RELATIONSHIP BETWEEN STUDENTS' LEARNING STYLES AND ACADEMIC PERFORMANCE IN THE FACULTY OF HEALTH SCIENCES AND TECHNOLOGY UNIVERSITY OF NIGERIA ENUGU CAMPUS

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M. Sc DISSERTATION

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ENUGU CAMPUS

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TITLE PAGE

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SUPERVISOR: DR (MRS) N.P. OGBONNAYA

OCTOBER, 2015

APPROVAL

This dissertation has been approved for the award of Master of Science Degree in Nursing in the Department of Nursing Sciences, Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus.

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CERTIFICATION

This is to certify that this dissertation is the original work of Chinyere Clementina Ezeh Registration Number PG/M.Sc/08/53399. I certify that the original work is mine except as specified in the acknowledgement and references, and that neither the dissertation nor the original work contained therein has been submitted to this University or any other Institution for the award of Degree.

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DEDICATION

This research work is dedicated to the Almighty God and to all hardworking students in different institutions of higher learning.

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ABSTRACT

This study was aimed at determining the relationship between studentsô learning styles and academic performance in Faculty of Health Sciences and Technology, University of Nigeria Enugu Campus. The study was carried out in four Departments in the faculty (Nursing Sciences, Medical Radiography, Medical Laboratory Sciences and Medical Rehabilitation). A descriptive design was adopted for the study. Five objectives and seven hypotheses guided the study. Kolbôs learning style inventory was used to collect data on the learning styles of 251 undergraduate students where as a researcher designed proforma was used to collect data from studentsô academic records. Academic records of 157 health science students who were admitted in the 2008/2009 academic session and whose results were ready and approved by the University senate as at January 2013 were studied. Data were analyzed with the aid of Computer Statistical Package for Social Sciences (SPSS) version 20. Analysis of variance, chi square and t- test for independent data were the statistics used. A probability level of $P < 0.05$ was considered significant. Findings indicated that majority of Health Science Students in the Faculty preferred the assimilating learning style. There was no significant difference between the preferred learning style of male and female students ($P = 0.738$). There was a significant difference in the learning styles of students across different departments ($P = 0.034$) There was no significant relationship between students final cumulative grade point average and their learning styles ($P = 0.300$). Also there was no significant difference in gender, learning styles and final cumulative grade point average ($P > 0.05$). It was recommended that educational programs should be designed, planned and implemented based on studentsô preferred learning styles. Students should also be made aware of their preferred learning styles as this will help them gain control of it thereby improving their academic performance. The major limitation of the study is that some students failed to write their correct registration numbers and some of them were referred in many courses thus had incomplete results. A conclusion was drawn and suggestions for further studies were highlighted.

CHAPTER ONE

INTRODUCTION

Background to the Study:

Todayôs amazing advancements in science and technology are the result of human learning. Human beings are continuously trying to learn and add to their knowledge in order to understand the constant changes in their environments. Learning is an act of acquiring new knowledge or modifying and reinforcing existing knowledge, behaviours, skills, values or preferences and may involve synthesizing different types of information. (Ghaffari, Ranjbarzadeh, Azar, Hassanzadeh, Safaei, Golanbar, Mazouchian & Abbasi, 2013).

In educational institutions, success is measured by academic performance and how well students meet standards set by the institution. Academic performance is the outcome of education and the extent to which a student, teacher or institution has achieved their educational goals (Schacter, Gilbert & Wegner, 2009). Academic performance is commonly measured by examinations and continuous assessment but there is no general agreement on how it is best tested or which aspects are most important. In most Nigerian Universities, academic performance is measured by the final cumulative grade performance average. A studentôs score or placement on the overall grade performance average is designed to be an indicator of such studentôs performance level and this is calculated annually (Schacter et al, 2009). Many factors have been said to affect academic performance. These include socioeconomic, psychologic and environmental factors (Mbandeka, 2012).

Learning process vary from person to person due to the presence of biological and psychological differences. All learners have individual attributes relating to their learning processes. (Abidin,

Rezaee, Abdullah & Singh, 2011). According to Keefe & Farrel, (2004), learning problems are frequently not related to the difficulty of the subject matter but rather to the type and level of the cognitive processes required to learn the material.

One area of higher education which has received great attention is the learning styles of students. Learning style has been defined by various scholars mostly as a signal for individual differences. These differences may manifest in the life styles and even in personality types (Zhang & Sternberg, 2005). Learning style is an individualôs natural or habitual pattern of acquiring and processing information in learning situations. (Gardner & James, 2005). The idea of individualized learning styles originated in 1970ôs and has greatly influenced education (Pashler, Mc Daniel Rohrer & Bjork, 2008). A good way to discover a studentôs learning style is by asking the student questions. Various instruments have been developed to assess learning styles. These instruments are referred to as learning styles inventory. Some of the learning styles inventory include Kolbôs learning style inventory, Dunn, Dunn and Price learning style inventory, Pharmacistôs inventory of learning styles, Honey and Mumfordôs learning style inventory and Grasha ï Reichmann student learning styles scales (Cassidy, 2004).

One of the most common instruments used today is the Kolbôs learning style inventory. It has been researched popularly in education field such as biology, science, programming, accounting and engineering (Othman & Othman, 2004, Sandil, 2009, Wing & Hoi, 2010, Yusof, Othman & Karim, 2005). In Kolbôs learning style model, there are four basic learning modes namely concrete experience (CE), abstract conceptualization (AC), Reflective observation (RO) and Abstract experimentation (AE). The differences between the learning modes is further classified

into four basic learning styles namely diverging, assimilating, converging and accommodating learning styles (Kolb & Kolb, 2005).

Learners with different learning styles would behave differently in the way they perceive, interact and respond to the learning environment. Therefore, it is important that teachers examine the variations in their students on the features of their learning styles as this will help them to become more sensitive to the differences students bring to the classroom (Felder & Spurlin, 2005). Students should also be aware of their learning styles as this increases self awareness about oneôs strengths and weaknesses as a learner (Coffield, 2005).

Studies conducted in different parts of the globe have shown that academic performance of University students is related to their learning styles (Mahmood, Rohaizad & Aripin, 2008). Wei, Hoo & See, (2011) in their study to determine the relationship between learning styles and content based academic performance among tertiary level students in Malaysia stated that studentsô academic performance is highly related to their learning styles.

The present study therefore intends to investigate the relationship between learning styles and academic performance of students in Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus.

Statement of Problem

One of the greatest aspirations of any country is to become a centre of excellence in education at the global level. Nigeria is no exception. Many attempts have been made in Nigeria to enhance

studentsô academic performance. Government and stakeholders are in continuous effort of building tertiary institutions while scholars and lecturers impact good knowledge but the outcome seems not to be positive (Mahmood, Rohaizad & Aripin, 2008).

In Nigeria today, serious concerns have been expressed by parents, lecturers, employers of labour and the entire society about the quality of graduates from universities and tertiary institutions (Idaka, Joshua & Allan, 2006). According to Udeme, (2014), the quality of graduates produced by Nigerian tertiary institutions are now identified as the causal factor that affect the countryôs economy negatively. He stated that 70% of Nigerian graduates are not fit for employment thus compounding the problems of youth unemployment.

In University of Nigeria, Enugu Campus, records available to the researcher revealed that about 30% of students fail to graduate each year when they are supposed to do so (UNEC Registry records, 2001-2013). This has resulted to a lot of problems like emotional stress, financial constraints e.t.c, to the students, parents and the University. It is also surprising to note that out of 282 students who graduated from the Faculty of Health Sciences and Technology in 2013, none graduated with first class honors. Only 74 (26%) students graduated with second class honors (upper division). The rest came out with second class honors (lower division), third class and pass (UNEC Senate approval, 2013).

Many reasons have been attributed to the poor state of academic performance in our society. These include parental ideology, poor educational background, insufficient instructional materials, inadequate and poor learning environment and lack of qualified teachers (Basavanthapa 2006). Vital as these reasons are, they have diverted attention from the learning

styles of students in our institutions. Quite often, less focus is given to the impact that studentsô learning styles have on their personality which will affect academic performance. The question which the researcher often asks is: does health science students have dominant learning styles which could affect their academic performance positively or negatively?, Does these learning styles influence academic performance?

Thus, the researcher in the present study intends to investigate the relationship between studentsô learning styles and academic performance in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus. No such study has been conducted among health science students in Nigeria. The study is therefore a baseline investigation to fill the existing gap in knowledge in this area.

Purpose of the Study

The purpose of the study is to investigate the relationship between studentsô learning styles and academic performance.

Specifically, the objectives of the study are to:

1. identify the learning styles of students in the Faculty of Health Sciences of Technology.
2. establish gender differences in learning styles of students in Faculty of Health Sciences of Technology.
3. determine differences in learning styles of students from the four departments under study.
4. determine the relationship between the learning styles and academic performance of students.

5. establish gender differences in learning styles and final cumulative grade point average among students in Faculty of Health Sciences and Technology .

Null Hypotheses

$H_0$1: There will be no significant gender difference in the learning styles of students.

$H_0$2: There will be no significant difference in the learning styles of students in different departments.

$H_0$3: There will be no significant relationship between studentsô learning styles and academic performance.

$H_0$4: There will be no significant relationship between the studentsô assimilating learning styles and their academic performance.

$H_0$5: There will be no significant relationship between the studentsô accommodating learning styles and their academic performance.

$H_0$6: There will be no significant relationship between the studentsô converging learning styles and their academic performance.

$H_0$7: There will be no significant relationship between the studentsô diverging learning styles and their academic performance.

Significance of the Study

1. Findings of the study if published will be beneficial to students, educators, and administrators in the following ways.

The findings will reveal the different learning styles of students in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus. This will help the students to understand the differences in the way they perceive, interact and respond to learning environment, thereby increasing self awareness about their strengths and weaknesses as learners which will make them learn more effectively and take responsibility for their own learning in order to achieve positive outcomes.

To educators, their awareness of studentsô learning styles and the relationship with academic performance will help them to make informed choices in course materials, design and learning processes, thereby preventing mismatch between the modes of teaching and the learning preferences.

To administrators, findings of the study will help in the production, planning and implementation of educational experiences which will meet the needs of the students and enhance their retention and retrieval of learning materials. It will equally help them in curriculum designing based on the preferred learning styles of students.

Scope of the Study

The study focused on establishing the relationship between studentsô learning styles and academic performance in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus. The study was delimited to male and female students admitted in the Departments of Nursing Sciences, Medical Laboratory Sciences, Medical Radiography and

Medical Rehabilitation during the 2008/2009 session and who graduated in 2013. Their final cumulative grade performance average was used to correlate their learning styles.

Operational definition of terms

Students Academic Performance

This is defined as the academic output of health science students in University of Nigeria, Enugu Campus measured by their final cumulative grade point average.

Students' Learning Styles.

This means different learning modes that the students utilize to take in experience and to deal with experience. In this study, studentsô learning styles will be measured using Kolbôs learning styles inventory of concrete experience, abstract conceptualization, reflective observation and active experimentation.

Concrete Experience.

Individuals at this stage learn by strong feelings and reactions, like to deal with feelings, open to new experiences, are intuitive, learn best from personal relationship, are receptive and open minded.

Reflective Observation

Individuals at this stage learn by watching, observing and reflecting, like to watch and listen, are quiet and reserved, look at all sides of issues and takes time before acting.

Abstract Conceptualization

Individuals at this stage learn by thinking, like to think about ideas and rely on logical thinking, tend to reason things out, learn best from rational theories, like ideas and theories, rely on ideas and analyze them.

Abstract Experimentation

Individuals at this stage learn by doing and work hard to get things done, like to try things out, like to see results from his /her work and practical.

Diverging Learning Style

Individuals with diverging learning style combine concrete experience and reflective observation as dominant learning abilities. They have sharp observation and view concrete situations from different points of view to generate new ideas with preference for group work in learning situations.

Assimilating Learning Style

Individuals with assimilating learning style combine abstract conceptualization and reflective observation. They are less focused on people and are more interested in ideas and abstract concept. They prefer theory to practical.

Accommodating Learning Style

Individuals with this learning style combine learning stages of active experimentation (AE) and concrete experience (CE). They prefer hand on experience and rely heavily on people for information to solve problems than in their own technical analysis.

Converging Learning style

Individuals with this learning style combine abstract conceptualization and active experimentation. People with this learning style have the ability to solve problems and make decisions based on solutions to problems.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents the review of related literature from journals, abstracts, unpublished university projects and internet. A careful review of literature indicated that studies on relationship between learning styles and academic performance are relatively available but concentrated in developed countries.

The chapter presents the review of literature under the following subheadings:

1. Conceptual Review
2. Theoretical Review
3. Empirical Review
4. Summary of literature review

Concept of Learning:

According to Mangal,(2007), learning occupies a very important place in our lives. Most of what we do or do not do is influenced by what we learn or how we learn it. He opined that learning provides a key to the structure of our personality and behavior. However, this term has not been always interpreted in the same way by numerous thinkers and psychologists.

Smith, in Mangal,(2007) defined learning as the acquisition of new behavior or the strengthening or weakening of old behavior as a result of experience. Crow and Crow in Mangal,(2007) also defined learning as the acquisition of habits, knowledge and attitudes. It involves new ways of doing things and it operates in an individualôs attempt to overcome obstacles or to adjust to new situations.

Basavanthapa,(2006) defined learning as the mental activity by which knowledge, skills, attitudes, appreciations and ideas are acquired resulting in the modifications of behavior which comes through knowledge and experience. Kolb sees learning as a core process of human development and makes a distinction between development and simple readjustment to change (Quinn,2004). Development results from learning that is gained through experience. As stated by Basavanthapa,(2006), learning involves a series of operations by the learner at a given time which includes observation, description, analysis, validation and evaluation. She opined that an effective learning is not a mere accumulation of facts but a discovery of a relationship between parts on the whole, between facts and principles and between principles and actions.

