



LEARNING SYSTEM AND A COMPARATIVE STUDY ON LEARNING STYLE OF STUDENTS IN AFRICA(NIGERIA) AND THOSE IN ASIA (JAPAN).

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DEDICATION

This research project is dedicated to Almighty Allah the beneficent and the merciful who taught man what he don't know, and for giving me the knowledge and wisdom to carry out this exercise successfully.

This research work is also dedicated to my entire family, professors, friends and well wishers.

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ABSTRACT

In different parts of the world especially African and Asian continents, students attend classes and taught in groups using the same method of teaching applied to all students irrespective of whether or not they have the same method of taking and assimilating information (learning style). This contributed negatively towards the development of educations in some countries of those continents. To tackle such problems, an intelligent and adaptive learning system should be the focal point in order to ensure faster and better performances in the learning process. One of its advantages is to help learners and teachers to discover students' learning preferences. Learning Style is the various ways or approaches of learning. They involve educating method, particular to an individual that are presumed to allow that individual to learn best. Learning preferences can then help learners to find their most effective way to learn conveniently. It can also help teachers to adopt/prepare suitable learning materials for efficient learning process. This paper is concerned with the study, implementation, and application of a web-based learning style index. In this paper we examine the learning style of students in Asia and those in Africa, Nigeria and Japan as a case study. However, this paper also compares the learning preferences of students in those two above mentioned continents.

Based on the study, we also give some recommendation to enhance the learning processes in those countries.

TABLE OF CONTENTS

TITLE	PAGE NUMBER
CHAPTER ONE	
1.1 Introduction-----	9
1.2 Aims and Objective-----	10
1.3 Scope and Limitation-----	10
1.4 Methodology-----	10
CHAPTER TWO	
LITERATURE REVIEW	
2.1 SQL-----	11
2.2 Web Server-----	12
2.3 Apache Web Server-----	12
2.4 Apache Tomcat-----	12
2.5 Learning Style-----	13
2.5.1 Dimensions of Learning Style-----	13
2.6 Related Works on Learning Style-----	15
2.7 Learning Style Index-----	18
CHAPTER THREE	
SYSTEM DISCRPTION	
3.1 Enhanced Learning style Index-----	20
3.2 Implementation-----	22
3.3 Web Application-----	24
3.3.1 Students Modules-----	25
3.3.2 Teachers Module-----	26
3.3.3 Administrator Module-----	28

3.4	<i>Integration in to Intelligent and Adaptive e-learning System---</i>	29
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CHAPTER FOUR

ANALYSIS OF THE RESULT

4.1	<i>Learning Style of Japanese students-----</i>	31
4.2	<i>Learning Style of Nigerian Students-----</i>	34
4.3	<i>The Comparism-----</i>	38
4.4	<i>Global Result and Implications-----</i>	43

CHAPTER FIVE

5.1	<i>Summary-----</i>	45
5.2	<i>Conclusion-----</i>	45
5.3	<i>Suggestion and Recommendation-----</i>	46
5.4	<i>Challenges-----</i>	46
5.5	<i>Future work-----</i>	47
	<i>References-----</i>	47
	<i>Appendix-----</i>	48

CHAPTER ONE

1.1 INTRODUCTION

During the past decade, educational research has identified a number of factors that account for some of the differences in how students learn. One of these factors, learning styles, is broadly described as *cognitive, effective* and *physiological* traits that are relatively stable indicators of how learners perceive, interact with, and respond to learning environment.

This research work uses an online learning style index (LSI) to determine the learning preferences of students based on their responses to answering some questions with multiple choice answers on a questionnaire to the best of their ability. The system will automatically categorize the students as Active/Reflective, Sensing/Intuitive, Visual/Verbal, Sequential/Global or Social/Emotional learners. Learning style index can help learners to know their learning preferences to enable them select/find out suitable learning materials in order to boost their learning process. Moreover, teachers can take this advantage to measure their students' learning preferences, which they can use to setup/adjust their teaching styles and to find out the necessary materials or equipment to match their students' learning capabilities. It is very important to know the learning preferences of an individual or group of students so as to avoid mismatch between learner's learning style and the available learning or teaching materials.

This system is an improvement of Felder-Silverman learning model, which was developed mainly for engineering students. We found that the quiz system of Felder-Silverman learning style model allows students to choose between two alternatives, just like true or false in logic, but however, in life we can find so many things that may not necessarily be black or white. Therefore, Felder-Silverman learning style index needs to be extended to give students an opportunity to choose one out of five options.

The enhanced learning style index (ELSI) is implemented using java as an applet, and integrated in to a web-based system which is connected to an SQL database using java database connector (JDBC). It is essential to use database so that we can analyze the enhanced learning style index for group of learners and help teachers to get general view of the learning preferences of their students.

To test this system, some data were collected from engineering students (male and female) in various schools and universities in Nigeria to analyze their learning styles and make comparative analysis between this result and that of the same type of students from Japan.

1.2 AIMS AND OBJECTIVES

Learning styles index is aimed at knowing an individual or group of students' learning preferences, in order to develop their knowledge, skills and understanding, so that they can perform with increasing competence and confidence in a range of educational activities.

Some of the key objectives of this research are as follows:

- To create awareness to both students and their teachers on students' learning style preferences.
- To enable teachers to know the convenient way of inseminating new idea/knowledge to their students.
- To improve learning processes in Africa.
- To show application of computer science in different fields of study.

1.3 SCOPE AND LIMITATION

The research work is concerned only about knowing the learning preferences of students using an on-line, web based learning system. The system does not have any suggestion to the teacher or students on the type of materials they may use in the teaching or learning processes. But the system can interpret the learning style preferences of the user automatically after completing all the necessary steps, as will be explained in the appendix.

1.4 METHODOLOGY:

The system has an online questionnaire that students are expected to login to the system through an internet service for proper inspection of the questions and also provide an answer to the 55 multiple choice questions based on their own learning capability. But unfortunately, internet service and good computer skills is not so common in majority of our schools in Africa, more especially in villages. Therefore, I tried to have printed copies of the questionnaire that can be answered manually using an ink (pen) anywhere and at time independent of availability of internet service as well as computer skills. The filled questionnaires were later entered in to the system in an environment where internet service and computer skills are not considered as a major challenge. Some of the schools visited in Nigeria are Bayero University Kano, African University of Science and technology Abuja, Government Secondary School Kafin Hausa Jigawa state, University of Nigeria Nsuka, etc. More so, In Japan Schools in Fukushima were visited by a student of Professor Mohamed Hamada in University of Aizu, Japan.

CHAPTER TWO

LITERATURE REVIEW

This is a body of text that aims to review the critical points including substantive finding as well as theoretical and methodological contributions to a particular topic. However, there is no any experimental report here, instead we just give a definition and brief explanation of some new words or a phrases that needs to be clear to the reader before going through most of the experimental works. Hence, words like SQL, Apache web server, Tomcat, Learning styles, Learning system, and Learning style index are explained in more details under this chapter.

2.1 SQL

SQL stands for Structured Query language, which is an ANSI (American National Standard Institute) standard that lets you access and manipulate database.

This programming language (SQL) was first developed by IBM in the early 1970's. Since that time, the language has gone through a number of modifications and revisions, but it still remains true to its original purpose of managing and retrieving data stored in database systems.

We choose to use SQL because of its ability to perform the following task on the database:

- Executing queries against database
- Retrieving data from database
- Inserting record into a database
- Deleting record from a database
- Creating new database
- Creating new tables in a database
- Creating stored procedures in a database
- It can set permission on tables, procedures, and views

Although SQL is an ANSI standard, there are many version of SQL language e.g. SQL99, SQL2003, SQL2008, etc. However, to be complaint with the ANSI standard, they all support at least the major commands (such as SELECT, UPDATE, DELETE, INSERT, WHERE) in a similar manner.

2.2 WEB SERVER

Web servers are computers that deliver (serves up) web pages. Every Web server has an IP address and possibly a domain name. For example, if you enter the URL *htt://www.u-aizu.ac.jp/e-index.html* in your browser, this sends a request to web server whose domain name is *u-aizu.ac.jp*. The server then fetches the page named *e-index.html* and send it to your browser.

Any computer can be turned in to a server by installing server software and connecting the machine to the internet. There are many web server software Applications, including public domain software from NCSA and Apache, and commercial packages from Microsoft, Netscape and others.

2.3 APACHE WEB SERVER

Often referred to as simply Apache, a public domain software developed by a loosely-knit group of programmers. The first version of Apache, based on the NCSA http web server, was developed in 1995.

Core development of the Apache web server is performed by a group of about 20 volunteer programmers called *Apache Group*. However, because the source code is freely available, anyone can adapt the server for specific needs, and there is a large public library of Apache add-ons (which refers to a product design to compliment another product). In many respect, development of Apache is similar to development of the Linux operating system.

The original version of Apache was written for UNIX, but there are now versions that can run under os/2, windows and other platforms.

The name is an attribute to the Native American Apache Indian tribe, a tribe well known for its endurance and skill in warfare. A common misunderstanding is that it was called Apache because it was developed from existing NCSA code plus various patches, hence the name patchy or Apache server.

2.4 APACHE-TOMCAT

Apache tomcat (or simply Tomcat) is an open source servlet container developed by *Apache Software Foundation (ASF)*. Tomcat implements the java servlet and the javaserver pages (JSP) specification from Oracle Corporation, and provide a “pure java” HTTP web server environment for java code to run.

Tomcat should not be confused with Apache web server, which is a C implementation of an HTTP server; these two servers are not bundled together, although they are frequently used together as part of server application stack.

2.5 LEARNING STYLE

Learning styles are different ways that a person can learn. It is commonly believed that most people favor some particular method of interacting with, taking in, and processing stimuli or information. Psychologists have proposed several complimentary taxonomies of learning styles. But other psychologist and neuroscientist have questioned the scientific basis of some learning styles theories. However, here are some definitions of learning styles found in internet glossaries.

- It is the manner in which a learner perceives, interact with, and respond to the learning environment. Components of learning styles are the Active/Reflective, Sensing/Intuitive, Visual/Verbal, Sequential/Global and Social/Emotional, all of which may influence person's cultural background.
- It is preferential mode, through which a subject likes to master learning, solve problems, think or simply react in pedagogical situation,
- A consistent pattern of behavior and performance by which an individual approaches an educational experiences; learning style is derived from cultural socialization and individual personality as well as from the broader influence of human development.
- It can also be referred to the set of cognitive, emotional, characteristics and physiological factors that serve as relatively stable indicators of how a learner perceives, interact with, and respond to the learning environment (keefe, 1979).

2.4.1 DIMENSIONS OF LEARNING STYLE.

- Active/Reflective Dimension:** Active learners understand new idea/information by doing something with it. They are sensitive to try out and experiment with new information and often enjoy group work, because this enables them to do active things. Active understand and memorize better what they went through. They are good in saying "Let's try it out and see how it works". While reflective learners understand better what they quietly think about it first. Their instruction is always "Let's think through it first".
- Sensing/Intuitive Dimension.** Sensing learners are those that essentially have the ability to incorporate different senses either alone or in combination to heighten and reinforce their learning process. Sensory learners prefer concrete, practical, and procedural information. They like learning facts and solving problems by well established methods. They

are generally careful, practical and patient, and like new knowledge to have some connection to the real world. While Intuitive learners tend to focus on the world of possibility. Unlike sensory learners, who are interested in the here and now, intuitive learners enjoy considering ideas, possibilities and potential outcomes. They like abstract thought, daydreaming and imagining the future. They prefer discovering new relationships and can be innovative in their approach to problem solving. Intuitive learners tend to work faster and dislike repetition and work which involves a lot of memorization and routine calculation.

- iii. **Visual/Verbal Dimension:** Verbal learners remember best what they see, such as pictures, diagrams, demonstrations, etc. visual learners have strong visualization skills. They look up to “see” the information visibly written or drawn, and they have a keen awareness of the aesthetic, the beauty of the physical environment, visual media or art. Whereas verbal learners learn through listening. They get more out of words, either written or spoken explanation. They prefer to work in groups where members explain concepts and ideas, but they learn even more when they are the one making the explanation.
- iv. **Sequential/Global Dimension:** Sequential learners gain understanding in small sequential, logical steps. They like to take information one piece at a time, although they can do it very quickly. On the other hand, global learners tend to learn in large jumps, absorbing materials almost randomly without seeing connections, and then suddenly “getting it.” They may be able to solve complex problems quickly or put things together in novel ways once they have understood the big picture, but they have difficulty explaining how they did it.
- v. **Social/Emotional Dimension:** Social and emotional learning (SEL) is the process of developing and supporting the social and emotional skills and competence of students through nurturing and caring learning environment and experiences. SEL emphasizes active learning techniques and the generalization of skills across the subjects, which provide opportunities to practice and to develop attitudes, behavior and thinking process to support students in becoming “healthy and competent” members of the society (Elias, et.al 1997).

