>	<b>Number of respondents</b>	<b>Mean</b>
Grade 10 public school students	400	216.26
Grade 10 private school students	249	220.68
Second year university students	271	224
The whole group	920	219.74

Table 5.9 shows the average attitude scores which were calculated from the summed scores of the grade 10 public and private school students, the second year university students and the whole group. By taking the number of items in the questionnaire and the lowest possible score (60) and the highest possible score (300), the entirely indecisive point would be the average score of 180 (the mid score of the sum of the lowest and the highest possible scores). In this regard, the averages of all three groups were well above the mid score. Therefore, it can be stated that the public school students, the private school students and the university students in general demonstrated positive attitudes towards active learning.

To further investigate the attitudes of the students towards the specific active learning methods, the average scores and standard deviations of the respondents were computed for each area separately. For example, to calculate the mean of the respondents for 'cooperative learning', the average response for items numbers 47, 48, 49, 50, 51, 52, 53, 54, 55 and 56 were calculated (see section 4.4.4.1).

The results are presented in Tables 5.10, 5.14 and 5.18. To analyse the significance of the differences between the means of the learning methods, a multiple analysis of

means, such as ANOVA or the Kruskal-Wallis test was needed. As is discussed in section 5.2.5.8, the appropriate test for this data was the Kruskal-Wallis, since Levene's, Welch's, and the Brown-Forsythe tests showed significant differences among the variances (i.e., the ANOVA assumptions are violated). Even though the appropriate method was the Kruskal-Wallis, both tests (ANOVA and Kruskal-Wallis) were employed, and the result turned out to be the same – both tests determined significant differences between the means, as presented in Tables 5.11, 5.15 and 5.19. This shows that the ANOVA is a reliable test even when the assumptions are violated (Field, 2009:382-391). Therefore, in this case ANOVA was preferred, since it allowed for a *post hoc* test that helps to identify specific differences among the means.

Tables 5.10 to 5.21 present the descriptive statistics, the ANOVA results, the post hoc tests, and homogeneous subsets for each school type.

**Table 5.10: The means and standard deviations of attitudes towards active learning of Grade 10 public school students**

Active learning method	N	Mean	Std. Deviation
Cooperative learning	400	3.7348	.79310
Problem-based learning	400	3.5331	.69892
Self-directed learning	400	3.3456	.77231
Discussion methods	400	3.7176	.87151
Discovery learning	400	3.6531	.79322
Inquiry learning	400	3.7442	.82731

The means in Table 5.10 reveal that for grade 10 public school students, the rank-order from the most positive to the least positive attitude towards the different active learning methods, were inquiry learning, cooperative learning, discussion methods, discovery learning, problem-based learning, and lastly, self-directed learning. To test

for the significance of the differences in preference, ANOVAs were calculated. The results are presented in Tables 5.11 to 5.13.

**Table 5.11: The ANOVA results of Grade 10 public school students' attitudes towards active learning methods**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.836	5	9.767	15.474	.000
Within Groups	1511.069	2394	.631		
Total	1559.906	2399			

**Table 5.12: The post hoc test between the means of active learning methods using Tukey HSD for Grade 10 public school students**

(I) learning methods		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Cooperative learning	Problem-based learning	.20172*	.05618	.005	.0415	.3619
	Self-directed learning	.38925*	.05618	.000	.2290	.5495
	Discussion method	.01722	.05618	1.000	-.1430	.1774
	Discovery learning	.08175	.05618	.693	-.0785	.2420
	Inquiry learning	-.00942	.05618	1.000	-.1696	.1508
Problem-based learning	Cooperative learning	-.20172*	.05618	.005	-.3619	-.0415
	Self-directed learning	.18753*	.05618	.011	.0273	.3478
	Discussion method	-.18450*	.05618	.013	-.3447	-.0243
	Discovery learning	-.11997	.05618	.269	-.2802	.0403
	Inquiry learning	-.21114*	.05618	.002	-.3714	-.0509
Self-directed learning	Cooperative learning	-.38925*	.05618	.000	-.5495	-.2290
	Problem-based learning	-.18753*	.05618	.011	-.3478	-.0273
	Discussion method	-.37203*	.05618	.000	-.5323	-.2118
	Discovery learning	-.30750*	.05618	.000	-.4677	-.1473
	Inquiry learning	-.39867*	.05618	.000	-.5589	-.2385
Discussion method	Cooperative learning	-.01722	.05618	1.000	-.1774	.1430
	Problem-based learning	.18450*	.05618	.013	.0243	.3447
	Self-directed learning	.37203*	.05618	.000	.2118	.5323
	Discovery learning	.06453	.05618	.861	-.0957	.2248
	Inquiry learning	-.02664	.05618	.997	-.1869	.1336
Discovery learning	Cooperative learning	-.08175	.05618	.693	-.2420	.0785
	Problem-based learning	.11997	.05618	.269	-.0403	.2802
	Self-directed learning	.30750*	.05618	.000	.1473	.4677
	Discussion method	-.06453	.05618	.861	-.2248	.0957
	Inquiry learning	-.09117	.05618	.583	-.2514	.0690
Inquiry learning	Cooperative learning	.00942	.05618	1.000	-.1508	.1696
	Problem-based learning	.21114*	.05618	.002	.0509	.3714
	Self-directed learning	.39867*	.05618	.000	.2385	.5589
	Discussion method	.02664	.05618	.997	-.1336	.1869
	Discovery learning	.09117	.05618	.583	-.0690	.2514

\*. The mean difference is significant at the 0.05 level.

**Table 5.13: Homogeneous sub-sets of the means of active learning methods using Tukey HSD for Grade 10 public school students**

Learning methods	N	Subset for alpha = 0.05		
		1	2	3
Self-directed learning	400	3.3456		
Problem-based learning	400		3.5331	
Discovery learning	400		3.6531	3.6531
Discussion method	400			3.7176
Cooperative learning	400			3.7348
Inquiry learning	400			3.7442
Sig.		1.000	.269	.583

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 400.000.

The ANOVA results in Table 5.11 show that grade 10 public school students' attitudes towards the six active learning methods (self-directed learning, problem-based learning, discovery learning, the discussion method, cooperative learning and inquiry learning) were significantly different at  $F = 15.474$ ,  $p < 0.000$ . More specifically, the results of the post hoc test, illustrated in Table 5.12, show that the strength of the students' attitudes towards the active learning methods was significantly different. Most importantly, the students demonstrated a significant less positive attitude towards self-directed learning than to the other five learning methods.<sup>2</sup> For further clarification of the strength of the students' preference towards the active methods, the homogeneous subset (Table 5.13) shows that they are heavily inclined towards inquiry learning, cooperative learning and the discussion methods, as is also illustrated in Table 5.10.

The aforementioned analysis was repeated for grade 10 private school students. Tables 5.14 to 5.17 illustrate the results.

<sup>2</sup> For the purpose of avoiding repetition only an example is given since the post hoc table contains very huge data. For further information the reader may inspect the table.



**Table 5.14: The means and standard deviations of attitude towards active learning of Grade 10 private school students**

Active learning method	N	Mean	Std. Deviation
Cooperative learning	249	3.7530	.70499
Problem-based learning	249	3.6381	.59767
Self-directed learning	249	3.3387	.70441
Discussion methods	249	3.7505	.71230
Discovery learning	249	3.7992	.70368
Inquiry learning	249	3.8682	.72965

The means in Table 5.14 show that for grade 10 private school students, the rank-order from most positive to least positive attitude towards the different active learning methods, were inquiry learning, discovery learning, cooperative learning, discussion methods, problem-based learning, and lastly, self-directed learning. To test for the significance of the differences in preference, the ANOVAs were calculated. The results are presented in Tables 5.15 to 5.17.

**Table 5.15: The ANOVA results of Grade 10 private school students' attitudes towards active learning methods**

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	44.180	5	8.836	18.374	.000
Within groups	715.564	1488	.481		
Total	759.744	1493			

**Table 5.16: The post hoc test between the means of active learning methods using Tukey HSD for Grade 10 private school students**

(I) Learning methods		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Cooperative learning	Problem-based learning	.11493	.06215	.434	-.0624	.2923
	Self-directed learning	.41432	.06215	.000	.2370	.5917
	Discussion method	.00251	.06215	1.000	-.1748	.1798
	Discovery learning	-.04618	.06215	.976	-.2235	.1312
	Inquiry learning	-.11522	.06215	.431	-.2926	.0621
Problem based learning	Cooperative learning	-.11493	.06215	.434	-.2923	.0624
	Self-directed learning	.29939	.06215	.000	.1221	.4767
	Discussion method	-.11242	.06215	.460	-.2898	.0649
	Discovery learning	-.16112	.06215	.100	-.3385	.0162
	Inquiry learning	-.23015	.06215	.003	-.4075	-.0528
Self-directed learning	Cooperative learning	-.41432	.06215	.000	-.5917	-.2370
	Problem-based learning	-.29939	.06215	.000	-.4767	-.1221
	Discussion method	-.41181	.06215	.000	-.5892	-.2345
	Discovery learning	-.46051	.06215	.000	-.6378	-.2832
	Inquiry learning	-.52955	.06215	.000	-.7069	-.3522
Discussion method	Cooperative learning	-.00251	.06215	1.000	-.1798	.1748
	Problem-based learning	.11242	.06215	.460	-.0649	.2898
	Self-directed learning	.41181	.06215	.000	.2345	.5892
	Discovery learning	-.04869	.06215	.970	-.2260	.1286
	Inquiry learning	-.11773	.06215	.406	-.2951	.0596
Discovery learning	Cooperative learning	.04618	.06215	.976	-.1312	.2235
	Problem-based learning	.16112	.06215	.100	-.0162	.3385
	Self-directed learning	.46051	.06215	.000	.2832	.6378
	Discussion method	.04869	.06215	.970	-.1286	.2260
	Inquiry learning	-.06904	.06215	.877	-.2464	.1083
Inquiry learning	Cooperative learning	.11522	.06215	.431	-.0621	.2926
	Problem-based learning	.23015	.06215	.003	.0528	.4075
	Self-directed learning	.52955	.06215	.000	.3522	.7069
	Discussion method	.11773	.06215	.406	-.0596	.2951
	Discovery learning	.06904	.06215	.877	-.1083	.2464

\*. The mean difference is significant at the 0.05 level.

**Table 5.17: Homogeneous sub-sets of the means of active learning methods using Tukey HSD for Grade 10 private school students**

Learning methods	N	Subset for alpha = 0.05		
		1	2	3
Self-directed learning	249	3.3387		
Problem-based learning	249		3.6381	
Discussion method	249		3.7505	3.7505
Cooperative learning	249		3.7530	3.7530
Discovery learning	249		3.7992	3.7992
Inquiry learning	249			3.8682
Sig.		1.000	.100	.406

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 249.000.

The ANOVA results in Table 5.15 show that grade 10 private school students' attitudes towards the six active learning methods were significantly different at  $F = 18.374$ ,  $p < 0.000$ . More precisely, the post hoc test results, portrayed in Table 5.16, indicate that the strength of the students' attitudes towards the active learning methods was significantly different. Similar to the public school sample, the private school students' attitudes towards self-directed learning was significantly less positive than towards the other methods. For more illumination of the strength of the students' preference towards active learning methods, among others, Table 5.17 shows that they were significantly more positive towards inquiry learning, discovery learning, cooperative learning and the discussion methods than towards self-directed learning.

The aforementioned analysis was again repeated in respect of the second year university students. Tables 5.18 to 5.21 illustrate the results.

**Table 5.18: The means and standard deviations of attitudes towards active learning of second year university students**

Active learning method	N	Mean	Std. Deviation
Cooperative learning	271	3.6949	.76865
Problem-based learning	271	3.7358	.54014
Self-directed learning	271	3.3407	.74151
Discussion methods	271	3.8524	.70070
Discovery learning	271	3.8479	.62427
Inquiry learning	271	4.0058	.65618

The means in Table 5.18 show that for second year university students, the rank-order from most positive to least positive attitude towards the different active learning methods, were inquiry learning, the discussion methods, discovery learning, problem-based learning, cooperative learning, and lastly, self-directed learning. To test for the significance of the differences in preference, the ANOVAs were calculated. The results are shown in Tables 5.19 to 5.21.

**Table 5.19: The ANOVA results of second year university students' attitudes towards active learning methods**

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	69.422	5	13.884	30.363	.000
Within groups	740.795	1620	.457		
Total	810.217	1625			

**Table 5.20: The post hoc test between the means of active learning methods using Tukey HSD for second year university students**

(I) Learning methods		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Cooperative learning	Problem-based learning	-.04096	.05809	.981	-.2067	.1248
	Self-directed learning	.35416	.05809	.000	.1884	.5199
	Discussion method	-.15752	.05809	.073	-.3233	.0082
	Discovery learning	-.15301	.05809	.090	-.3188	.0127
	Inquiry learning	-.31092	.05809	.000	-.4767	-.1452
Problem-based learning	Cooperative learning	.04096	.05809	.981	-.1248	.2067
	Self-directed learning	.39512	.05809	.000	.2294	.5609
	Discussion method	-.11656	.05809	.339	-.2823	.0492
	Discovery learning	-.11205	.05809	.385	-.2778	.0537
	Inquiry learning	-.26996	.05809	.000	-.4357	-.1042
Self-directed learning	Cooperative learning	-.35416	.05809	.000	-.5199	-.1884
	Problem-based learning	-.39512	.05809	.000	-.5609	-.2294
	Discussion method	-.51169	.05809	.000	-.6774	-.3459
	Discovery learning	-.50718	.05809	.000	-.6729	-.3414
	Inquiry learning	-.66509	.05809	.000	-.8308	-.4993
Discussion method	Cooperative learning	.15752	.05809	.073	-.0082	.3233
	Problem-based learning	.11656	.05809	.339	-.0492	.2823
	Self-directed learning	.51169	.05809	.000	.3459	.6774
	Discovery learning	.00451	.05809	1.000	-.1612	.1703
	Inquiry learning	-.15340	.05809	.088	-.3191	.0123
Discovery learning	Cooperative learning	.15301	.05809	.090	-.0127	.3188
	Problem-based learning	.11205	.05809	.385	-.0537	.2778
	Self-directed learning	.50718	.05809	.000	.3414	.6729
	Discussion method	-.00451	.05809	1.000	-.1703	.1612
	Inquiry learning	-.15791	.05809	.072	-.3237	.0078
Inquiry learning	Cooperative learning	.31092	.05809	.000	.1452	.4767
	Problem-based learning	.26996	.05809	.000	.1042	.4357
	Self-directed learning	.66509	.05809	.000	.4993	.8308
	Discussion method	.15340	.05809	.088	-.0123	.3191
	Discovery learning	.15791	.05809	.072	-.0078	.3237

\*. The mean difference is significant at the 0.05 level.

**Table 5.21: Homogeneous sub-sets of the means of active learning methods using Tukey HSD for second year university students**

Learning methods	N	Subset for alpha = 0.05		
		1	2	3
Self-directed learning	271	3.3407		
Cooperative learning	271		3.6949	
Problem-based learning	271		3.7358	
Discovery learning	271		3.8479	3.8479
Discussion method	271		3.8524	3.8524
Inquiry learning	271			4.0058
Sig.		1.000	.073	.072

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 271.000.

The ANOVA results in Table 5.19 show that second year university students' attitudes towards the six active learning methods were significantly different at  $F = 30.363$ ,  $p < 0.000$ . More precisely, the results of the post hoc tests in Table 5.20 show that the students' attitudes towards self-directed learning were significantly more negative than towards the other five methods. To illustrate the strength of students' preference towards the active methods, the homogeneous subset (in Table 5.21) confirmed, for example, that they demonstrated more positive attitudes towards inquiry learning, the discussion methods and discovery learning than towards self-directed learning in particular.

The results of research question 3 are presented in the next section.

### **5.2.4 Research question 3: The relationship between the students' learning styles and their attitudes towards active learning**

The hypothesis that was stated for this research question was that there was a significant relationship between the learning style preference of students and their attitudes towards active learning (see section 4.3). In order to determine the

relationship between the students' learning styles and their attitudes towards active learning, a point bi-serial correlation ( $r_{pb}$ ) was calculated. The results are presented in Table 5.22.

**Table 5.22: Correlations between the learning style dimensions and the students' attitudes towards active learning**

	Learning styles dimensions		The students' attitude towards active learning	Sig. (2-tailed)
1	Active-reflective	$r_{pb}$	0.118**	0.000
		N	920	
2	Sensing-intuitive	$r_{pb}$	0.016	0.624
		N	920	
3	Visual-verbal	$r_{pb}$	0.042	0.200
		N	920	
4	Sequential-global	$r_{pb}$	-0.023	0.491
		N	920	

**\*\* . Correlation is significant at the 0.01 level (2-tailed).**

As Table 5.22 indicates, as regards the relationship between the students' attitudes towards active learning and the active-reflective dimension, a statistically significant positive correlation was observed at  $r_{pb} = 0.118$ ,  $p < 0.01$ . However, the correlation was not high. Other unknown variables could have played an influencing role (see section 5.3.1.3).

In respect of the other dimensions (sensing-intuitive, visual-verbal and sequential) there were no significant correlations with the students' attitudes towards active learning at  $r_{pb} = 0.016$ ,  $p > 0.05$ ;  $r_{pb} = 0.042$ ,  $p > 0.05$ ; and  $r_{pb} = -0.023$ ,  $p > 0.05$  respectively.

The results of research question 4 are presented in the next section.

#### **5.2.5 Specific research question 4: The significance of the differences in learning style and attitudes towards active learning between the different groups of students**

To determine the significance of the differences between learning styles and attitudes towards active learning of different groups of students as regards gender, educational level and school type, the following statistical analysis was done, namely cross-tabulations (and chi-square analysis), and t-tests (to cross check the chi-square results).

The results of the cross-tabulation of learning style and gender are presented in Tables 5.23 to 5.25, and the results of the t-tests are indicated in Tables 5.26 and 5.27.