Mangal,(2007) stated that learning which is a process of bringing out relatively permanent changes in the behavior of an organism may be classified into a number of categories depending upon the domain or specific area of the behavior in which changes are introduced or the methods that are employed for the introduction of behavioural changes. She stated that if we follow the former criterion, learning can be classified as verbal learning, learning of motor skills (such as walking, dancing, swimming), affective learning (such as learning of habits, interests, attitudes, appreciation) and cognitive learning(learning of concepts, principles, problem solving). She further stated that in terms of the later criterion, learning may be categorized as trial and error learning, classical conditioning, operant conditioning, chain learning, shaping, learning through generalization, learning through discrimination, serial learning, associative learning and insightful learning. In addition, Mangal (2007) stated that learning as a useful process may result in outcomes such as bringing desirable changes in behavior, attaining of proper growth and development, attaining balanced development of personality, and realizing of the goals of life.

These outcomes can contribute significantly in the overall improvement and progress of the learner for helping him to lead an adjusted and satisfying life.

Factors affecting Learning

According to Mangal,(2007), the success or failure in the task of learning in terms of introducing desired modification in the behavior of a learner will automatically depend upon the quality as well as control and management of some factors which include the following:

Mangal,(2007) stated that learning is greatly affected by the learnerôs physical and mental health maintained by him particularly at the time of learning. She opined that a child that does not maintain satisfactory physical health have to suffer adversely in terms of gains in learning. He further stated that the mental state and health of a learner at the time of learning become potent factors in deciding the outcomes of learning.

The results achieved by the learner through the process of learning depend heavily upon potentials which include learnerôs innate abilities and capabilities, learnerôs basic potential in terms of general intelligence, specific knowledge and learnerôs basic interests, aptitude and attitudes related to learning.

Basavanthapa,(2006) stated that mental processes vary from individual to individual. Individual differences such as educational background, experiences in the home, church, or business influence these responses. In addition, she opined that the same person may not respond the same way at all times because he may not always interrelate facts, emotions and opinions the same way.

According to Basavanthapa,(2006), most single learning experiences contribute to the attainment of more than one objective. She stated that the learner must perceive the learning experience as relevant as the objective.

Mangal,(2007) stated that learning is greatly influenced by the level of aspiration and nature of achievement motivation possessed by a learner. She opined that too much aspiration makes it impossible for the learner to achieve gains in learning. She therefore stated that a learner has to maintain the level of his aspiration at a reasonable level. This means that his aspirations should neither be too high which will result in non achievement of any of his goals nor too low as not to try to achieve goals which is quite capable.

Basavanthapa,(2006) stated that the teaching learning environment should be structured to provide opportunities to cope with the studentsô individual differences. She opined that teachers should establish an environment in which learning will most likely take place. Berman, Synder, Kozier & Erb,(2008) stated that an optimal learning environment facilitates learning by reducing distraction and providing physical and psychological comfort. They stated that a learning environment should have adequate lighting free from glare, a comfortable room temperature and good ventilation. Noise can also distract the students and interfere with listening and thinking.

According to Berman, Synder, Kozier & Erb,(2008), motivation to learn is the desire to learn which greatly influences how quickly and how much a person learns. Motivation is generally greatest when a person recognizes a need and believes the need will be met through learning.

Readiness to learn is the demonstration of behaviours or cues that reflect the learnerôs motivation to learn at a specific time. Readiness reflects not only the desire or willingness to learn but also the ability to learn at a specific time (Berman et al, 2008).

Berman, et al (2008) stated that when a learner is actively involved in the process of learning, learning becomes more meaningful. If the learner actively participates in planning and discussion, learning is faster and retention is better. They stated that active learning promotes critical thinking, enabling learners to problem solve more effectively.

Concept of learning style:

Learning style is a concept which has provided some valuable insights into learning in both academic and other settings. It emerged in the second half of the 20th century. Although its origin has been traced back further, research in the area of learning style has been active around four decades. During this period, the intensity of activity has varied, with recent years seeing a particularly upturn in the number of researchers working in the area. Increasingly, research in the area of learning styles is being conducted in domains outside psychology. These domains include medical and health care training, management, industry, vocational training and a vast range of settings and levels in the field of education (Cassidy, 2004).

It has been recognized for many years that individuals learn differently (Stevens & king, 2008). Learning style is used in the academic literature with a variety of different definitions. According to Dunn and Dunn, (2005), learning styles are individualôs preferences for the process of learning. She stated that these preferences may change slightly from situation to situation but are generally considered to be stable over time providing the learner with confidence and routine. She described learning styles as the way each learner begins to concentrate, process and retain new and different information. She noted that this information occurs differently for everyone. Dunn & Griggs (2010) explored historical and current learning styles research and confirmed the use of the definition by Dunn and Dunn which is still utilized today. Quinn (2004) also defined

learning styles as the preferred ways of learning and processing information. She stated that individuals differ in their learning styles.

The concept of learning styles builds on the idea that all individuals have a different way of learning. In recent years, interests in this concept have revived for many reasons. First, the concept does not concentrate on weaknesses and limitations but on strengths and talents. Secondly, it does not merely involve information processing within an individual but on person environment interaction. Thirdly, it does not relate to average persons and large populations but to individuals (Cassidy & Eachus, 2005).

Felder & Spurlin, (2005) have shown that a more profound learning effect may occur when teaching styles match learning styles. This does not necessarily require assessing the studentôs learning style preferences. The citation reinforces how important it is to identify each studentôs learning styles. Since classes always consists of students with a wide variety of learning preferences, it suffices to select a model of learning styles and attempt to address all of its categories. The optimal instruction style should be balanced meaning that a wide range of learning styles is acknowledged and facilitated otherwise some students will always fall out of place which will minimize learning while others will not be challenged in their current learning habits.

According to Stiller,(2010), it is essential to provide students with variety of learning experiences that will improve their academic performance. Every teacher and every parent hope that their students will succeed in school. Teachers and parents have the same final goals and objectives to promote and ensure that these children are enabled to perform well academically. Most parents can name their childôs learning style and by the first school quarter, teachers should

be able to do same. Providing students with the knowledge of their individual learning styles ensures that they have an upper hand in performing well in school. Quinn, (2004) opined that teachers should use variety of techniques such as lecture, discussion, small group work, role playing, modeling, return demonstration, imitation, problem solving, games and question and answer sessions to match different learning styles of students. Quinn, (2004) further stated that the state or trait debate associated with so many human psychological characteristics such as personality is not surprisingly relevant with learning styles. She opined that learning styles may be considered as stable over time or as changing with each experience or situation.

Learning Style Preferences of Students

Since the emergence of learning style research around 1892, majority of research appeared in the 1940s. By 2006, over 650 books had been published, 4500 articles written in professional publications and over 26,000 Websterôs available for measuring and addressing learning styles (Howles,2008).

Auditory Learning Style Preferences

Students with auditory style preferences learn best by hearing and remembering information they hear. They are distracted easily either by noise or music. These individuals talk to self aloud and actively participate in class discussions and would prefer to tape and then listen to lectures. To recall information, they use mnemonic devices. They enjoy listening, but cannot wait to have a chance to talk. These students respond well to lectures and discussions. Often they find themselves talking to those around them. In a class setting, when the teacher is not asking questions, they must find a way to express their emotions verbally. (Kolb,2005). Out of the school too, they remember things said to them and make the information of their own. They may

even carry on mental dialogues and determine how to continue by thinking back on the words of others.

Visual Learning Style Preferences

Students with visual learning styles learn by seeing. They think in pictures and have vivid imaginations. They have greater recall of concepts that are presented visually. Picture and images help them to understand ideas and information better than explanations. A drawing may help more than a discussion about the same. When someone explains something to them, they may create a mental picture of what the person talking describes. They prefer to watch a speaker talk, as well as listen to what is said and are able to work from the general to the specific. They like to receive information from many sources when learning new concepts. They see the ñbig pictureò, (the forest) before seeing its part (the trees) and like to ñseeò things to understand them. They find verbal instructions difficult as their minds tend to wander during lectures. They like to read and generally are good at spelling. They doodle frequently but organize well. They have good hand writing and take notice of details (Cassidy, 2004).

Kinesthetic Learning Style Preferences

Kinesthetic describes a learning style which involves the stimulation of nerves in the bodyôs muscles, joints and tendons. Kinesthetic try things out, touch, feel and manipulate. They express their feelings physically. They gesture when speaking, they are poor listeners and lose interest in long speeches. These students learn best by doing. They need direct involvement in what they are learning. More than thirty percent of students may have a kinesthetic/tactile preference for learning. Often, they do not thrive in traditional schools because most classrooms do not offer enough opportunity for movement and touching. Most assessments group Kinesthetic and tactile

styles together, though they can mean different things. Their similarity is that both perceive information through nerve ends in the skin as well as organs through muscles, tendons and joints. Kinesthetics are usually well coordinated with a strong sense of timing and body movements. In some cases, they often wiggle, tap their feet or move their legs when they sit. Some of these children were often labeled as hyperactive before this learning style was discovered (Cassidy, 2004).

Learning Style Inventory

A good way to discover a studentôs learning style is by asking the student questions. Various instruments have been developed to assess learning styles. These instruments are referred to as learning styles inventory. Some of the learning styles inventory includes Kolbôs learning styles inventory, Pharmacistôs inventory of learning style, Honey and Mumfordôs learning styles inventory and Grasha- Reichmann student learning styles scales. Irrespective of the instrument used, many studies have shown that learning styles play an important role in the academic performance of college students. The accommodation of student learning styles in learning environment have resulted in improved test scores while a mismatch in learning characteristics and learning environment resulted in poor studentsô achievement (Cassidy, 2004).

Grasha and Riechmannôs Style of learning is described as a social interaction scale which focuses on learnerôs preferences but introduces social and affective dimensions to the measurement of style. The three dimensions described are avoidant-participant, competitive-collaborative and dependent-independent. It is believed that the style to some degree is fluid and will alter according to the learning situation. The Grashaôs scale is a 90-item scale presented in two versions, one to assess class style and one to assess individual style (Cassidy,2004).

Honey and Mumfordôs description and measurement of learning style is grounded in Kolbôs experiential learning model with styles closely corresponding to those defined by Kolb. The learning styles questionnaire was developed for use with management trainees and has been proposed as an alternative to Kolbôs learning styles inventory. The four learning styles measured by the learning styles questionnaire are activist (Kolbôs active experimentation), reflector (Kolbôs reflective observation), theorist (Kolbôs abstract conceptualization) and pragmatist (Kolbôs concrete experience).

The learning style questionnaire is an 80 item self report inventory based on Kolbôs experiential learning model. Individualôs tendency towards a preferred learning style is indicated by their ratings of behavioral and preference orientations. Although developed for use with management trainees, the learning styles questionnaires has been used in a range of settings including education. However, concerns regarding the psychometric qualities of the inventory have been raised. Duff and Duffy (2012) report a failure to support the existence of either the bipolar dimensions or learning style proposed by Honey and Mumford and found the learning styles questionnaire to have only modest levels of internal consistency ranging from 0.52 to 0.73 for the four subscales. Duff and Duffy (2012) therefore concluded that the learning style questionnaire is not an acceptable alternative to the learning style inventory and that itôs use in the field of higher education is premature (Garcia & Hughes, 2006).

Dunn, Dunn and Price learning style inventory is a 100 item questionnaire asking individuals to respond to items relating to key factors of the construct: environmental (light, sound, temperature and design), emotional (structure, persistence, motivation and responsibility), sociological (pairs, peers, adults, self, and group), physical (perceptual strengths : auditory,

visual, tactile, kinaesthetic, mobility, intake and time of day) and psychological (global-analytic, impulsive-reflective and cerebral dominance). Versions of the scale have been developed for use with primary and secondary schools children and with adults. Curryôs review of different learning/ cognitive styles model reports the learning styles inventory as having one of the highest reliability and validity ratings. The learning styles inventory has also been identified as being practitioner oriented and the most widely used assessment for learning styles in elementary and secondary schools (Cassidy,2004).

The Kolbôs learning style inventory differs from other tests of learning style and personality used in education by being based on a comprehensive theory of learning and development. The Learning Style Inventory (LSI) was created to fulfill two purposes.

- To serve as an educational tool to increase individualsô understanding of the process of learning from experience and their unique individual approach to learning. By increasing awareness of how they learn, the aim is to increase learners capacity from meta-cognitive control of their learning process enabling them to monitor and select learning approaches that work best for them in different learning situations. By providing a language for talking about learning styles and learning process, the inventory can foster conversation among learners and educators about how to create the most effective learning(Merill, 2005).
- To provide a research tool for investigating experiential learning theory (ELT) and the characteristics of individualsô learning styles.