The process of social and emotional learning builds five central competences in students:

- ✚ Self-awareness: knowing what we are feeling in the moment, having a realistic assessment of our own abilities and a well-grounded sense of self-confidence.
- ✚ Social or Other-awareness: understanding what others are feeling, being able to take their perspective, appreciating and interacting with diverse groups.
- ✚ Relationship skills: handling emotions in relationship effectively, establishing and maintaining healthy and rewarding relationship based on cooperation, resistance to inappropriate social pressure, negotiating solutions to conflict, and seeking help when needed.
- ✚ Self-management: regulating one's emotions to handle stress, control impulse, and persevere in overcoming an obstacle.
- ✚ Decision making: making decision based on accurate consideration of all relevant factors and the likely consequences of alternative courses of action, respecting others, and taking responsibility for one's decision (CASEL 2003).

2.6 RELATED WORK ON LEARNING SYSTEM

There are several different learning styles models (e.g., [3], [5], [7] and [8]) including Kolb (1984), Honey and Mumford (1982) and Felder-Silverman (1988). Each proposes different description and classification of learning styles.

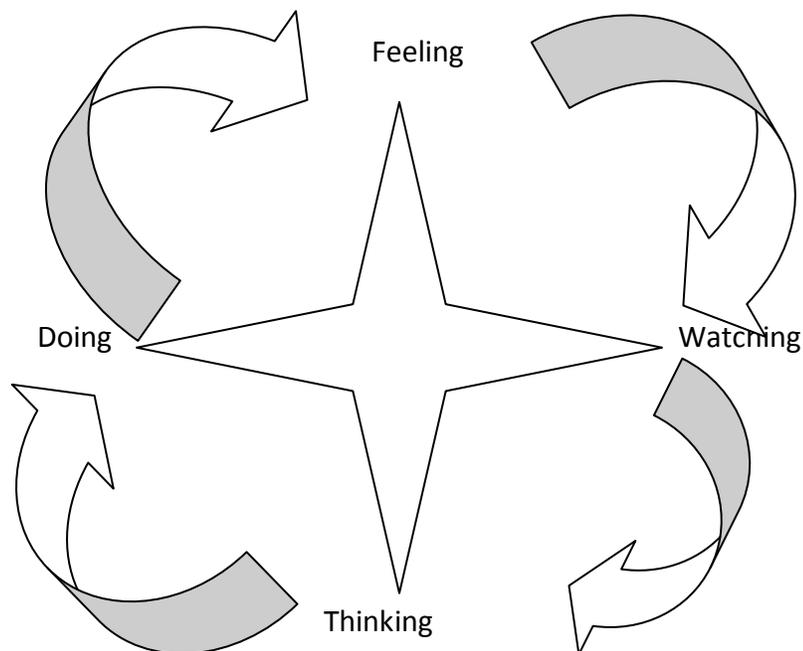
David Kolb published his learning style model in 1984 from which he developed his learning style inventory. Kolb's learning theory works on two levels: a four stage cycle of learning and four separate learning styles. Much of Kolb's learning theory is concerned learner's internal cognitive processes. Kolb states that learning involves the acquisition of abstract concepts that can be applied flexibly in a range of situations. In Kolb's theory, the impetus for the development of new concepts is provided by new experiences.

"Learning is the process whereby knowledge is created through the transformation of experiences (David A. Kolb, 1984)".

Kolb's experimental learning style theory is typically represented by a four stage learning cycle in which a learner 'touches all the bases'.

- a. Concrete experience – (a new experience of situation is encountered, or a reinterpretation of existing experience).
- b. Reflection observation – (of the new experience of particular importance are any inconsistencies between experience and understanding).
- c. Abstract conceptualization – (Reflection give rise to a new idea or a modification of an existing abstract concept).
- d. Active experiment – (the learner applies them to the world around them to see what result).

In other word, those stages can be addressed as feeling, watching, thinking, and doing respectively. The figure below represent this learning cycle.



Another learning style were developed by Peter Honey and Alan Mumford based upon the work of Kolb, and they identified four distinct learning styles or preferences: **Activist** (are those who learn by doing), **Theorist** (Those that like to understand the theory behind the actions), **Pragmatist** (are people who need to see how to connect learning with the practice in the real world), **Reflector** (Someone who learn by observing and thinking about what happened). These are the learning approaches that individuals naturally prefer and they recommend that in order to maximize one's own personal learning, each learner ought to:

- Understand their learning style
- Seek out opportunities to learn using that style

To understand your particular learning style, Honey and Mumford have developed a learning style questionnaire that contain useful information to put you in a far better position to do the following three important things [quoting Peter Honey]:

- I. “Become smatter at getting a better fit between learning opportunities and the way you learn best. This makes your learning easier, effective and more interesting”.
- II. “Expand the bandwidth of your experience from which you derive benefit. To increase your versatility and helps you learn from a wide variety of differences”.
- III. “Improve your learning skills and processes. Increase awareness of how you learn, opens up the whole process to self scrutiny and improvement”.

The Felder and Silverman model categorizes individuals’ preferences in terms of type and information perception (i.e Sensory or Intuitive, Verbal or Visual); approaches for organization and processing of information (i.e. inductive or deductive, active or reflective); and the rate at which students progress towards understanding (Sequential or global). In this way individuals are classified according to their preference for one or the opposite of each of the first four dimensions of learning style *in section 2.5.1* (i.e. Active or Reflective, Sensing or Intuitive, Visual or Verbal, Sequential or Global learner)

Other models are Anthony Gregorc’s model, Fleming’s VAK/VARK model, etc. Among all the existing learning system models, we choose Felder-Silverman learning system model (FSLSM) for the following reasons:

- ✓ It is widely known and applicable.
- ✓ It can described learning styles in more details than other models.
- ✓ Its reliability and revalidation have been tested already.

Most other learning style models classify learners into few groups, whereas Felder and Silverman describe the learning style of a learner in more detail, distinguishing between preferences on four dimensions, as processing, perception, input and understanding. Each of those dimensions is made up of contrasting attributes as will be shown in tabular form shortly.

Another main difference is that FSLSM is based on tendencies, indicating that learners with high preferences for certain behavior can also act sometimes differently.

FSLSM is used very often in researches related to learning style in advanced learning technology. According to Carver et al. (1999), The Felder model is most appropriate for hypermedia courseware (p.34). Kuljis and Liu (2005) confirmed this by conducting a Comparism of learning style models with respect to the application in e-learning and web-based learning system. As a result, they also suggest FSLSM as the most appropriate model.

Nevertheless, despite the recognition given to the Felder and Silverman model by different researchers, there are still some drawbacks to their model. This is because, according to their questionnaire of evaluating some one’s learning preferences, the answer to each question must be completed in terms of choosing the best option out of two given alternatives, in other word, the answer to each question is expected to be in the form of **Yes** or **No**, which does not give right to an individual for taking benefit from both the two opposite dimensions of learning style. Section **2.7** explains in detail the method used to evaluate the learning preferences of a person using this model. Felder Silverman does not consider one of the most important dimensions of learning style; that is Social/Emotional learning (seen in section 2.5.1 above). However, to overcome such disadvantages, we extend their model into an extended learning style index in section **3.1**, to give a considerable treatment to the above mentioned drawbacks.

Learning Styles		Teaching Styles	
Process	Active	Students participation	Active
	Reflective		Passive
Perception	Sensing	Content	Concrete
	Intuitive		Abstract
Input	Visual	Presentation	Visual
	Verbal		Verbal
Understanding	Sequential	Understanding	Sequential
	Global		Global

Table of learning and teaching style.

2.7 LEARNING STYLE INDEX

Felder-Silverman learning style model has an index consisting of an online questionnaire for identifying learning preferences of a student. The index of learning style (ILS) consist of a total of 44 questions that cover all the first four of the earlier mentioned dimensions of learning style in section 2.4.1, with each dimension taking 11 questions. These preferences can take values between +11 down to -11, and each of the questions is assign to a value 1 or -1. For instance,

when you answer a question that fall under “Active/Reflective” dimension, and the answer has active preference, +1 will be added to the score, whereas 1 will be subtracted from the score if the answer has reflective preference. To calculate the degree of preference for each dimension, the sum all the values of the answers to the eleven questions were taken algebraically, as in the relation below:

$$Val_{DIM} = \sum_{i=1}^{11} q_i^{DIM}$$

$DIM = \{A/R, S/I, V/V, S/G\}$ refers to each of the four dimensions (A/R for Active/ Reflective, S/I for Sensing/Intuitive, V/V for Visual/Verbal, and S/G for Sequential/Global). The vector of indexes $I = \{iA/R, iS/I, iV/V, iS/G\}$ describes attributes in each dimension. $Q = \{q_1, q_2, \dots, q_{11}\}$ is the sum of questions belonging to each dimension, and each q_i indicates the contribution given by i -th question within the eleven questions for each DIM to detect preference, 1 or -1 is substituted into q_i . Results are divided into three groups, according to points (Figure 1). If your score is between 3 to -3, you are categorized into “well balanced”. If your score is between -5 and -7, or between 5 and 7, you are classified into “moderate preference”. If your score is between -9 and -11 or between 9 and 11, you are grouped into “strong preference”, as shown in the figure1 below.

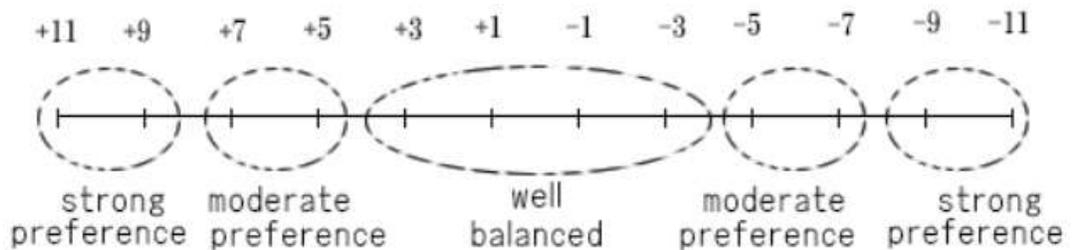


Figure1 Learning Style Index Evaluation diagram.

Reliability of LSI system was established in western style educational institutes, because the western style culture allows a clear-cut “yes/no” answers for queries. Contrarily, the reliability of LSI is not clear in other educational institutes, because their culture (especially Africa) tend to give unclear fuzzy answers for queries. Hence, in order to be able to study the reliability of LSI in African and Asian educational institutes, it is necessary to extend the traditional “yes/no” style for answers to a new fuzzy-like system with index of five levels. This extension will be introduced in the next section

CHAPTER THREE

SYSTEM DISCRPTION

The description of new system is given in more details here. This entails the extension of Felder Silverman model; the method we use to evaluate the learning preferences of an individual, implementation of the new system, the web Application and integration of the system in to an intelligent e-learning system are well explained under this chapter.

3.1 ENHANCED LEARNING STYLE INDEX (ELSI)

This is where the new model is to be introduced. It extends the Felder-Silverman LSI model in two ways: a new fuzzy-like evaluation system and a new social/emotional dimension are also introduced.

- Fuzzy-like evaluation system

Our model is based on answers of an ascending risk scale of 1 to 5 (Figure 2). Our new assessment system extends the traditional Felder-Silverman model as follows.

$$Val_{DIM} = \sum_{i=1}^{11} q_i^{DIM+} - \sum_{i=1}^{11} q_i^{DIM-}$$

DIM, q and i are the same as in Felder-Silverman LSI model. q_i^{DIM-} and q_i^{DIM+} are the attributes which represents the value of each dimension. The Felder-Silverman model only has 1 or -1 value assigned to one of the dimension when the learner answers a question. Our new model has five different values assigned for each question. Depending on the choice of the learner on the 5 scale values of the question's answer, and will take one of those values: 1, 0.75, 0.5, 0.25, or 0. If you choose the first option in q_i , the value +1 will be assigned to q_i^{DIM+} and 0 assigned to q_i^{DIM-} . When you choose the second option in q_i , the value +0.75 will be assigned to q_i^{DIM+} and +0.25 will be the value to q_i^{DIM-} . When you choose the third (middle) option in q_i , the value +0.5 will be assigned to each of q_i^{DIM+} and q_i^{DIM-} . When you choose the forth option in q_i , the value +0.25 will be assigned to q_i^{DIM+} and +0.75 to q_i^{DIM-} .

Finally, when you choose the fifth option in q_i , the value 0 will be assigned to q_i^{DIM+} and +1 to q_i^{DIM-} . Summation of the values assigned to each of the q_i^{DIM+} and q_i^{DIM-} attributes will be calculated separately. Then the difference between the two calculated values of the two attributes (q_i^{DIM+} and q_i^{DIM-}) will be the result of one's learning preference. For example, suppose you choose the first option in this question, +1 point will be added to the attribute of "active". If you choose the second option, +0.75 will be added to the attribute of "active" and +0.25 will be added to the attribute of "reflective." Likewise, if you choose the third option, +0.5 will be added to "active" and +0.5 to "reflective" and so on. Then the result of the learning preference in the active/reflective dimension will be calculated by subtracting the total value assigned to "reflective" from that assigned to "active" as in the above formula.

Figure2 below is the demo of an enhanced learning style index questionnaire.