### 5.2.5.1 The relationship between gender and learning style by considering the sub- categories of the ILS dimensions

**Table 5.23: Cross-tabulation of gender and sub-categories of the ILS dimensions**

The ILS Dimension	Sub categories	Gender		$\chi^2$	df	Asymp. Sig. (2-sided)
		Male	Female			
Active-reflective	Balanced	391 <sub>a</sub>	323 <sub>a</sub>	3.641 <sup>c</sup>	4	0.457
	Moderate active	47 <sub>a</sub>	34 <sub>a</sub>			
	Moderate reflective	60 <sub>a</sub>	50 <sub>a</sub>			
	Strong active	3 <sub>a</sub>	0 <sub>a</sub>			
	Strong reflective	5 <sub>a</sub>	7 <sub>a</sub>			
Sensing-intuitive	Balanced	321 <sub>a</sub>	264 <sub>a</sub>	4.880 <sup>d</sup>	4	0.300
	Moderate intuitive	50 <sub>a</sub>	53 <sub>a</sub>			
	Moderate sensing	103 <sub>a</sub>	77 <sub>a</sub>			
	Strong intuitive	7 <sub>a</sub>	8 <sub>a</sub>			
	Strong sensing	25 <sub>a</sub>	12 <sub>a</sub>			
Visual-verbal	Balanced	266 <sub>a</sub>	244 <sub>a</sub>	8.473 <sup>e</sup>	4	0.076
	Moderate verbal	77 <sub>a</sub>	71 <sub>a</sub>			
	Moderate visual	103 <sub>a</sub>	62 <sub>b</sub>			
	Strong verbal	13 <sub>a</sub>	11 <sub>a</sub>			
	Strong visual	47 <sub>a</sub>	26 <sub>a</sub>			
Sequential-global	Balanced	360 <sup>a</sup>	285 <sup>a</sup>	4.930 <sup>f</sup>	4	0.295
	Moderate global	75 <sub>a</sub>	74 <sub>a</sub>			
	Moderate sequential	53 <sub>a</sub>	45 <sub>a</sub>			
	Strong global	11 <sub>a</sub>	9 <sub>a</sub>			
	Strong sequential	7 <sub>a</sub>	1 <sub>a</sub>			

Each subscript letter denotes a subset of gender categories whose column proportions do not differ significantly from each other at the .05 level.

c = 2 cells (20.0%) have expected counts less than 5. The minimum expected count is 1.35.

d = 0 cells (0.0%) have expected counts less than 5. The minimum expected count is 6.75.

e = 0 cells (0.0%) have expected counts less than 5. The minimum expected count is 10.80.

f = 2 cells (20.0%) have expected counts less than 5. The minimum expected count is 3.60.

According to Table 5.23, the chi-square test for independence indicated no significant association between gender and the active-reflective, sensing-intuitive, visual-verbal, or the sequential-global dimensions of the ILS in consideration of the sub-categories. The respective results are  $\chi^2$  (df=4, n = 920) = 3.641,  $p > 0.05$ ;  $\chi^2$  (df=4, n = 920) = 4.880,  $p > 0.05$ ;  $\chi^2$  (df=4, n = 920) = 8.473,  $p > 0.05$ ; and  $\chi^2$  (df=4, n = 920) = 4.930,  $p > 0.05$ . The gender and visual-verbal association is also not significant even though the p-value (0.076) is very close to 0.05. This interpretation is also supported by the significant association between gender and the moderate-visual sub-category (which is indicated by subscript letters a and b).

In the next section the relationship between gender and learning style in consideration of the ILS dimensions only (without considering the sub-categorisation of the dimensions), is examined.

### 5.2.5.2 The relationship between gender and learning style by considering the ILS dimensions

**Table 5.24: Cross-tabulation of gender by ILS dimensions**

Dimensions	Male	Female	$\chi^2$	df	Asymp. Sig. (2-sided)
Reflective	274 <sub>a</sub>	217 <sub>a</sub>	0.275 <sup>c</sup>	1	0.600
Active	232 <sub>a</sub>	197 <sub>a</sub>			
Intuitive	197 <sub>a</sub>	197 <sub>b</sub>	6.961 <sup>c</sup>	1	0.008*
Sensing	309 <sub>a</sub>	217 <sub>b</sub>			
Verbal	242 <sub>a</sub>	213 <sub>a</sub>	1.196 <sup>c</sup>	1	0.274
Visual	264 <sub>a</sub>	201 <sub>a</sub>			
Global	276 <sub>a</sub>	228 <sub>a</sub>	0.026 <sup>c</sup>	1	0.873
Sequential	230 <sub>a</sub>	186 <sub>a</sub>			

\* Chi-Square is significant at the 0.05 level

Each subscript letter denotes a subset of gender categories whose column proportions do not differ significantly from each other at the .05 level.

a = 0 cells (0.0%) have expected count less than 5. The minimum expected count is 187.20.

Table 5.24 indicates a significant relationship between gender and the sensing-intuitive dimension at  $\chi^2$  (df=1) = 6.961,  $p < 0.05$ . That is, more males than females selected the 'sensing' dimension as their preferred learning style. However, there was no significant dependency between gender and the active-reflective, visual-verbal and sequential-global dimensions since  $\chi^2$  (df=1) = 0.275,  $p > 0.05$ ;  $\chi^2$  (df=1) = 1.196,  $p > 0.05$ ; and  $\chi^2$  (df=1) = 0.026,  $p > 0.05$  respectively.

Table 5.25 presents a cross-tabulation of gender with ILS merged dimensions.

**Table 5.25: Cross-tabulation of gender by ILS merged dimensions**

Merged Dimensions	Male	Female	$\chi^2$	df	Asymp. Sig. (2-sided)
Strong and moderate active	50 <sub>a</sub>	34 <sub>a</sub>	0.787 <sup>c</sup>	1	0.375
Strong and moderate reflective	65 <sub>a</sub>	57 <sub>a</sub>			
Strong and moderate sensing	128 <sub>a</sub>	89 <sub>a</sub>	3.527 <sup>c</sup>	1	0.060
Strong and moderate intuitive	57 <sub>a</sub>	61 <sub>a</sub>			
Strong and moderate visual	150 <sub>a</sub>	88 <sub>b</sub>	4.709 <sup>c</sup>	1	0.030*
Strong and moderate verbal	90 <sub>a</sub>	82 <sub>b</sub>			
Strong and moderate sequential	60 <sub>a</sub>	46 <sub>a</sub>	0.855 <sup>c</sup>	1	0.355
Strong and moderate global	86 <sub>a</sub>	83 <sub>a</sub>			

\* Chi-Square is significant at the 0.05 level

Each subscript letter denotes a subset of gender categories whose column proportions do not differ significantly from each other at the .05 level.

c 0 cells (0.0%) have expected count less than 5. The minimum expected count is 187.20.

According to Table 5.25, there is a significant dependency between gender and the visual-verbal dimension when the two extreme categories are merged (strong and moderate) while omitting the 'balanced' dimension, since  $\chi^2$  (df=1) = 4.709,  $p < 0.05$ . That is, significantly more males than females selected the 'visual' learner dimension. On the other hand, there were no significant dependency between gender, on the one hand, and the active-reflective, sensing-intuitive and sequential-global dimensions, on the other hand, when the sub-categories (strong and

moderate) were merged since  $\chi^2$  (df=1) = 0.787,  $p > 0.05$ ;  $\chi^2$  (df=1) = 3.527,  $p > 0.05$ ; and  $\chi^2$  (df=1) = 0.855,  $p > 0.05$  respectively were determined.

To determine to what extent parametric tests would confirm or not confirm the above, the next section presents the relationship between gender and learning style by means of a parametric test, namely a t-test.

### 5.2.5.3 The relationship between gender and learning style by considering the ILS dimensions using a parametric test

In order to calculate the t-test to determine if there are significant differences between the two genders, the mean scores of each dimension were calculated by tallying the codes assigned to the categories of the four dimensions. Code 1 was assigned for active/sensing/visual/sequential and 2 was assigned for reflective/intuitive/verbal/global. The mean scores ranged from 11 to 22. The mean scores of 11 to 16 represent the active/sensing/visual/sequential categories, and the mean scores of 17 to 22 represent the reflective/intuitive/verbal/global categories.

The results are illustrated in tables 5.26 and 5.27.

**Table 5.26: Gender group statistics across the ILS dimensions**

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Active-reflective	Male	506	16.6937	1.66473	.07401
	Female	414	16.6812	1.62599	.07991
Sensing-intuitive	Male	506	15.8913	2.15122	.09563
	Female	414	16.2705	2.13225	.10479
Visual-verbal	Male	506	16.0850	2.51150	.11165
	Female	414	16.4565	2.36434	.11620
Sequential-global	Male	506	16.6996	1.88077	.08361
	Female	414	16.8237	1.90839	.09379

**Table 5.27: The t-test statistics for the relationship between gender and the ILS dimensions**

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Active-reflective	Equal variances assumed	.352	.553	.115	918	.909	.01252	.10917	-.20174	.22678
	Equal variances not assumed			.115	889.883	.909	.01252	.10892	-.20125	.22628
Sensing-intuitive	Equal variances assumed	.252	.616	-2.671	918	.008	-.37923	.14200	-.65791	-.10055
	Equal variances not assumed			-2.673	885.228	.008	-.37923	.14187	-.65767	-.10078
Visual-verbal	Equal variances assumed	2.958	.086	-2.292	918	.022	-.37154	.16212	-.68972	-.05337
	Equal variances not assumed			-2.306	900.139	.021	-.37154	.16115	-.68781	-.05527
Sequential-global	Equal variances assumed	.343	.558	-.989	918	.323	-.12407	.12547	-.37030	.12217
	Equal variances not assumed			-.987	877.183	.324	-.12407	.12565	-.37067	.12254

Tables 5.26 and 5.27 show that there were no significant differences between the learning style preferences of the two genders regarding the active-reflective and the sequential-global dimensions at  $t(889.883) = 0.115$ ,  $p > 0.05$  and  $t(877.183) = -0.987$ ,  $p > 0.05$  respectively. However, the results show significant differences between the learning style preferences of males and females with regard to the sensing-intuitive and visual-verbal dimensions at  $t(885.228) = -2.673$ ,  $p = 0.008$  and  $t(900.139) = -2.306$ ,  $p = 0.021$  respectively - in both instances  $p < 0.05$ . Thus, this analysis confirms the analysis done by the chi-square test (see Tables 5.23 to 5.26). The male students are more 'sensing' and 'visually' oriented in their learning styles than the female students.

The relationship between school type and learning style in consideration of the sub-categories of the ILS dimensions is presented next.

#### **5.2.5.4 The relationship between school type or university and learning style by considering the sub-categories of the ILS dimensions**

In Table 5.28, a cross-tabulation of school type (grade 10 public or private school), and second year university students with the sub-categories of the ILS dimensions is presented.

**Table 5.28: The cross-tabulation of school type or university and sub-categories of the ILS dimensions**

The ILS Dimension	Sub categories	School type			$\chi^2$	df	Asymp. Sig. (2-sided)
		Public	Private	University second year			
Active-reflective	Balanced	328 <sub>a</sub>	197 <sub>a</sub>	189 <sub>b</sub>	31.021 <sup>d</sup>	8	.000
	Moderate active	40 <sub>a</sub>	20 <sub>a</sub>	21 <sub>a</sub>			
	Moderate reflective	30 <sub>a</sub>	27 <sub>a</sub>	53 <sub>b</sub>			
	Strong active	0 <sub>a</sub>	1 <sub>a</sub>	2 <sub>a</sub>			
	Strong reflective	2 <sub>a</sub>	4 <sub>a, b</sub>	6 <sub>b</sub>			
Sensing-intuitive	Balanced	278 <sub>a</sub>	143 <sub>b</sub>	164 <sub>b</sub>	71.574 <sup>e</sup>	8	.000
	Moderate intuitive	65 <sub>a</sub>	24 <sub>b</sub>	14 <sub>b</sub>			
	Moderate sensing	44 <sub>a</sub>	68 <sub>b</sub>	68 <sub>b</sub>			
	Strong intuitive	9 <sub>a</sub>	3 <sub>a</sub>	3 <sub>a</sub>			
	Strong sensing	4 <sub>a</sub>	11 <sub>b</sub>	22 <sub>b</sub>			
Visual-verbal	Balanced	258 <sub>a</sub>	112 <sub>b</sub>	140 <sub>b</sub>	142.860 <sup>f</sup>	8	.000
	Moderate verbal	92 <sub>a</sub>	12 <sub>b</sub>	44 <sub>c</sub>			
	Moderate visual	30 <sub>a</sub>	84 <sub>b</sub>	51 <sub>c</sub>			
	Strong verbal	13 <sub>a</sub>	3 <sub>a</sub>	8 <sub>a</sub>			
	Strong visual	7 <sub>a</sub>	38 <sub>b</sub>	28 <sub>b</sub>			
Sequential-global	Balanced	277 <sub>a</sub>	180 <sub>a</sub>	188 <sub>a</sub>	19.549 <sup>g</sup>	8	.012
	Moderate global	68 <sub>a, b</sub>	30 <sub>b</sub>	51 <sub>a</sub>			
	Moderate sequential	44 <sub>a, b</sub>	34 <sub>b</sub>	20 <sub>a</sub>			
	Strong global	8 <sub>a, b</sub>	1 <sub>b</sub>	11 <sub>a</sub>			
	Strong sequential	3 <sub>a</sub>	4 <sub>a</sub>	1 <sub>a</sub>			

Each subscript letter denotes a subset of school type categories whose column proportions do not differ significantly from each other at the .05 level.

d = 5 cells (33.3%) have expected counts less than 5. The minimum expected count is .81.

e = 2 cells (13.3%) have expected counts less than 5. The minimum expected count is 4.06.

f = 0 cells (0.0%) have expected counts less than 5. The minimum expected count is 6.50.

g = 3 cells (20.0%) have expected counts less than 5. The minimum expected count is 2.17.

Table 5.28 indicates that the chi-square test for dependence revealed a significant association between school or university type, and the active-reflective, sensing-intuitive, visual-verbal and sequential-global dimensions of the ILS, as  $\chi^2$  (df=8, n = 920) = 31.021,  $p < 0.01$ ;  $\chi^2$  (df=8, n = 920) = 71.574,  $p < 0.01$ ;  $\chi^2$  (df=8, n = 920) = 142.860,  $p < 0.01$  and  $\chi^2$  (df=8, n = 920) = 19.549,  $p < 0.05$  respectively.

With regard to the *active-reflective* dimension, a greater proportion of university students than secondary school students preferred the 'balanced' and the 'moderate-reflective' categories. There were no significant dependencies between the students of the two school types regarding their preferences on this dimension. Regarding the remaining two categories ('strong-active' and 'strong-reflective'), these were not added to the comparison because 5 cells (33.3%) had less than 5 counts and, according to the assumptions of the chi-square statistics, those categories are rejected from the comparison.

As regards the *sensing-intuitive* dimension, grade 10 public school students scored significantly different to the private school and the university students on three sub-categories. A greater proportion of grade 10 public school students than private school and university students selected the 'balanced' and 'moderate-intuitive' category, while a greater proportion of private school and second year university students than the public school students selected the 'moderate sensing' category. Grade 10 private school students and university students were also significantly more inclined to select 'moderate-sensing' and 'strong-sensing' in their learning styles. The 'strong-intuitive' category was not considered in the analysis because there were less than 5 counts in the cells.

With reference to the *visual-verbal* category, the analysis revealed that the grade 10 public school students had a significantly greater preference than the private school and university students for the 'balanced' sub-category, while the private school and university students indicated a significantly greater preference than the grade 10



public school students for the 'strong-visual' sub-category. All three groups differed significantly in respect of the two dimensions, in rank-order, the preference for 'moderate verbal' was public school students, university students, private school students; while the rank-order for 'moderate visual' was private school students, university students and then public school students.

As regards the *sequential-global* dimension, the grade 10 public school students favoured the 'moderate global' and the 'moderate sequential' dimensions significantly more than the private school and the university students. The 'strong-global' and 'strong-sequential' cells did not have sufficient counts (under 5) to be considered.

The next section presents the results of the relationship between gender and attitude towards active learning.

#### 5.2.5.5 The relationship between gender and attitude towards active learning

In order to investigate the relationship between gender and attitude towards active learning, the means were calculated and compared by means of a t-test. The results appear in Tables 5.29 and 5.30.

**Table 5.29: Gender group statistics of attitude data**

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	506	3.6748	0.55562	0.02470
Female	414	3.6486	0.58969	0.02898

**Table 5.30: The t-test statistics for the relationship between gender groups and attitudes towards active learning**

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.604	.437	.694	918	0.488	.02627	.03785	-.04802	.10056
Equal variances not assumed			.690	859.862	0.490	.02627	.03808	-.04847	.10101

Tables 5.29 and 5.30 show that when the average attitude scores towards active learning were compared, those of the male students were 3.6748 ( $SE = 0.02470$ ) and those of the female students were 3.6486 ( $SE = 0.02898$ ). This difference was not significant  $t(918) = 0.488$ ,  $p > 0.05$ , on the basis of the assumptions of “equal variances not assumed”.

In the next section, the results of the test of the relationship between school type and attitude towards active learning are presented.

### **5.2.5.6 The relationship between school type and attitude towards active learning**

In order to examine the relationship between school type (private and public school students), the means were compared by using an independent-means t-test for parametric tests. The assumptions to employ the independent t-test are:

- there is a normal distribution of scores (referring to the theoretical sampling distribution);
- data are measured at least at the interval level;
- there is a homogeneity of variances (the samples are supposed to have roughly equal variances); and
- the scores are independent (collected from different people) (Field, 2009:326).

The results of applying the t-test are presented in tables 5.31 and 5.32.

**Table 5.31: Group statistics of Grade 10 public and private school students' attitudes towards active learning**

School type	N	Mean	Std. Deviation	Std. Error Mean
Grade 10 public	400	3.6057	.64868	.03243
Grade 10 private	249	3.6783	.51456	.03261

**Table 5.32: The t-test statistics for the relationship between Grade 10 public and private school students and attitudes towards active learning**

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	21.033	.000	-1.496	647	.135	-.07258	.04850	-.16781	.02266
Equal variances not assumed			-1.578	610.213	.115	-.07258	.04599	-.16290	.01774

Table 5.31 shows that, on average, the grade 10 private school students indicated a somewhat more positive attitude towards active learning than the grade 10 public school students ( $M = 3.6783$ ,  $SE = .03261$  versus  $M = 3.6057$ ,  $SE = .03243$ ). However, according to Table 5.32, this difference was not significant, as  $t(918) = -1.578$ ,  $p > .05$  on the basis of the assumption that equal variances were not assumed.