When it is used in the simple, straight forward and open way intended, the learning style inventory usually provides a valuable self examination and discussion that recognizes the uniqueness, complexity and variability in individualsô approaches to learning. The learning style

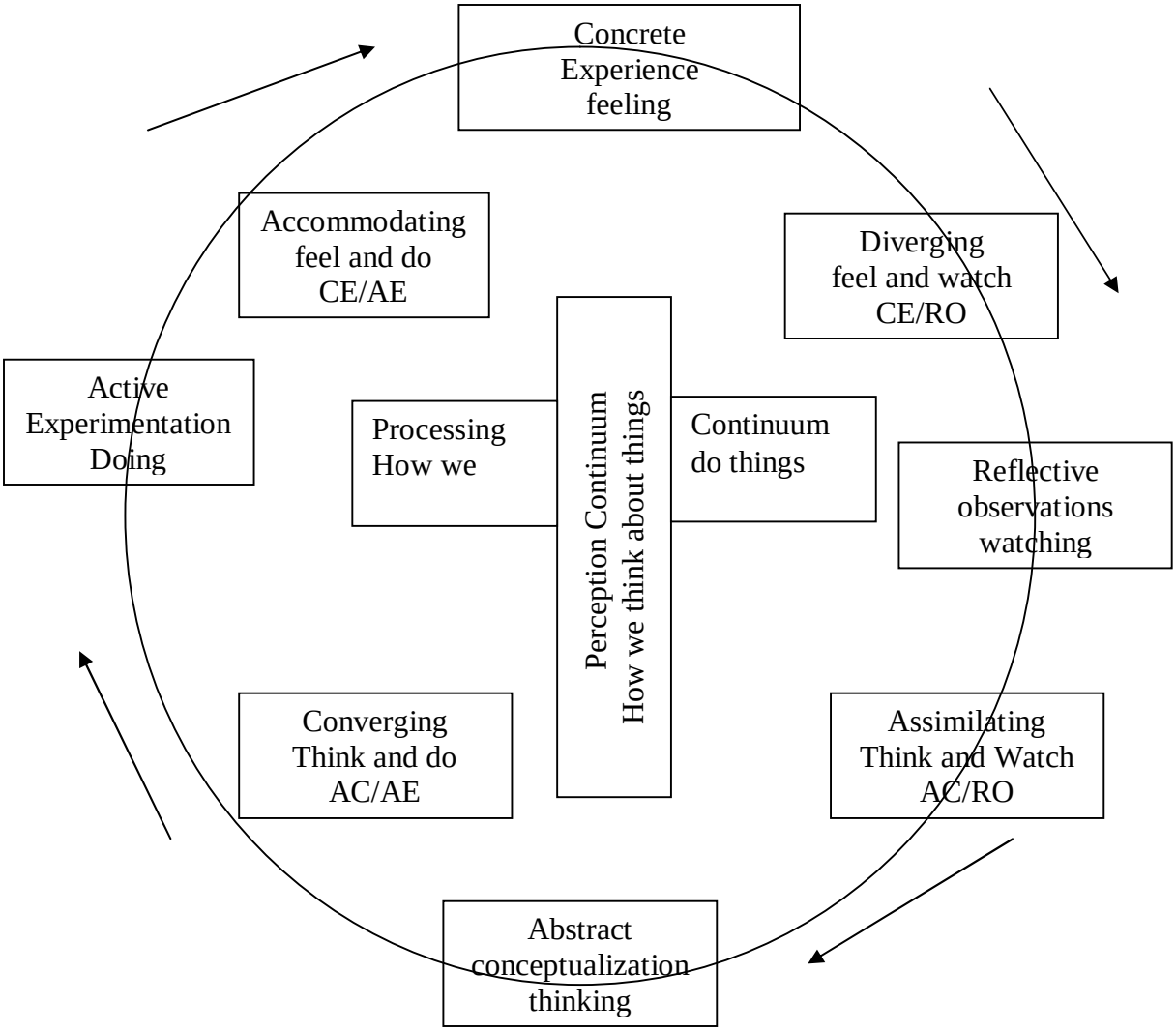
inventory is constructed as a self assessment exercise and tool for construct validation of Experiential Learning Theory. Tests designed for predictive validity typically begin with a criterion, such as academic achievement, and work backward to identify items with high criterion correlations.

Five versions of the learning style inventory have been published over the last 35 years. During the time, attempts have been made to openly share information about the inventory, its scoring and its technical characteristics with other interested researchers. The results of their research have been instrumental in the continuous improvement of the inventory.

Kolbôs learning theory sets out four distinct learning styles (or preferences) which are based on a four ï stage learning cycle. In this respect, Kolbôs model is particularly elegant since it offers both a way to understand individual peopleôs different learning styles and also an explanation of a cycle of experimental learning that applies to all.

Kolbôs model therefore works on two levels ï a four stage cycle:

- Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), Active Experimentation (AE),and a four type definition of learning styles (each representing the combination of two preferred styles, rather than a two by two matrix of the four stage cycle styles) for which Kolb used the terms ï Diverging (CE/RO), Assimilating (AC/RO), converging (AC/AE), Accommodating (CE/AE). (Kolb, 2005)



Source: Kolb's Learning Styles (Amended and revised March 2006)

Kolb explains that different people naturally prefer a certain single different learning style. Various factors influence a personôs preferred style, notably in his experiential learning theory model (ELT). Kolb defined three stages of a personôs development and suggests that our propensity to reconcile and successfully integrate the four different learning styles improves as we mature through our development stages. The development stages that Kolb identified are:

- **Acquisition:** Birth to adolescence ï development of basic abilities and cognitive structures.
- **Specialization:** Schooling, early work and personal experiences of adulthood.
- **Integration:** Mid career to later life ï expression of non-dominant learning style in work and personal life.

Whatever influences the choice of learning style, the learning style preference itself is actually the product of two pairs of variables or two separate choices that we make, which Kolb presented as lines of axis each with conflicting modes at either end.

Concrete Experience CE (Feeling) Versus Abstract Conceptualization AC (thinking)

Active Experimentation ï AE (doing) Versus Reflective Observation ï RO (watching)

A typical presentation of Kolbôs two continuums is that the east ï west axis is called the processing continuum (how we approach a task), and the north south axis is called the perception continuum (our emotional response, or how we think or feel about it). These learning styles are the combination of two lines of axis (continuums) each formed between what Kolb calls ñdialectically related modes of ógrasping experienceô (doing or watching) and transforming experience (feeling or thinking).

According to Kolb, we cannot do both at the same time and to an extent our urge to want to do both creates conflict, which we resolve through choice when confronted with a new learning situation. We internally decide whether we wish to do or watch and at the same time, we decide whether to think or feel.

The result of these two decisions produces the preferred learning style, hence the two by two matrix. We choose a way of grasping the experience into something meaningful and usable which defines our emotional response to the experience. Our learning style is a product of these two choice decisions.

Knowing a personôs learning style enables learning to be oriented according to the preferred method. Here are brief descriptions of the four Kolb learning styles (Kolb and Kolb, 2005)

Kolb's learning Style Inventory and the Four Basic Learning Styles

In 1971, David Kolb developed the learning style inventory (LSI) to assess individual learning styles while individuals tested on the learning style inventory show many different patterns of scores. Research on the instrument has identified four statistically prevalent learning styles. Diverging, Assimilating, Converging and Accommodating (figure I).

Diverging (feeling and watching – CE/RO): The Diverging styles dominate learning abilities are Concrete Experience (CE) and Reflective Observation (RO). People with this learning style are best at viewing concrete situations from many different points of view. It is labeled ñdivergingò because a person with it performs better in situations that call for generation of ideas such as a ñbrainstorming session. People with diverging learning styles have broad cultural interests and like to gather information. Research shows that they are interested in people, tend to be imaginative and emotional, have broad cultural interests and tend to specialize in arts. In formal learning situations, people with the diverging style prefer to work in groups, listening with open mind and receiving personalized feedback (Kolb, 2005).

Assimilating (Watching and Thinking AC/RO): The assimilating styles dominant learning abilities are Abstract Conceptualization (AC) and Reflective Observation (RO). People with this learning style are best at understanding a wide range of information and putting into concise, logical form. Individuals with an Assimilating style are less focused on people and more interested in ideas and abstract concepts. Generally, people with this style find it more important that a theory have logical soundness than practical value. The Assimilating learning style is important for effectiveness in information and science careers. In formal learning situations,

people with this style prefer readings, lectures, exploring, analytical models and having time to think things through.

Converging (Doing and Thinking – AC/AE): The converging styleôs dominant learning abilities are Abstract Conceptualization (AC) and Active Experimentation (AE). People with this learning style are best at finding practical use for ideas and theories. They have the ability to solve problems and make decisions based on finding solutions to questions or problems.

Individuals with a Converging learning style prefer to deal with technical tasks and problems rather than with social issues and interpersonal issues. These learning skills are important for effectiveness in specialist and technology careers. In formal learning situations, people with this style prefer to experiment with new ideas, simulations, laboratory assignment and practical applications.

Accommodating (Doing and Feeling – CE/AE): The accommodating styleôs dominant learning abilities are Concrete Experience (CE) and Active Experimentation (AE). People with this learning style have the ability to learn from primarily ñHand ï onò experience. They enjoy carrying out plans and involving themselves in new and challenging experiences. Their tendency may be to act on ñgutò feeling rather than on logical analysis. In solving problems, individuals with an Accommodating learning style rely more heavily on people for information than on their own technical analysis. This learning style is important for effectiveness in action ï oriented careers such as marketing or sales. In formal learning situations, people with the accommodating learning style prefer to work with others to get assignments done, to set goals, to do field work and to test out different approaches to completing a project.

Factors that Shape and Influence Learning Styles

The above patterns of behaviour associated with the four basic learning styles are shaped by transactions between people and their environment at five different levels ï personality, educational specialization, professional career, current job role and adaptive competencies. While some have interpreted learning style as a personality variable, Experimental learning theory defines learning style as a social psychological concept that is only partially determined by personality.

Personality Types

Although the learning styles and learning modes proposed by experiential learning theory are derived from the works of Dewey, Lewin and Piaget, many have noted the similarity of these concepts to Carl Jungôs descriptions of individualsô preferred ways for adapting in the world. Several research studies relating to learning style inventory with the Myers ï Briggs Type Indicator (MBTI) indicate that Jungôs Extraversion/Introversion dialectical dimension correlates with Active/Reflective dialectic of Experiential Learning Theory, and the MBTI Feeling/Thinking dimension correlates with the learning style inventory Concrete Experience/Abstract Conceptualization dimension. The MBTI sensory type is associated with the LSI Accommodating learning style and the MBTI intuitive type with the LSI Assimilating style. MBTI feeling types correspond to LSI Diverging learning styles and thinking types to converging styles.

Educational Specialization

Early educational experiences shape peopleôs individual learning styles by instilling positive attitude toward specific sets of learning skill and by teaching students how to learn. Although elementary education is generalized, an increasing process of specialization begins in high

school and becomes sharper during the college years. This specialization in the realms of social knowledge influences individualôs orientations towards learning, resulting in particular relations between beginning styles and early training in an educational specialty or discipline. For example, people specializing in the arts, history, political science, English and psychology tend to have Diverging learning styles, while those majoring in more abstract and applied areas such as medicine and engineering have converging learning styles. Individuals with Accommodating styles often have educational backgrounds in education, communications and nursing and those with Assimilating styles in mathematics and physical sciences (Kolb, 2005).

Professional Career

A third set of factors that shape learning styles stems from professional careers. Oneôs professional career choice not only exposes one to a specialized learning environment, but it also involves a commitment to a generic professional problem, such as social service that requires a specialized adaptive orientation. In addition, one becomes a member of a reference group of peers who share a professional mentality and a common set of values and beliefs about how one should behave professionally. This professional orientation shapes learning style through habits acquired in professional training and through the more immediate normative pressures involved in being a competent professional. Research over the years has shown that social service and arts careers attract people with a diverging learning style. Professions in the sciences and information or research have people with an Assimilating learning style. The converging learning style tends to be dominant among professionals in technology intensive fields such as medicine and engineering. The Accommodating learning style characterizes people with careers in fields such as sales, social service and education.

Current Job Role

The fourth level of factors influencing learning style is the personôs current job role. The task demands and pressures of a job shape a personôs adaptive orientation. Executive jobs, such as general management, that require a strong orientation to task accomplishment and decision making in uncertain emergent circumstances requires an Accommodating learning style. Personal job such as counseling and personnel administration, which require the establishment of personal relationships and effective communication with other people demand a Diverging learning style. Information jobs such as planning and research which require data gathering and analysis as well as conceptual modeling require an Assimilating learning style. Technical jobs, such as bench engineering and production require technical and problem solving skills which require a convergent learning orientation.

Adaptive Competencies

The fifth and most immediate level of forces that shapes learning style is the specific task or problem the person is currently working on. Each task we face requires a corresponding set of skills for effective performance. The effective matching of task demands and personal skills results in an adaptive competence. The Accommodating learning style encompasses a set of competencies that can best be termed as Acting skills; Leadership, Initiative and Action. The Diverging learning style is associated with Valuing skills. Relationship, Helping others and Sense making. The Assimilating learning style is related to Thinking skills: Information Gathering, Information Analysis and Theory Building. Finally, the Converging learning style is associated with Decision skills like Quantitative Analysis, Use of Technology and Goal Setting (Kolb, 2005).

Concept of Academic Performance

Academic performance or academic achievement is the outcome of education or the extent to which a student, teacher or institution has achieved their educational goals. (Stumm, Shell, Chamoro & Thomas, 2011). Academic performance is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspect are most important ï procedural knowledge such as skills or declarative knowledge such as facts. Individual differences in academic performance have been linked to differences in intelligence and personality (Stumm, Shell, Chamoro & Thomas, 2011). Students with higher mental ability as demonstrated by intelligence quotient tests (quick learners) and those who are higher in conscientiousness (linked to effort and achievement motivation) tend to achieve higher in academic settings. A recent meta-analysis suggested that mental curiosity has an important influence on academic performance in addition to intelligence and conscientiousness (Stumm et al, 2011).

A studentôs score or placement on the overall GPA is designed to be an indicator of such studentôs performance level and is calculated annually. The final cumulative grade point average is obtained by adding all the grade points obtained by the students in all the courses he or she registered from the first year to the final year and dividing the figure by the total unit loads of all the courses registered from the first year to final year. The answer is then approximated to two decimal places. Most studies show that on average girls do better in school than boys. Girls get higher grades and complete high school at a higher rate compared to boys. Standardized achievements tests also show that females are better at spelling and perform better on tests of literacy, writing and general knowledge (National Centre for Education Statistics, 2003).

An international aptitude test administered to fourth graders in 35 countries for example showed that females outscored males on reading literacy in every country.

Factors Affecting Academic Performance

Academic performance is one of the crucial areas of a learnerôs life. This is because families as well as government invest in education of the child. Multiple factors come into play when it comes to academic performance of a learner. Determinants of learnersô performance have been the subject of on-going debate among educators, academicians and policy makers (Mbandeka, 2012). Different people believe that different factors affect learners differently under different circumstances. However, there is a form of consensus on general factors that affect performance. These include socioeconomic, psychological and environmental factors.

Socioeconomic factors

Socioeconomic status is a personôs overall social position to which attainments in both the social and economic domains contribute. It is determined by an individualôs achievements in education, employment, occupational status and income (Herminlo, 2005). Children from high socioeconomic status perform better at school compared to children from low socioeconomic status families. Socioeconomic status is commonly determined by combining parentsô educational background, educational level, occupational status and income level. On the other hand, students coming from disadvantaged socioeconomic and educational homes perform relatively better than those coming from higher socioeconomic status and educational strata.