Number	Question	Answer
1	I understand something better after I a) try it out. b) think it through.	Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4 Ⓔ 5
2	I would rather be considered a) realistic. b) innovative.	Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4 Ⓔ 5
3	When I think about what I did yesterday, I am most likely to get a) a picture. b) words.	Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4 Ⓔ 5
4	I tend to a) understand details of a subject but may be fuzzy about its overall structure. b) understand the overall structure but may be fuzzy about detail.	Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4 Ⓔ 5
5	When I study in a group/team, a) I like to lead other members. b) I like to follow other members.	Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4 Ⓔ 5
6	When I am learning something new, it helps me to a) talk about it. b) think about it.	Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4 Ⓔ 5
7	If I were a teacher, I would rather teach a course a) that deals with facts and real life situations. b) that deals with ideas and theories.	Ⓐ 1 Ⓑ 2 Ⓒ 3 Ⓓ 4 Ⓔ 5

Figure2

Following the changes in the point allocation system, we changed the degrees of preference (Figure 3). If your score is between 11 and 7.5, or between -11 and -7.5, you are categorized into "strong preference." If your score is between 7.5 and 3.5, or between -7.5 and -3.5, you are classified into "moderate preference." If your score is between 3.5 and 2, or between -3.5 and -2, you are grouped into "some preference." If your score is between -2 and 2, you fall into "well balanced".

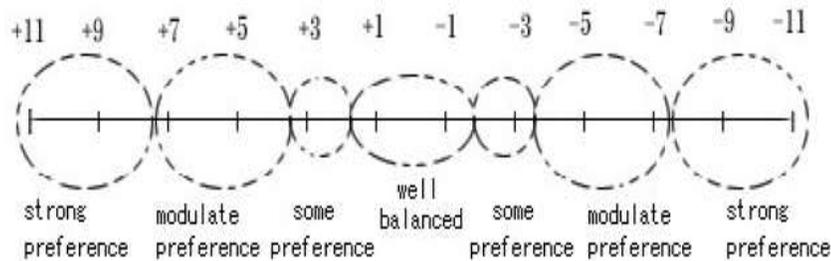


Figure3 ELSI evaluation scheme

Several works were done to analyze the Felder-Silverman LSI model, but none of them considered the extension of the evaluation system as it is in this project. The additional dimension is social/emotional dimension; this has been explained near the beginning of this paper under dimensions of learning style (at section 2.5.1 number v.).

While extending the FLSM, addition of social/emotional dimension comes with 11 additional questions. In designing the new questions, we referred to the temperament and character inventory (TCI) model [15].

TCI is based on Cloninger's psychobiological theory of personality, and has questionnaire that can investigate and measure the personality of an individual.

There are seven dimensions of temperament and character in TCI (Figure 4). There are four temperament scales that describe aspects of the personality that are probably hereditarily influenced and can be observed at any point in time. The three character scales refer to

dimensions that become fully developed at any level of education, influence personal and social effectiveness, as well as the acquisition of conscious self-perception.

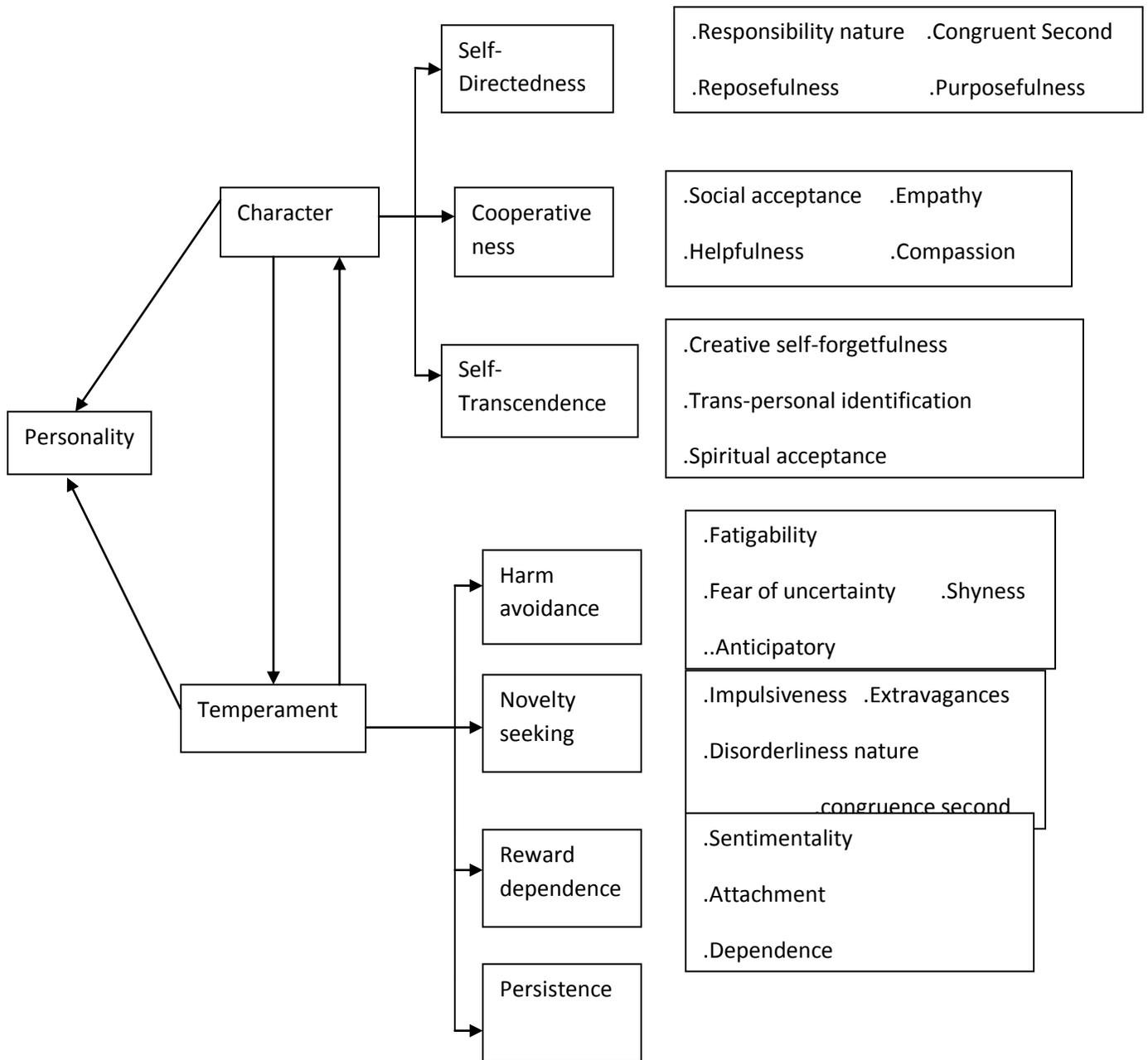


Figure4 Temperament and character Inventory

3.2 Implementation

A web-based application is developed with a web server, application server and a database for better analysis of the learning style. The developed system has the following advantages.

1. Easy to use through its user-friendly interface

2. Easy to find and analyze the learning style of a group of learners. This enables the teachers to have a several views of the learning preferences of all students in the class.
3. Easy to access and use anytime anywhere.

The overview of our system is shown in the Figure below. The system consists of the following components: a user friendly graphical interface, a web-server, an application server, and a database module.

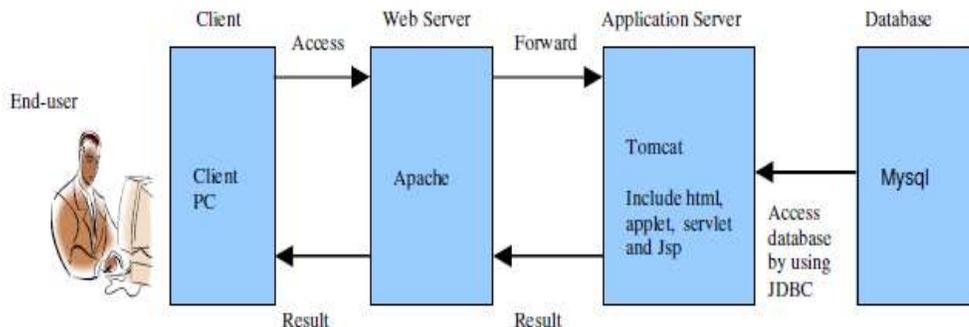


Figure5. Extended ILS System outline

The learning preferences computational module of the system resides in the application server, uses the new calculation model described in the above section. This calculation model will provide more detailed information about the learning style of a learner. The learner can access the system through the user interface: that is a java applet runs on a web browser. The learner then fills in all the answers of the quiz system and then submits the answers to the Apache [1] web server through the client PC. The web server will then pass it to the Tomcat [14] application server. The application server will run the computation module of the system to compute the learning preferences of the user. The application server will send the result back to the user through the Apache web server and the Client PC. A copy of the result will also be stored in the MySQL database which is connected to the application server through the “Java Database Connector” JDBC. JDBC provides methods for querying and updating data in a database. To use the JDBC with our system we execute the code shown bellow.

```

Class.forName("com.mysql.jdbc.Driver");
Connection connect=DriverManager.getConnection(url,user,password);
//create statement object
Statement statement=connect.createStatement();
String thesql="SELECT*FROMresult";
//get result
ResultSet res=statement.executeQuery(thesql);
  
```

Figure6. Java and SQL database connection

The first statement loads the driver class, and the second one connects to the database. The next statement creates an object (called statement) to stores the instructions that control the database. This database includes name, gender and learning style for each dimension. So our system also provides functions that maintain statistics with the ability to distinguish between users' different gender. This can helps teachers to analyze the learning styles of their group students and then prepare suitable teaching materials and adapt their teaching style accordingly.

The user interface of the system can be seen in the demo below:

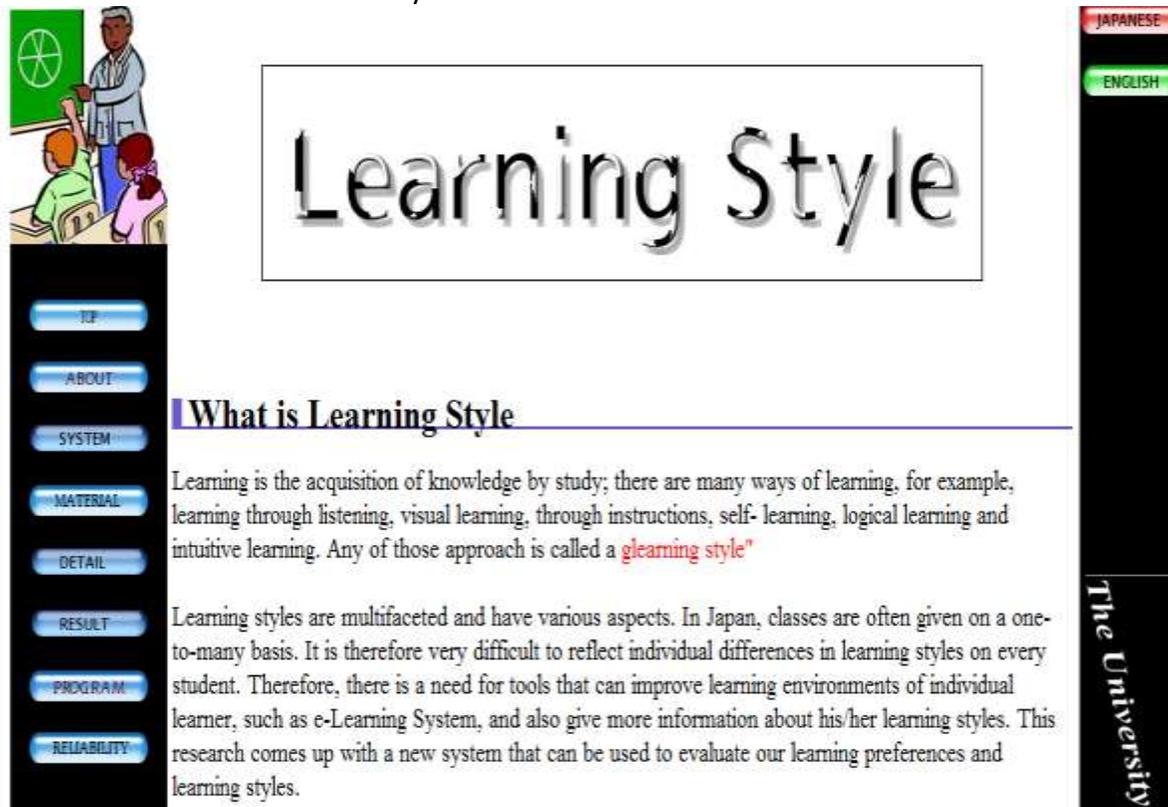


Figure7. User interface of the system

3.3 Web Application

Our web-based application has three modules: students' module, teachers' module, and administrator module, see Figure 8. The students' module enables an individual student to analyze his/her learning preferences and/or send it to his/her teachers. The teachers' module enables teachers to access and analyze their students learning preferences individually or in groups, male or female, and get a graphical representation of their students learning preferences. The administrator module can maintain the system and the data base.