In the next section the relationship between the grade levels (secondary and university) and attitudes towards active learning is indicated.

#### **5.2.5.7 The relationship between grade levels (secondary and university) and attitude towards active learning**

Similarly to the analysis presented in section 5.2.5.6, the 'attitude' means of the students of the grade 10 public schools, and of the grade 10 private schools, on the one hand, were compared with the means of the university students, on the other

hand, with an independent-means t-test. The results are depicted in Tables 5.33 to 5.36.

**Table 5.33: Group statistics of Grade 10 public school and university students' attitudes towards active learning**

School type	N	Mean	Std. Deviation	Std. Error Mean
Grade 10 public	400	3.6057	.64868	.03243
Second year university	271	3.7336	.48454	.02943

**Table 5.34: The t-test statistics for the difference in attitudes between Grade 10 public school and university students towards active learning**

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	27.026	.000	-2.764	669	.006	-.12786	.04626	-.21869	-.03703
Equal variances not assumed			-2.919	662.648	.004	-.12786	.04380	-.21386	-.04186

Tables 5.33 and 5.34 show that the second year university students had significantly more positive attitudes towards active learning than the grade 10 public schools students ( $M = 3.7336$ ,  $SE = .02943$ ) versus ( $M = 3.6057$ ,  $SE = .03243$ ). This

difference was significant as  $t(918) = -2.919$ ,  $p < 0.01$  (equal variances not assumed).

**Table 5.35: Group statistics of Grade 10 private school and university students' attitudes towards active learning**

School type	N	Mean	Std. Deviation	Std. Error Mean
Grade 10 Private school students	249	3.6783	.51456	.03261
Second year university students	271	3.7336	.48454	.02943

**Table 5.36: The t-test statistics for the difference in attitudes between Grade 10 private school and university students towards active learning**

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.092	.762	-1.262	518	.208	-.05528	.04382	-.14136	.03080
Equal variances not assumed			-1.258	507.381	.209	-.05528	.04393	-.14159	.03102

Tables 5.35 and 5.36 illustrate that the second year university students demonstrated more positive attitudes towards active learning than the grade 10 private school students ( $M = 3.7336$ ,  $SE = .02943$ ) versus ( $M = 3.6783$ ,  $SE =$

.03261). However, this difference was not significant at  $t(918) = -1.262, p > 0.05$  on the basis of the assumption of equal variances.

### 5.2.5.8 The relationship between school type and grade level and attitude towards active learning

To conduct an ANOVA, statisticians require confirmation of certain assumptions, such as the homogeneity of variances. To assure the homogeneity of variances, statisticians suggest running exploratory analyses such as Levene's, Welch's, or the Brown-Forsythe tests. If Levene's test shows significant differences between the variances regarding the robust tests of the equality of means, then Welch's and the Brown-Forsythe tests are recommended – see Tables 5.37 and 5.38.

**Table 5.37: Test of the homogeneity of variances**

Levene Statistic	df1	df2	Sig.
18.283	2	917	.000

**Table 5.38: Robust tests of the equality of means**

	Statistic <sup>a</sup>	df1	df2	Sig.
Welch	4.258	2	587.332	0.015
Brown-Forsythe	4.561	2	903.897	0.011

Tables 5.37 and 5.38 show that both tests of variances and the equality of means revealed significant differences between the relevant groups. Thus, another counterpart of ANOVA, the Kruskal-Wallis test was used (Field, 2009: 382-391). The Kruskal-Wallis test was done instead of the ANOVA to address the violation of one

of the ANOVA assumptions, namely the equality of variances. The results appear in Table 5.39.

**Table 5.39: Grade 10 public and private school and university students' attitudes towards active learning and the Kruskal-Wallis test results**

School type and grade levels	N	Mean Rank	Chi-Square	Df	Asymp. Sig.
Grade 10 public school students	400	445.67	3.684	2	0.159
Grade 10 private school students	249	457.12			
Second year university students	271	485.49			
Total	920				

Table 5.39 indicates that with the Kruskal-Wallis non-parametric test, the grade 10 public and private school students and the university students do *not* differ significantly with regard to their attitudes towards active learning. That is, there were no significant differences observed between the three groups at chi-square (df= 2) = 3.684,  $p > .05$ .

### 5.3 A DISCUSSION OF THE RESULTS

The main purpose of the study was to explore the learning styles and attitudes towards active learning of students of different grade levels and school types.

To this end, the following four research questions were stated:

- What are the learning styles of students at Grade 10 public schools, Grade 10 private schools and at second year university level, and do the students have significant preferences for certain learning styles?
- What are the attitudes of students at Grade 10 public schools, Grade 10 private schools and at second year university level towards active learning approaches?



- Are there significant relationships between the students' learning styles (the four dimensions – active-reflective, sensing-intuitive, visual-reflective, and sequential-global) and their attitudes towards active learning?
- Are there significant differences in the learning style and attitude towards active learning between different groups of students (e.g., gender, different education levels, and type of school)?

In the following sections the results that were obtained and presented in the different tables and figures will be discussed.

### **5.3.1 Research question one: *The learning styles of the students at different grade levels***

#### **5.3.1.1 The learning styles of students at different grade levels by sub-categories (strong, moderate and balanced)**

As various learning theories claimed (Dunn et al., 2009, in Felder & Brent, 1996(a), (b); Lovelace, 2005:177; Sadler-Smith & Smith, 2004:396), students differ in their way of processing and organising information in a specific learning situation because of their differences in learning style and instructional preferences. (See section 2.3.6.1). In this research study, the majority (82%) of the grade 10 public school students were balanced in their preference for the active/reflective dimension, for the sensing/intuitive dimension (70%), for the visual-verbal dimension (65%), and for the sequential/global dimension (69%) of the ILS (see Table 5.3 and Figure 5.3). Likewise, the grade 10 private school students were fairly well-balanced in their preference for the active/reflective dimension (79%), the sensing/intuitive dimension (57%), the visual/verbal dimension (45%), and the sequential/global (72%) dimension of the ILS (see Table 5.4 and Figure 5.4). Accordingly, the majority of the second year university students were fairly balanced in their learning style preference for the active/reflective dimension (70%), the sensing/intuitive dimension

(61%), the visual/verbal dimension (52%), and the sequential/global dimension (69%) of the ILS (see Table 5.5 and Figure 5.5).

These results are similar to that obtained by Gappi (2013:72) (see section 3.3.4), namely that the majority of his respondents were also ‘balanced’ in their preferences for the opposing dimensions. According to Felder and Soloman (1998), a balance between the two extremities is advantageous (see section 2.3.6.3). The majority’s preference for the ‘balanced’ learning style could therefore be considered as favourable in moving from a teacher-centred strategy to active learning. Nevertheless, several challenges were pointed out by researchers regarding the implementation of active learning styles (for example, Felder & Brent, 1996a:44-46; Felder & Brent, 1996b; Lea et al., 2003:323). It should also be noted that there were no clear preferences for an active learning style by the students in the sense that very few of the respondents selected the strong- and moderate-active categories.

The implication of the above is that, since the majority of the students from the different types of schools were well-balanced in their preferences of learning style, they are able to learn to adapt to a new teaching style, although the teachers may make use of both dimensions (Felder & Soloman, 1994).

The above result seems to indicate that teachers in Ethiopia could have been using a variety of teaching methods, even though researchers previously found that the majority of teaching methods used in Ethiopia were teacher-centred (Kenea, 2009:83-4; MOE-TESO, 2003:2-11) (see section 3.3.4 and section 1.2). Lea et al. (2003:326) stated that the possibilities existed of mixing active teaching methods on a continuum of passive to active (see section 3.4.2). Ethiopian schools need to adopt student-centred teaching methods that are widely advocated by the contemporary constructivist theory of learning (Matthews, 1997:5; Michael, 2006:159; Saville et al., 2005). (See section 3.2.)

Even though some learning style models claim the significant influence of relatively stable characteristics (Dunn & Dunn, in Coffield et al., 2004(b):4), others, for example by Rochford (2003:667), assert that learning style is a combination of various biological and experiential variables that contribute to learning. From this it follows that because of the fact that the results are similar for all age groups and school types, the students' experiences may have been similar. This may imply that similar instructional strategies are used across the country, as the research findings indicated that most of the teachers in Ethiopia were making use of positivist, teacher-centred methods at all the grade levels (MOE-TESO, 2003:2-11). (See section 1.2.)

#### **5.3.1.2 The learning styles of the students at different grade levels by dimensions (active-reflective, sensing-intuitive, visual-verbal and sequential-global)**

There has not been any investigation done on Ethiopian students' learning styles, using the Felder-Soloman ILS. This doctoral study on the students' learning styles in Ethiopia was conducted by means of the Dunn and Dunn LSQ in the area of mathematics (Geche, 2009). The Felder-Soloman ILS was widely used in the field of engineering, while some researchers used it in the area of business economics, for example Van Zwanenberg et al. (2000). The studies which have been conducted in the United States of America and other parts of the world indicated diverse results, since the students' preferences for the ILS dimensions differed from university to university and from year to year (Felder & Brent, 2005:61). (See section 3.3.4.)

In this study, when the learning styles of the students were analysed without considering the sub-categories of the four dimensions of the ILS (Table 5.6 and Figure 5.6 - see section 5.2.2.2) the results showed that 59% of the grade 10 public school students were mostly 'intuitive'; 65% were 'verbal' and 56% were 'global', while 55% were 'active'. These results were different to most of the studies, as

indicated by Felder and Brent (2005:61) (see section 3.3.4), namely that the active, sensing, visual and sequential categories were preferred by their sample.

As regards grade 10 private schools, it is indicated in Table 5.7 and Figure 5.7 (see section 5.2.2.2) that 53% of the students were 'reflective', 70% were 'sensing', 75% were 'visual', and 56% were 'sequential'. This result is in line with the results in a study conducted at the University of Sao Paulo by Kuri and Tiruzzi (in Felder & Brent, 2005:61). Their results showed that 47% of freshmen mechanical engineering students were 'reflective', 67% of them were 'sensing', 84% were 'visual', and 45% were 'sequential' (55% were 'global' learners). (See section 3.3.4.)

In respect of the second year university students, 69% were 'sensing', 66% 'reflective', 62% 'global', and 51% were 'visual' learners. This contrasts on two dimensions with the results of most engineering studies in the Western universities that are mostly 'active' and 'sequential', rather than 'reflective' and 'global' (Felder & Brent, 2005:61). This may be because the respondents of this doctoral study were from the social sciences. 'Reflective' students, according to Felder and Soloman (1998), prefer to think about a topic quietly at first (see section 3.3.4), before proceeding.

In this study the preferences indicated the following important results: the public school students preferred 'active', 'intuitive', 'verbal' and 'global' learning styles; but the second year university students preferred a 'reflective' learning style to an active learning style, in addition to preferring 'sensing' and 'global' learning styles (see Tables 5.6 and 5.8). With regard to the grade 10 private school students, they significantly preferred 'sensing', 'visual' and 'sequential' learning styles (see Table 5.7). This may be related to the fact that their teachers are better qualified and have more resources available to use in these teaching approaches ( see section 4.4.2).

### 5.3.2 Research question two: The attitudes of the students towards active learning

An *attitude* is a learned and consistent reacting tendency, in a positive or negative manner, towards an object, thought or idea (Fishbein & Ajzen, in Oskamp & Schultz, 2005:8). It is also defined as a person's evaluation of an object or thought (Bohner & Dickel, 2011:392) (see section 1.5.8). This study found that the students at grade 10 secondary school and at university level demonstrated positive attitudes towards active learning. This was true of all private and public schools, and of both genders. This attitude was not developed on the basis of the *practical experience* of the students in active learning but it was the students' attitude towards *the idea of being active* in class, because many of Ethiopian students were not familiar with student-centred instruction (Kenea, 2009:83-4; MOE-TESO, 2003:2-11) (see section 1.2). These findings are in line with studies conducted by Jungst et al. (2003) and Qualters (2001), namely that the students generally showed favourable attitudes towards active learning, especially when they were informed about the importance of active learning methods.

Having positive attitudes in general, could be considered an advantage for the further implementation of active learning strategies in the country. In consideration of this result, the low achievement which was observed among university students when active learning methods were used (Mihirka et al., 2009) (see section 1.1.2), might not be the result of the negative attitudes of the students, but because of their unfamiliarity with the method of teaching, and the difficulties experienced during its implementation, or the negative attitudes of the lecturers.

Regarding the students' attitudes towards specific active learning/teaching methods (see Tables 5.13, 5.17 and 5.21), the students of all the school types and at university least of all preferred *self-directed learning*. The most preferred method was *inquiry-learning*. The *discussion* method was also favourably evaluated by all the groups, followed by *discovery learning* and *cooperative learning*.

As noted, the method preferred the least by all the groups was *self-directed learning* (see Tables 5.13, 5.17 and 5.21 in section 5.2.3). Self-directed learning is a very important aspect of active learning. It is the ability of understanding one's own way of learning, and performing according to one's own pace. It is an important aspect of learning in accordance with socio-constructivist theory (Jenkins, 2006:197; Loyens & Gijbels, 2008:352) (see section 2.3.3). At higher educational levels, the failure of a student to advance to the level of independence is serious, since it indicates that the student has failed to move to the basics of the new paradigm, which requires self-paced instruction rather than the teacher's transmission of knowledge and monitoring of learning (Kemp, 2006:21; Reigeluth, 1994:7; 1997:204; Watson & Reigeluth, 2008:42) (see section 2.4.1).

The other active learning methods (cooperative learning, problem-based learning, the discussion method and discovery learning) were chosen as other options in the study (see Tables 5.13, 5.17 and 5.21). However, the students have to be taught how to learn by means of these methods by actually implementing and using the teaching methods, which are constructivist in nature (Brown, 2001:47; Chen & Honomichl, 2008; Felder & Brent, 2007:34; Lefrancois, in Mayer, 2004:14; Yew & Schmidt, 2012:371-372) (see section 2.5). The methods allow the students to actively participate in the instructional process, and permit them to be inventive and to improve their competences, and therefore also their self-esteem (Brown, 2001:46-47; Keyser, 2000:35). (See section 2.5).

### **5.3.3 Research question three: The relationship between the students' learning styles and their attitudes towards active learning**

It was expected that those students who had positive attitudes towards active learning would have an active learning style, and in turn, that there would be a strong positive correlation between them. Table 5.22 revealed that there was a significant but very low correlation of only 0.118 between the active-reflective kind of learning style and attitude towards active learning. Other intervening variable(s) may

have played a role. To investigate such intervening variable(s) would require further studies. Furthermore, confidence in a relationship is formally determined not only by the correlation coefficient, but also by the number of pairs in the data. If there are very few pairs, then the coefficient needs to be very close to +1 for it to be considered 'statistically significant', but if there are many pairs then a coefficient could be closer to 0, and it can still be considered 'highly significant'.

### **5.3.4 Research question four: The significance of the differences in learning style and attitude towards active learning between different groups of students**

#### **5.3.4.1 Gender variation in learning styles**

Some researchers recommend that teachers and researchers should consider the influence of gender differences in learning style to improve learning outcomes (Honigsfeld & Dunn, 2003:195). Some other studies, however, could not confidently confirm gender differences in learning styles (Severiens & Ten Dam, 1994:498). (See section 3.3.4.)

With regard to using learning style inventories, in particular, Severiens and Ten Dam (1994:494) pointed out that different inventories consist of a variety of dimensions. Studies that show gender variations using the ILS are scarce. Felder and Brent (2005:68) also admitted the limitation of studies using the ILS, by recommending further research on gender-related patterns in learning style preferences. As was mentioned in section 2.3.4, although various learning style theories have similar constructs, the inventories have different dimensions. Thus, the results could differ with regard to gender, depending on which inventory was used. For example, by using Kolb's learning style inventory, Severiens and Ten Dam (1994:487) found that males, more than females, preferred an abstract style of learning (see section 3.3.4).

Chi-square analysis focuses on the number of students in different categories, and not on the average score of a group. Considering the cross-tabulation between gender and the sub-categories of the ILS (see Table 5.23), the chi-square analysis found no significant differences between the number of male and female students that preferred certain learning styles with regard to the dimensions of 'active-reflective', 'sensing-intuitive', 'visual-verbal' or 'sequential-global'.

However, some other significant differences were found, namely

- more males than females selected the 'moderate visual' sub-scale (see Table 5.23);
- more males than females selected 'sensing' (see Table 5.24.);
- more males than females selected 'strong and moderate verbal' as well as 'strong and moderate visual' (see Table 5.25).

Further light was shed on possible significant differences when the average scores of the genders were compared. Thus, the study revealed some gender variations in the 'sensing-intuitive' and 'visual-verbal' dimensions (see Table 5.27). As was indicated in Table 5.26, in the case of the 'sensing-intuitive' and the 'visual-verbal' dimensions, the means of the females (16.27 and 16.46) exceeded those of the males (15.89 and 16.10). Thus, as described in section 5.2.5.3, the females tended to be more 'intuitive' and 'verbal', while the males tended to be more 'sensing' and 'visual'. Therefore, the teachers should consider gender differences when using instructional strategies. For example, 'sensing' students are more inclined toward hands-on activities, whereas 'intuitive' students show greater interest in the imaginative component (Felder & Henriques, 1995:22) - see section 2.3.6.3. On the other hand, 'visual' students learn better from visual images – "pictures, diagrams, flow charts, graphs, and demonstrations or any other visual representation of course material that is predominantly visual" (Felder & Henriques, 1995:23; Felder & Soloman, 1998) - see section 2.3.6.3.



The implication of this study is that in the case of Ethiopia, which is in need of following the constructivist paradigm, and with the study's identification of gender differences in learning styles, the teachers need to consider these differences to support the learners to learn effectively (Lee, 2006:22; Watson, 2006:24; Watson & Reigeluth, 2008:43) (see section 2.4.1).

The results of this study are in contrast to the findings by other researchers, for example D'Cruz et al. (2013:323) in Tamil Nadu. These researchers compared the strength of learning style preferences of male and female first year medical students on the four dimensions of the ILS. They found no significant differences between the two genders. Gappi (2013:74) also conducted a study on freshman students at AMA International University of Bahrain, and identified no significant gender differences in the learning style preferences (see section 3.3.4).