(Petrosa, Noberto, Fafael, Cibele and Benilton, 2006).

Psychological factors

Behaviours such as smoking and drug usage can affect academic performance of students as these interfere with brain functioning. Learners need to take good care of their personal health

which includes eating healthy, engaging in regular exercises, getting enough sleep and rest. Some attributes like motivation, readiness to learn and active involvement of the learner play a crucial role in improving academic performance of students in Universities.

Environmental Factors

Factors in the environment can affect academic performance of students in Universities either positively or negatively. These factors include increase workload, noise, incessant strike actions, inadequate accommodation, poor power supply, inadequate water supply, lack of assessable departmental/ faculty libraries, and cult activities in institutions of higher learning. Studentsô cults have a pronounced effect on academic performance in Universities because every member of studentsô cult is expected to place membersô interest over any others (Umar, Atituisi, Yakubu and Bada, 2006**).**

Theoretical Review

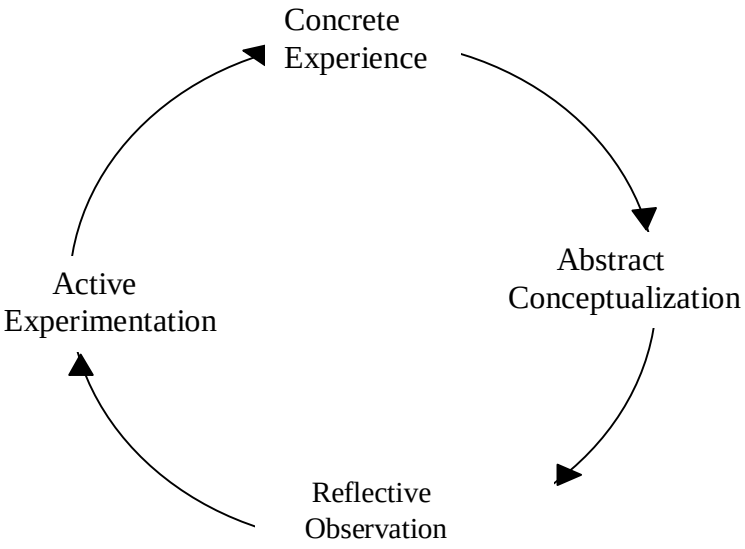
For the purpose of this study, Kolbôs theory of experiential learning will be used because of its consistency with stages of cognitive growth and development. Experiential learning theory provides a holistic model of the learning process and a multilinear model of learning process and a multilinear model of adult development both of which are consistent with what we know about how people learn, grow and develop. The theory is called ñexperiential learningò to emphasize the central role that experience plays in the learning process. The term ñexperientialò is used therefore to differentiate experiential learning theories both from cognitive learning theories, which tend to emphasize cognition over affect, and behavioural learning theories that deny any role for subjective experience in the learning process.

Experiential learning theory defines learning as the process whereby knowledge is created through the transformation of experience. The Experiential learning model portrays two dialectically related modes of grasping experience é Concrete Experience (CE) and Abstract Conceptualization (AC) and two dialectically related modes of transforming experience --- Reflective Observation (RO) and Active Experimentation (AE). According to the four stage learning cycle, immediate or concrete experiences are the basis for observations and reflections. These reflections are assimilated and distilled into abstract concepts from which new implications for actions can be drawn. These implications can be actively tested and serve as guides in creating new experiences.

A closer examination of the ELT learning model suggests that learning requires abilities that are polar opposites and that the learner must continually choose which set of learning abilities he or she will use in a specific learning situation. In grasping experience, some people perceive new information through experiencing the concrete, tangible, felt qualities of the world, relying on senses and immersing themselves in concrete reality. Others tends to perceive, grasp or take hold of new information through symbolic representation or abstract conceptualization ï thinking about, analyzing or systematically planning, rather than using sensation as a guide. Similarly, in transforming or processing experience, some people tend to carefully watch others who are involved in the experience and reflect on what happens while others choose to jump right in and start doing things. The watchers favor reflective observation while the doers favor active experimentation.

Each dimension of the learning process presents with a choice. Since it is virtually impossible for example, to simultaneously drive a car (Concrete Experience) and analyze a driverôs manual about the carôs functioning (Abstract Conceptualization), the conflict is resolved by choosing.

Because of hereditary equipment, oneôs particular past life experiences and the demands of present environment, one develops a preferred way of choosing. The conflict between concrete or abstract and between active or reflective is resolved in some patterned, characteristics way. This is called patterned ways of ñlearning stylesò.



Kolb's Experiential Learning Cycle (Kolb, 2005)

Kolbôs theory was adopted for the present study because it has been found to be successfully implemented in adult learning contexts where experiential learning is an appropriate pedagogy (Mulligen & Griffin, 2005). According to educationists, the experiential learning model offers an excellent framework for designing, developing and delivering diverse learning experiences for adults. Nursing students are among the most frequently studied groups of health professionals with regard to the learning style construct.

Conceptual Model

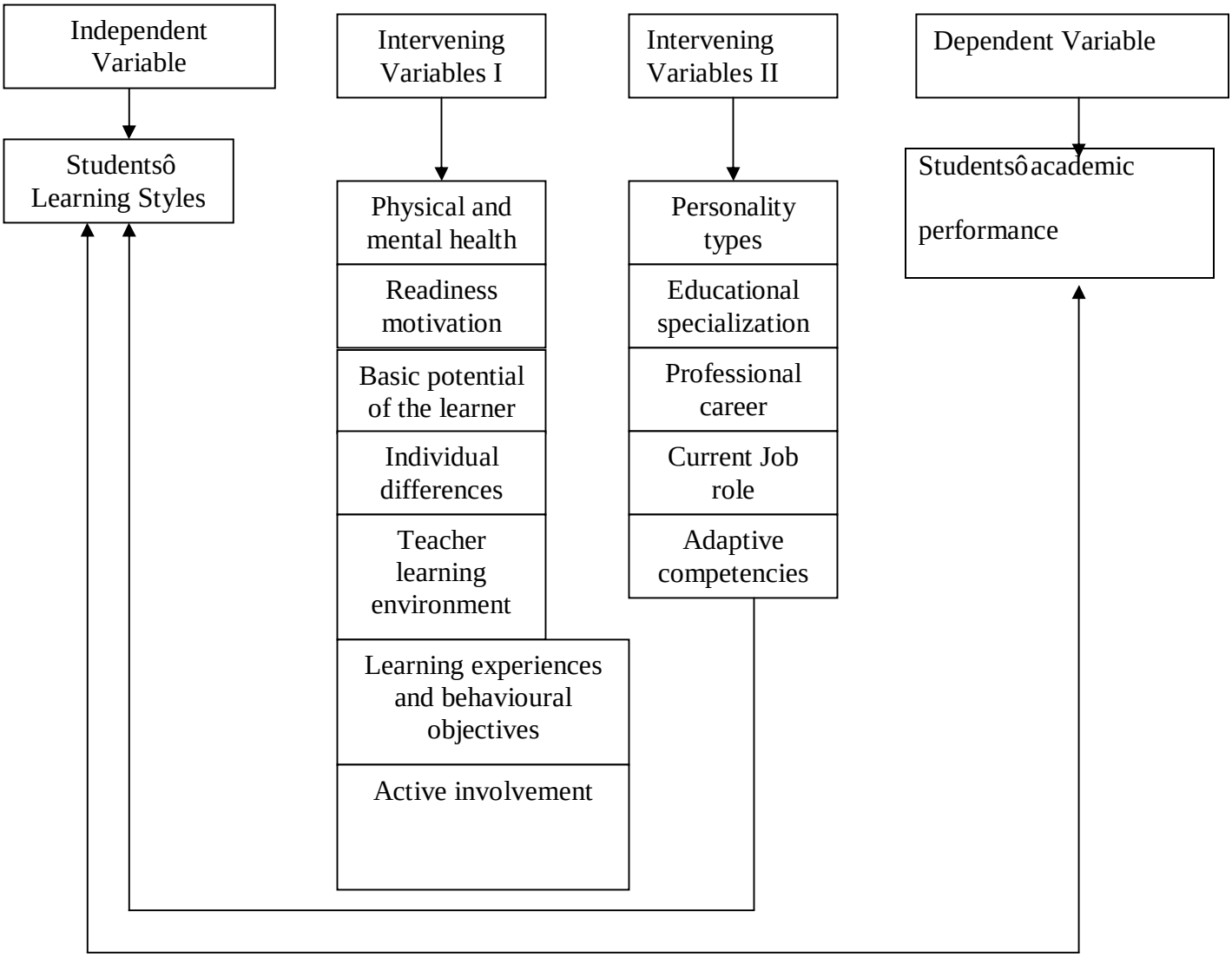
In this study, there are basically three types of variables. These include the dependent, independent and the intervening variables. The studentsô academic performance is the dependent variable which is presumed by the researcher to be the effect or outcome. The studentsô learning styles is the independent variable which is presumed by the researcher to be cause or antecedent. The researcher is interested in understanding, explaining or predicting the dependent variable. Variation in the dependent variable is presumed to depend on variation in the independent variables (Polit, Beck and Hungler, 2011). The studentsô academic performance (dependent variable) is determined by the studentsô learning styles (independent variable). There are other extraneous/intervening variables which may confound the relationship between the independent and dependent variables. These would be controlled in the research design and through some statistical procedures.

According to Kolbôs experiential learning theory, the diverging styles (feeling and watching) dominate learning abilities are concrete experience (CE) and reflective observation (RO). People with this learning style are best at viewing concrete situations from many different points of view. People with these learning styles perform better in situations that call for generation of ideas. These individuals need to be motivated, have a balanced physical and mental health, must be ready to learn, must learn in an environment that is suitable for learning and they must be actively involved in the learning process.

On the other hand, individualôs personality types correspond to their preferred ways to learn. For example, the Myer ï Briggs Type Indicator (MBTI) indicate that Jungôs extraversion/introversion dialectical dimension correlates with Active/ Reflective dialectic of experiential learning theory. In addition, early educational experiences shape peopleôs individual

learning styles. People specializing in the arts, history, political science, English and psychology tend to have diverging learning styles (Kolb, 2005). Professional orientation shapes learning styles through habits acquired in professional training.

In Carl Rogerôs experiential learning theory, he believed in the strength and potentialities of human beings. This implies that for an individual to learn, he must be ready and actively involved with the learning material. He or she must be motivated to learn, and must maintain a good physical and mental health. The attempts of the teachers and the parents in realizing the objectives of experiential learning according to Carl Rogers include arranging a favorable and positive climate for learning, helping the learner to have clear cut objectives, organizing the learning resources and making them available for the learner and balancing intellectual and emotional components of learning.



Researcher's Self-developed model, 2013.

Empirical Review

In a research carried out by Entwistle and Breman (2004) on the academic performance of students using a sample of 87 junior students from different universities, it was found out that students who had high attainment were those who had high motivation, good study methods, learning styles and examination techniques while those who had low academic attainment were those of average ability and of low motivation and ineffective study habits and learning styles.

Salehi,(2007) investigated nursing studentsô preferred learning styles in Khorasgan Islamic Azad University. A descriptive analytical research was employed. The instrument for data collection was Kolbôs learning style inventory. 294 students received the questionnaire. Analysis of Variance was used to investigate the possible relationship between learning styles and studentsô grades in the curriculum (i.e freshman, sophomore, junior or senior). The findings revealed that junior students preferred the converging learning style while the senior students preferred the assimilating learning style.

Russian, (2005), also conducted a study to investigate the preferred learning styles of Respiratory care students at Texas State University using Kolbôs learning style inventory. Eighty two students voluntarily participated in the study. Of the eighty two subjects, 23.17% preferred the accommodator style, 26.83% preferred the diverging style, 24.39% preferred the converging style, and 25.61% preferred the assimilating style. Male subjects made up 23.2% (n=19) of the subjects and females consisted of 76.8% (n=63). Findings showed that there was no significant correlation between learning styles and gender.

Wagner, Harsen, Rhee, Brunt, Terbizan and Christensen (2014) carried out a study on the learning style preferences of Undergraduate Dietetics, Athletic Training and Exercise Science Students. The study assessed the preferred learning styles of college students and compared learning style preferences among students using a cross- sectional study design. A convenience sample of undergraduate college students (mean age 20.6± 1.7 years) was obtained (N=590) from those currently enrolled in allied health courses at three different institutions in the region. Kolbôs learning style inventory was administered to all the students enrolled and present in selected allied courses on each campus. Results from chi square test for independence indicated a significant relationship between collage major and learning styles, X^2 (21, N=590) =60.66,(

$p<0.05$). Results from the chi square test for goodness of fit indicated dietetics (X^2 (6, N=122) =226.74, $p<0.05$), athletic training (X^2(4,N=56=95.61, $p<0.05$) and exercise science (X^2(6, N=284) =413.437, $p<0.05$) majors each had a significant learning style preference. The preferred learning style of students in all three majors was the converging learning style.

Alqahtani and Gahtani, (2013) conducted a study to determine the learning style preferences of Australian Health Science Students enrolled in 10 disciplines. Kolbôs learning style inventory was distributed to 2,885 students enrolled in dietetics and nutrition, midwifery, nursing, occupational therapy, paramedics, pharmacy, physiotherapy, radiation therapy, radiography and social work at one Australian University. A total of 752 usable survey forms were returned (response rate 26%). The results indicated the converging learning style to be most frequently preferred by health science students and that the diverging and accommodating learning styles were least preferred.