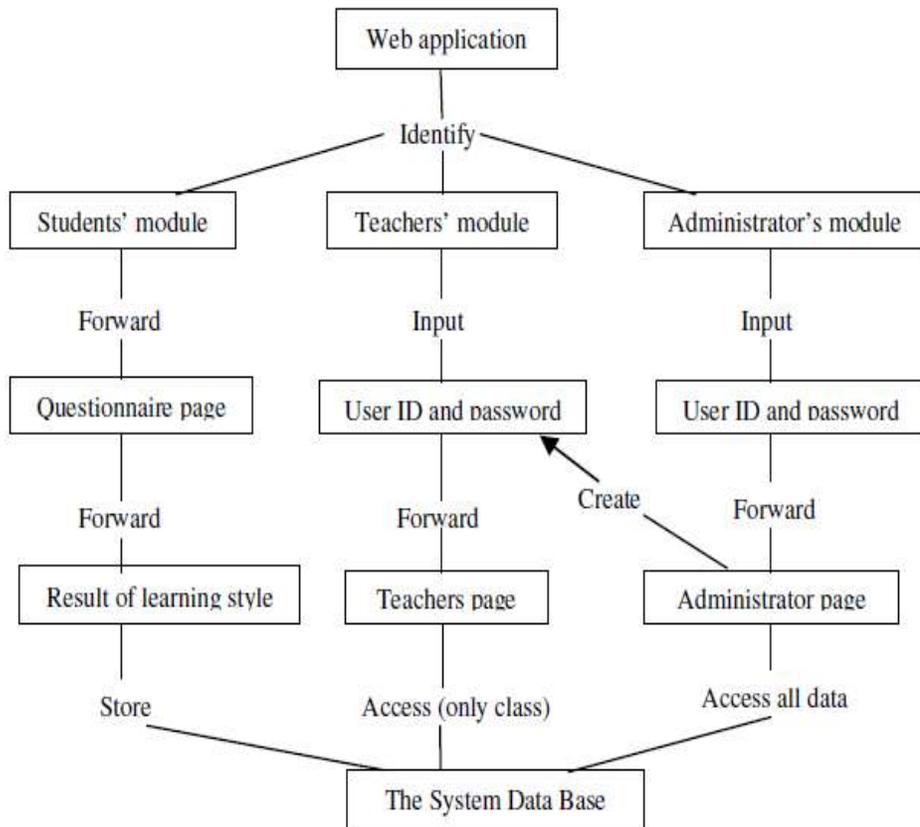


Figure 8. The Web-based application architecture

3.3.1 Students' module

Student can access the system individually through the interface shown in Figure 9. Then the student can answer the questions in the questionnaire and get his/her learning preferences analyzed automatically by the system. If the student provides his/her "Student ID", the system will store his learning preferences in his teachers' data base.

Name

Student ID number

Gender
 male female

Now, we ask for answering 55 questions. In each question, we let you rate yourself on a scale of one to five. you select 1 if your thought is closer to A. And you select 5 if your thought is closer to B

PRECAUTION

Please never fail to choose one button that apply to you from questionnaire.
 Please answer as honestly as possible, as you objectively look back on your past.
 No time limits but you should answer as quick as possible without considering carefully.
 Please press the submit button, if you finish answering all questions.

Number	Question	Answer
1	I understand something better after I a) try it out. b) think it through.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
2	I would rather be considered a) realistic. b) innovative.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
3	When I think about what I did yesterday, I am most likely to get a) a picture. b) words.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

Figure 9. Students' module interface

3.3.2 Teachers' module

Teachers should have their passwords provided by the system administrator before they can use the system and access the data base. Using the password they can login to the system and have access to their students' learning preferences data. An example is shown in Figure 10. Then they can access the learning preferences of a single student, a group of students, all students, male students only, or female students only. The system has also a function to graphically analyze and represent the result as in the example shown in Figure 11.

45	044	KHS13	male	Moderate Active	Strong Sensing	Moderate Visual	Some Sequential	Moderate Social	right
46	045	KHS14	male	Well Balanced	Moderate Sensing	Moderate Visual	Some Sequential	Moderate Social	moderately right
47	046	KHS15	male	Moderate Active	Strong Sensing	Some Visual	Moderate Sequential	Moderate Social	right
48	047	KHS16	male	Some Active	Some Sensing	Moderate Visual	Moderate Sequential	Well Balanced	right
49	048	AUST16	female	Moderate Active	Some Sensing	Moderate Visual	Well Balanced	Moderate Social	moderately right
50	049	KHS17	male	Moderate Active	Some Sensing	Some Visual	Moderate Sequential	Well Balanced	moderately wrong
51	050	KHS18	male	Well Balanced	Moderate Sensing	Moderate Visual	Some Sequential	Moderate Social	moderately right
52	051	BUK16	male	Well Balanced	Well Balanced	Some Verbal	Well Balanced	Some Social	right
53	052	KHS19	male	Moderate Active	Moderate Sensing	Moderate Visual	Some Sequential	Well Balanced	moderately right
54	053	BUK17	male	Well Balanced	Some Intuitive	Moderate Visual	Well Balanced	Moderate Social	moderately right
55	054	KHS20	male	Well Balanced	Some Sensing	Well Balanced	Some Sequential	Well Balanced	right
56	055	AUST17	male	Well Balanced	Moderate Sensing	Moderate Visual	Well Balanced	Some Social	right
57	056	AUST18	male	Well Balanced	Well Balanced	Some Visual	Well Balanced	Well Balanced	moderately right
58	057	AUST19	male	Well Balanced	Well Balanced	Some Visual	Moderate Sequential	Some Social	right

Number

Name

Gender male female

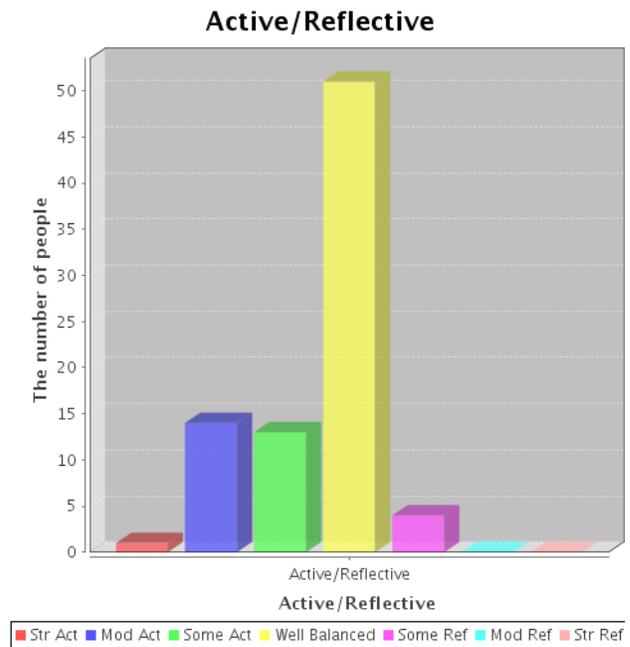
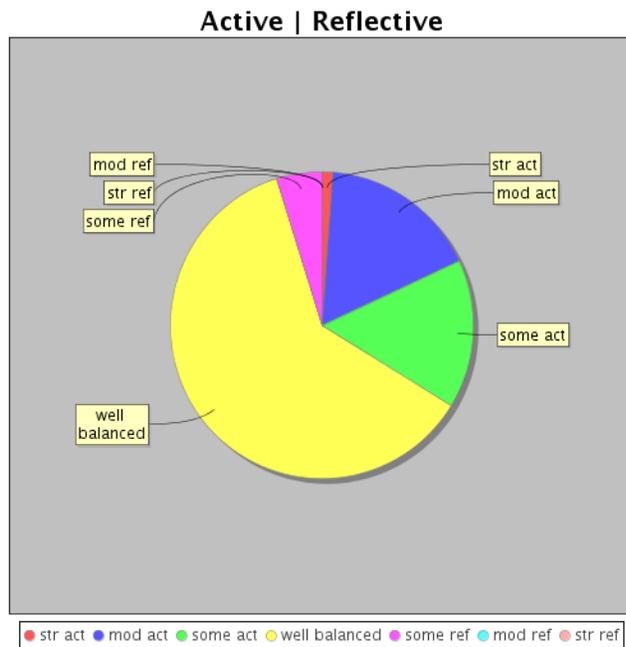
Active/Reflective Sensing/Intuitive Visual/Verbal

Sequential/Global Social/Emotional FEEDBACK

NO

Figure10. Teacher's module interface

Strong Active	Moderate Active	Some Active	Well Balanced	Some Reflective	Moderate Reflective	Strong Reflective
1	14	13	51	4	0	0



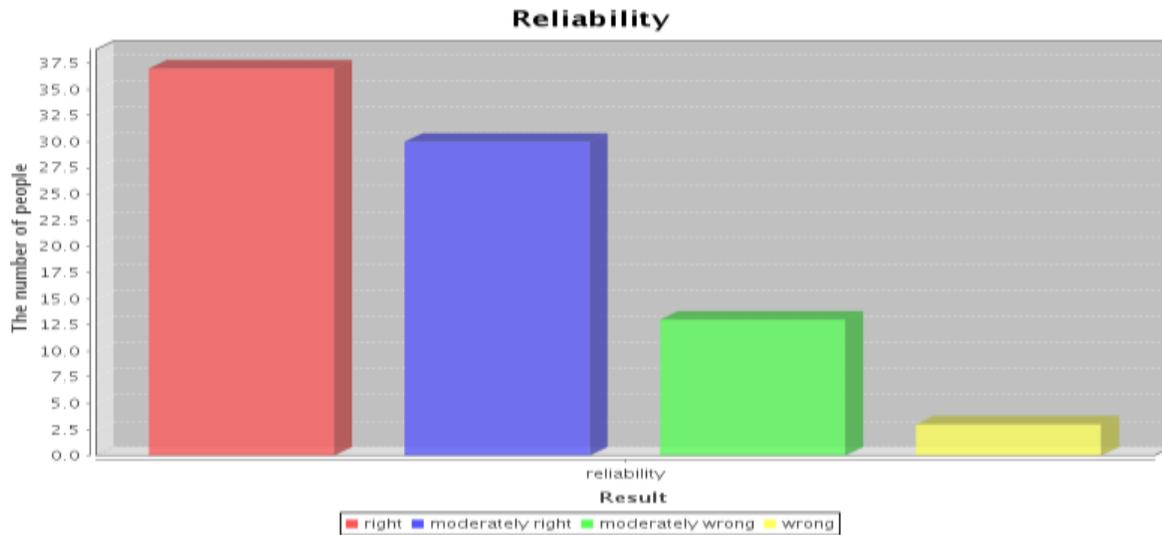


Figure11. Example of graphical representation of the learning preferences of a group of students.

3.3.3 Administrator module

The system administrator can maintain the whole system, create/delete new users (teachers), create or change passwords, and access/maintain the whole data base. The administrator user interface is shown in Figure 12.

information about users

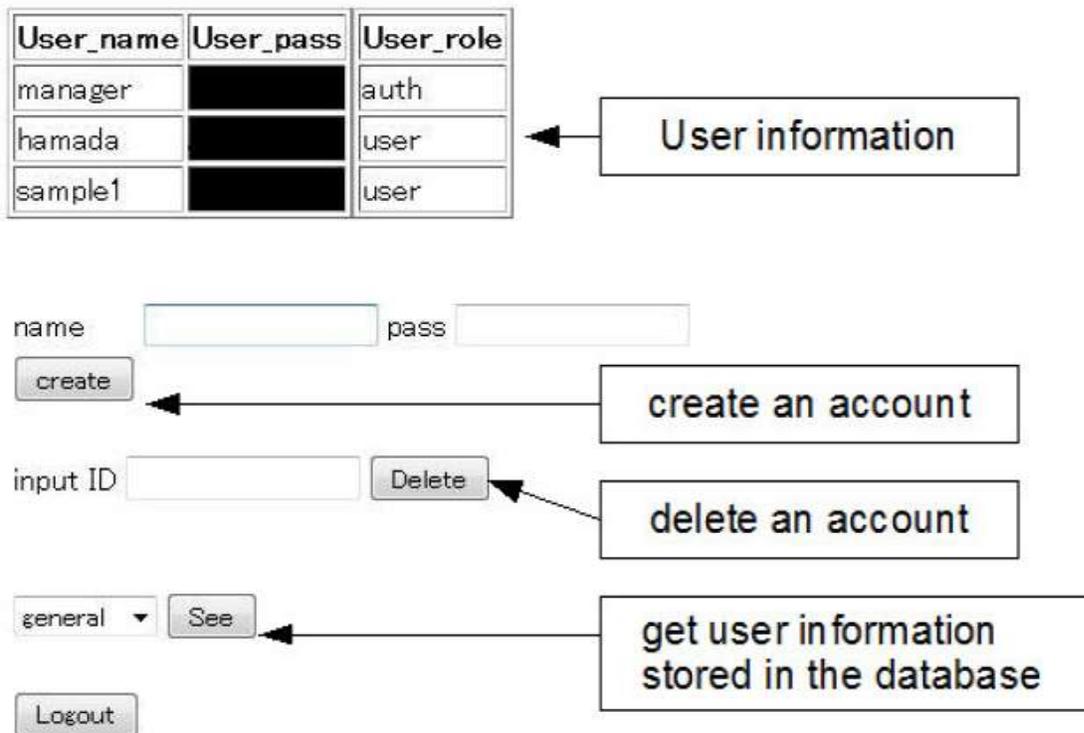


Figure12. Administrator's module interface

3.4 Integration into intelligent and adaptive e-learning system

Compared to traditional learning systems, E-learning [2] provides a more comfortable learning environment, where learners can learn at their convenient time and environment. E-learning systems are widely used and rapidly increasing. Hamada [4] provides an e-learning system for automata theory and theory of computation based on Java2D technology [6] (Figure 13). Hamada's e-learning system for automata and theory of computation is an intelligent and adaptive learning system that is composed of several components: an animated (movie-like) welcome component, a hypertext introduction to the theory of computation topics, a finite state machine (FSM) simulator, a Turing machine (TM) simulator, a self-assessment component, a chatting component for supporting online collaborative learning, and other three components showing automata visual examples such as video player, rice cooker, and tennis game. Novice automata learners find it difficult to grasp these comprehensive materials that were designed to meet all kinds of learning preferences. Learners do not know where they should start.