#### **5.3.4.2 The relationship between school type and learning style**

Teaching methods affect the students' attitudes towards the class. For example, students who are involved in cooperative learning show more interest towards learning than those who attend a lecture (Gottschall & Garcia-Bayonas, 2008; Luntungan, 2012:50; Sadi & Cakiroglu, 2011:95). The teaching methods presumably also affect the learning styles of the students who attend different school types. This is because private schools may have more resourceful teachers, as was indicated (see section 4.4.2).

According to the results, as indicated in Table 5.28, there were significant differences between the school types in relation to the learning styles of the students.

In particular,

- the ‘balanced active-reflective’ and ‘moderate-reflective’ sub-categories were largely chosen by the secondary school students rather than by the university students;
- the ‘balanced sensing-intuitive’ or ‘moderate intuitive’ and ‘moderate sensing’ options were more popular with the public schools students than with the private school students or the university students;
- the ‘balanced visual-verbal’ option was selected more by the public schools students than by the private school students or the university students; and
- the ‘moderate global’ and ‘moderate sequential’ options were more popular with the public schools students than with the private school students or the university students.

Therefore, it seems that, in most cases, the students in the public schools find it difficult to choose between the two dimensions of a given scale. For those students, addressing a wide variety of learning styles could work well (Felder & Henriques, 1995:28). However, it seems that the university students need to be trained to become more ‘active’, ‘intuitive’, ‘verbal’ and ‘sequential’, in respect of the socio-constructivist learning theory. The teachers at private schools could also consider the fact that many of the students were ‘moderate-sensing’, ‘moderate-visual’, and ‘moderate-sequential’ in their learning styles. This shows a preference for concrete content, visual presentation and a sequential presentation in teaching style (Felder & Silverman, 1988:675) (see section 2.3.6.4).

#### **5.3.4.3 The relationship between gender and attitude towards active learning**

A number of studies concluded that girls show less interest in active learning than boys. As Rolon (2012: 953) stated, girls are usually passive, and participate less in group-activities and leadership-roles than boys. From these before mentioned results, it may be deduced that girls were assumed to have less positive attitudes towards active learning. However, this doctoral study in Ethiopia found no significant differences in the attitudes between males and females at secondary school or at

university levels. The means of 3.6748 and 3.4686 are on the positive side of the Likert scale. Thus, both genders indicate positive attitudes towards active learning. This doctoral study is therefore in line with the studies conducted by Lea et al. (2003), Jungst et al. (2003) and Oliver-Hoyo and Allen (2005), namely that the students generally indicated positive attitudes towards active learning instruction. (See section 3.4.2.)

It should be noted that these attitudes did not indicate the students' actual experiences of active learning approaches, but their *attitudes* towards it. The implementation of active learning pedagogies can encounter several obstacles, as pointed out by Kenea (2009:106). Further studies are required to investigate the students' attitudes to active learning while they are practically engaged in such instructional processes, especially in the Ethiopian context, where active learning practices are practically non-existent. Tuji (2006:23-4) declared that the implementation of active learning instruction would be very difficult in Ethiopia because of limited resources and training. (See section 3.3.5.)

#### **5.3.4.4 The relationship between school type and grade level, and attitude towards active learning**

In respect of this study it needs to be indicated that the private school context differs from the public school context, and the secondary school context also differs from the university context, with regard to the teachers' level of education, the economic and material supplies they have at their disposal, and in the teaching methods that are used. Thus, the students at these two school types (private and public/governmental) and at different grade levels (secondary school and university) could differ significantly in their attitudes towards active learning (see section 4.4.2).

By using t-tests to test for differences between the attitudes of students of different school types and grade levels towards active learning, the following was found:

- The grade 10 private school students indicated significantly more positive attitudes towards active learning than the public schools students (see Tables 5.31 and 5.32).
- The university students indicated significantly more positive attitudes towards active learning than the public schools students (see Tables 5.33 and 5.34).
- The university students and the private school students did not differ significantly in their attitudes towards active learning – both groups demonstrated positive attitudes towards active learning (see Tables 5.35 and 5.36).

From the above, it could be speculated that the university students and the private school students had a better understanding of the nature and the advantages of active learning than the public secondary school students. Active learning favours independent (self-monitored, self-regulated) learning (Pierce & Kalkman, 2003) (see section 3.2.1.) The university students and the private school students may have had more experience, and thus a greater awareness of independent learning than the public school students.

#### **5.4 SUMMARY**

The purpose of this study was to investigate the students' learning styles and their attitudes towards active learning.

In summary, the study mainly found the following:

- The secondary school students and the university students were generally 'balanced' in their preferences for the four scales of the Felder-Soloman ILS (active-reflective, sensing-intuitive, visual-reflective and sequential-global). Their next preference was for the 'moderate' sub-categories on all the scales of the instrument. The 'strong' sub-categories were seldom chosen by the students.

- The grade 10 public school students' preferences for the 'active', 'intuitive', 'verbal' and the 'global' categories rather than for the 'sensing', 'visual' and 'sequential' categories were significant.
- The grade 10 private school students generally indicated a significant preference for the 'sensing' and the 'visual' dimensions, rather than for the 'intuitive' and the 'verbal' dimensions. They did not indicate a statistically significant preference for the 'active' or the 'reflective' dimensions. In addition, their preference for the 'sequential' rather than the 'global' dimension was statistically significant on the 5% level only.
- The university second year students strongly preferred the 'reflective', 'sensing' and 'global' dimensions to an 'active', 'intuitive' or 'sequential' learning style. Their preference for either a 'visual' or a 'verbal' learning style was not significant.
- The students of all the school types and grade levels showed positive attitudes towards active learning.
- A significant positive correlation was observed between the students' attitudes towards active learning and the 'active-reflective' dimension of the ILS.
- Significant differences were found between the male and female students with regard to the 'sensing-intuitive' and 'visual-verbal' categories of the learning styles. The male students were more 'sensing' and 'visual', while the female students were more 'intuitive' and 'verbal' in their preferences.
- Significant differences were found among the school types with respect to all the learning styles dimensions.
- There were no significant differences between the two genders regarding their attitudes towards active learning.

- Significant differences were found between the grade 10 public school students and the university students on their attitudes towards active learning<sup>3</sup>.
- When employing the Kruskal-Wallis test, significant variations were not found among the school types and grade levels regarding the students' attitudes towards active learning.

In chapter six the conclusions, a number of limitations of the study and recommendations will be presented.

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<sup>3</sup> The inconsistency between this result and the last one may be due to the type of test used. In this case the t-test was used and it is more robust. But to avoid such kind of inconsistency, using the Mann-Whitney may resolve the problem. In the case of using the Mann-Whitney there would be no significant difference.

## CHAPTER 6

# CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS

### 6.1 INTRODUCTION

In chapter 5 the results were presented, discussed and interpreted against the background of the theoretical framework and previous publications that also focussed on the issue of active learning.

In this chapter the conclusions of the study are stated. The conclusions focus on the four basic questions of the study as formulated in respect of the students' learning styles and attitudes towards active learning (see section 1.2).

These questions are:

- What are the learning styles of students at Grade 10 public schools, Grade 10 private schools and at second year university level, and do the students have significant preferences for certain learning styles?
- What are the attitudes of students at Grade 10 public schools, Grade 10 private schools and at second year university level towards active learning approaches?
- Are there significant relationships between the students' learning styles (the four dimensions – active-reflective, sensing-intuitive, visual-reflective, and sequential-global) and their attitudes towards active learning?
- Are there significant differences in the learning style and attitude towards active learning between the different groups of students (e.g., gender, different education levels, and type of school)?

Furthermore, certain limitations of the study will be indicated and a number of recommendations will be put forward. Finally, the contribution of the study and a summary will be presented.

The conclusions are indicated in the next section. The conclusions are drawn from the results, in line with the research questions and the hypotheses that were stated.

## **6.2 CONCLUSIONS**

### **6.2.1 Research question 1**

*What are the learning styles of students at Grade 10 public schools, Grade 10 private schools and at second year university level, and do the students have significant preferences for certain learning styles?*

Hypothesis:

Grade 10 public school students, Grade 10 private school students and second year university level students have significant preferences for certain learning styles.

The students' learning styles can vary on four dimensions, namely active-reflective, sensing-intuitive, visual-verbal, and sequential-global.

From the results in sections 5.2.2.1 and 5.2.2.2, it can be concluded that the majority of the public, private and university students' learning styles were balanced between the two dimensions of the four ILS scales.

This result is considered as positive for transforming the Ethiopian educational system from the traditional approach of teaching to a learner-centred or active learning approach according to the constructivist theory because the students should be able to adapt.



It can also be concluded that some of the Ethiopian students of all the school types and grade levels (between 5% and 27%) prefer the 'moderate' categories of the ILS scales. That is, they can learn more easily in an instructional situation that matches the dimension of their preference. This does not necessarily mean that they cannot learn when other teaching strategies are used. It can also be concluded that a very small section of the students (ranging from 0% to 5%) from the three educational levels or school types preferred the 'strong' categories of the ILS scales. These students would face difficulties in learning in an instructional situation that does not support their preference, as pointed out (Felder & Soloman, 1994).

Finally, from the above it can be concluded that it should not be too difficult to implement the learner-centred approach in Ethiopia, although the results of this study cannot be generalised to the whole Ethiopia. In order to satisfy the individual needs of all the students and using a variety of instructional strategies should facilitate efficient learning.

## **6.2.2 Research question 2**

*What are the attitudes of students at Grade 10 public schools, Grade 10 private schools and second year university level towards active learning approaches?*

Hypothesis:

The students' attitudes can vary on a continuum from extremely negative on the one end to extremely positive on the other end. It can be hypothesised that some groups of students may differ significantly in their attitudes towards active learning.

It can be concluded that the students of all school types and grade levels indicate positive attitudes towards active learning – see section 5.2.3.

This result has very high significance for the country's educational transformation programme (the declaration of the learner-centred paradigm in 2003). So this study has important implications for the problems that the country is encountering or will encounter in implementing the active learning pedagogy, other than the students' attitudes. Constraints could rather be related to the unfamiliarity of the teaching methods for both the students and the teachers, and a lack of appropriate resources to fulfil the requirements of the active learning strategies. However, this would require further investigation.

The results of this study also imply similarities in the instructional strategies that the teachers use across the country, because of the similarities in the students' learning style preferences across all school types and grade levels that were observed.

### **6.2.3 Research question 3**

*Are there significant relationships between the students' learning styles and their attitudes towards active learning?*

Hypothesis:

There is a significant relationship between the students' learning styles students and their attitudes towards active learning.

It can be concluded that there is a significant relationship between the students' attitudes towards active learning and the 'active-reflective' dimension of the ILS – see section 5.2.4. This result shows a positive correlation between a positive attitude towards active learning, and the 'active' dimension of the ILS scale. This means that the more positive the students' attitudes are towards active learning, the more possible it is that they will be actively involved in the learning process.

#### 6.2.4 Research question 4

*Are there significant differences in the learning style and attitude towards active learning between the different groups of students (e.g., gender, different education levels, and type of school)?*

*The following hypotheses may be stated from this research question:*

Hypothesis 4a: Regarding students' learning styles

It can be concluded that there exist significant differences in the learning styles of male and female students, of the students at different grade levels and of the students at different types of schools (public and private).

Significant gender variations were observed between the 'sensing-intuitive' and 'visual-verbal' dimensions of the ILS scales. More specifically, the following conclusions can be drawn, namely

- more males than females prefer the 'moderate visual' ILS sub-scale (see Table 5.23);
- more males than females prefer the 'sensing' ILS sub-scale (see Table 5.24);
- more males than females prefer the 'strong and moderate verbal' as well as the 'strong and moderate visual' ILS sub-scales (see Table 5.25).

Similarly, significant variations were found between the school type and grade levels on different sub-categories of the four dimensions of the ILS scales.

The following conclusions are drawn from the results depicted in Table 5.28:

- The secondary school students had a significant greater preference for the 'balanced active-reflective' and 'moderate-reflective' sub-categories than the university students.

- The public school students had a significant greater preference for ‘balanced sensing-intuitive’ or ‘moderate intuitive’ and ‘moderate sensing’ options than the private school students or the university students.
- The public school students had a significant greater preference for the ‘balanced visual-verbal’ option than the private school students or the university students.
- The public school students had a significant greater preference for the ‘moderate global’ and ‘moderate sequential’ options than the private school students or the university students.

From the above it can be concluded that many similarities exist between the private school students and the university students on the ILS dimensions, as opposed to the public school students.

Hypothesis 4b: Regarding the students’ attitudes

There are significant differences between the attitudes towards active learning of male and female students, of the students of different grade levels and of the students of different types of school (public versus private schools).

Regarding a gender variation in the students’ attitudes towards active learning, the hypothesis cannot be accepted (see section 5.2.5.5). It is therefore concluded that there is no significant difference between the two genders in their attitudes towards active learning (see Tables 5.29 and 5.30). However, with regard to school type and grade level, the hypotheses are accepted. The university students demonstrated significantly more positive attitudes towards active learning than the public school students, as indicated by a t-test analysis (see Table 5.33). However, when using a Kruskal-Wallis test there was no significant difference between the school types and grade levels. Since the t-test is the more robust statistical technique, it may be concluded that the university students were more knowledgeable about active learning instruction strategies than the public secondary school students, and therefore more progressive in respect of them.

## **6.3 RECOMMENDATIONS**

### **6.3.1 Recommendations related to the research questions**

- Since the attitudes of the students towards active learning were positive, the implementation problems that were noted in section 1.1 (e.g. resistance to change), may be caused by other factors. The government should, therefore, conduct further research to pinpoint the actual obstacles in respect of the implementation, and take the necessary measures.
- As early studies indicated (Kenea, 2009:83-4; MOE-TESO, 2003:2-11; Tuji, 2006:23-4), the teachers' experience and resources to implement active learning are limited. Thus, the responsible governmental bodies should work on capacity building, especially for teachers, and on providing facilities for the schools and the universities.
- As indicated in section 6.2.2, the secondary school students and the university students are not overly motivated towards self-directed learning. The literature indicated that self-directed learning is crucial in a constructivist approach, for it advocates the independent (individual) and social construction of knowledge through active interaction. Therefore, intervention to develop self-directed learning is a burning issue in the Ethiopian education system.
- Although the concept of 'learning style' has been part of the international education terminology for more than three decades (Dunn et al., 2009), it is not well-known in the Ethiopian education environment. Therefore, the government has to introduce the idea to the school principals, supervisors, heads of departments and teachers so that they can learn how to identify the students' learning styles, which may enable them to adjust their teaching styles to meet the needs of individual groups of students.

- In the process of trying to implement the new paradigm (student-centred methods of teaching), instead of insisting on one unfamiliar method only, alternating the teaching methods are suggested to accommodate all the learning style preferences, as was also recommended by Felder and Henriques (1995:28-29) as follows:
  - Balance concrete and conceptual information to help both 'sensing' and 'intuitive' students.
  - Balance structured teaching approaches that support students with a 'sequential' learning style, with unstructured activities that are enjoyed by students with a 'global' learning style.
  - Make liberal use of visuals (photographs, images, sketches, cartoons, films, videotapes, and live role-play) to aid the 'visual' and 'global' learners.
  - Use drill exercises to practice basic vocabulary and grammar, and thus assist 'sensing' learners without overdoing it to the detriment of 'intuitive' students.
  - Use short writing exercises for 'reflective' students. At the same time, assign tasks to small groups to facilitate discussion; and provide the opportunity for 'activity' through drama and team competition.
  - Provide the students with the opportunity for active cooperation on some assignments in consideration of the 'active' students.
  
- To improve the students' attitudes towards active learning, the Ethiopian education system needs to change from sorting-focused to learning-focused instruction, in line with a transformation from the industrial age to the information age. This change entails a paradigm shift from teacher-centred to learner-centred instruction (Duffy & Reigeluth, 2008; Reigeluth & Duffy, 2008; Watson & Reigeluth, 2008). Ethiopia has a mixed social setting – with agrarian, industrial and information periods. It has been 10 years since the

Ethiopian government decided to implement a learner-centred curriculum. As was mentioned in chapter 1, the declaration was top-down. To improve the students' and the teachers' attitudes towards active learning, the paradigm shift requires changes in instructional strategies, as well as major transformations of the education system. All the transformation processes should be participatory and collaborative so as to motivate the teachers and the lecturers to give their full participation. Teaching should also ensure that individual students' learning needs are met, as indicated above.

### **6.3.2 Recommendations for further research**

- As has been mentioned before (see section 3.3.4 and section 1.2), practical knowledge of active learning among Ethiopian students is limited. It is recommended that experimental designs be used to compare a group of students who are involved in active learning with a control group who are involved in teacher-centered instruction. Such studies in different fields, such as the social and the natural sciences, could be valuable.
- Further studies are also recommended in respect of other stakeholders' attitudes towards active learning (teachers, lecturers and educational professionals at different governmental organizations) to identify constraints that thwart active teaching in the country.
- Similar studies to this one should be undertaken on a wider scale (at regional and country levels).
- A validation study of the Students' Attitude towards Active Learning Scale (SATAL) is needed.

- More research is also needed on facilities, the suitability of the school environments for active learning instruction, and leadership in schools for the implementation of active learning.
- Research is necessary on ways to stimulate and improve the self-directed learning of Ethiopian students.
- Qualitative studies or mixed-methods studies could be done for a more in-depth understanding of how teachers and students experience the different kinds of active, student-centred methods.

#### **6.4 LIMITATIONS OF THE STUDY**

This research study was undertaken by making use of the convenience sampling technique at Grade 10 and second year university levels in the Hawassa city of Ethiopia. Thus, the generalisation of the results is limited to the selected sample, although there are many similar schools and students in Ethiopia.

Secondly, the data were collected by means of a self-response instrument (a questionnaire), and such an instrument has inherent limitations. For instance, the participants may answer superficially, may forget important issues, or may misinterpret a given question (Babbie, 2010:293). Conducting similar studies by also using other data-gathering methods, such as observation and interviews or focus-group discussions, are suggested.