Bhatti and Bart (2013) also used the Kolbôs learning style inventory to determine the effect of learning styles on scholastic achievement using a descriptive survey design. The participants were undergraduates at University of Minnesota from three randomly selected classes in sociology. A sample of 200 undergraduate students received the consent forms for the study. 193 students participated in the study. SPSS software was used in the analysis of the resulting data. Among the 179 participants who indicated their gender, there were 108 females and 71 males. Findings showed the frequencies of the participants in each learning style category and their respective percentages as follows; 76 Assimilators (39.4%), 49 Divergers (25.4%), 40 Accommodators (20.7%), and 28 Convergers (14.5%). More of the participants had the Assimilating learning style more than any other learning style. Among the 108 female participants, the frequencies of females in each learning style category and their respective

percentages of the female subsample are the following; 35 Assimilators (32.4%) 29 Accommodators (26.9%) 28 Divergers (25.9%) and 16 Convergers (14.8%). Among the female participants, the Assimilating learning style category claimed the highest frequency. Among the 71 male participants, the frequencies of males in each learning style category and their respective percentages of the male subsample are the following: 38 Assimilators (53.5%), 17 Divergers (23.9%), 8 convergers (11.3%) and 8 accommodators (11.3%). The Assimilating learning style category claimed the largest frequency among the male participants as it did among the female participants. A two way analysis of variance and chi square test of independence was performed with gender (two categories) and learning style (four categories) being the two factors and GPA being the dependent variable. Results showed that there was a statistically significant main effect for gender with F (1,166) = 6.17, p=0.014, partial eta squared=0.036. There was also a statistically significant main effect for learning style with F(3,166)=2.92, p=0.036, partial eta squared=0.050.The converger participants had the greatest mean GPA. The chi square test of independence showed that the relationship between gender and learning styles is significant, $X^2(3, N=180) =10.72$, p=0.013.

Ghaffari, Ranjbarzadeh, Azar, Hassanzadeh, Safaei, Golanbar, Mazouchian and Abbasi, (2013) conducted a study on the analysis of learning styles and their relationship with academic achievement in Medical students of Basic sciences program. The study was carried out in Tabriz University of Medical Sciences, Iran. A descriptive analytical design was employed. The sample consisted of all medical students of Basic sciences program at Tabriz University of Medical sciences in 2011-2012. The data was collected through a questionnaire which included respondentsô demographic information and overall grade point average as well as Kolbôs standard questions on learning styles. 140 out of 350 questionnaires were fully completed by the

respondents. The results showed that 41.7% of respondents were males with an average age of 20.58 ±1.87 and 58.3% were females with an average age of 20.41 ±0.75. 64 respondents (44.9%), 65 (47.8%), 4(2.9%) and 6 (4.3%) used converging, assimilating, accommodating and diverging learning styles respectively. No significant relationship was found between respondentsô preferred learning styles and their gender and age. Studentsô calculated average GPA was 15 ±0.61. There was no significant difference between academic achievement of male and female students (p=0.616). Pearson chi squared test results showed a significant inverse relationship between studentsô academic achievement and their age (p=0.013 and r= 0.214). One way ANOVA test was used to examine the relationship between studentsô academic achievement and their preferred learning styles. The results indicated no significant relationship between the two variables (p=0.598).

Cano and Justica (2010) demonstrated that students with better academic achievement scored higher in Concrete Experience, Abstract Conceptualization and Reflective Observation than those with poorer academic achievement. This result was further substantiated by Cano-Garcia and Hughes (2006) who also demonstrated that students with better academic achievement scored higher in Concrete Experience.

Another study was conducted by Wei, Hoo and See (2011) on the relationship between learning styles and content based academic achievement among tertiary level students using a descriptive analytical design. Convenience sampling was used to draw 30 students from the field of Finance, Computer science and basic professional writing for Language classes. The instrument for data collection was Kolbôs Learning Style Inventory. Findings showed that majority of the female respondents preferred diverging, accommodating and assimilating learning styles while majority of the male students preferred the converging learning style. In terms of fields of study, findings

showed that finance students prefer diverging learning style, computer science students prefer converging learning style while English Language students prefer accommodating learning style. The findings also showed that participantsô preferred learning styles have significant influence on studentôs academic achievements.

Ibe,(2015) also conducted a study on the effects of learning styles on the performances of senior secondary school biology students in Imo state using quasi- experimental design. The sample consisted of 300 SS 11 Biology students comprising of 150 males and 150 females obtained using simple random sampling. The Biology Achievement Test (BAT) was used to determine the schoolsô performance in both pre-test and post-tests. Data were analyzed using Analysis of Co-variance at probability level of 0.05. Findings from the study showed that the four learning styles of Kolb were represented amongst the Biology students, many students prefer to learn by more than one mode of information presentation and that the converging learners had the highest mean while the diverging learners had the least mean scores (p=0.67).

Dania (2014) carried out a survey on the effect of gender on studentsô academic achievement in secondary school social studies. Quasi- experimental design was adopted for the study. Six schools and one hundred and eighty (180) upper basic 2 students in Delta and Edo states made up the sample for the study. The instrument used for the study was the achievement instrument called Social Studies Achievement Test (SSAT). Data were analyzed using means, standard deviation and Analysis of Co-variance. Findings showed that there is significant interaction effect of treatment and gender on studentsô academic performance in social studies.

However, empirical research indicates inconclusive association between reflective thinking and the academic performance in different disciplines. For instance, Phan (2007) demonstrates that understanding (being part of reflective thinking) is related negatively with academic performance

for students of educational psychology whereas critical- thinking (part of reflective thinking) is positively associated with academic performance for students in mathematics discipline. Review of literature indicates that learning style preferences is affected by various factors which may in turn have some degree of association with the academic achievement of the learners.

Summary of Literature Review

The concept of learning has not been always interpreted in the same way by various researchers and psychologists. Generally, all the definitions revealed that learning is a process which leads to changes in behaviour. Factors that influence learning as stated by Mangal (2007) and Basavanthapa (2003) was reviewed and these included learnerôs physical and mental health, the basic potentials of the learner, the level of aspiration and achievement motivation, individual differences, learning experiences and behavioural objectives and teaching and learning environment.

Most of the above different opinions, conclusions and empirical findings of researchers show that individuals have different ways in which they prefer to learn and these are called learning styles. Students therefore possess certain characteristics that serve as indicator of how they learn. A number of researchers also agreed that there are different types of learning styles or learning style preferences of students. Also many factors that shape or hamper the learning styles of students were reviewed. This included personality types, educational specialization, professional career, current job role and adaptive competencies. There were little divergent contrary views on the review of the factors that influence studentsô learning styles. Some of the learning styles inventory were reviewed which included the Grasha and Reichmannôs learning style inventory, Honey and Mumfordôs styles of learning inventory, Dunn, Dunn and Price learning styles inventory and David Kolbôs learning styles inventory. The Kolbôs learning style inventory has

become the most frequently used method of measuring learning styles among science students. The study was based on David Kolbôs theory of experiential learning.

Consequently, research conducted in different parts of the world have shown learning styles as a predictor of academic performance. Some researchers like Cano Justica (2004), Garcia and Hughes (2000) concluded that studentsô achievement is associated with their learning styles. However, not all research literature supports a direct relationship between learning styles and academic performance.

In-fact, many of the above studies and researches were done outside the country with higher college students. No such studies focused on health science students in Nigeria. Therefore there are needs for more research and studies on the learning styles of health science students and its relationship with academic performance.

CHAPTER THREE

RESEARCH METHODS

This chapter discusses the research methods and procedures employed in the study. Specifically, the areas highlighted include: the research design, area of the study, population of study, instrument for data collection, ethical considerations, procedure for data collection and method of data analysis.

Research Design

A descriptive design was adopted for the study. This design was employed to investigate the relationships that exist between learning styles and academic performance of students. According to Polit et al., (2011), a descriptive design provides an accurate portrayal of characteristics of a group by discovering a description of what characteristics exist and determining the frequency with which they exist. It provides information from population regarding the characteristics, frequency and interrelations of variables within the population. Some researchers like Mahmood, et al, (2008), Abidin et al, (2011) and Russian, (2005) successfully used this design in similar studies of the relationship between studentsô learning styles and academic performance. This design is therefore deemed fit for the present study.

Area of Study

The study was carried out in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus. It is located at the centre of Enugu metropolis. It is bounded in the east by Enugu State University of Science and Technology/ Institute of Management and Technology, in the west by Kenyatta Market, north by Maryland Layout and south by College Road. It is a federal University and the first full fledged indigenous and autonomous university in Nigeria modeled upon the American educational system. The University has 15 faculties and

102 academic departments. The faculty was created at the inception of the College of Medicine as the sister Faculty to the long established Faculty of Medical Sciences and Dentistry by a statute of the Federal Government of Nigeria in 1984. The Faculty has five academic departments namely: Nursing Sciences, Medical laboratory Sciences, Medical Rehabilitation, Medical Radiology and Health administration. All the departments are housed in the Faculty building at Enugu Campus of the University of Nigeria and they provide both Undergraduate and Postgraduate Professional Education and Training.

Population of the Study

The population of the study was all the undergraduate students in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus. The total number of undergraduates in the Faculty is 1,871 at the time of the study.

Subjects of the Study

The population of the study was all the final year students of the Departments of Nursing Sciences, Medical Laboratory, Medical Rehabilitation and Medical Radiography. According to the departmental record, the total number of final year students in these departments is 342.

Criteria For Selection

- Final year students in four (4) departments: Nursing Sciences, Medical Laboratory Sciences, Medical Radiology and Medical Rehabilitation.
- Availability at the time of data collection.
- Willingness to participate in the study.

Instrument for data collection:

A standardized questionnaire (Kolbôs learning style inventory) and a proforma (final cumulative grade point average) were used as instruments for data collection. The Kolbôs learning style inventory was adapted and used to collect data regarding the studentsô learning styles. The proforma (final cumulative grade point average) was used to collect data from studentsô academic records. The instrument has two sections, A and B. Section A consists of the demographic data of students while section B is a two part questionnaire which requires the respondents to complete 12 sentences that describe learning. Each sentence has a choice of four endings. Individuals are asked to rank the endings for each sentence ranging from ñ4ò for the sentence that best describes the way that he/she learns to ñ1ò for the sentence that least describes the way that he /she would learn. The four endings corresponds to the four learning modes of Active Experimentation (AE), Concrete Experience (CE), Reflective Observation (RO), and Abstract Conceptualization (AC). The sum of the scores for each choice of the twelve sentences referred to the respondentôs overall score of four main learning methods. The total score for reflective observation is subtracted from the total score for active experimentation while the total score for concrete experience is subtracted from the total score for abstract conceptualization. The two scores obtained are put in a coordinate axis of a learning style grid. The intersection of the scores represents the respondentôs learning style. The academic records of the students i.e their final grade point average represented their academic performance.

Validity of the instrument:

Face and Content validity of the instrument was established by the research supervisor and two other senior lecturers in Department of Measurement and Evaluation, University of Nigeria, Nsukka. The validity of revised version of Kolbôs Learning Style Inventory (2005) was

investigated using the responses to the learning style inventory of 187 Arts and Science students in an Australian University and results indicate a construct validity of 0.87.(Kolb, 2005).

Reliability of the instrument:

Studies of the revised learning style inventory indicate that coefficient alpha reliability estimates for individual scales is 0.80 (Kolb, 2005).

A pilot study was conducted by administering the instrument to 22 students of similar nature in Ebonyi State University to determine its reliability in our locality. Information regarding how the questions were to be answered was given to the students who seemed to understand them. The instrument was administered once to 22 male and female students. Data generated were computed. Split half method was employed and Cronbachôs Alpha was used to establish the consistency giving a reliability coefficient of 0.81 showing a satisfactory reliability. The purpose of the pilot study was to determine the reliability of the instrument and also to see whether the instrument was culture sensitive in our society since it was published abroad.

Ethical Considerations:

An ethical clearance was obtained from the ethical committee of University of Nigeria Teaching Hospital, Ituku- Ozalla (See appendix III). In addition, an administrative permit to collect data from 2008/2009 health science students was obtained from the Dean, Faculty of Health Sciences and Technology (See appendix VI). An approval was also obtained from the Deputy Vice Chancellor of the University for Permission to have access to studentsô academic records. All the study participants were fully informed of the objectives of the study, assured of anonymity and confidentiality of their information and a group informed written consent was obtained (See appendix IV).

Procedure for Data Collection:

Four research assistants were trained to assist the researcher to administer the questionnaire. They were trained on the nature of Kolbôs learning style inventory and how to answer the questions. The nature of Kolbôs learning style inventory was explained to the students prior to data collection. The instrument was administered formally to the students in their different classes during break period. Thirty minutes was allotted for the completion of the questionnaire after which it was collected from the students. This was to avoid any bias. With ethical clearance and permission from the Deputy Registrar, studentsô academic records were retrieved with the aid of a proforma. Data collection lasted for one year.

Method of Data Analysis:

Data generated for the study were collated, organized and subjected to data analysis. Computer Statistical Package for Social Sciences (SPSS) version 20 was used to aid data analysis. Data was analyzed by the use of descriptive and inferential statistics. Descriptive statistics used included frequencies, percentages, mean and standard deviation while the inferential statistics used were t-test analysis for independent data, chi square and analysis of variance. A probability level of P less than 0.05 was considered significant in all statistical analysis.

CHAPTER FOUR

PRESENTATION OF RESULTS

In this chapter, the results obtained from data analysis with their interpretations were presented. Two hundred and sixty five (265) copies of questionnaire were administered to health science students in the department of Nursing Sciences, Radiography, Medical Laboratory Sciences, and Medical Rehabilitation. Out of 265 copies of questionnaire administered, 251 copies of questionnaire were answered correctly and usable. Also, out of 251 respondents who properly completed and returned the copies of the questionnaire, only 157 graduated at the time of data collection. This gives a 59.2% return rate. The generated data for the study were collated and subjected to data analysis for different objectives set for the study. The data were analyzed using descriptive and inferential statistics with the aid of statistical package for social sciences (SPSS) version 20. Descriptive statistics were presented as means and standard deviation. Analysis of variance (ANOVA), t-test analysis and Chi-square were used to draw inferences on the responses of the study participants as p-value of less than 0.05 was considered significant. The results for each objective were presented below:

Demographic Characteristics of Respondents

Descriptive statistics involving frequencies and their percentages were used to analyze data on demographic profiles of the respondents. The results of the analysis were presented in Table 1 below.