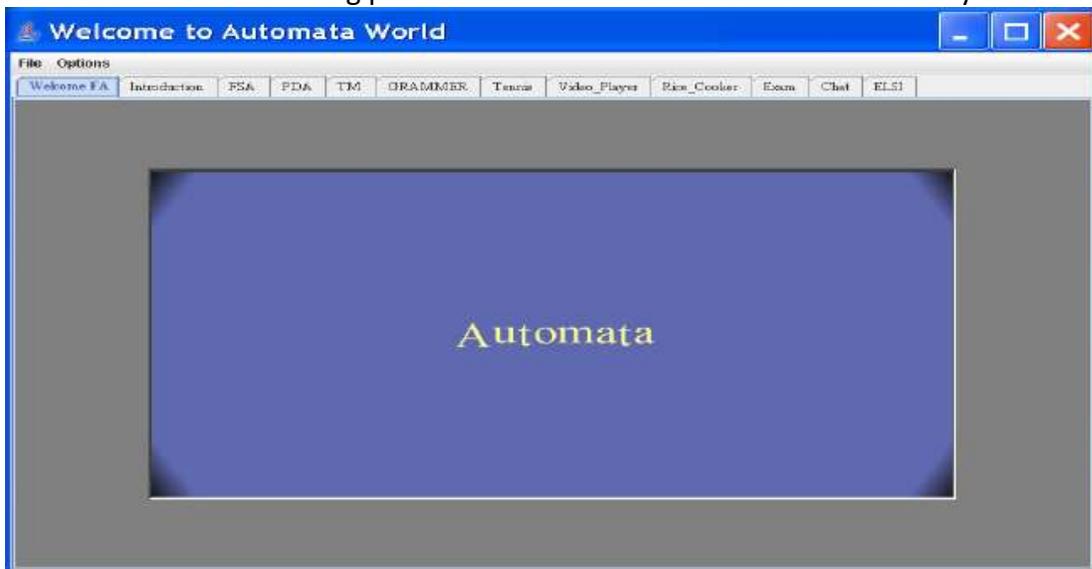


Figure 13. Automata e-learning system interface.

To facilitate their learning process, we extend Hamada's e-learning system by adding a new component (Figure 14) for learning style. This new component enables the user to find his/her learning preferences and hence chose the suitable components from the rich automata e-learning system.

ELSI component integrated into the e-learning system.



Figure 14. ELSI integrated into Hamada's automata e-learning system.

The integration of our extended learning style system into Hamada's automata e-learning system needs access to the source code. Since both systems are written in Java, there was no compatibility problem in the integration process.

CHAPTER FOUR

ANALYSIS OF THE RESULT

In this chapter, the analysis of the result collected from both Japanese and Nigerian students will be done theoretically by using the result in tabular and graphical forms. Different Comparism where taking in to account starting from comparing Boys and Girls at each particular country, and finally comparing the results obtained from the countries by considering all the five dimensions of learning styles. The analysis will be done as follows:

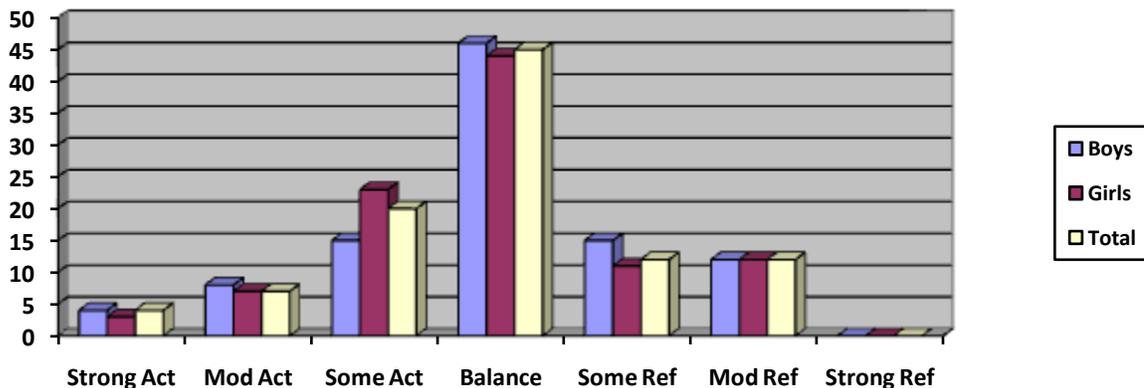
4.1 LEARNING STYLES OF JAPANESE STUDENTS:

We consider a sample of 83 students, in which 26 of them are Boys and 57 are girls. The result of the questionnaire are listed and explained in the tables and their corresponding percentages are represented in the chat below:

Active/Reflective Dimension:

	Active-Reflective						
	Strong Act	Mod Act	Some Act	Balanced	Some Ref	Mode Ref	Strong Ref
Boys	4%(1)	8%(2)	15%(4)	46%(12)	15%(4)	12%(3)	0
Girls	3%(2)	7%(4)	23%(13)	44%(25)	11%(6)	12%(7)	0
Total	4%(3)	7%(6)	20%(17)	45%(37)	12%(10)	12%(10)	0

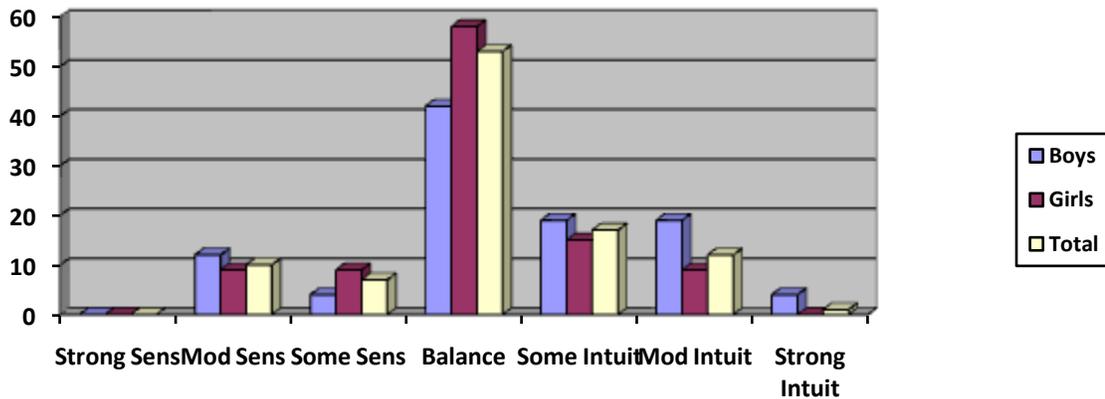
In the above table, it shows that girls are more active than boys. This result is obtained by comparing the percentages in the two rows of both girls and boys under the second, third and fourth column in the table above, girls have 33% active, boys have 27% active. In the row for total, 31% of the total number of students is active learners, while only 24% are reflective learners. Hence, Asian students are more active than reflective learners. Therefore, their teachers needs to be given them group works that enable each one of them to participate actively. This result can also be presented in the figure below.



Sensing/Intuitive Dimension:

	Sensing-Intuitive						
	Strong Sensing	Mod Sensing	Some Sensing	Balanced	Some Intuitiv	Mode Intuitiv	Strong Intuitv
Boys	0	12%(3)	4%(1)	42%(11)	19%(5)	19%(5)	4%(1)
Girls	0	9%(5)	9%(5)	58%(33)	15%(9)	9%(5)	0
Total	0	10%(8)	7%(6)	53%(44)	17%(14)	12%(10)	1%(1)

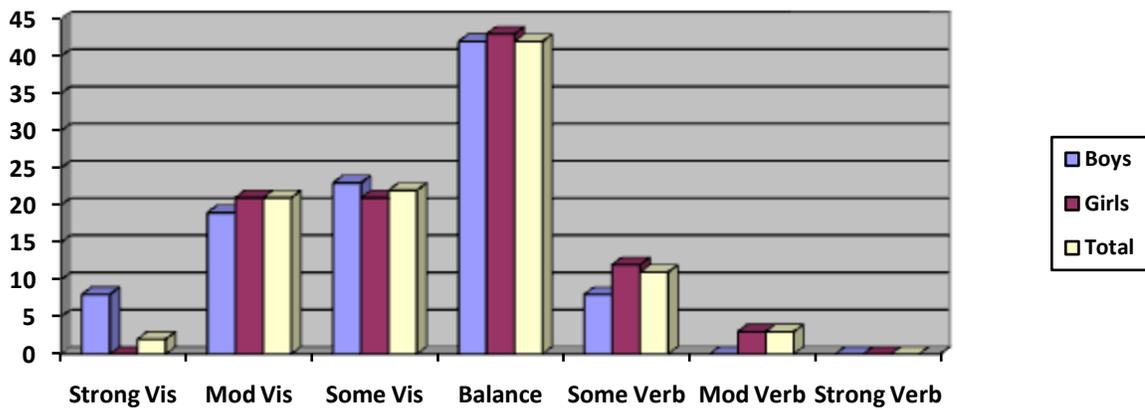
Boys are more intuitive than girls. This follows by obtaining 42% of the boys to be intuitive whereas only 24% of the girls are found to be intuitive learners. Also considering the collection of all the students, intuitive learners overweight the sensory learners, 30% are intuitive learners and only 17% are sensory learners. Because they are intuitive, Japanese students work faster, and they prefer discovering new relationships, and are innovative in their approach to problem solving.



Visual/Verbal Dimension

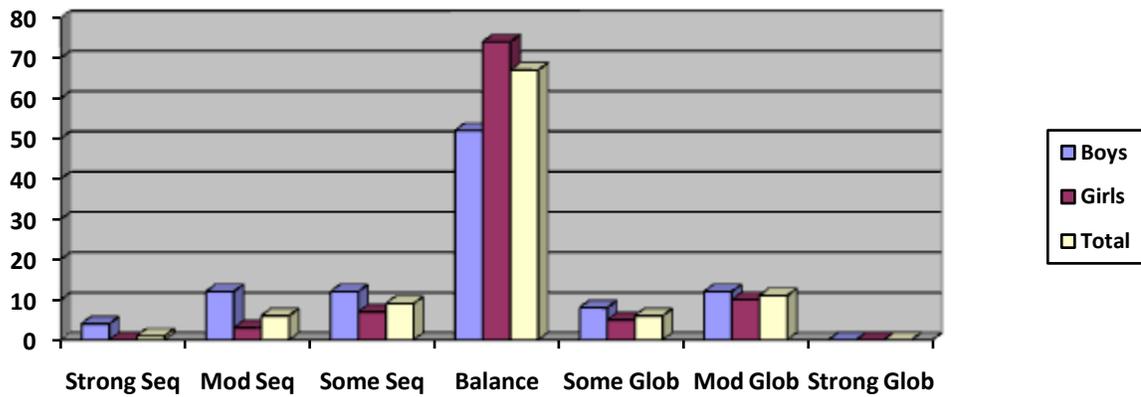
	Visual-Verbal						
	Strong Visual	Mod Visual	Some Visual	Balanced	Some Verbal	Mode Verbal	Strong Verbal
Boys	8%(2)	19%(5)	23%(6)	42%(11)	8%(2)	0	0
Girls	0	21%(12)	21%(12)	43%(24)	12%(7)	3%(2)	0
Total	2%(2)	21%(17)	22%(18)	42%(35)	11%(9)	3%(2)	0

Boys show more visual references than girls. In the overall result also, Asian students are more visual than verbal (45% are visual while 13% are verbal learners). This is one of the reasons that Japanese student are concerned and advanced in technology. They remember what they see. Their teachers need to be using pictures, drawing on the board to teach their students for better understanding of the subject matter. The figure below gives the details of the above table.