#### **6.5 CONTRIBUTION OF THE STUDY**

This study on learning style and attitude towards active learning is the first of its kind in Ethiopia in many ways, e.g., with regard to the instruments used, comparing Grade 10 students with second year university students, and comparing private and



public school students. It was extensive in scope, involving 920 students of a wide variety. The students' learning style preferences were explored. The results are significant for identifying which strategies the teachers can use for which group to facilitate efficient learning.

The findings that are particularly significant include the following:

The Ethiopian students at both Grade 10 school and second year university levels exhibited positive attitudes towards active learning. This implies that the time is ripe for the Ethiopian education system to implement renewal in consideration of the constructivist paradigm that advocates active learning.

The study identified specific kinds of active learning methods that the students prefer, or do not give preference to. In general, all the students favoured *inquiry learning* while they least of all selected *self-directed learning*. This is a crucial finding because of the importance of self-directed learning for life-long and independent learning.

The results identified many significant differences in learning styles between school types and gender. This enhances the awareness of educationalists, such as the Ministry of Education of Ethiopia and other stakeholders, of how to deal with individual or group differences in line with preferred styles within an active learning pedagogy. The study also listed ways how to deal with these differences to improve student learning. Thus, the research makes a valuable contribution to new knowledge with regard to teaching and learning within the Ethiopian context.

## **6.6 SUMMARY**

The government of the Federal Democratic Republic of Ethiopia proclaimed a new curriculum for reconstructing the education system. This programme aims to change

the predominantly-used *teacher*-centred instructional strategies to *student*-centred, active learning methods.

This motivated the main research question of this study namely:

*What are Ethiopian students' learning styles and attitudes towards active learning approaches?*

The specific research questions that were investigated include:

- What are the learning styles of students at Grade 10 public schools, Grade 10 private schools, and at second year university level, and do the students have significant preferences for certain learning styles?
- What are the attitudes of students at Grade 10 public schools, Grade 10 private schools and at second year university level towards active learning approaches?
- Are there significant relationships between the students' learning styles and their attitudes towards active learning, in respect of the four dimensions of the Index of Learning Styles (ILS) (active-reflective, sensing-intuitive, visual-reflective and sequential-global)?
- Are there significant differences in the learning style and attitude towards active learning between the different groups of students (e.g., gender, different education levels, and type of school)?

To answer these questions, the study used an exploratory, descriptive design. By means of questionnaires, the data were collected from a purposefully and a conveniently selected sample of 920 students from Grade 10 government (also called 'government-managed schools') and private schools, and second year

university students in Hawassa, Ethiopia. The sample comprised of 506 males and 414 females; 400 students from government/government-managed schools, 249 from private schools, and 271 from the university. The data were analysed by means of descriptive statistics (means and correlations) and inferential statistics (analysis of variance).

Firstly, the results indicated that the majority of the students' learning styles were balanced between the two dimensions of the ILS scales. As secondary preference, they tended towards moderate categories, and a small section of the students preferred the strong categories of the scales. Secondly, the study determined that the sampled students, in general, indicated a positive attitude towards active learning. Thirdly, the study found a significant relationship between the students' attitudes towards active learning and the 'active-reflective' dimension of the ILS. Fourthly, significant differences in learning style and attitude towards active learning were found in respect of gender, education level and type of school.

## REFERENCES

Abelson, R.P., Frey, K.P. & Gregg, A.P. 2004. *Experiments with people: Revelations from social psychology*. Mahwah: Lawrence Erlbaum Associates Publishers.

Adams, J., Khan, H.T.A., Raeside, R. & White, D. 2007. *Research methods for graduate business and social science students*. Los Angeles: Response Books, Business books from SAGE.

Aga, F.J. 2005. Active learning versus the traditional lecture methods of teaching at higher education: A case study of learners' preferences at the Department of Business Education, Addis Ababa University. *The Ethiopian Journal of Education*, 25(1): 49-77.

Alberta Learning. 2002. *Instructional strategies health and life skills guide to implementation (K-9)*. Alberta Learning, Alberta, Canada. Available online at <http://www.education.alberta.ca/media/352984/is.pdf>. (Accessed on 12/04/13).

Alemu, B.M. 2010. Active learning approaches in Mathematics education at Universities in Oromia, Ethiopia. Unpublished D.Ed. thesis. Pretoria: University of South Africa.

Alexander, P.A. & Murphy, P.K. 1998. The research base for APA's learner-centered psychological principles. In N. M. Lambert & B. L. McCombs (Eds.) *How students learn: reforming schools through learner-centred education*. Washington, DC, US: American Psychological Association, 25-60.

Alfieri, L., Brooks, P.J., Aldrich, N.J. & Tenenbaum, H.R. 2011. Does discovery-based instruction enhance learning? *Journal of Educational Psychology*, 103(1): 1-18.

Anderson, J.A., Reder, L.M. & Simon, H.A. 1997. Situative versus cognitive perspectives: Form versus substance. *Educational Researcher*, 26 (1): 18-21.

Auster, E. R. & Wylie, K. K. 2006. Creating active learning in the classroom: A systematic approach. *Journal of Management Education*, 30(2): 333-353.

Babbie, E. 2010. *The practice of social research* (12<sup>th</sup> edition.) Belmont, CA: Wadsworth.

Baldwin, L.P. 2009. Editorial. *Active Learning in Higher Education*, 10(2): 99-102.

Ballone, L.M. & Czerniak, C.M. 2001. Teacher's beliefs about accommodating students' styles in science classes. *Electronic Journal of Science Education*, 6(2):1-41.

Bartlett, J.E. II, Kotrlik, J.W. & Higgins, C.C. 2001. Organizational research: Determining appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal*, 19(1): 43-50.

Battaglia, M.P. 2008. Convenience sampling. In P.J. Lavrakas (Ed.), *Encyclopedia of survey research methods*, SAGE Publications, Inc., Thousand Oaks, CA.:149-150.

Beijaard, D., Verloop, N. & Vermunt, J.D. 2000. Teachers' perceptions of professional identity: An exploratory study from a personal knowledge perspective. *Teaching and Teacher Education*, 16: 749-764.

Black, T.R. (Ed.). (2002). *Understanding social science research* (2nd edition.) London, England: SAGE Publications, Ltd.

Blackbourn, J & Chessin, D. 2006. Conditioning theory. In F. W. English (Ed.), *Encyclopedia of educational leadership and administration*. Thousand Oaks, CA: SAGE Publications, Inc., 191-192.

Bohner, G. & Dickel, N. 2011. Attitudes and attitude change. *Annual Review Psychology*, 62: 391-417.

Bostrom, L. & Lassen, L. 2006. Unraveling learning, learning styles, learning strategies and meta-cognition. In E. Sadler-Smith & C. Evans (Eds.), *Education and training: Learning styles in education and training* (Volume 48, Number 2/3). Bradford, England, Emerald Group Publishing Limited, 178-189.

Brown, H.D. 2001. *Teaching by principles: An interactive approach to language pedagogy*. (2<sup>nd</sup> edition.) New York: Longman.

Brualdi, A.C. 1996. *Multiple intelligences: Gardner's theory*. Washington DC: ERIC Clearinghouse on Assessment and Evaluation.

Burton, D. 2000. *Research training for social scientists*. London: SAGE Publications Ltd.

Cangelosi, J. 1990. *Designing tests for evaluating students' achievement*. New York: Longman Pub. Ltd.

Cappelleri, J.C., Zou, K.H., Bushmakina, A.G., Alvir, J.M.J., Alemayehu, D. & Symonds, T. 2013. *Patient-reported outcomes measurement, implementation and interpretation*. London: Chapman and Hall/CRC.

Carlile, O. & Jordan, A. 2005. It works in practice but will it work in theory? The theoretical underpinnings of pedagogy. In G. O'Neill, S. Moore, & B. McMullin (Eds.), *Emerging issues in the practice of university learning and teaching*. Dublin: AISHE. Released under Creative Commons licence: Attribution-NonCommercial 2.0. Some rights reserved. Available online at <http://www.aishe.org/readings/2005-1/>. (Accessed on 6/06/13).

Carmines, E. & Woods, J. 2004. Validity. In M. S. Lewis-Beck, A. Bryman, & T. F. Liao (Eds.), *Encyclopedia of social science research methods*, SAGE Publications, Inc., Thousand Oaks, CA, 1172-1173.

Carpendale, J., Müller, U. & Bibok, M. 2008. Piaget's theory of cognitive development. In N. J. Salkind (Ed.), *Encyclopedia of educational psychology*. Thousand Oaks, CA: SAGE Publications, Inc., 799-805.

Chan, B. & Tang, W. 2006. Evaluating the impact of university teaching on approaches to learning of first-year hospitality students. *Journal of Teaching in Travel and Tourism*, 6(1): 41-59.

Chen, P.Y. & Popovich, P.M. (Eds.). 2002. *Correlation*. Thousand Oaks, CA: SAGE Publications.

Chen, Z. & Honomichl, R. 2008. Discovery learning. In N.J. Salkind (Ed.), *Encyclopedia of educational psychology*. Thousand Oaks, CA: SAGE Publications, pp.256-259.

Cheung, Y.B. 2013. *Statistical analysis of human growth and development*. Boca Raton: Chapman and Hall/CRC.

Coffield, F., Moseley, D., Hall, E. & Ecclestone, K. 2004(a). *Should we be using learning styles? What research has to say to practice*. London: Learning and Skills Research Centre.

Coffield, F., Moseley, D., Hall, E. & Ecclestone, K. 2004(b). *Learning styles and pedagogy in post-16 learning: A systematic and critical review*. London: Learning and Skills Research Centre.

Collins, J.W. & O'Brien N.P. (Eds.). 2003. *The Greenwood dictionary of education*. Westport, CT: Greenwood Press.

Colliver, A.J. 2002. Constructivism: The view of knowledge that ended philosophy or a theory of learning and instruction? *Teaching and Learning in Medicine: An International Journal*, 14(1):49-51.

Creswell, J.W. 2009. *Research design: Qualitative, quantitative, and mixed methods approaches*. (3<sup>rd</sup> edition.) Los Angeles: SAGE.

Crick, R.D., McCombs, B., Haddon, A., Broadfoot, P. & Tew, M. 2007. The ecology of learning: Factors contributing to learner-centred classroom cultures. *Research Papers in Education*, 22(3): 267-307.

Cuban, L. 1991. History of teaching in social studies. In J.P. Shaver (Ed.). *Handbook of research on social studies teaching and learning: A project of the National Council for the Social Studies*. New York: MacMillan, 197–209.

Daniels, D.H. & Perry, K.E. 2003. "Learner-centred" according to children. *Theory into Practice*, 42(2):102-108.

D'Cruz, S.M., Rajaratnam, N. & Chandrasekhar, M. 2013. Learning styles of first year medical students studying physiology in Tamil Nadu. *International Journal of Medical Research and Health Sciences*, 2(3):321-327.

De Gruijter, D.N.M. & Van der Kamp, L.J. Th. 2007. *Statistical test theory for the behavioral sciences*. London: Chapman and Hall/CRC.

Denig, S.J. 2004. Multiple intelligence and learning styles: Two contemporary dimensions. *Teachers College Record*, 106 (1):96-111.



Denzine, G.M. 2008. Social learning theory. In N.J. Salkind (Ed.). *Encyclopedia of educational psychology*. Thousand Oaks, CA: SAGE Publications, 920-925.

Deubel, P. 2003. An investigation of behaviorist and cognitive approaches to instructional multimedia design. *Journal of Educational Multimedia and Hypermedia*, 12 (1):63-90.

Dewar, T. & Whittington, C. 2000. Online learners and their learning strategies. *Journal of Educational Computing Research*, 23(4):415-433.

DiCarlo, S.E. 2006. Cell biology should be taught as science is practiced. *Nature Reviews Molecular Cell Biology*, 7(4):290-295.

Distlehorst, L.H., Dawson, E., Robbs, R.S. & Barrows, H.S. 2005. Problem-based learning outcomes: The glass half-full. *Academic Medicine*, 80(3):294-299.

Drew, V. & Mackie, L. 2011. Extending the constructs of active learning: Implications for teachers' pedagogy and practice. *The Curriculum Journal*, 22(4):451-467.

Duff, A. 2004. A note on the problem-solving style questionnaire: An alternative to Kolb's learning style inventory? *Educational Psychology*, 24(5):699-709.

Duffy, F.M. & Reigeluth C.M. 2008. The school system transformation (SST) protocol. *Educational Technology*, 48(4):41-49.

Dunn, R. 2003. The Dunn and Dunn learning-style model and its theoretical cornerstone. In R. Dunn & S.A. Griggs (Eds.). *Synthesis of Dunn and Dunn learning style Model research: Who, what, when, where, and so what?* New York: St. John's University's Centre for Study of Learning and Teaching Styles, 1-6.

Dunn, R., Honigsfeld, A., Doolan, L.S., Bostrom, L., Russo, K., Schiering, M.S., Suh B. & Tenedero, H. 2009. Impact of learning-style instructional strategies on students' achievement and attitudes: Perceptions of educators in diverse institutions. *The Clearing House*, 82(3):135-140.

Ebel, R.L. & Frisbie, D.A. 1991. *Essentials of educational measurement* (5<sup>th</sup> edition.) New Jersey: Englewood Cliffs.

Ebert-May, D., Brewer, C. & Allred, S. 1997. Innovation in large lectures: Teaching for active learning. *Bioscience*, 47:601-607.

Ediger, M. 2009. Rating teachers of social studies instruction. *Journal of Instructional Psychology*, 36(4):323-325.

Endawoke, Y. 2004. Teachers' beliefs, knowledge and practice of learner-centred approach in schools of Ethiopia. *The Ethiopian Journal of Education*, 24(2):17-41.

Ertmer, P.A. & Newby, T.J. 1993. Behaviorism, cognitivism and constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, 6(4):50-72.

Eryaman, M.Y. & Genc, S.Z. 2010. Learning theories. In C. Kridel (Ed.), *Encyclopedia of curriculum studies*. Thousand Oaks, CA: SAGE Publications, pp.535-538.

Federal Democratic Republic of Ethiopia [FDRE], 1994. *Education and training policy*. Addis Ababa: St. George Printing Press.

Federal Democratic Republic of Ethiopia [FDRE], 1995. *The Constitution of the Federal Democratic Republic of Ethiopia*. Addis Ababa: House of Peoples' Representatives.

Felder, R.M. 1993. Reaching the second tier: Learning and teaching in college science education. *Journal of College Science Teaching*, 22(5):286-290.

Felder, R.M. 1995. We never said it would be easy. *Chemical Engineering Education*, 29(1):32-33.

Felder, R.M. 1996. *Matters of Style*. ASEE Prism, 6(4) pages 18-23. Available online at <http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/LS-Prism.htm>. (Accessed on 1/06/12).

Felder, R.M. & Brent, R. 1996(a). Navigating the bumpy road to student-centred instruction. *College Teaching*, 44(2):43-47.

Felder, R.M. & Brent, R. 1996(b). Navigating the bumpy road to student-centred instruction. Available online at <http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Papers/Resist.html>. (Accessed on 10/09/13).

Felder, R.M. & Brent, R. 2005. Understanding student differences. *Journal of Engineering Education*, 94:57-72.

Felder, R.M. & Brent, R. 2007. Cooperative learning. In P.A. Mabrouk, (Ed.). *Active learning: Models from the analytical sciences*. ACS Symposium Series 970, chapter 4. Washington, DC: American Chemical Society, 34–53.

Felder, R.M. & Brent, R. 2009. Active learning: An introduction. *ASQ Higher Education Brief*, 2(4):1-5.

Felder, R.M. & Fuller, H. 2000. Accounting for individual effort in cooperative learning teams. *Journal of Engineering Education*, 89(2):133-140.

Felder, R.M. & Henriques, E.R. 1995. Learning and teaching styles in foreign and second language education. *Foreign Language Annals*, 28(1):21-31.

Felder, R.M. & Silverman, L.K. 1988. Learning and teaching styles in engineering education. *Journal of Engineering Education*, 78(7):674-681.

Felder, R.M. & Soloman, B.A. (n.d.). *Index of Learning Styles*. Retrieved from <http://www.ncsu.edu/felder-public/ILSpage.html> (Accessed on 28 March 2014)

Felder, R.M. & Soloman, B.A. 1994. Index of Learning Styles. North Carolina State University <http://www.ncsu.edu/felder-public/ILSpage.html>.

Felder, R.M. & Soloman, B.A. 1998. *Learning styles and strategies*. Available online at: <http://www.ncsu.edu/felder-public/ILSdir/styles.htm> (Accessed on 10/08/14).

Felder, R. M. & Spurlin, J. 2005. Applications, reliability and validity of the index of learning styles. *International Journal of Engineering Education*, 21(1):103-112.

Felder, R.M., Woods, D.R., Stice, J.E. & Rugarcia, A. 2000. The future of engineering education II. Teaching methods that work. *Chemical Engineering Education*, 34(1):26-39.

Ferguson, E. & Bibby, E. 2004. The design and analysis of quasi-experimental field research. In G.M. Breakwell, (Ed.). *Doing social psychology research* (93-127). Oxford: The British Psychological Society and Blackwell Publishing Ltd.

Field, A. 2009. *Discovering statistics using SPSS*. (3<sup>rd</sup> edition.) Los Angeles: Sage.

Fischer, K.W. & Rose, L.T. 2001. Webs of skill: How students learn. *Educational Leadership*, 59(3):6-123.

Fox, R. 2001. Constructivism examined. *Oxford Review of Education*, 27(1):23-35.

Gappi, L.L. 2013. Relationships between learning style preferences and academic performance of students. *International Journal of Educational Research and Technology*, 4 (2):70-76.

Geche, T.J. 2009. Learning styles and strategies of Ethiopian secondary school students in learning mathematics. Unpublished Master's thesis, University of South Africa.

Geelan, D. R. 1997. Epistemological anarchy and the many forms of constructivism. *Science and Education*, 6(1-2):15-28.

Gelman, A. 2005. Analysis of variance: Why it is more important than ever. *The Annals of Statistics*, 33(1):1-31.

Gijbels, D., Dochy, F., Van den Bossche, P. & Segers, M. 2005. Effects of problem-based learning: A meta-analysis from the angle of assessment. *Review of Educational Research Spring*, 75(1):27-61.