Table 1: Demographic Characteristics of the respondents n=251

Variables		F	%
Gender	**Male**	**89**	**35.5**
	Female	**162**	**64.5**
Age (in years)	**16 – 24**	**114**	**45.4**
	25 – 33	**125**	**49.8**
	34 – 42	**12**	**4.8**
Marital status	**Single**	**232**	**92.4**
	Married	**18**	**7.2**
	Separated	**1**	**0.4**
Religion	**Christianity**	**251**	**100**
	Islamic	**-**	**-**
	Traditionalist	**-**	**-**
Department	**Medical Rehabilitation**	**38**	**15.1**
	Medical Radiography	**43**	**17.1**
	Medical Laboratory Sciences	**35**	**13.9**
	Nursing Sciences	**135**	**53.8**

The results on Table 1 show that the age range of the respondents was 16 ï 42 years with a mean age of 25.6 $\pm$ 3.6 years. 114(45.4%) respondents were within the age range of 16 ï 24 years while 125 (49.8%) and 12 (4.8%) respondents were within the age range of 25 ï 33 years and 34 ï 42 yeas respectively. Majority of the respondents 162 (64.5%) were females where as 89 (35.5%) of them were males. As regards their marital status, majority of the respondents 232 (92.4%) were single, 18 (7.2%) were married where as only 1 (0.4%) was separated. All the students 251 (100%) belonged to the Christian religion. Majority of the respondents 135 (53.8%)

were Nursing Science students. Others were Medical Radiography Students 43(17.1%), Medical Rehabilitation students 38(15.1%) and Medical Laboratory Science Students 35 (13.9%).

Objective 1: To identify the learning styles of students in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus.

In order to achieve this objective, the sum of the scores for each choice of the twelve questions in Kolbôs Learning Style Inventory was obtained. The total scores for concrete experience of each respondent was subtracted from the total scores from abstract conceptualization (AC-CE) where as the total scores for reflective observation was subtracted from the total scores for abstract experimentation. (AE-RO). The two scores for each respondent were placed on a coordinate axis of a learning style type grid to mark the intersection of the two scores on the grid. This intersection represented each students learning style as presented in Table 2 below.

Table 2: Learning styles of Students in Faculty of Health Science and Technology.

Learning Styles	Frequency	Percent	Valid Percent	Cumulative Percent
Assimilating	114	45.4	45.4	45.4
Diverging	68	27.1	27.1	72.5
Accommodating	28	11.2	11.2	83.7
Converging	41	16.3	16.3	100
Total	**251**	**100**	**100**	

The result in Table 2 shows that most 114 (45.4%) of the students utilized the assimilating learning style. This was followed by 68 (27.1%) of students who utilized the diverging learning style. 41(16.3%) and 28(11.2%) of the respondents utilized the converging learning style and accommodating learning style respectively.

Objective 2: To establish gender differences in learning styles of students in the Faculty of Health Science of Technology Science and Technology.

To achieve this objective, data generated from 251 respondents were subjected to descriptive statistical analysis using frequencies and percentages as presented in Table 3 below.

Table 3: Gender differences in learning styles of Health Science Students.

Learning Styles	**Gender**					
	Male (n=89)		**Female (n=162)**			
	F	**%**	**F**	**%**	**Total**	**%**
Assimilating	39	43.8	75	46.3	114	45.4
Diverging	22	24.7	46	28.4	68	27.1
Accommodating	12	13.5	16	9.9	28	11.2
Converging	16	18.0	25	15.4	41	16.3
Total	**89**	**100**	**162**	**100**	**251**	**100**

The result on Table 3 shows the gender differences in learning styles of FSHT students. The Table shows that most 39(43.8%) of male students utilized the assimilating learning style. This was followed by 22 (24.7%) of them who utilized the diverging learning style. The remaining male respondents utilized the accommodating 12(13.5%) and converging learning styles 16(18.0%).

The result also shows that 75(46.3%) of female students utilized the assimilating learning style. This was also followed by 46(28.4%) of them, who utilized the diverging learning style. The remaining female respondents utilized the accommodating 16(9.9%) and converging learning styles 25(15.4%).

Objective 3: To determine differences in learning styles of students from the four (4) departments under study.

To achieve this objective, data generated from 251 respondents in the four departments of the faculty were subjected to descriptive analysis using frequencies and percentages and presented in Table 4 below.

Table 4: Differences in the learning styles of students from four departments under study.

Learning styles	Department				
	Medical Rehabilitation	**Medical Radiography**	**Medical Lab Sci.**	**Nursing Sciences**	**Total**
Assimilating	12	18	19	65	114
	31.6%	41.9%	54.3%	48.1%	45.4%
Diverging	15	9	6	38	68
	39.5%	20.9%	17.1%	28.1%	27.1%
Accommodating	7	9	1	11	28
	18.4%	20.9%	2.9%	8.1%	11.2%
Converging	4	7	9	21	41
	10.5%	16.3%	25.7%	15.6%	16.3%
Total	**38**	**43**	**35**	**135**	**251**
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**

The result on Table 4 shows that most of the Nursing students 65 (48.1%), Medical Laboratory students 19(54.3%) and Medical Radiography students 18(41.9%) utilized the assimilating learning style where as most 15(39.5%) of Medical Rehabilitation students utilized the diverging learning style. Few respondents from departments of Nursing Sciences 11(8.1%) and Medical Laboratory Sciences 1(2.9%) utilized the accommodating learning style. Also few students from departments of Medical Radiography 7(16.3%) and Medical Rehabilitation 4(10.5%) utilized the converging learning styles.

Objective 4: To determine the relationship between learning styles and final cumulative grade point average of students in the Faculty.

To achieve this objective, data generated from 157 respondents were subjected to descriptive analysis and the adjusted mean scores and standard deviation of their FCGPA were presented in Table 5 below.

Table 5: Means and Standard Deviations of Students' Learning Styles and Academic Performance.

Learning styles	N	Mean	Std. Deviation
Assimilating	76	3.4147	.41763
Diverging	34	3.3659	.50403
Accommodating	15	3.1820	.59120
Converging	32	3.4609	.56418
Total	**157**	**3.3913**	**.48768**

The results on Table 5 show the descriptive statistical analysis of learning styles and final cumulative grade point average (FCGPA) of the students. The results show that there was no significant relationship between learning styles and final cumulative grade point average of students. This implies that learning styles does not have any significant relationship on final cumulative grade point average (FCGPA) of students in the faculty.

Objectives 5: To establish gender differences in learning styles and final cumulative grade point average among FHST Students.

In order to achieve this objective, the data generated from 157 respondents were subjected to two way analysis of variance with gender (Two categories) and learning styles (Four categories)

being the two factors and FCGPA being the dependent variable. The results were presented in Tables 6 and 7 below.

Table 6: Means and standard deviation on gender differences in learning styles and FCGPA

Gender	Learning Style	Mean	Std. Deviation	N
	Assimilating	3.4952	.36157	27
	Diverging	3.4050	.53158	12
Male	**Accommodating**	3.2800	.68694	8
	Converging	3.2954	.62760	13
	Total	**3.4052**	**.50486**	**60**
	Assimilating	3.3704	.44279	49
	Diverging	3.3445	.49984	22
Female	**Accommodating**	3.0700	.48741	7
	Converging	3.5742	.50225	19
	Total	**3.3828**	**.47920**	**97**
	Assimilating	3.4147	.41763	76
	Diverging	3.3659	.50403	34
Total	**Accommodating**	3.1820	.59120	15
	Converging	3.4609	.56418	32
	Total	**3.3913**	**.48768**	**157**

Table 7: Result of Two way ANOVA on gender differences in learning styles and FCPGA

Source	Sum of squares	df	Mean square	F	P – value
Corrected model	1.940[a]	7	.277	1.175	**.321**
Intercept	1233.803	1	1233.803	5228.441	**.000**
Gender	.023	1	.023	.098	**.754**
Learning style	.884	3	.295	1.248	**.294**
Gender * learning style	**1.020**	**3**	**.236**	**1.441**	**.233**
Error	35.161	249			
Total	1842.785	157			
Corrected Total	37.101	156			

Result on Table 6 shows the means and standard deviations for each of the four (4) learning styles for male and female students in the four departments under study. Table 7 shows the result of 2ï way ANOVA of gender differences in learning styles and final cumulative grade point average (FCGPA) among FHST students. The results show that there was no significant difference in gender and final cumulative grade performance (FCGPA) of the students (P > 0.05). Also, there was no significant difference in learning style and final cumulative grade point average (FCGPA) of FHST students (P > 0.05). This implies that the learning style does not have any significant effect on the final cumulative grade performance of the students. The interaction of gender and learning style showed no significant difference (P >0.05).

Test of Hypotheses

Hypothesis 1: There will be no significant gender difference in learning styles of students.

To test this hypothesis, data generated from male and female students were subjected to Pearson chi square and the results were presented in Table 8 below.

Table 8: Result of Pearson Chi square on gender differences in learning styles of students.

	Gender			
Learning Styles	**Male (n=89)**	**Female (n=162)**	**X^2**	**P –Value**
Assimilating	39	75	**1.262**	**0.738**
Diverging	22	46		
Accommodating	12	16		
Converging	16	25		
Total	**89**	**162**		
X^2 = 1.262, df = 2, P = 0.738, P > 0.05				**NS**

The results on Table 8 show that there is no significant difference in the learning styles of male and female students in the Faculty (p=0.738). The null hypothesis was therefore accepted.

Hypothesis 2: There will be no significant difference in the learning styles of students in the four (4) departments under study.

To test this hypothesis, Pearson Chi square was used to analyze the data generated from 251 respondents. The result of the analysis is presented in Table 9 below.

Table 9: Result of Pearson Chi Square on departmental differences in learning styles.

Learning styles	Department				X^2	P-Value
	Medical Rehabilitation	Medical Radiography	Medical Lab Sci.	Nursing Sciences		
Assimilating	12	18	19	65		
Diverging	15	9	6	38	**18.093**	**0.034**
Accommodating	7	9	1	11		
Converging	4	7	9	21		
Total	**38**	**43**	**35**	**135**		

$X^2 = 18.093$, df = 9, p = 0.034, p < 0.05 **S**

The results on Table 9 show that there is a significant difference in learning styles of students across different departments (p=0.034). The null hypothesis was therefore rejected.

Hypothesis 3: There will be no significant difference in academic performance of students with different learning styles.

To test this hypothesis, data generated from 157 respondents were subjected to analysis of variance and the results were presented in Table 10 below.

Table 10: Result of Analysis of Variance of Students' learning styles and academic performance

Source of Variation	Sum of Squares	Df	Mean square	F	P -value
Between groups	.876	3	.292	1.233	**.300**
Within groups	36.225	153	.237		
Total	**37.101**	**156**			

The results on Table 10 show that there is no significant difference in the academic performance of students with different learning styles (p=0.300). The null hypothesis is therefore accepted.

Hypothesis 4: There will be no significant relationship between assimilating learning styles and academic performance of FHST students

In order to test this hypothesis, data generated from 157 participants were subjected to descriptive statistical analysis. The means and standard deviation were computed .T-test analysis for equality of means was performed and the results were presented in Table 11 below.

Table 11: Result of t-test analysis of FCGPA and assimilating learning style.

Learning style	N	X	Std. Deviation	df	t	P-value
Assimilating learning style	76	3.4147	.41763	**155**	**.581**	**.562**
Non Assimilating learning style	81	3.3694	.54703			
t = 0.581, df = 155, P=0.562						**NS**

The results on Table 11 show that there is no significant relationship between the assimilating learning style and academic performance. (P=0.562). The null hypothesis was therefore accepted.

Hypothesis 5: There will be no significant relationship between accommodating learning style and academic performance of FHST students.

To test this hypothesis, data generated from 157 participants were subjected to group descriptive analysis to compute the means and standard deviation. A t-test analysis for equality of means was performed on the variables and the result is presented on Table 12 below.

Table 12: Results of t-test Analysis of FCGPA and accommodating learning style

Learning style	N	Mean	Std. Deviation	df	t	P-value
Accommodating learning style	15	3.1820	.59120	**155**	**-1.760**	**0.049**
Non Accommodating learning style	142	3.4135	.47251			

t = -1.760, df = 155, p = 0.049 NS

The results on Table 12 show that there is no significant relationship between accommodating learning style and academic performance of FHST students (P=0.049). The null hypothesis is therefore accepted.

Hypothesis 6. There will be no significant relationship between converging learning styles and academic performance of FHST students.

To test the hypothesis, items generated from 157 respondents were subjected to descriptive statistics. The means and standard deviation were computed. A t-test analysis was performed for equality of means and the results were presented in Table 13 below.

Table 13: Result of t- test analysis of FCGPA and converging learning style

Learning style	N	Mean	Std. Deviation	df	t	P-value
Converging learning style	32	3.4609	. 56418	**155**	**.904**	**.367**
Non Converging learning style	125	3.3735	. 46697			

t = .904, df = 155, P = .367 NS

The results on Table 13 show that there was no significant difference between the converging learning style and academic performance of FHST students (P = 0.367). The hypothesis is therefore accepted.

Hypothesis 7: There will be no significant relationship between the diverging learning style and academic performance of FHST students.

In order to test this hypothesis, items generated from 157 respondents were subjected to descriptive statistics. T-test analysis was performed for equality of means and the results were presented in Table 14 below.

Table 14: Result of t-test analysis of FCGPA and diverging learning style

Learning style	**N**	**Mean**	**Std. Deviation**	df	t	P-value
Diverging learning style	34	3.3659	.50403	**155**	**-.343**	**0.732**
Non diverging learning style	123	3.3984	.48493			

t = -.343, df = 155, p = 0.732 NS

The results on Table 14 show that there was no significant relationship between diverging learning styles and academic performance of FHST students. (P = 0.732). The null hypothesis was therefore accepted.