Sequential/Global Dimension

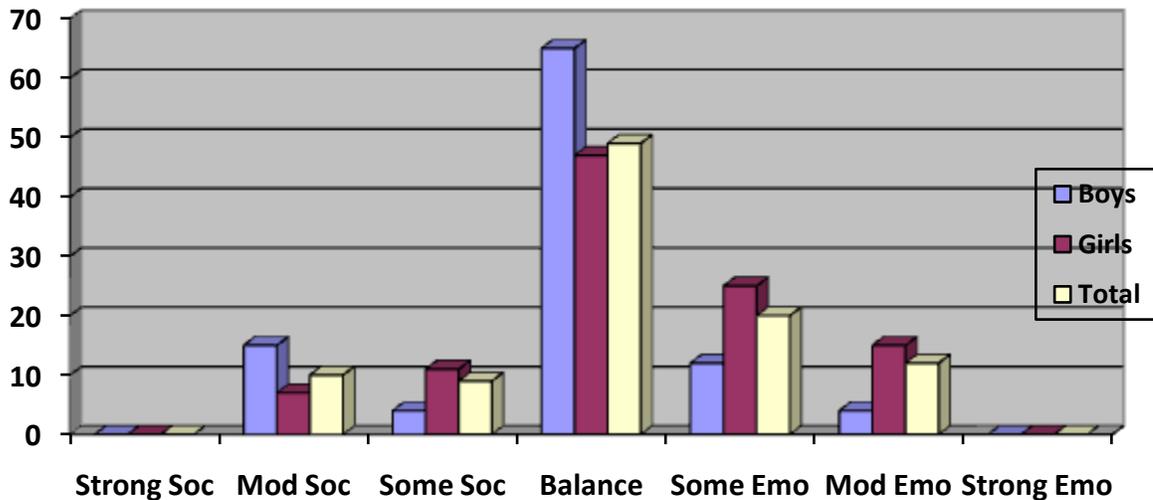
	Sequential-Global						
	Strong Seq	Mod Seq	Some Seq	Balanced	Some global	Mode global	Strong global
Boys	4%(1)	12%(3)	12%(3)	52%(14)	8%(2)	12%(3)	0
Girls	0	4%(2)	7%(4)	74%(42)	5%(3)	10%(6)	0
Total	1%(1)	6%(5)	9%(7)	67%(56)	6%(5)	11%(9)	0



Majority of the girls students are well balanced between sequential and global learning style, while boys are more sequential and global than girls. This shows that Japanese male students gain understanding in small sequential, logical steps, and even if they do not fully understand teaching materials, they may still be able to solve problems and pass their exams. They seem to learn in a large jump, absorbing material almost randomly without seeing connection, and the suddenly “getting it”. None of the girls is a strong sequential learner; therefore, they may not have severe difficulties in solving problems even if the entire things are not well understood.

Social/Emotional Dimension

	Social-Emotional						
	Strong Soc	Mod Soc	Some Soc	Balanced	Some Emo	Mode Emo	Strong Emo
Boys	0	15%(4)	4%(1)	65%(17)	12%(3)	4%(1)	0
Girls	0	7%(4)	11%(6)	42%(24)	25%(14)	15%(9)	0
Total	0	10%(8)	9%(7)	49%(41)	20%(17)	12%(10)	0



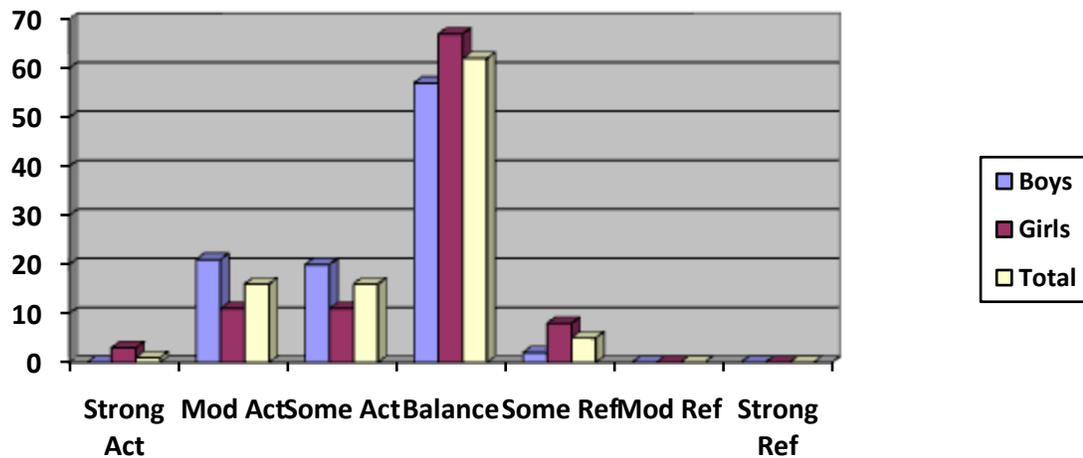
The result from both girls and boys is approaching moderate behavior. Boys show more social behavior than girls. However, girls also show more emotional behavior than boys. If we consider the effect of Japanese culture on the behavior of people, then the result should not be surprising.

4.2 LEARNING STYLE OF NIGERIAN STUDENTS

The same numbers of students (83) were tested in Nigeria, under which 36 are female and 47 are male students. The analysis of the result and the table containing information will be shown under each dimension for female, male and global (total) result.

Active/Reflective Dimension

	Active-Reflective						
	Strong Act	Mod Act	Some Act	Balanced	Some Ref	Mode Ref	Strong Ref
Boys	0	21%(10)	20%(9)	57%(27)	2%(1)	0	0
Girls	3%(1)	11%(4)	11%(4)	67%(24)	8%(3)	0	0
Total	1%(1)	16%(14)	16%(13)	62%(51)	5%(4)	0	0



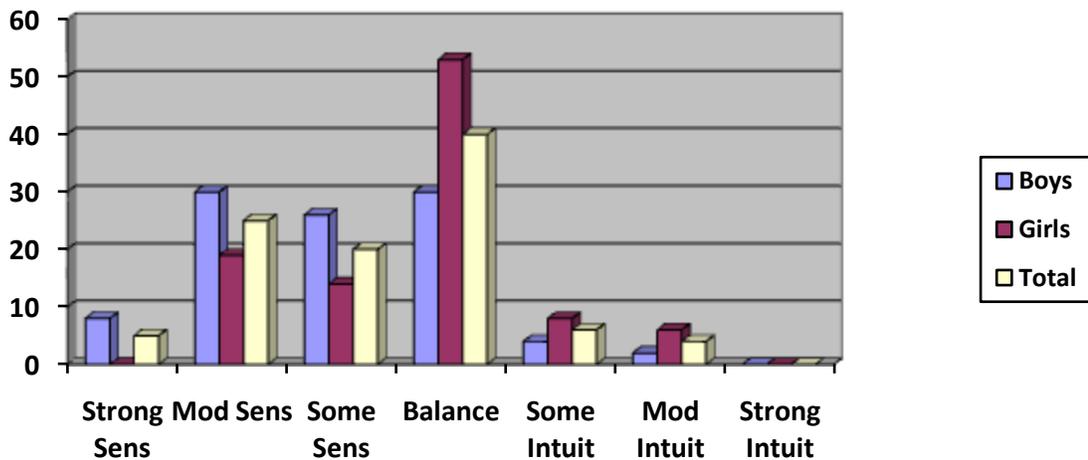
Boys are more active than girls, whereas, girls are reflective and well balanced between active and reflective learning preferences. This result shows that male students show initiative and are more suited to stimulate higher cognitive processes and critical thinking than girls. And it is easier to evaluate their understanding while teaching.

Female needs to gain a comprehensive outline of the subject under discussion. Therefore, to teach Nigerian ladies, it is strongly advisable to start from their previous knowledge and then eventually moving to the targeted topic. Most of the Nigerian ladies being reflective learners may be frustrating to one another when they are asked to work in group. They are very slow, which means unlike male students it takes them longer time to carry out a task.

In general, Nigerian students show higher references toward active learning.

Sensing/Intuitive Dimension

	Sensory-Intuitive						
	Strong Sensing	Mod Sensing	Some Sensing	Balanced	Some Intuitiv	Mode Intuitiv	Strong Intuitv
Boys	8%(4)	30%(14)	26%(12)	30%(14)	4%(2)	2%(1)	0
Girls	0	19%(4)	14%(5)	53%(19)	8%(3)	6%(2)	0
Total	5%(4)	25%(21)	20%(17)	40%(33)	6%(5)	4%(3)	0



Females are more intuitive and well balanced than males; while male remain to be more sensory than females.

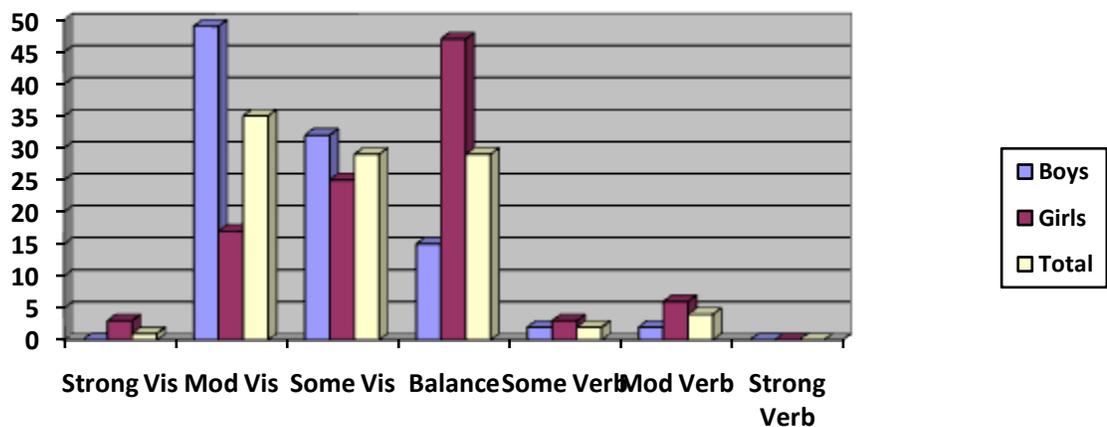
Some Nigerian female students like innovation and dislike repetition, they prefer discovering possibilities and relationships.

Another good observation from this dimension is that Nigerian male students are more sensory learners than female which implies that they tends to be patient with the details and are good at memorizing facts and doing hands work, e.g. labs, projects. They do not like courses that have no apparent connection to the real world.

Generally, Nigerian students are more sensory than intuitive.

Visual/Verbal Dimension

	Visual-Verbal						
	Strong Visual	Mod Visual	Some Visual	Balanced	Some Verbal	Mode Verbal	Strong Verbal
Boys	0	49%(23)	32%(15)	15%(7)	2%(1)	2%(1)	0
Girls	3%(1)	17%(6)	25%(9)	47%(17)	3%(1)	6%(2)	0
Total	1%(1)	35%(29)	29%(24)	29%(24)	2%(2)	4%(3)	0



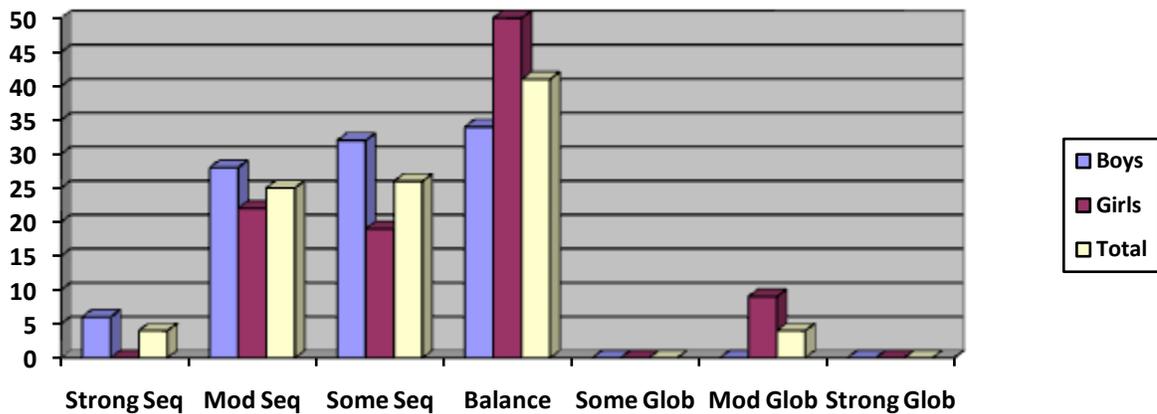
Collectively, Nigerian students show more visual learning preferences than verbal. As visual

learners, they enjoy images and are good at visualizing events imagining things. They remember information through visual strategy. Their interest in appearance of something than its actual description may be a disadvantage to them in some situation, though not in all.

All those characteristics of learning described in the above paragraph are more on male students because they are visual learners than female. However, female too may benefit more from listening to physical conversations and lectures, and be able to absorb a lot of information through mass media programs e.g. radio.