Gijbels, D. & Loyens, S.M.M. 2009. Constructivist learning (environments) and how to avoid another tower of Babel: Reply to Renkl. *Instructional Science*, 37:499-502.

Gijbels, D., Van de Wattering, G., Dochy, F. & Van den Bossche, P. 2006. New learning environments and constructivism: The students' perspective. *Instructional Science*, 34: 213-226.

Giles, J., Ryan, D.A.J., Belliveau, G., De Freitas, E. & Casey, R. 2006. Teaching style and learning in a quantitative classroom. *Active Learning in Higher Education*, 7(3):213-225.

Goodwin, C. J. 2010. *Research in psychology: Methods and design* (6<sup>th</sup> edition.) NJ: John Wiley & Sons, Inc.

Gordon, M. 2009. Toward a pragmatic discourse of constructivism: Reflections on lessons from practice, educational studies. *A Journal of the American Educational Studies Association*, 45(1):39-58.

Gottschall, H., & Garcia-Bayonas, M. 2008. Student attitudes towards group work among undergraduates in business administration, education and mathematics. *Educational Research Quarterly*, 32(1):3-29.

Grasha, A.F. 2002. *Teaching with style: A practical guide to enhancing learning by understanding teaching and learning styles*. CA: Alliance Publisher.

Guild, P.B. 2001. Diversity, learning style and culture. New horizons for learning. Available online at <http://www.newhorizons.org/strategies/styles.guild.htm>. (Accessed on 20/05/13).

Gulpinar, M.A. 2005. The principles of brain-based learning and constructivist models in education. *Educational Sciences: Theory & Practice*, 5(2):299-306.

Gushta, M., & Rupp, A. 2010. Reliability. In N.J. Salkind (Ed.). *Encyclopedia of research design*. Thousand Oaks, CA: SAGE Publications, 1238-1243.

Hadfield, J. 2006. Teacher education and trainee learning style. *RELC Journal*, 37:367-386.

Halpern, D.F. & Donaghey, B. 2002. Learning theory. In J.W. Guthrie (Ed.). *Encyclopedia of Education* (2<sup>nd</sup> edition, Vol. 4.) New York: MacMillan Reference USA: 1458-1469. Available online at [http://0-go.galegroup.com.oasis.unisa.ac.za/ps/i.do?id=GALE%7CCX3403200370&v=2.1&u=usa\\_itw&it=r&p=GVRL&sw=w](http://0-go.galegroup.com.oasis.unisa.ac.za/ps/i.do?id=GALE%7CCX3403200370&v=2.1&u=usa_itw&it=r&p=GVRL&sw=w). (Accessed on 30 April 2013).

Hampson, S.E. 1996. Individual difference. In A.S.R. Manstead, M. Hewstone, S.T. Fiske, M.A. Hogg, H.T. Reis, & G.R. Semin (Eds.). *The Blackwell encyclopedia of social psychology*. Oxford: Blackwell Publishers, pp.319-320.

Haney, J.J., Lumpe, A.L. & Czerniak, C.M. 2003. Constructivist beliefs about the science classroom learning environment: Perspectives from teachers, administrators, parents, community members, and students. *School Science and Mathematics*, 103(8): 366-377.

Hannafin, M.J., Hill, J.R. & Land, S.M. 1997 Student-centered learning and interactive multimedia: Status, issues and implications. *Contemporary Education*, 68:94-97.

Harris, Y.R. 2006. Cognitive development. In N. J. Salkind, L. Margolis, K. DeRuyck, & K. Rasmussen, (Eds.). *Encyclopedia of human development*. Thousand Oaks, California: Sage Publications, pp.275-280.

Haslam, E. L. 1997. A learning model that develops students' active learning reflective practices. *Frontiers in Education Conference (FIE)*, 116-120.

Hawassa City Administration Education Department [HCAED], 2013/14. Statistical abstract. Unpublished document with the permission of the Head of the Department.

Hawk, T.F. & Shah, A.J. 2007. Using learning style instruments to enhance student learning. *Decision Sciences Journal of Innovative Education*, 5(1):1-19.

Henson, R. & Hwang, D. 2002. Variability and prediction of measurement error in Kolb's learning style inventory scores: A reliability generalization study. *Educational and Psychological Measurement*, (62):712-727.

Hickcox, L.K. 2002. Personalizing teaching through experiential learning. *College Teaching*, 50(4):123-128.

Hmelo-Silver, C.E. 2004. Problem-based learning: What and how do students learn? *Educational Psychology Review*, (16)3:235-266.

Hohn, R.L. 2005. Learning. In S.W. Lee (Ed.). *Encyclopedia of school psychology*. Thousand Oaks, CA: SAGE Publications, pp. 284-290.

Honigsfeld, A. & Dunn, R. 2003. High school male and female learning-style similarities and differences in diverse nations. *The Journal of Educational Research*, 96(4):195-206.

Honigsfeld, A. & Schiering, M. 2004. Diverse approaches to the diversity of learning styles in teacher education. *Educational Psychology: An International Journal of Experimental Educational Psychology*, 24(4):487-507.

Horn, R, Jr. 2006. Piaget, Jean. In F.W. English (Ed.). *Encyclopedia of educational leadership and administration*. Thousand Oaks, CA: SAGE Publications, pp.760-761.

Hunt, E. 1997. Nature vs. nurture: The feelings of dé ja vu. In R. J. Sternberg, & E. Grigorenko. (Eds.). *Intelligence, heredity, and environment*. New York: Cambridge University Press.



Hwang, A. 1996. Positivist and constructivist persuasions in instructional development. *Instructional Science*, 24:343-356.

Iversen, G. 2004. Analysis of variance (ANOVA). In M. S. Lewis-Beck, A. Bryman, & T. F. Liao (Eds.). Thousand Oaks, CA: Sage Publications, pp.13-17.

Jenkins, J. 2006. Constructivism. In F. W. English (Ed.), *Encyclopedia of educational leadership and administration*. Thousand Oaks, CA: SAGE Publications, pp.196-200.

Jeong, A. & Lee, J. 2008. The effects of active versus reflective learning style on the processes of critical discourse in computer-supported collaborative argumentation. *British Journal of Educational Technology*, 39(4):651-665.

Johnson, D.W., Johnson, R.T. & Stanne, M.E. 2000. *Cooperative learning methods: A meta-analysis*. University of Minnesota, Minneapolis: Cooperative Learning Centre. Available online at <http://www.ccsstl.com/sites/default/files/Cooperative%20Learning%20Research%20.pdf>.(Accessed on June 5, 2013).

Joyce, B. & Weil, M. 1996. *Models of teaching* (5th edition.) New Delhi: Prentice-Hall of India Private Limited.

Jungst, S., Licklider, L.L. & Wiersema, J. 2003. Providing support for faculty who wish to shift to a learning-centred paradigm in their higher education classrooms. *The Journal of Scholarship of Teaching and Learning*, 3(3):69-81.

Kalaian, S. 2008. Research design. In P.J. Lavrakas (Ed.). *Encyclopedia of survey research methods*. Thousand Oaks, CA: SAGE Publications, pp.724-732.

Karagiorgi, Y. & Symeou, L. 2005. Translating constructivism into instructional design: Potential and limitations. *Educational Technology and Society*, 8(1):17-27.

Kayes, D. 2005. Internal validity and reliability of Kolb's learning style inventory version 3 (1999). *Journal of Business and Psychology*, 20(2):249-257.

Keenan, T. & Evans, S. 2009. *An introduction to child development* (2<sup>nd</sup> edition.) Los Angeles: Sage Publishers.

Kember, D.& Leung, D.Y.P. 2005. The influence of active learning experiences on the development of graduate capabilities. *Studies in Higher Education*, 30(2):155-170.

Kemp, J.E. 2006. Societal evolution and the need for systemic change in education. *Technological Trends*, 50(2):20-21.

Kenea, A. 2009. Students' reaction to active learning methods in selected classrooms of Addis Ababa University. *The Ethiopian Journal of Education*, 29(1):77-110.

Keyser, M. W. 2000. Active learning and cooperative learning: Understanding the difference and using both styles effectively. *Research Strategies*, 17:35-44.

Kim, K., Sharma, P., Land, S.M. & Furlong, K.P. 2013. Effects of active learning on enhancing student critical thinking in an undergraduate general science course. *Innovative Higher Education*, 38:223-235.

Kinchin, I.M., Hatzipanagos, S. & Turner, N. 2009. Epistemological separation of research and teaching among graduate teaching assistants. *Journal of Further and Higher Education*, 33(1):45-55.

Kolb, A. & Kolb, D. 2005. Learning styles and learning space: Enhancing experiential learning in higher education. *Academy of Management and Education*, 4(2):193-212.

Koob, J. & Funk, J. 2002. Kolb's learning styles inventory issues of reliability and validity. *Research on Social Work Practice*, 12(2):293-308.

Kothari, C.R. 2004. *Research methodology: Methods and techniques* (2<sup>nd</sup> edition.) New Delhi: New Age International.

Kotz, S., Read, C.B., Balakrishnan, N. & Vidakovic, B. (Eds), 2006. *Encyclopedia of Statistical Sciences*. Hoboken, New Jersey: John Wiley & Sons.

Kraemer, H.C. 2004. Biserial correlation. *Encyclopedia of Statistical Sciences*. Hoboken, New Jersey: John Wiley & Sons.

Kuri, N.P., and Tiruzzi, O.M.S. 2002 "Learning styles of freshmen engineering students," Proceedings, International Conference on Engineering Education. Arlington, Va.: International Network for Engineering Education and Research.

Lake, D. A. 2001. Student performance and perceptions of a lecture-based course compared with the same course utilizing group discussion. *Physical Therapy*, 81:896-903.

Lamon, M. 2002. Constructivist approach. In J. W. Guthrie (Ed.). *Encyclopedia of Education* (2<sup>nd</sup> edition, Vol. 4.) New York: Macmillan Reference, pp.1458-1469.

Lasonen, J., Kempainen, R. & Raheem, K. 2005. *Education and training in Ethiopia: An evaluation of approaching EFA goals*. Jyvaskyla: Jyvaskyla University Press.

Lea, S.J., Stephenson, D. & Troy, J. 2003. Higher education students' attitudes to student-centred learning: Beyond educational bulimia. *Studies in Higher Education*, 28(3):321-334.

Lee, S. 2006. The learner-centred paradigm of instruction and training. *Technological Trends*, 50(2):21-22.

Lee, V.S. 2011. The power of inquiry as a way of learning. *Innovative Higher Education*, 36:149-160.

Lee, V.S. 2012. What is inquiry-guided learning? *New Directions for Teaching and Learning*, 129:5-14.

Lesik, S.A. 2009. *Applied statistical inference with MINITAB*. Chapman and Hall/CRC.

Lieberman, S.A., Stroup-Benham, C.A. & Litwins, S.D. 2001. Cognitive benefits of problem-based learning: Do they persist through clinical training? *Academic Medicine*, 76(10):84-86.

Lincoln, F. & Rademacher, B. 2006. Learning styles of ESL students in community colleges. *Community College Journal of Research and Practice*, 30(5-6):485-500.

Lindblom-Ylanne, S., Trigwell, K., Nevgi, A. & Ashwin, P. 2006. How approaches to teaching are affected by discipline and teaching context. *Studies in Higher Education*, 31(3):285-298.

Littlejohn, S.W. 2009. Theory. In S.W. Littlejohn & K.A. Foss (Eds.). *Encyclopedia of communication theory* (Vols. 1-2.) Thousand Oaks, CA: SAGE Publications, pp.958-959.

Liu, C.H. & Matthews, R. 2005. Vygotsky's philosophy: Constructivism and its criticisms examined. *International Education Journal*, 6(3):386-399.

Liu, R., Qiao, X. & Liu, Y. 2006. A paradigm shift of learner-centred teaching style: Reality or illusion? *Arizona Working Papers in SLAT*, 13: 77-91. Available online at <http://slat.arizona.edu/sites/slat/files/page/awp13liu.pdf>. (Accessed on June 30, 2013).

Livesay, G.A., Dee, K.C., Neuman, E.A. and Hites, Jr., L.S. 2002. Engineering student learning styles: A statistical analysis using Felder's Index of Learning Styles, Presented at the 2002 ASEE Conference and Exposition, Montreal, Quebec.

Lovelace, M.K. 2005. Meta-analysis of experimental research based on the Dunn and Dunn Model. *The Journal of Educational Research*, 98(3):176-183.

Loyens, S.M.M. & Gijbels, D. 2008. Understanding the effects of constructivist learning environments: Introducing a multi-directional approach. *Instructional Science*, 36:351-357.

Loyens, S M.M., Rikers, R.M.J.P. & Schmidt, H.G. 2008. Relationships between students' conceptions of constructivist learning and their regulation and processing strategies. *Instructional Science*, 36:445-462.

Lunenburg, F.C. 2010. Forces for and resistance to organizational change. *National Forum of Educational Administration and Supervision Journal*, 27(4):1-10.

Luntungan, R. 2012. Effects of teaching methods and students' attitude on academic performance. *International Forum*, 15(2):42-56.

Machemer, P. L. & Crawford, P. 2007. Student perceptions of active learning in a large cross-disciplinary classroom. *Active Learning in Higher Education*, 8(1):9-30.

Maclellan, E. & Soden, R. 2004. The importance of epistemic cognition in student-centred learning. *Instructional Science*, 32: 253-268.

Mahmoudi, A. 2012. Individualized instruction in CAI. *International Journal of Engineering and Social Science*, 2(3):105-116.

Matthews, M.R. 1997. Introductory comments on philosophy and constructivism in science education. *Science and Education*, 6(1-2): 5-14.

Maxwell, J.A. & Mittapalli, K. 2008. Theory. In L.M. Given (Ed.). *The SAGE encyclopedia of qualitative research methods*. Thousand Oaks, CA: SAGE Publications, pp.877-881.

Mayer, R. E. 2004. Should there be a three-strikes rule against pure discovery learning? The case for guided methods of instruction. *American Psychologist*, 59(1):14-19.

McAdams, D.P. 1997. A conceptual history of personality psychology. In R. Hogan, J. Johnson, & S. Briggs, (Eds.). *Handbook of Personality Psychology*. San Diego: Academic Press, pp.3-39.

McCombs, B.L. 1997. Self-assessment and reflection: Tools for promoting teacher changes toward learner-centred practices. *NASSP Bulletin*, 81(1):1-14.

McKeachie, W. J. 2002. *McKeachie's teaching tips: Strategies, research, and theory for college and university teachers* (11<sup>th</sup> edition.) Boston: Houghton Mifflin Co.

Meece, J.L. 2003. Applying learner-centered principles to middle school education. *Theory into Practice*, 42(2):109-116.

Michael, J. 2006. Where's the evidence that active learning works? *Advances Physiology Education*, 30:159-167.

Mihirka, A., Adane, T. & Aneme, T. 2009. The survey study on the extent of the preparedness of the preparatory program students for university studies: The case of preparatory high schools in the vicinity of Hawassa University. Paper presented at the National Conference of Ethiopian Teachers' Association, Addis Ababa, Ethiopia.

Miller, D. 2008. Teaching strategies. In N.J. Salkind (Ed.). *Encyclopedia of educational psychology*. California: SAGE Publications: pp.962-968.

Ministry of Education [MOE], 2002. The education and training policy and its implementation. Addis Ababa: Ministry of Education.

Ministry of Education [MOE, TESO], 2003. A national curriculum guideline for pre-service teacher-education program. Addis Ababa: Ministry of Education.

Mokkink, L.B., Terwee, C.B., Patrick, D.L., Alonso, J., Stratforth, P.W., Knol, D.L., Bouter, L.M. & De Vet, H.C.W. 2010. The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes. *Journal of Clinical Epidemiology*, 63:737-745.

Morra, S., Gobbo, C., Marini, Z. & Sheese, R. 2008. *Cognitive development: Neo-Piagetian perspectives*. New York: Lawrence Erlbaum Associates, Taylor & Francis.

Moss, P.A. 2010. Validity. In N.J. Salkind (Ed.). *Encyclopedia of research design*. Thousand Oaks, CA: SAGE Publications, pp.1590-1592.

Neuman, W.L. 2007. *Basics of social research: Qualitative and quantitative approaches* (2<sup>nd</sup> edition.) Boston: Allyn and Bacon.

Niemi, H. 2002. Active learning - a cultural change needed in teacher education and schools. *Teaching and Teacher Education*, 18:763-780.

Nilson, L.B. 2010. *Teaching at its best: A research-based resource for college instructors* (3rd edition.) San Francisco: Jossey-Bass.

Nussbaum, E.M. 2002. How introverts versus extroverts approach small-group argumentative discussions. *The Elementary School Journal*, 102(3):183-197.

Oliver-Hoyo, M.T. & Allen, D. 2005. Attitudinal effects of a student-centred active learning environment. *Journal of Chemical Education*, 82(6):944-949.

Olson, M.H. & Hergenhahn, B.R. 2009. *An introduction to theories of learning* (8<sup>th</sup> edition.) New Jersey: Pearson Prentice Hall.

Osborne, J., Simon, S. & Collins, S. 2003. Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education*, 25(9):1049-1079.

Oskamp, S. & Schultz, W. 2005. *Attitudes and opinions* (3<sup>rd</sup> edition.) London: Lawrence Erlbaum Associates.

O'Sullivan, M. 2004. The reconceptualisation of learner-centred approaches: A Namibian case study. *International Journal of Educational Development*, 24:585-602.

Parke, R.D. & Gauvain, M. 2009. *Child psychology: A contemporary viewpoint* (7<sup>th</sup> edition.) Boston: McGraw Hill.



Pashler, H., McDaniel, M., Rohrer, D. & Bjork, R. 2009. Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 9(3):105-119.

Penger, S. & Tekavcic, M. 2009. Testing Dunn & Dunn's and Honey & Mumford's learning style theories: The case of the Slovenian higher education system. *Management*, 14(2):1-20.

Petrina, S. 2007. *Advanced teaching methods for the technology classroom*. London: Information Science Publishing.

Pierce, J.W. & Kalkman, D.L. 2003. Applying learner-centred principles in teacher education. *Theory into Practice*, 42(2):127-132.