Summary of findings

1. Most of the study participants 114 (45. 4%) utilized the assimilating learning style
2. Most of the male 39(43.8%) and female participants 75(46.3%) utilized the assimilating learning style.
3. Only 28 (11.2%) and 41(16.3%) of the study participants utilized the accommodating and converging learning styles respectively.
4. There was no significant difference in the learning styles of male and female students (P=0.738).
5. Most of the nursing students 65(48.1%) Medical Laboratory Students 19(54.3%) and Medical Radiography 18(41.9%) utilized the assimilating learning style.
6. Few respondents from departments of Nursing Sciences 11(8.1%) and Medical Laboratory Sciences 1(2.9%) utilized the accommodating learning style whereas few respondents from departments of Medical Radiography 7(16.3%) and Medical Rehabilitation 4(10.5%) utilized the converging learning style.
7. There is a significant difference in learning styles of students across different departments (P = 0.034).
8. There were no significant relationship between learning styles and academic performance of students in the faculty (P > 0.05)
9. There was no significant difference in gender, learning styles and final cumulative grade point average of FHST students (P > 0.05)

CHAPTER FIVE

DISCUSSION OF FINDINGS

This chapter dealt with the discussion of the findings of the study, implications for Nursing, limitations, suggestions for further studies, summary, conclusion and recommendations.

The findings of the study were discussed in line with the objectives of the study and the research hypotheses formulated to guide the study.

Discussion of major findings

Learning styles of students in the Faculty of Health Sciences and Technology.

The findings of the study revealed that the study participants utilized different learning styles namely assimilating, converging, accommodating and diverging learning styles. Most of the participants 114 (45.4%) utilized the assimilating learning styles.

This is not surprising because assimilating learning style has been proved for its effectiveness in information and science careers (Kolb, 2005). In formal learning situations, individuals with this learning styles prefer readings, lectures, exploring, analysis of models and having time to think things through (Kolb, 2005) The teaching and learning method of health science students in the Faculty involves readings, lectures, thinking, exploration and analysis of models.

The findings of the study are in agreement with Bhatti and Bart (2013) which reported that more of the participants had the assimilating learning style more than any other learning style. It also agrees with Salehi, (2007) who reported that senior students preferred the assimilating learning style. However, it disagrees with Wagner, Harsen, Rhee, Brunt, Terbizan and Christensen (2014) which reported that the preferred learning style of students in all three majors was the converging learning style.

Gender differences in learning styles of students in the Faculty of Health Sciences and Technology.

Findings show that the assimilating learning style category claimed the highest frequency among the male and female participants. Furthermore, hypothesis I formulated to determine differences in learning styles of male and female students was accepted (P = 0.738).

This finding is a normal expectation since both the male and female genders belong to the same professional body. Professional orientation shapes learning styles through habits required in professional training and immediate normative pressures involved in being a competent professional (Kolb 2005).

This finding is consistent with findings from other researchers. Bhatti and Bart (2013) found out that the assimilating learning style claimed the largest frequency among male and female participants. Furthermore, the finding is similar with Madu, (2014) who reported no difference between gender of students and learning style preference. It also supports Kolb, (2005) which never reported a difference in learning style preferences between male and female genders. Ghaffari, et al, (2013) also reported that there was no significant difference between the preferred learning styles of male and female students (P = 0.349) where $P \leq 0.05$) was considered as the significance level.

Differences in Learning Styles across Departments in the Faculty.

The findings show that most of the Nursing science students 65(48.1%), Medical laboratory sciences students and Medical Radiography students preferred the assimilating learning style where as majority 15(39.5%) of medical rehabilitation students preferred the diverging learning style. Hypothesis 2 was formulated to establish difference in learning styles of students across

different departments. Findings also revealed that there were significant differences in the learning styles of students in the four (4) departments hence the hypothesis was rejected. (P = 0.034). This could probably be as a result of the fact that students choose certain disciplines based on their learning styles. The reason could also be attributed to the fact that learning styles are shaped by studentsô major areas of study (Kolb, 2005).

This finding is in agreement with Wagner, et al (2014) in a study on the preferred learning styles of students in three Universities in the Midwestern United States and reported that Dietetics, Athletic Training and Exercise Science majors each had a significant learning style preference. Commonalities appears to exist among students majoring in Allied Health fields however, it is clear that differences in learning styles exist among students in individual allied health disciplines (Jones, Reichard and Mokhtari, 2013).

Relationship between learning styles and final cumulative grade point average among students in the Faculty.

Hypothesis on the relationship between studentsô basic learning styles and academic performance was accepted showing that there was no significant relationship between studentsô learning styles and final cumulative grade point average (P = 0.300). Furthermore, hypothesis 4, 5, 6 and 7 were tested to establish the relationship between the individual learning styles of students and academic performance and the hypotheses were all accepted. This result could probably be attributed to a number of factors. These include lack of awareness of learning styles among students in the Faculty, inadequate lecture rooms, lack of facilities like faculty library, inaccessible departmental library, incessant strike actions, inadequate accommodation in the hostels, poor power supply as well as crowded academic programme in various departments of

the Faculty. Moreover, some socioeconomic and psychological factors could contribute to the observed mismatch between students learning styles and FCGPA. In addition, lecturers in different departments of the Faculty do not seem to understand the learning styles which their students possess and this could lead to serious mismatch between teaching styles and learning styles thereby affecting academic performance negatively.

Nevertheless, similar studies have shown different results in other countries. This finding is in agreement with Ghaffari, et al (2013) which reported that there was no significant relationship between preferred learning styles and academic achievement of students. Furthermore Bitran, Lafuente, Zuniga, Viviani and Mena (2004) conducted a research to study the effect of medical studentsô learning styles on their academic performance and the results showed no significant relationship between studentsô preferred learning styles and academic performance. However, a study by Pouladi, Bahram, Abedi, and Molanee (2007) has shown a significant relationship between preferred learning styles and overall GPAs of Medical students at Tehran University.

Gender differences in learning styles and final cumulative grade point average among FHST Students.

Results of a two way analysis of variance (ANOVA) of gender differences in learning styles and FCGPA among students in the FHST showed that there was no significant difference in gender and FCGPA of the students ($P > 0.05$). This could probably be due to a number of factors which include possible incidence of examination malpractice during the course of study and harsh school environment in Universities. Lack of awareness of learning styles among students and lecturers could also result to indifference in gender, learning styles and FCGPA of FHST students.

This finding is consistent with Ghaffari et al (2013) which reported no significant difference in gender and preferred learning styles of students. (P = 0.349) and no significant relationship between preferred learning styles and academic achievement of students. The findings are also in agreement with Bhatti and Bart (2013) which reported that there was no statistically interaction effect between gender and learning style with GPA as the dependent variable (P = 0.229). However, the findings of this study is in disagreement with Bhatti and Bart (2013) which reported a significant difference between the scholastic achievement of males and females (P = 0.014) and a significant relationship between converging learning style and GPA of students.

Implications for Nursing

1. Increase in studentsô awareness of their learning styles will help them to gain control of their learning habits and strategies thereby influencing their academic performance positively.
2. Periodic administration of Kolbôs learning style inventory to students can provide educators with information that will be useful in planning educational experiences.
3. Educators should match their teaching styles with the studentsôpreferred learning styles. This will help to improve material retention thereby influencing the studentsô academic performance positively.
4. Health science students did not fit into a particular learning style. This implies that the educators in the faculty must employ a variety of teaching techniques to effectively reach all the students.
5. The results of the study revealed that majority of the students in the faculty are assimilators. Strengths of assimilators include their ability to plan. However a tendency to plan may inhibit actual application of knowledge and skills in a practical manner. Learning skills of

assimilators can be further developed by including activities that require them to organize information, build conceptual models, design experiments, collect and analyze quantitative data.

Limitations of the Study

The researcher encountered some limitations during the study which may affect the generalization of findings. These include:

1. Failure of some students to provide their correct registration numbers after all explanations made to convince them that the study will not affect them negatively. This formed the major limitation of the study.
2. Some students were referred in many courses thus had incomplete results and therefore were not included in the study. The results of medical laboratory science students were delayed for six months because of incomplete results.
3. The instrumentation format was self reporting in nature and could have been incorrectly reported by study participants.
4. Difficulty in getting all the students in their various classes was also a limitation Some provided wrong registration numbers and this made it extremely difficult to locate their academic records.

Suggestions for Further Studies

1. The researcher suggests that further study is needed to examine and analyze studentsô preferred learning styles and their probable changes during the course of their study.
2. The current study should be replicated using a larger sample size and include students in the second, third and fourth year of study using their current GPA to correlate their learning styles.

Summary

This study was carried out to establish the relationship between students learning styles and academic performance in the Faculty of Health Sciences and Technology, Enugu Campus. Five objectives and seven hypotheses were formulated to guide the study. The significance of the study was highlighted. Conceptual, theoretical and empirical review of literature was based on published and unpublished thesis and dissertations, journals, and internet sources. A descriptive design was adopted for the study. The subjects of the study were 251 health science students in the Faculty of Health Sciences who met the inclusion criteria. The instruments for data collection were a proforma and David Kolbôs learning style inventory.

Data collected was arranged, coded and analyzed using a Computer Statistical Package for Social Sciences (SPSS) Version 20. Results were presented using tables.

The findings of the study showed that:

1. Most of the study participants utilized the assimilating learning style.
2. There was no significant difference in learning styles of male and female students.
3. There was a significant difference in the learning styles of students across different departments.
4. There was no significant relationship between learning styles and academic performance of students in the faculty.
5. There was no significant difference in gender, learning styles and final cumulative grade point average.

Based on the findings of the study, it was concluded that there was no significant relationship between learning styles and academic performance. The major implication for study is that since health science students did not fit into any particular learning style, educators must employ a

variety of teaching techniques to effectively reach all the students. It was recommended that educators should administer Kolbôs learning style inventory to students periodically as this will provide information on their learning preferences which will help in planning their educational experiences. There is also need for educators to take care of individual differences in learning styles of students by employing different teaching styles to match the studentsô preferred learning styles as this will improve material retention thus improving studentsô academic performance. The major limitation of the study is that students failed to provide their correct registration numbers and this made it extremely difficult to locate their academic records thus affecting the sample size and generalization of findings. Suggestion to replicate the study using a larger sample size and including students in the second, third and fourth year of study and also using their current GPA to correlate their learning styles was made.

Conclusion

The main purpose of the study was to assess the relationship between studentsô learning styles and academic performance in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus. The major findings of the study were:

1. Majority of the students in the faculty preferred the assimilating learning styles though there was a relative even spread of the four basic learning styles.
2. There was no significant difference between the preferred learning styles of male and female students (P=0.738).
3. There was a significant difference in the learning styles of students across different departments (P = 0.034).

4. There was no significant relationship between studentsô final cumulative grade point average and their learning styles (P = 0.300).
5. There was no significant difference in gender, learning styles and final cumulative grade point average of students (P >0.05).

Recommendations

Based on the results of the study, the following recommendations were made:

1. Educational programs should be designed, planned and implemented based on the preferred learning style.
2. Students should be made aware of their preferred learning styles as this will help them gain control of it thereby improving their academic performance.
3. Educators in the faculty should match their teaching styles with the students preferred learning styles as this improves material retention thus improving studentsô academic performance.
4. Educators in the faculty should assess studentsô preferred learning styles throughout their enrolment in the program.
5. Educators should provide opportunities for health science students to apply knowledge and skills in a practical manner since most of them utilized the assimilating learning style.

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APPENDIX I

Department of Nursing Sciences,
University of Nigeria,
Enugu Campus.
2nd May, 2012

Dear Respondent,

I am a post graduate student of the above institution carrying out a study to investigate the relationship between learning styles and academic performance. The questionnaire is designed to determine the learning styles of health science students in the Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus.

You are hereby requested to kindly complete and return this questionnaire to the researcher to enable her conclude this study.

All information obtained shall be used for academic and research purposes with utmost confidentiality. Please complete this questionnaire objectively by answering all the questions truthfully and honestly.

Thanks for your co-operation and candid responses.

Ezeh Chinyere C

APPENDIX
II

Informed Consent Form

Introduction

You are needed to participate in a study titled Student's Learning Styles and Academic Performance in Faculty of Health Sciences and Technology, University of Nigeria Enugu Campus. The findings of the study will be of benefit to both students and teachers by helping students to identify how they prefer to learn, indicate the degree to which their learning styles are consistent and develop insight to effective learning styles which will enable them to perform excellently in examinations and become useful members of the society.

Voluntary Nature of Participation

Participation in this project is completely voluntary. Thus although you have been selected, you are free to participate in the programme or to decide otherwise. If you decide to participate, you are to withdraw from it, at any stage of the programme without any reprisals whatsoever.

Study Procedure

You will be required to give your response on the questionnaire that will be given to you or interpreted to you as it applies personally to you. You will be reached at a place that is convenient for you and at no financial cost.

Confidentiality

Information obtained from you will be treated as confidential and will not be used against you in any form. In addition, data analysis and presentation from this study will be aggregated and will not in any way reveal your identity.

Feedbacks

The researcher will be willing to discuss the result of the study with you and make recommendations that will enhance your learning styles and academic performance positively.

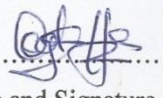
Respondent

I have read and understood the above (or had someone read and explain the entire study to me). All the gray areas have also been clarified. I fully understand the nature, risk and benefits of the study and hereby consent to take part in it.

.....

Name and Signature of Respondent

Date 06/06/13



.....

Name and Signature of Researcher

Date 06/06/2013

.....

Name and signature of witness

Date .....

Instructions Tick [√] and in the appropriate spaces.

Section A: Demographic characteristics of respondents.

1) Gender (a) Male [ ] (b) Female [ ]

2) Age é ..

3) Marital status (a) Married [ ](b) Single [ ] (c) Divorced [ ] (d) Separated [ ]

4) Religion (a) Christianity [ ] (b) Islamic [ ]

5) Department

a) Nursing sciences [ ]

b) Medical laboratory sciences [ ]

c) Medical Radiography [ ]

d) Medical Rehabilitation [ ]

6) **Registration Number ……**

Section B: Below are words, phrases /statements indicating the ways people prefer to learn. Kindly indicate your most preferred learning style.