Sequential/Global Dimension

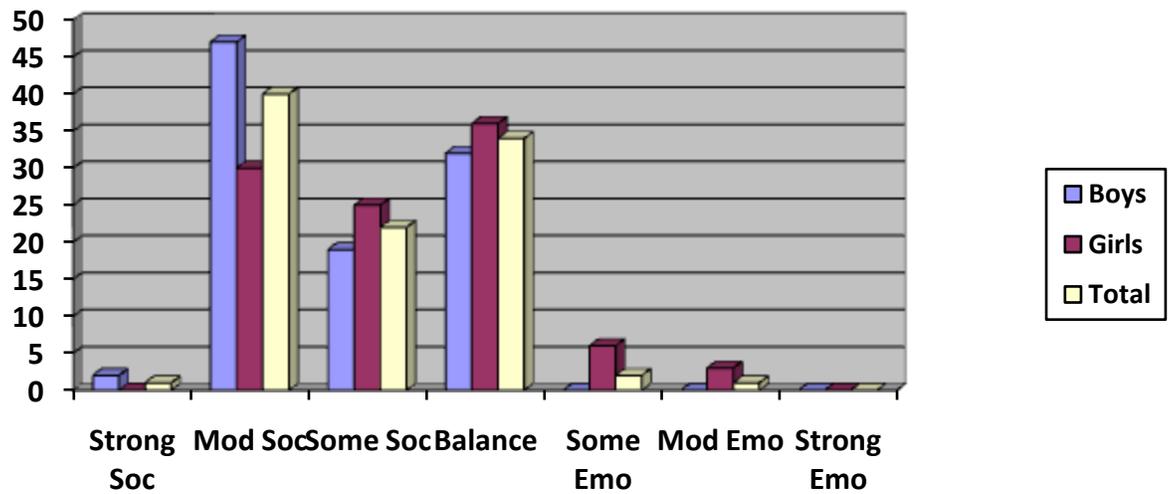
	Sequential-Global						
	Strong Seq	Mod Seq	Some Seq	Balanced	Some global	Mode global	Strong global
Boys	6%(3)	28%(13)	32%(15)	34%(16)	0	0	0
Girls	0	22%(8)	19%(7)	50%(18)	0	9%(3)	0
Total	4%(3)	25%(21)	26%(22)	41%(34)	0	4%(3)	0



Social/Emotional Dimension

	Social-Emotional						
	Strong Soc	Mod Soc	Some Soc	Balanced	Some Emo	Mode Emo	Strong Emo
Boys	2%(1)	47%(22)	19%(9)	32%(15)	0	0	0
Girls	0	30%(11)	25%(9)	36%(13)	6%(2)	3%(1)	0
Total	1%(1)	40%(33)	22%(18)	34%(28)	2%(2)	1%(1)	0

Socially, Nigerian boys are better than the girls. This means the Boys enjoy working with others or in a team, and they encourage female to be involved in a task, they motivational than girls. But girls show less dependency on assistance than boys.



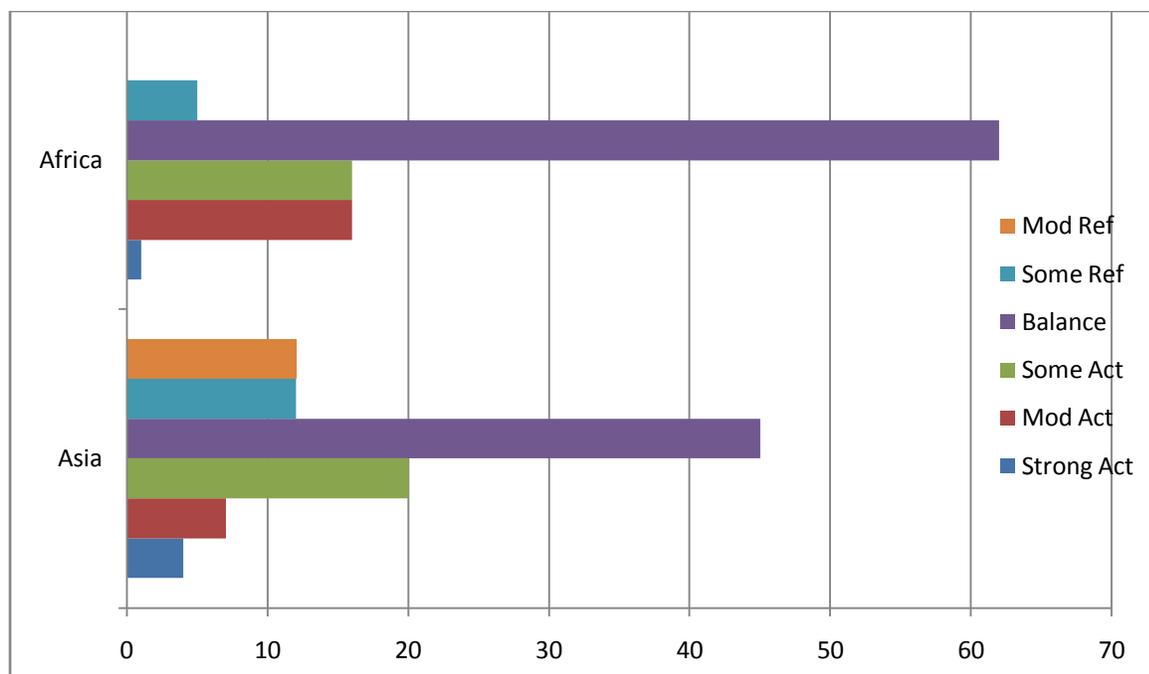
4.3 THE COMPARISM

To compare learning system of the students from two different continents (Asia and Africa) as stated in the head line of this research work, we use the row containing the total number of students tested in Nigeria and the other tested in Japan. The new rows in each dimension are now named Asia and Africa, as will be demonstrated below:

Active/Reflective dimension

	Strong Act	Mod Act	Some Act	Balance	Some Ref	Mod Ref	Strong Act
Asia	4%(3)	7%(6)	20%(17)	45%(37)	12%(10)	12%(10)	0
Africa	1%(1)	16%(14)	16%(14)	62%(51)	5%(4)	0	0

African students are well balanced between Active and Reflective learning preferences than Asian students. Even though there are some students from Asian side that shows some little active preferences than those in Africa, but generally speaking, African students shows more active learning style than Asian students. In terms of reflective learning preferences, Asian students took an advantage over their African counter parts. Only few students (not more than 5%) from Africa shows a little preference on reflective learning style. All this information can be verified using the above table and the figure below.

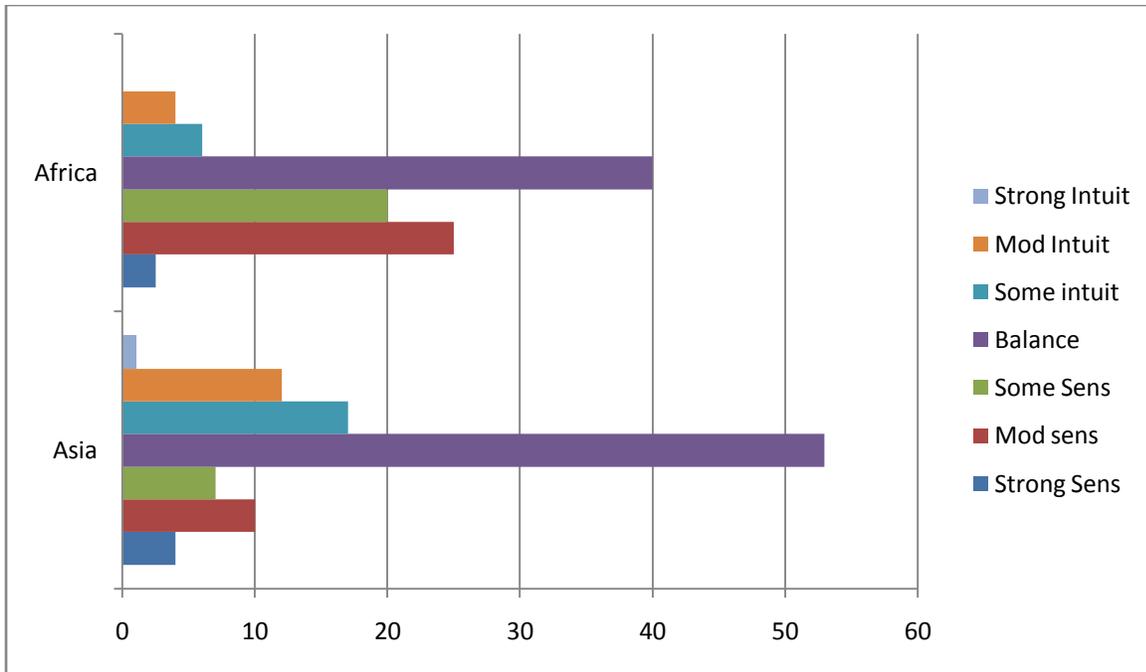


Sensing/Intuitive dimension

	Strong Sens	Mod Sens	Some Sens	Balance	Some Intuit	Mod Intuit	Strong intuit
Asia	0	10%(8)	7%(6)	53%(44)	17%(14)	12%(10)	1%(1)
Africa	5%(4)	25%(21)	20%(17)	40%(33)	6%(5)	4%(3)	0

In reference to the above table, intuitive learning and well balancing between sensory and intuitive learning are being observed from Asian students (more than half of them are well balanced). While majority of the Africans are somehow sensory and moderately sensory learners than Asians.

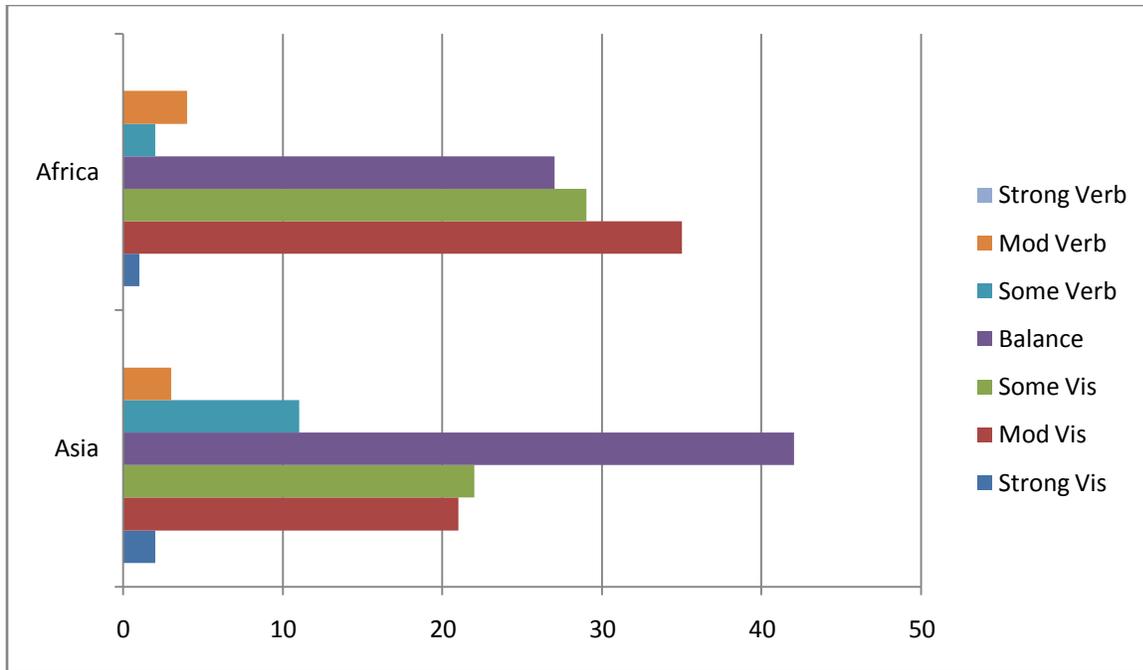
The chat below contains the same but more explanatory information of the table above.



Visual/Verbal dimension

	Strong Vis	Mod Vis	Some Vis	Balance	Some Verb	Mod Verb	Strong Verb
Asia	2%(2)	21%(17)	22%(18)	42%(35)	11%(9)	3%(2)	0
Africa	1%(1)	35%(29)	29%(24)	29%(24)	2%(2)	4%(3)	0

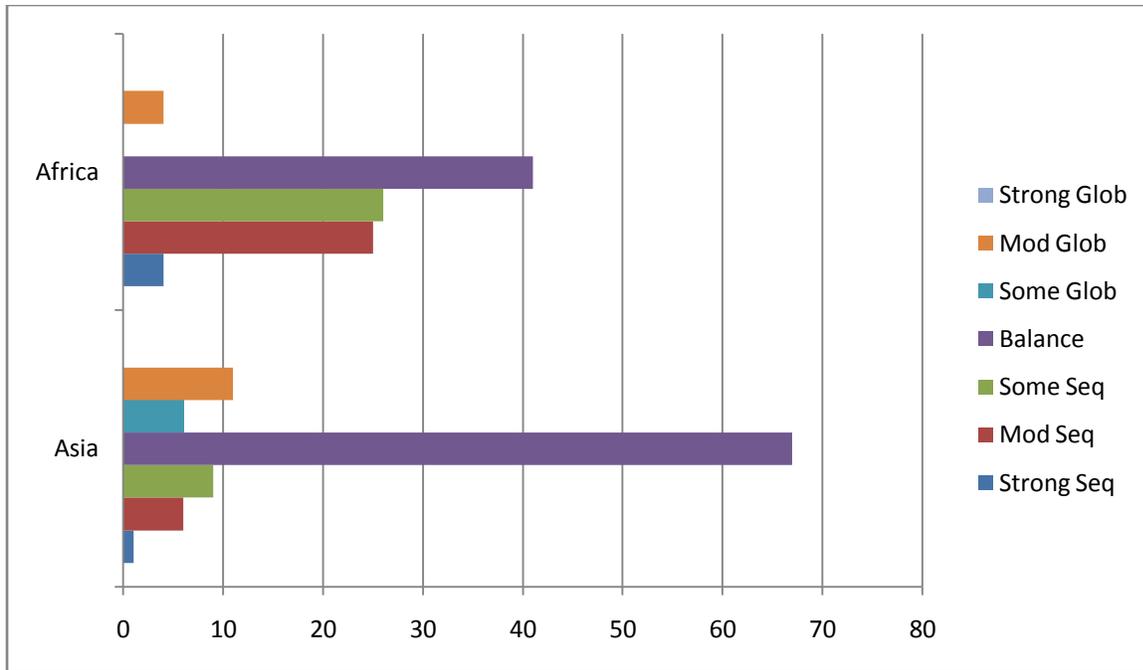
Majority of the students from each side concentrated on visual learning preferences. But Africans are more visual than Asians by far, whereas Asians show well balanced and little verbal learning preferences than Africans, although no student from any of the two side is strongly a verbal learner.