Pillay, H. 2002. Understanding learner-centeredness: Does it consider the diverse needs of individuals? *Studies in Continuing Education*, 24(1):93-102.

Pitts, J. 2009. Identifying and using teacher-friendly learning styles instruments. *The Clearing House*, 82(5):225-231.

Ponticell, J.A. 2006. Learning theories. In F.W. English (Ed.). *Encyclopaedia of educational leadership and administration*. Thousand Oaks, CA: SAGE Publications, pp.605-608.

Powell, K.C. & Kalina, C.J. 2009. Cognitive and social constructivism: Developing tools for an effective classroom. *Education*, 130(2):241-250.

Price, L. 2004. Individual differences in learning: Cognitive control, cognitive style, and learning style. *Educational Psychology*, 24(5):681-698.

Prince, M. 2004. Does active learning work? A review of the research. *Journal of Engineering Education*, 93(3):223-231.

Quale, A. 2007. Radical constructivism, and the sin of relativism. *Science and Education*, 16:231-266.

Qualters, M. 2001. Do students want to be active? *The Journal of Scholarship of Teaching and Learning*, 2(1):51-60.

Reigeluth, C.M. 1994. The imperative for systemic change. In C.M. Reigeluth, & R.J. Garfinkle (Eds.). *Systemic change in education*. New Jersey: Educational Technology Publications, Englewood Cliffs, pp. 3-11.

Reigeluth, C.M. 1997. Educational standards: To standardize or to customize learning? *Phi Delta Kappa*, 79(3):202-206.

Reigeluth, C.M & Duffy, F.M. 2008. The AECT Future Minds Initiative: Transforming America's school system. *Educational Technology*, 48(3):45-49.

Reinert, H. 2002. One picture is worth a thousand words? Not necessarily! Available at <http://www.newhorizons.org/>. (Accessed on June 10, 2010).

Roberts, M.J. & Newton, E.J. 2001. Understanding strategy selection. *International Journal of Computer Studies*, 54:137-154.

Rochford, R.A. 2003. Assessing learning styles to improve the quality of performance of community college students in developmental writing programs: A pilot study. *Community College Journal of Research and Practice*, 27: 665–677.

Rolon, C. 2012. Gender and learning. In J.A. Banks (Ed.). *Encyclopaedia of diversity in education*, Thousand Oaks, CA: SAGE Publications, pp.952-956.

Russ-Eft, D. 2011. Towards a meta-theory of learning and performance. In M. Malloch, L. Cairns, K. Evans & B.N. O'Connor (Eds.). *The SAGE handbook of workplace learning*. London: SAGE Publications Ltd, pp.120-132.

Ryan, K. & Cooper, J. 1998. *Those who can, teach*. Boston: Houghton Mifflin Company.

Sadi, O. & Cakiroglu, J. 2011. Effects of hands-on activity-enriched instruction on students' achievement and attitude toward science. *Journal of Baltic Science Education*, 10(2):87-97.

Sadler, I. 2012. The challenges for new academics in adopting student-centred approaches to teaching. *Studies in Higher Education*, 37(6):731-745.

Sadler-Smith, E. & Smith, P.J. 2004. Strategies for accommodating individual's style and preference in flexible learning programmes. *British Journal of Educational Technology*, 35(4):395-412.

Saunders, W.L. 1992. The constructivist perspective: Implications and teaching strategies for science. *School Science and Mathematics*, 92(3):136-141.

Saville, B.K., Zinn, T.E. & Elliott, M.P. 2005. Inter-teaching versus traditional methods of instruction: A preliminary analysis. *Teaching of Psychology*, 32:161-163.

Schunk, D. H. 2012. *Learning theories: An educational perspective*. (2<sup>nd</sup> edition.) Boston: Pearson.

Severiens, S.E. & Ten Dam, G.T.M. 1994. Gender differences in learning styles: A narrative review and quantitative meta-analysis. *Higher Education*, (27):487-501.

Sheskin, D.J. 2003. *Handbook of parametric and non-parametric statistical procedures* (3<sup>rd</sup> edition.) Boca Raton: Chapman and Hall/CRC.

Sireci, S.G. 2003. Validity: Content. In R. Fernández-Ballesteros (Ed.). *Encyclopedia of psychological assessment*, London: SAGE Publications, pp.1076-1078.

Sivan, A., Leung, R.W., Woon, C. & Kember, D. 2000. An implementation of active learning and its effect on the quality of student learning. *Innovations in Education and Training International*, 37(4):381-389.

Slavin, K. & Whitten, S. 2006. Abstract reasoning. In N.J. Salkind, L. Margolis, K. DeRuyck, & K. Rasmussen, (Eds.). *Encyclopaedia of human development*. London: Thousand Oaks, Sage Publications, pp. 7-8.

Smeets, E. & Mooij, T. 2001. Pupil-centred learning, ICT, and teacher behaviour: Observations in educational practice. *British Journal of Educational Technology*, 32(4): 403-417.

Soriano, F.I. 1995. Survey methods and sample size requirements. In *Conducting needs assessments: A multidisciplinary approach*. SAGE human service guide 68, Thousand Oaks, CA: SAGE Publications, pp.35-50.

Starr, K. 2011. Principals and the politics of resistance to change. *Educational Management Administration and Leadership*, 39(6):646-660.

Strauss, S. & Ziv, M. 2004. Teaching: ontogenesis, culture, and education. *Cognitive Development*, 19:451-456.

Strickland, B.R. 2001. Differential psychology. In B.R. Strickland, (Ed.). *The Gale encyclopaedia of psychology* (2<sup>nd</sup> edition.) Detroit: Gale Group, pp.187-188.

Subban, P. 2006. Differentiated instruction: A research basis. *International Education Journal*, 7(7):935-947.

Tikva, J.B. 2009. Socratic teaching is not teaching, but direct transformation is: Notes from 13 to 15-years olds' conceptions of teaching. *Teaching and Teacher Education*, 26: 656-664.

Trochim, W.M.K. 2006. *The research methods knowledge base* (2<sup>nd</sup> edition.) Available online at <<http://www.socialresearchmethods.net/kb/>> (Accessed on 25 February 2014)

Trumpower, D. & Atas, S. 2014. Analysis of variance. In J.I. Barragues, A. Morais & J. Guisasola (Eds). *Probability and statistics: A didactic introduction*. Boca Raton: Taylor and Francis, pp.293-329.

Tucker, J. 2005. Sampling. In S. Mathison (Ed.). *Encyclopaedia of evaluation*, Thousand Oaks, CA: SAGE Publications, pp.385-386.

Tuji, W. 2006. Upper primary students' engagement in active learning: The case in Butajira town primary schools. *The Ethiopian Journal of Education*, 26(1):1-29.

Ullrich, C. 2008. Descriptive and prescriptive learning theories. In R. Goebel, J. Siekmann, & W. Wahlster (Eds.). *Pedagogically founded courseware generation for web-based learning: Lecture notes in computer science* (Volume 5260):37-42.

Van Zwanenberg, N., Wilkinson, L.J., & Anderson, A. 2000. Felder and Silverman's Index of Learning Styles and Honey and Mumford's Learning Styles Questionnaire: How do they compare and do they predict academic performance? *Educational Psychology*, 20(3):365-381.

Von Glasersfeld, E. 1995. *Radical constructivism: A way of knowing and learning*. London: The Falmer Press.

Wang, K.H., Wang, T.H., Wang, W.L. & Huang, S.C. 2006. Learning styles and formative assessment strategy: Enhancing student achievement in web-based learning. *Journal of Computer Assisted Learning*, 22:207-217.

Watson, S. 2001. Learning styles of interior design students as assessed by the Gregorc Style Delineator. *Journal of Interior Design*, 27(1):12-19.

Watson, W. 2006. Systemic change and systems design. *Technological Trends*, 50(2): 24.

Watson, S.L. & Reigeluth, C.M. 2008. The learner-centred paradigm of education. *Educational Technology*, 48(5):39-48.

Weimer, M. 2013. *Learner centred teaching: Five key changes* (2<sup>nd</sup> edition.) San Francisco, CA: John Wiley and Sons.

Weinstein, C.E. & Acee, T.W. 2008. Cognitive view of learning. In N.J. Salkind (Ed.). *Encyclopedia of educational psychology*. Thousand Oaks, CA: SAGE Publications, pp.164-165.

Westen, D. 2002. *Psychology: Brain, behaviour and culture* (3<sup>rd</sup> edition.) New York: John Wiley and Sons.

Westwood, P. 2008. *What teachers need to know about teaching methods*. Victoria: ACER Press, An Imprint of Australian Council for Educational Research Ltd.

Wilkins, J. 2006. Theories. In H. Birx (Ed.). *Encyclopaedia of anthropology*. Thousand Oaks, CA: SAGE Publications, pp.2185-2187.

Wolfe, K. 2006. Active learning. *Journal of Teaching in Travel and Tourism*, 6(1):77-82.

World Bank. 2013. Surface area per square kilometre. Available online at <http://data.worldbank.org/indicator/AG.SRF.TOTL.K2>. (Accessed on 7/04/13).

Yew, E.H.J. & Schmidt, H.G. 2012. What students learn in problem-based learning: A process analysis. *Instructional Science*, 40:371-395.

Yilmaz, K. 2008. Social studies teachers' views of learner-centred instruction. *European Journal of Teacher Education*, 31(1):35-53.

Yilmaz, K. 2011. The cognitive perspective on learning: Its theoretical underpinnings and implications for classroom practices. *The Clearing House*, 84:204-212.

Young, M.E. & Wasserman, E.A. 2005. Theories of learning. In K. Lamberts & R. L. Goldstone (Eds.). *Handbook of cognition*. London: SAGE Publications, pp.162-184.

Yuen, K. & Hau, K. 2006. Constructivist teaching and teacher-centred teaching: A comparison of students' learning in a university course. *Innovations in Education and Teaching International*, 43(3):279-290.

Zywno, M.S. 2003. A contribution to validation of score meaning for Felder-Soloman's index of learning styles. ASEE Annual Conference and Exposition Proceeding,

## Appendix A

### QUESTIONNAIRE

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V1

Dear Student

This questionnaire has three parts. I collect background information of you, determine your learning style preferences and investigate your views on active learning methods. Please indicate your answer by circling one of the alternatives that shows your answer. There is no “right” or “wrong” answer. Please be honest. You need not write your name on the questionnaire.

#### Section A: Background Information

(1) **Sex:**

(V2)

Male = 1

Female = 2

(2) **Grade Level:**

(V3)

Grade 10 government school = 1

Grade 10 private school = 2

University second year = 3

#### Section B: Learning Styles

Please choose only one answer for each question. If both “1” and “2” seem to apply to you, choose the one that applies more frequently.

(3) I understand something better after I

(V4)

try it out = 1

think it through = 2

(4) When I am learning something new, it helps me to

(V5)

talk about it = 1

think about it = 2

(5) In a study group working on difficult material, I am more likely to

(V6)

jump in and contribute ideas = 1

sit back and listen = 2



- (6) In classes I have taken  
(V7)  
I have usually gotten to know many of the students = 1  
I have rarely gotten to know many of the students = 2
- (7) When I start a homework problem, I am more likely to  
(V8)  
start working on the solution immediately = 1  
try to fully understand the problem first = 2
- (8) I prefer to study  
(V9)  
in a study group = 1  
alone = 2
- (9) I would rather first  
(V10)  
try things out = 1  
think about how I'm going to do it = 2
- (10) I more easily remember  
(V11)  
something I have done = 1  
something I have thought a lot about = 2
- (11) When I have to work on a group project, I first want to  
(V12)  
have everyone to contribute ideas = 1  
brainstorm individually and then come together as a group to compare ideas = 2
- (12) I am more likely to be considered  
(V13)  
easy to talk to = 1  
shy to speak with others = 2
- (13) The idea of doing homework in groups, with one grade for the entire group,  
(V14)  
appeals to me = 1  
does not appeal to me = 2
- (14) I prefer to be considered  
(V15)  
Realistic = 1  
Inventive = 2
- (15) If I were a teacher, I would rather teach a course  
(V16)  
that deals with facts and real life situations = 1  
that deals with ideas and theories = 2
- (16) I find it easier  
(V17)  
to learn facts = 1  
to learn concepts = 2
- (17) In reading nonfiction, I prefer  
(V18)  
something that teaches me new facts or tells me how to do something = 1  
something that gives me new ideas to think about = 2

- (18) I prefer the idea of  
(V19)  
certainty = 1  
theory = 2
- (19) I am more likely to be considered  
(V20)  
careful about the details of my work = 1  
creative about how to do my work = 2
- (20) When I am reading for enjoyment, I like writers to  
(V21)  
clearly say what they mean = 1  
say things in creative, interesting ways = 2
- (21) When I have to perform a task, I prefer to  
(V22)  
master one way of doing it = 1  
come up with new ways of doing it = 2
- (22) I like to be called  
(V23)  
reasonable = 1  
creative = 2
- (23) I prefer courses that emphasize  
(V24)  
concrete material (facts, data) = 1  
abstract material (concepts, theories) = 2
- (24) When I am doing long calculations,  
(V25)  
I tend to repeat all my steps and check my work carefully = 1  
I find checking my work tiresome and have to force myself to do it = 2
- (25) When I think about what I did yesterday, I am most likely to get  
(V26)  
a picture = 1  
words = 2
- (26) I prefer to get new information in  
(V27)  
pictures, diagrams, graphs, or maps = 1  
written directions or verbal information = 2
- (27) In a book with lots of pictures and charts, I am likely to  
(V28)  
look over the pictures and charts carefully = 1  
focus on the written text = 2
- (28) I like teachers  
(V29)  
who put a lot of diagrams on the board = 1  
who spend a lot of time explaining = 2
- (29) I remember best  
(V30)  
what I see = 1  
what I hear = 2

- (30) When I get directions to a new place, I prefer  
 (V31)  
 a map = 1  
 written instructions = 2
- (31) When I see a diagram or sketch in class, I am most likely to remember  
 (V32)  
 the picture = 1  
 what the instructor said about it = 2
- (32) When someone is showing me data, I prefer  
 (V33)  
 charts or graphs = 1  
 text summarizing the results = 2
- (33) When I meet people at a party, I am more likely to remember  
 (V34)  
 what they looked like = 1  
 what they said about themselves = 2
- (34) For entertainment, I would rather  
 (V35)  
 watch television = 1  
 read a book = 2
- (35) I tend to picture places I have been  
 (V36)  
 easily and fairly accurately = 1  
 with difficulty and without much detail = 2
- (36) I tend to  
 (V37)  
 understand details of a subject but may be confused about its overall structure = 1  
 understand the overall structure but may be confused about details = 2
- (37) Once I understand  
 (V38)  
 all the parts, I understand the whole thing = 1  
 the whole thing, I see how the parts fit = 2
- (38) When I solve math problems  
 (V39)  
 I usually work my way to the solutions one step at a time = 1  
 I often just see the solutions but then have to struggle to figure out the steps to get to them = 2
- (39) When I'm analysing a story or a novel  
 (V40)  
 I think of the incidents and try to put them together to figure out the themes = 1  
 I just know what the themes are when I finish reading and then I have to go back and find the incidents that demonstrate them = 2
- (40) It is more important to me that an instructor  
 (V41)  
 put the material in clear sequential steps = 1  
 give me an overall picture and relate the material to other subjects = 2
- (41) I learn  
 (V42)  
 at a fairly regular pace. If I study hard, I'll "get it" = 1  
 sometimes, I'll be totally confused and then suddenly understand = 2

- (42) When considering a body of information, I am more likely to  
 (V43)  
 focus on details and miss the big picture = 1  
 try to understand the big picture before getting into the details = 2
- (43) When writing a paper, I am more likely to  
 (V44)  
 work on (think about or write) the beginning of the paper and progress forward = 1  
 work on (think about or write) different parts of the paper and then order them = 2
- (44) When I am learning a new subject, I prefer to  
 (V45)  
 stay focused on that subject, learning as much about it as I can = 1  
 try to make connections between that subject and related subjects = 2
- (45) Some teachers start their lectures with an outline of what they will cover.  
 Such outlines are  
 (V46)  
 somewhat helpful to me = 1  
 very helpful to me = 2
- (46) When solving problems in a group, I would be more likely to  
 (V47)  
 think of the steps in the solution process = 1  
 think of possible consequences or applications of the solution in a wide range of areas = 2

### **Section C: Views on active learning**

The number that you are going to rate or circle will refer to the word or phrase that is placed corresponding to each number below.