For example:

When I learn: I am happy [2] I am careful [4] I am fast [1]I am logical [3]

4 = Most like you.

1 = least like you.

1. When I learn:

I like to deal with my feelings [ ] I like to think about ideas [ ]

like to be doing things [ ] I like to watch and listen [ ]

2. I learn best when:

I listen and watch carefully [ ] I rely on logical thinking [ ]

I trust my hunches and feelings [ ] I work hard to get things done [ ]

3. When I am learning:

I tend to reason things out [ ] I am responsible about things [ ]

I am quiet and reserved [ ] I have strong feelings and reactions [ ]

4. I learn by:

Feeling [ ] Doing [ ] Watching [ ] Thinking [ ]

5. When I learn:

I am open to new experiences [ ] I look at all sides of issues [ ]

I like to analyze things, break them down into their parts [ ] I like to try things out [ ]

6. When I learn:

I am observing persons [ ] I am active person [ ]

I am an intuitive person [ ] I am logical [ ]

7. I learn best from:

Observation [ ] personal relationships [ ]

Rational theories [ ] A chance to try out and practice

8. When I learn :

I like to see results from my work [ ] I like ideas and theories [ ]

I take my time before acting [ ] I feel personally involved in things [ ]

9. I learn best when:

I rely on my observations [ ] I rely on my feelings [ ]

I can try things out for myself [ ] I rely on my ideas [ ]

10. When I am learning:

I am a reserved person [ ] I am an accepting person [ ]

I am a responsible person [ ] I am a rational person [ ]

11. When I learn:

I get involved [ ] I like to observe [ ] I evaluate things [ ]

I like to be active [ ]

12. I learn best when:

I analyze ideas [ ] I am receptive and open ï minded [ ]

I am careful [ ] I am practical [ ]

APPENDIX III

PROFORMA

1. Department ----------
2. Registration Number ----------
3. Gender ----------
4. Year of Graduation ----------
5. Final cumulative Grade Performance Average ----------

APPENDIX IV
IDENTIFICATION LETTER

DEPARTMENT OF NURSING SCIENCES
FACULTY OF HEALTH SCIENCES AND TECHNOLOGY
COLLEGE OF MEDICINE
UNIVERSITY OF NIGERIA

Phone: 08068178477
Telegrams: Nigersity Enugu.

Enugu Campus
Enugu State, Nigeri
nursing.healthsciences@unn.edu.ng

Your Ref:.....

Our Ref: UN /CM/DNS/90

Date: 28th Nov. 2011

HEAD: A.N. ANARADO **PhD. (Nursing) (Ibadan); RN, RM, FWACN.**

TO WHOM IT MAY CONCERN

IDDENTIFICATION LETTER

RE: EZEH CHINYERE CLEMENTINA

REG. NO. PG/MSc/08/53399

This is to certify that the bearer of this letter is a student of Department of Nursing Sciences, Faculty of Health Sciences & Technology, College of Medicine, University of Nigeria, Enugu Campus.

Kindly allow him/her to carry out research in your department.

Thank you.

Dr. (Mrs.) A. N. Anarado
Ag. Head of Department

APPENDIX V
LETTER FOR ADMINISTRATIVE PERMIT

Department of Nursing Sciences,
Faculty of Health Sciences and Technology,
University of Nigeria,
Enugu Campus.
6th May, 2013.

The Dean,
Faculty of Health Sciences and Technology,
University of Nigeria,
Enugu Campus.

Approved pmer 7/5/13

Through:
The Head,
Department of Nursing Sciences,
University of Nigeria,
Enugu Campus.

Forwarded for your consideration and approval.

DEPT. OF NURSING SCIENCES
UNIVERSITY OF NIGERIA ENUGU
06/05/13

Dear Sir,

APPLICATION FOR ADMINISTRATIVE PERMIT

I humbly apply for your permission to collect data from 2008/2009 Health Sciences Students in the Departments of Nursing Sciences, Medical Laboratory Sciences, Medical Radiography and Medical Rehabilitation, Faculty of Health Sciences and Technology, University of Nigeria, Enugu Campus. I am a post graduate student of the above department and is presently carrying out a study to determine the relationship between students' learning styles and academic performance in partial fulfillment for the award of a master's degree in Nursing Education.

This is strictly for research purpose only and information obtained will be treated with utmost confidentiality. The students' lectures will not be interrupted as they will be reached during their break period.

I look forward to a favourable consideration of this application.

Thank you for your anticipated co-operation.

Yours faithfully,

Ezeh Chinyere C.
PG/MSC/08/53399.

DEAN'S OFFICE
FACULTY OF HEALTH SCIENCES & TECHNOLOGY
COLLEGE OF MEDICINE
UNIVERSITY OF NIGERIA
ENUGU CAMPUS
RECEIVED
DATE 7/5/13

APPENDIX VI
LETTER FOR PERMISSION

Department of Nursing Sciences,
Faculty of Health Sciences and Technology,
University of Nigeria,
Enugu Campus.
1st March, 2013.

The Deputy Vice Chancellor,
University of Nigeria,
Enugu Campus.

Through:
The Dean,
Faculty of Health Sciences and Technology,
University of Nigeria,
Enugu Campus.

Through:
The Head,
Department of Nursing Sciences,
University of Nigeria,
Enugu Campus.

Dear Sir,

APPLICATION FOR PERMISSION TO HAVE ACCESS TO STUDENTS' ACADEMIC RECORDS

I humbly apply for permission to have access to students' academic records for research purposes. I am a post graduate student of the above department and is presently carrying out a study to determine the relationship between students' learning styles and academic performance in partial fulfillment for the award of a master's degree in Nursing Education.

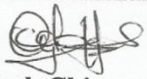
I therefore, request for the academic records of 2008/2009 students in the Department of Nursing Sciences, Medical Laboratory, Medical Rehabilitation and Medical Radiography in Faculty of Health Sciences and Technology University of Nigeria, Enugu Campus.

This is strictly for research purpose only and information obtained will be treated with utmost confidentiality.

I look forward to a favourable consideration of this application.

Thank you for your anticipated co-operation.

Yours faithfully,



Ezeh Chinyere C.
PG/MSC/08/53399

APPENDIX VII
ETHICAL CLEARANCE

UNIVERSITY OF NIGERIA TEACHING HOSPITAL
ITUKU- OZALLA, P.M.B. 01129, ENUGU
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Chief Sir Dr. C. J. UDEOGU, FICS
Specialist Surgeon, Endoscopist
Chairman UNTH Management Board

Barr. (Mrs.) J. C. OKAFOR
LLB.(HONS),BL., LL.M, FHAN, FCAI, MCIA
Ag. Director of Administration/Secretary
UNTH Management Board

Dr. C. C. AMAH, MBBS, FWACS, FICS,FIAM,FNIM,FCE
Chief Medical Director

Dr. (Mrs.) ANNE C. NDU, MBBS,FWACP, MPH.
Chairman Medical Advisory Committee

Our Ref. UNTH/CSA/329 /VOL. 5

Date. 26th February, 2014.

NHREC/05/01/2008B-FWA00002458-1RB00002323

ETHICAL CLEARANCE CERTIFICATE

TOPIC: STUDENTS' LEARNING STYLES AND ACADEMIC PERFORMANCE IN THE FACULTY OF HEALTH SCIENCES AND TECHNOLOGY, UNIVERSITY OF NIGERIA, ENUGU CAMPUS

BY: EZEH CHINYERE CLEMENTINA

FOR: A DISSERTATION FOR MASTERS DEGREE IN NURSING SCIENCES OF THE DEPARTMENT OF NURSING SCIENCES, FACULTY OF HEALTH SCIENCES AND TECHNOLOGY, UNIVERSITY OF NIGERIA

This research project on the above topic was reviewed and approved by the University of Nigeria Teaching Hospital Health Research Ethics Committee. This certificate is valid for **one** year from date of issue.

Prof. R. E. Umeh
Chairman, Health Research Ethics Committee

Date: 30/04/14

Scoring your preferred learning style

Understanding your preferred learning style, and the strengths and weaknesses inherent in that style, is a major step toward increasing your learning power and getting the most from your learning experiences.

To determine your learning style, take your scores for the four learning phases, AC, CE, AE, and RO (listed on the second sheet of the questionnaire) and subtract as follows to get your two combination scores:

Total for AC ____ - Total for CE ____ = [AC - CE]

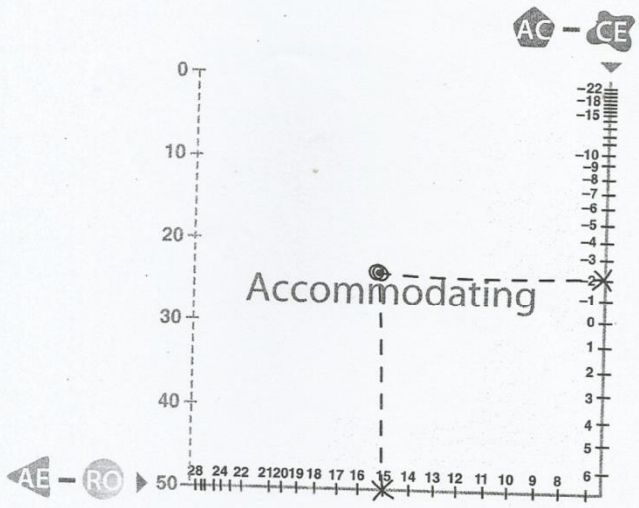
This score tells you how you **take in** experience

Total for AE ____ - Total for RO ____ = [AE - RO]

This score tells you how you **deal with** experience

Now mark your AC-CE score on the vertical dimension of the Learning Style Type Grid on page 8. Mark your AE-RO score on the horizontal dimension. Then place a dot marking the intersection of the two scores on the grid.

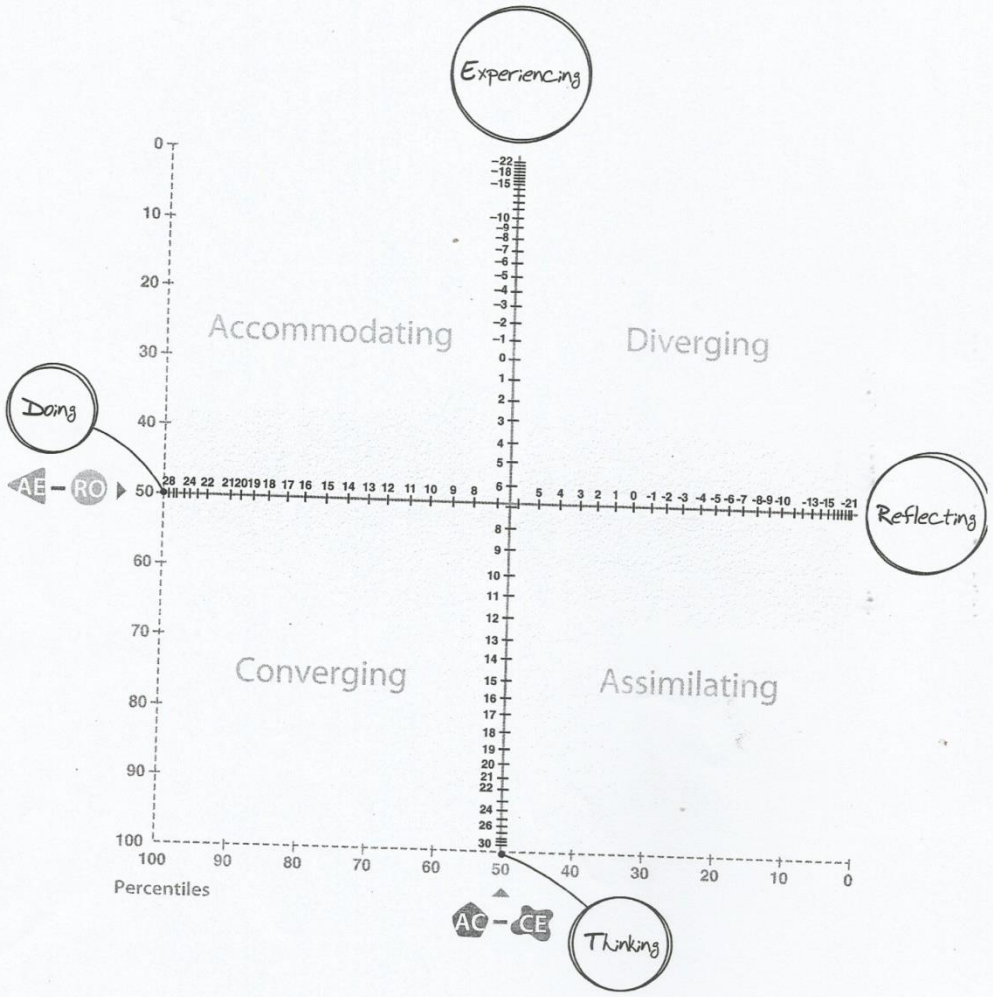
Example: If your AC - CE score is -2 and your AE - RO score is +15, your style falls into the Accommodating quadrant.



APPENDIX IX

Section 1

Your learning style grid



The closer your data point is to the center of the grid, the more balanced your learning style is. If your data point falls near a corner of the grid in the unshaded area, you tend to rely heavily on that particular learning style. If your data point falls in a shaded area then your style is characterized by a combination of the two adjoining learning styles. For example, if your data point falls in the shaded area between the accommodating and diverging quadrants your learning style is characterized by a strong orientation to concrete experience (CE) with an equal emphasis on active experimentation (AE) and reflective observa (RO), and with little emphasis on abstract conceptualization (AC). If your data point falls in the middle of the shaded area tl you balance experiencing, thinking, reflection and action.

APPENDIX X

Reliability

Scale: All Variables

Case Processing Summary

		N	%
Cases	Valid	22	100.0
	Excluded [a]	0	.0
	Total	22	100.0

a. Listwise deletion based on all variables in the procedure

Reliability Statistics

Cronbach's Alpha	No of items
0.812	22

Scale Statistics

Mean	Variance	Std. Deviation	No of items
218.77	222.946	14.931	22