0 = Not applicable

1 = Definitely disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Definitely agree

Statements	Responses						
	0	1	2	3	4		5
(47)Working in groups can improve my attitude towards learning.	0	1	2	3	4	5	(V48)
(48)I improve my relationships with others when I work in a group.	0	1	2	3	4	5	(V49)
(49)Group work helps me to participate in the class.	0	1	2	3	4	5	(V50)
(50)I willingly participate in group activities with my friends.	0	1	2	3	4	5	(V51)
(51)When working in groups I learn different skills from others.	0	1	2	3	4	5	(V52)
(52)In group activities I get support from others.	0	1	2	3	4	5	(V53)
(53)I enjoy working in groups because I like group interaction.	0	1	2	3	4	5	(V54)
(54)I take personal responsibility during group activities.	0	1	2	3	4	5	(V55)
(55)Group work improves my marks.	0	1	2	3	4	5	(V56)
(56)Team work increases my understanding of learning tasks.	0	1	2	3	4	5	(V57)
(57)I find it easy to eliminate wrong ideas when solving problems.	0	1	2	3	4	5	(V58)
(58)Problem-based learning helps me to connect my earlier knowledge with new information.	0	1	2	3	4	5	(V59)
(59)To solve a problem I can combine ideas from different subjects.	0	1	2	3	4	5	(V60)
(60)When I solve problems, I usually use information or technology tools.	0	1	2	3	4	5	(V61)
(61)I can develop different hypotheses to solve a problem.	0	1	2	3	4	5	(V62)
(62)I am interested to solve real life problems.	0	1	2	3	4	5	(V63)
(63)Including real life problems in learning, motivates me.	0	1	2	3	4	5	(V64)
(64)I like the fact that learning through problem solving helps me to think critically.	0	1	2	3	4	5	(V65)
(65)I want to solve problems with my peers.	0	1	2	3	4	5	(V66)
(66)I feel comfortable when a teacher observes students' discussing problems with their peers.	0	1	2	3	4	5	(V67)
(67)I like working with others during problem solving tasks.	0	1	2	3	4	5	(V68)
(68)I enjoy studying with my peers when a problem has different solutions.	0	1	2	3	4	5	(V69)

Statements	Responses						
	0	1	2	3	4		5
(69)It is difficult to evaluate information that is collected to solve a problem, on my own.	0	1	2	3	4	5	(V70)
(70)I develop good social relations with peers during problem solving.	0	1	2	3	4	5	(V71)
(71)Learning through problem solving improves my think about on the learning material.	0	1	2	3	4	5	(V72)
(72)I prefer problem-based learning to simple memorisation.	0	1	2	3	4	5	(V73)
(73) I like problem-based learning because it improves my problem solving capabilities.	0	1	2	3	4	5	(V74)
(74)I can read the material which is not covered in class on my own.	0	1	2	3	4	5	(V75)
(75)Usually I can learn on my own without a teacher's assistance.	0	1	2	3	4	5	(V76)
(76)I usually search for my own way of learning.	0	1	2	3	4	5	(V77)
(77)I can learn new subjects with my own efforts.	0	1	2	3	4	5	(V78)
(78)I can present new ideas in the class which I developed on my own.	0	1	2	3	4	5	(V79)
(79)I enjoy the responsibility required by student involved teaching methods.	0	1	2	3	4	5	(V80)
(80)I assume responsibility for my own learning.	0	1	2	3	4	5	(V81)
(81)Teachers need only present parts of lessons in class because students can learn on their own.	0	1	2	3	4	5	(V82)
(82)I enjoy different responsibilities in group work.	0	1	2	3	4	5	(V83)
(83)I understand learning material better when we have group discussions.	0	1	2	3	4	5	(V84)
(84)I discover new scientific knowledge when I am involves in peer discussions.	0	1	2	3	4	5	(V85)
(85)Discussions improve students' social interactions.	0	1	2	3	4	5	(V86)
(86)Discussions help me to reflect on views that oppose my own ideas.	0	1	2	3	4	5	(V87)
(87)Discussions help students to solve problems more easily.	0	1	2	3	4	5	(V88)
(88)The ability to interact verbally improves through discussion.	0	1	2	3	4	5	(V89)
(89)Discussions help me to actively listen to conversations.	0	1	2	3	4	5	(V90)

Statements	Responses						
	0	1	2	3	4		5
(90) Discussion is a suitable method to change beliefs.	0	1	2	3	4	5	(V91)
(91) Providing students with unfinished material helps them to contribute their ideas.	0	1	2	3	4	5	(V92)
(92) I construct new knowledge when I conduct an experiment.	0	1	2	3	4	5	(V93)
(93) Learning through exploring helps me to relate my earlier experiences with the surroundings.	0	1	2	3	4	5	(V94)
(94) Interacting with the world helps me to form higher level understanding.	0	1	2	3	4	5	(V95)
(95) I am interested in interacting with the environment because it allows me to be involved with other students.	0	1	2	3	4	5	(V96)
(96) I appreciate interacting with the environment because it allows me to evaluate myself.	0	1	2	3	4	5	(V97)
(97) I always learn a lot when we conduct experiments.	0	1	2	3	4	5	(V98)
(98) I enjoy investigating the real world because it helps me to develop solutions to problems.	0	1	2	3	4	5	(V99)
(99) Learning through investigating real world questions gives meaning to learning.	0	1	2	3	4	5	(V100)
(100) Questions that cannot simply be answered by "yes" or "no", help me to explain my ideas.	0	1	2	3	4	5	(V101)
(101) I believe questioning is important to develop critical thinking skills.	0	1	2	3	4	5	(V102)
(102) Learning through questioning helps me to take responsibility for my own learning.	0	1	2	3	4	5	(V103)
(103) Exploring real world questions enables me to identify answers.	0	1	2	3	4	5	(V104)
(104) Learning through questioning helps me to formulate good questions.	0	1	2	3	4	5	(V105)
(105) I enjoy learning through questioning because it helps me to communicate with others.	0	1	2	3	4	5	(V106)
(106) I like learning through questioning because it encourages my active participation.	0	1	2	3	4	5	(V107)

## Appendix B

### ETHICAL CLEARANCE CERTIFICATE



#### Research Ethics Clearance Certificate

This is to certify that the application for ethical clearance submitted by

**AA Mirrka [45668728]**

for a D Ed study entitled

**Learning styles and attitudes towards active learning of students at different levels in Ethiopia**

has met the ethical requirements as specified by the University of South Africa College of Education Research Ethics Committee. This certificate is valid for two years from the date of issue.

Prof KP Dzvimo  
Executive Dean : CEDU

Dr M Claassens  
CEDU REC (Chairperson)  
[mcdtc@netactive.co.za](mailto:mcdtc@netactive.co.za)

Reference number: 2014 MAY /45668728/MC

19 MAY 2014



## **APPENDIX C**

### **LETTER OF PERMISSION**

**Subject: Request for permission**

I, Mr AA Mirrka (student number 45668728), am a DEd student at the University of South Africa. I am doing my DEd thesis on “Learning styles and attitudes towards active learning of students at different levels in Hawassa, Ethiopia”

I hereby sincerely request your permission to use “Index of Learning Styles Questionnaire” to investigate students’ learning styles at different educational levels (grade 7, 10 and 2<sup>nd</sup> year university students). I planned to use the online English version of ILS questionnaire for grade 10 and university students and to translate it to Amharic for grade 7 and let them complete it manually. Thank you in advance.

With best regards,

Mr. Adamu Assefa Mirrka

## APPENDIX D

### RESPONSE LETTER FROM Dr RICHARD FELDER

Richard Felder [felder@ncsu.edu](mailto:felder@ncsu.edu)

31 January 2014

Dear ILS user:

You have raised one of several frequently asked questions about the Index of Learning Styles. You will find a response at

<http://www.ncsu.edu/felder-public/ILS-faq.htm>

You may also find it helpful to consult the ILS home page,

<http://www.ncsu.edu/felder-public/ILSpage.html>

Sincerely,  
Richard Felder

Richard M. Felder  
Hoechst Celanese Professor Emeritus of Chemical Engineering  
N.C. State University  
[http://www.ncsu.edu/effective\\_teaching](http://www.ncsu.edu/effective_teaching)

According to the link given by the author above, the answer for the question is "Yes." Please see below the response for the frequently asked question that is posted on the website.

- *May I use the ILS in my research?*  
Yes. (See next question for information on how to cite it.)  
*How should I cite the ILS or the short paper "Learning Styles and Strategies" if I refer to them in publications?*  
If you use the ILS and/or publish anything related to the ILS or data obtained with it, please cite Felder, R.M., and Soloman, B.A. (n.d.).  
in the text and include the bibliographic listing  
Felder, R.M., and Soloman, B.A. (n.d.). *Index of Learning Styles*. Retrieved from <http://www.ncsu.edu/felder-public/ILSpage.html>  
To reference "Learning Styles and Strategies," cite  
Felder, R.M., and Soloman, B.A. (n.d.).  
in the text and include the bibliographic listing  
Felder, R.M., and Soloman, B.A. (n.d.). *Learning styles and strategies*. Retrieved from <http://www.ncsu.edu/felder-public/ILSdir/styles.htm>

**APPENDIX E**  
**STUDENT UNDER 18 YEARS ASSENT FORM**

Dear student

I am a doctoral student in Psychology of Education at UNISA. I am interested in investigating the learning styles and attitudes towards active learning of students at secondary school and university levels. The Hawassa City Administration Education Department has given permission for the research which involves grade 10 students. I would like to invite you to participate in the research.

Your duty in this study will be filling out the questionnaire. The questionnaire has statements and alternative answers and you are only required to circle the number of your choice that you are inclined to. You should use less than one hour to complete the questionnaire during your free periods.

Participating in the research enables you to indicate your preferred learning style and attitude towards active learning.

There are no known risks involved. Your name and the name of your school will be confidential. Participation is voluntary and unpaid. You can stop your participation at any point if you want to. The results of the study may be published in a scientific journal or presented at a meeting.

Please discuss your involvement with your parent/guardian before completing the form below. Complete the form if you are willing to participate in the study. Kindly note that a parent/guardian will also be asked to give permission for participation on your behalf if you are younger than 18 years old, and will be given a copy of your signed form.

This study is conducted under the supervision of Prof Salomé Schulze at UNISA (Department of Psychology of Education). Please feel free to contact Prof Schulze at [Schuls@unisa.ac.za](mailto:Schuls@unisa.ac.za) for any questions you may have.

Thank you.

Adamu Assefa Mhrka

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

E-mail: [adamuass@gmail.com](mailto:adamuass@gmail.com) Tel: +251 462202597 Cell: +251 916784523

**STUDENT CONSENT TO PARTICIPATE IN THE STUDY**

I, \_\_\_\_\_ herewith confirm that I understand the above conditions of the research which have been explained to me and that I agree to participate in the above mentioned study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX F

### LETTER OF PERMISSION TO THE HAWASSA CITY ADMINISTRATION EDUCATION DEPARTMENT

ATT:

Director: Hawassa City Administration Education Department

Tel. +251 462 207443

Hawassa, Ethiopia

Dear Sir/Madam

#### REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT SCHOOLS IN HAWASSA

I am currently pursuing my D Ed studies in Psychology of Education at UNISA. The main purpose of my study is to investigate learning styles and attitudes towards active learning of students at different school levels in the city of Hawassa. All participants will complete a questionnaire with two sections. Participants should use less than one hour to complete the questionnaire during their free periods.

Specifically, the study will be conducted on Grade 10 students. The expected number of sample size will be at about 650 students. In order to complete the above sample size, almost all Grade 10 students of the selected schools are supposed to fill out the questionnaire.

There are no risks anticipated and all information will be kept confidential. The students' and schools' name will not be revealed. Participation is voluntary and there will be no monetary rewards. Students are free to withdraw from the study at any point without being penalised. Students are expected to indicate whether they agree to participate by completing an assent form. The parents/guardians are also expected to complete and return a consent form to give permission for their children's participation if they are younger than 18. As required, the results of the study will be made available to the Hawassa City Administration Education Department. The findings of the research will be published in the thesis for which this study is being conducted and may be published in an academic journal or presented at a scientific meeting.

This research is conducted under the supervision of Prof Salomé Schulze at UNISA (Department of Psychology of Education). Prof Schulze can be contacted on Schuls@unisa.ac.za if you have any queries regarding the research or any other related matters.

I sincerely appreciate you for your permission for this research in advance.

Thank you

Adamu Assefa Mirhka

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

E-mail: adamuass@gmail.com

Tel: +251 462202597

Cell: +251 916784523

## APPENDIX G

### LETTER OF PERMISSION TO HAWASSA UNIVERSITY, OFFICE OF THE V/PRESIDENT FOR RESEARCH AND TECHNOLOGY TRANSFER

ATT:

V/President: Hawassa University, Office for Research and Technology Transfer (OVRPTT)  
PO Box 05  
Hawassa, Ethiopia  
19 February 2014

Dear Prof/Dr/Sir/Madam

#### REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT HAWASSA UNIVERSITY

I am currently pursuing my D Ed studies in Psychology of Education at UNISA. The main purpose of my study is to investigate learning styles and attitudes towards active learning of students at secondary and university education levels in the city of Hawassa. Regarding the study, the procedures and the relevance of the study are included in the research proposal which has already submitted to your office.

More specifically, the university second year students will participate in the study. The expected number of sample size will be at about 270 students; and all of them are proposed to be taken from the Social Science and Humanity College.

All participants will complete a questionnaire. Participants will use less than one hour to complete the questionnaire during their free periods.

There are no known risks involved and all information will be kept confidential. The students' and the college's name will not be revealed. Participation is voluntary and there will be no monetary rewards. Students are free to withdraw from the study at any point without being penalised. Students are expected to indicate whether they agree to participate by completing an assent form. As required, the results of the study will be made available to the university. The college will receive a summary of the findings. The findings of the research will be described in the thesis for which this study is being conducted and may be published in an academic journal or presented at a scientific meeting.

This research is conducted under the supervision of Prof Salomé Schulze at UNISA (Department of Psychology of Education). Prof Schulze can be contacted at Schuls@unisa.ac.za if you have any queries regarding the research or any other related matters.

I sincerely appreciate you for your permission for this research in advance.

Thank you

Adamu Assefa Mirhka

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
E-mail: adamuass@gmail.com Tel: +251 462202597 Cell: +251 916784523

## APPENDIX H

### LETTER OF PERMISSION TO THE SCHOOL PRINCIPALS

ATT:

School principal: Name of the school  
Hawassa, Ethiopia

Dear Sir/Madam

#### REQUEST FOR PERMISSION TO COLLECT DATA FROM YOUR SCHOOL

As per Hawassa City Administration Education Department (HCAED) approval of the research granted to me, I am currently pursuing my D Ed studies in Psychology of Education at UNISA. The main purpose of my study is to investigate learning styles and attitudes towards active learning of students at secondary school level in the city of Hawassa. Regarding the study procedures and the relevance of the study are included in the research proposal and will be available when requested. All participants will complete a questionnaire. Participants will use less than one hour to complete the questionnaire during their free periods.

Specifically, the study will be conducted on Grade 10 students. The expected number of sample size will be at about 650 students. To achieve a complete sample size mentioned above, almost all Grade 10 students of your school are supposed to fill out the questionnaire.

There are no known risks involved and all information will be kept confidential. The students' and schools' name will not be revealed. Participation is voluntary and there will be no monetary rewards. Students are free to withdraw from the study at any point without being penalised. Students are expected to indicate whether they agree to participate by completing an assent form. The parents/guardians are also expected to complete and return a consent form to give permission for their children's participation if they are younger than 18. As required, the results of the study will be made available to the Hawassa City Administration Education Department. The school will also receive a summary of the findings. The findings of the research will be presented in the thesis for which this study is being conducted and may be published in an academic journal or presented at a scientific meeting.

This research is conducted under the supervision of Prof Salomé Schulze at UNISA (Department of Psychology of Education). Prof Schulze can be contacted on Schuls@unisa.ac.za if you have any queries regarding the research or any other related matters.

I sincerely appreciate you for your permission for this research in advance.

Thank you

Adamu Assefa Mhrka

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
E-mail: adamuass@gmail.com Tel: +251 462202597 Cell: +251 916784523

## APPENDIX I

### LETTER OF PERMISSION TO THE SOCIAL SCIENCE AND HUMANITIES COLLEGE OF HAWASSA UNIVERSITY

ATT:

School principal: Name of the college dean  
Hawassa, Ethiopia

Dear Prof/Dr./Sir/Madam

#### REQUEST FOR PERMISSION TO COLLECT DATA FROM STUDENTS IN YOUR COLLEGE

As per Hawassa University, Office of V/President for Research and Technology Transfer permission granted to me, I am currently pursuing my D Ed studies in Psychology of Education at UNISA. The main purpose of my study is to investigate learning styles and attitudes towards active learning of students at different school levels in the city of Hawassa. Regarding the study procedures and the relevance of the study are included in the research proposal and it was submitted to the Office of V/President for Research and Technology Transfer. All participants will complete a questionnaire. The participants should use less than one hour to complete the questionnaire during their free periods.

More specifically, the university second year students will participate in the study. The expected number of sample size will be at about 270 students. To achieve a complete sample size mentioned above, almost all students of the departments under the Social Science and Humanity College are supposed to fill out the questionnaire.

There are no risks anticipated and all information will be kept confidential. The students' and college's names will not be revealed. Participation is voluntary and there will be no monetary rewards. Students are free to withdraw from the study at any point without being penalised. Students are expected to indicate whether they agree to participate by completing an assent form. As required, the results of the study will be made available to the Office of V/President for Research and Technology Transfer. The college will receive a summary of the findings. The findings of the research will be presented in the thesis for which this study is being conducted and may be published in an academic journal or presented at a scientific meeting.

This research is conducted under the supervision of Prof Salomé Schulze at UNISA (Department of Psychology of Education). Prof Schulze can be contacted on Schuls@unisa.ac.za if you have any queries regarding the research or any other related matters.

I sincerely appreciate you for your permission for this research in advance.

Thank you

Adamu Assefa Mhrka

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

E-mail: adamuass@gmail.com

Tel: +251 462202597

Cell: +251 916784523

## APPENDIX J

### LETTER OF PERMISSION TO PARENT/GUARDIAN OF STUDENTS REQUESTING CONSENT

Dear Parent/Guardian

I, Adamu Assefa Mirrka, am a doctoral student in Psychology of Education at UNISA. I have a special interest in investigating learning styles and attitudes towards active learning of students at different school levels in the city of Hawassa. The Hawassa City Administration Education Department has given permission for the research which involves grade 10 students and I would like to invite your child to participate in the research.

At about 650 Grade 10 students will participate in the study. All the Grade 10 students of the selected schools will fill out a questionnaire. They use less than one hour to complete the questionnaire during their free periods.

Participating in the research will enable the children to recognize the presence of a variety of learning styles and gain insight into their own styles. This will enable them to adjust their study skills and styles so as to improve their academic achievement.

There are no known risks involved. Your child's name and the name of the school will not be required. Participation is voluntary and unpaid. Your child can stop his/her participation at any time without being punished. The results of the study may be published in a journal or presented at a meeting. The summary of the findings will be submitted to the school in request.

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Please complete and sign the form below to indicate if you want your child to participate. The study will be carried out after its ethical qualifications would have been approved by Research Ethics Committee of the College of Education of the University of South Africa. This study is also conducted under the supervision of Prof Salomé Schulze at UNISA (Department of Psychology of Education). Please feel free to contact Prof Schulze at Schuls@unisa.ac.za for any questions you may have.

Thank you.

Adamu Assefa Mirrka

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

E-mail: adamuass@gmail.com Tel: +251 462202597 Cell: +251 916784523

#### PARENT/GUARDIAN CONSENT FORM

I, \_\_\_\_\_ the undersigned parent/guardian of \_\_\_\_\_ who is younger than 18 years, herewith confirm that I understand the above terms and conditions of the research which have been explained to me and agree/disagree that he/she should participate in the above mentioned research/study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_