Sequential/Global dimension

	Strong Seq	Mod Seq	Some Seq	Balance	Some Glob	Mod Glob	Strong Glob
Asia	1%(1)	6%(5)	9%(7)	67%(56)	6%(5)	11%(9)	0
Africa	4%(3)	25%(21)	26%(22)	41%(34)	0	4%(3)	0

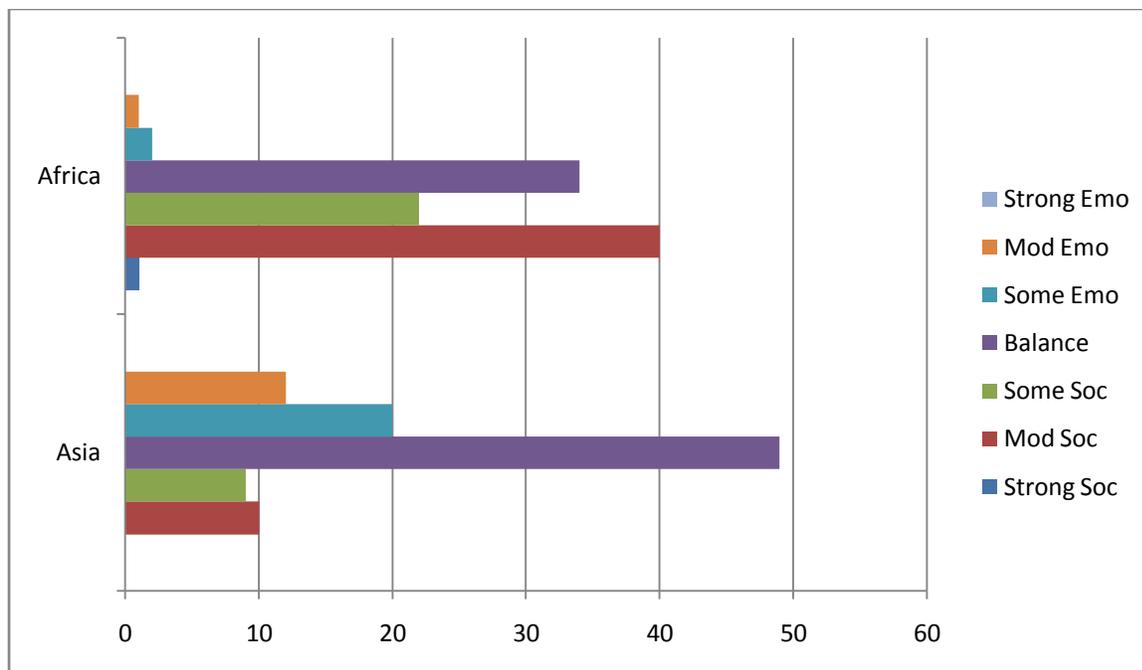
Considering the result on the above table or the figure below, unlike Asians who are more global than sequential learners, only 4% among the Africans are moderately global learners. Africans can be regarded as sequential learners, which mean they learn step-by-step, following a logical progression from beginning to end. They need to understand each part of a problem before moving to the next part. Asians can learn in large jumps, absorbing materials almost randomly without seeing connections and finally reaching the target point.



Social/Emotional dimension

	Strong Soc	Mod Soc	Some Soc	Balance	Some Emo	Mod Emo	Strong Emo
Asia	0	10%(8)	9%(7)	49%(41)	20%(17)	12%(10)	0
Africa	1%(1)	40%(33)	22%(18)	34%(28)	2%(2)	1%(1)	0

In Asia, there are higher percentages of both social and emotional learners, with most of them being well balanced between social/emotional dimensions. But in general, emotional learners are much more than the social learners in Asia. Going back to the Africans, moderately social learners are considered to be the majority. Almost all Africans are categorized as social learners



4.4 GLOBAL RESULT AND IMPLICATIONS

Here, the percentage of those who have “Strong”, “Moderately”, and “Somehow” learning preferences were combined into a single category to represent preferred learning style.

In reference to the statistics shown in the two charts below, African students understand new information by doing something with it, and they are keen to try out and experiment with the new information and often enjoy group work because this enables them to do something that entails handwork. On the other hand, unlike African students, Asians often prefer to think through a problem first before acting on it, and they prefer to think through a problem first on their own rather than discussing it in groups. As reflective learners, Asians like to have some reasonable amount of time to think through new information.

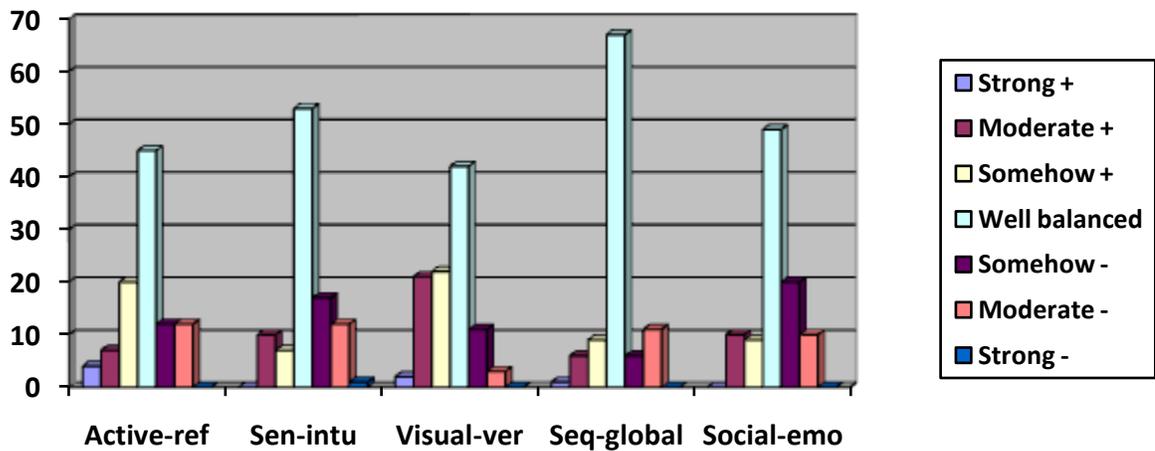
However, African students like learning facts and solving problems by well-established methods. As sensing learners, they are generally careful, practical and patient and like new knowledge to have something in common with the real world. But their Asian counterparts prefer discovering new relationships and can be innovative in their approach to solving problems. As intuitive learners, Asians tend to work faster and they do not like repetitions and works that involve lots of memorization and routine calculations.

African students understand new information in linear steps where each step follows logically from the previous one. While Asians can learn in a large jump by absorbing materials in

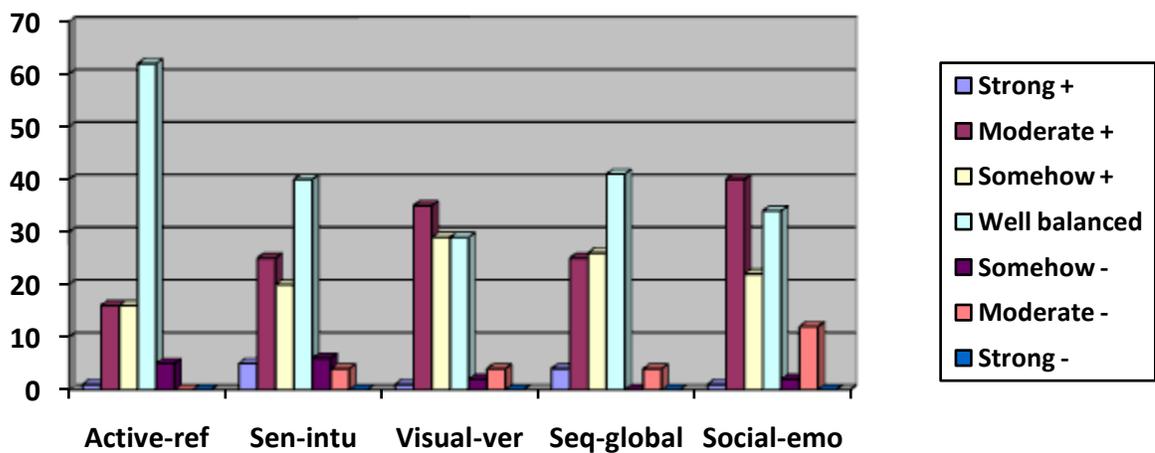
a random order without necessarily seeing any intersection between ideas, and they will eventually understand the whole concept.

Because of high social competence of African students, they tend to enjoy working with others or in a team, and they encourage others to be involved in a task, therefore they can be seen as motivational. They working in groups and will be have a prime concern for the well being of their colleagues and friends. On the other hand, Asian students are less dependent on assistance from others, which means they may not find it difficult to structure a task if they are on their own

Asia



Africa



CHAPTER FIVE

5.1 Summary

This research examine preferred learning style of selected students at different level of studies starting from Secondary schools to graduate school from Japan and Nigeria, and found important learning style characteristics including (1) active/reflective learner, (2) sensing/intuitive learner, (3) visual/verbal learner, (4) sequential/global, and (5) social/emotional learner. Significant variations were noted between students of Japanese and Nigerian schools.

This study clearly indicates that Japanese and Nigerian students are different in their learning styles. Finding suggest that students in Nigerian schools appears to be more concerned and engaged in active, sensing, visual, sequential, and social learning preferences than Japanese students. A large proportion of Nigerian students appeared to be well balanced between active and reflective learning styles. However, it was also observed that, from the teachers' perspective, the teachers in Japanese schools do not experience the same magnitude of potential learning problem as a functional of learning style as do their Nigerian counterparts. Therefore, it was evident that teachers and professors in Nigerian setting should plan for students with more active, sensing, visual, sequential, and social learning styles than reflective, intuitive, verbal, global and emotional learning styles respectively.

Furthermore, the research result provide a relatively complete profile of individual learning styles, suggesting important mode of learning and individual differences as well. Once a teacher is aware of the status of the learning style behavior of their students, teaching strategies can be best utilized through taking advantage of learners' learning preferences. It is also agreed that students who are taught in a manner in which they are most comfortable are expected to feel more confident and competent. Anybody having non-adoptive learning characteristics should be identified for special consideration as well. Knowing students' learning preferences will not identify a particular teaching method that is convenient to all students, but it does suggest a range of alternatives that needs to be respected so as to achieve the aims and objectives of teaching.

5.2 Conclusion

The characterization of students' learning style is a new tool for the teachers. This research demonstrated a vital approach, and it has shown a major characteristic of learning styles which appear to be completely different between Asian and African students.

5.3 SUGGESTION AND RECOMMENDATION

To enhance learning process based on the above observed data and result, it's worth mentioning some important things to bear in mind for the effective learning style to achieve the goal of testing, knowing, and using learning preferences among learners.

The first suggestion is to explain to the learners from the very beginning what are a learning style is, what kind of task it will develop, and the key role that knowing learning preferences will play for them to improve in their learning processes. Doing this is essential for them to regard learning preferences as an important tool for achieving specific goals.

Secondly, is to define what task students will do and to let them know how they are expected to work each of the tasks gradually? More so, teachers/professors need to provide the guidelines learners will follow based on their learning preferences in a conducive learning environment. It is very vital to do this, so learners can have a clear knowledge of what elements are involved in developing the task.

However, it is also essential to give some time to the learners for them to think on there is a significant changes towards their learning performance, if possible immediately after a task has been completed, so their comments will better describe their actual performance along with their strengths and weaknesses.

Furthermore, the teacher ought to provide feedback based on his own observation of their performance in their process. This will make learners feel that he is well aware of how they are doing in the lecture. This will them understand that their reflections are taken in to consideration all along their learning process.

Finally, I recommend that both high schools, undergraduate and graduate schools in African and Asian continent should use the result obtained in this work as guideline for teaching their students. I also recommend my school (African University of Science and Technology, Abuja) to host the entire system in their website for future use.

5.4 CHALLENGES

Many challenges came across this research work, such as limited time interval, instability of electricity, and lack of proper understanding with the some principals of most of the secondary schools in Nigeria which at one time resulted to denial of access to communicate with their students.

5.5 FUTURE WORK

As our system does not have any provision for suggesting the best learning and teaching materials, this shortcoming need to be addressed at the long run.

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APPENDIX

The Snapshots of the data collected from 83 Nigerian Students can be shown below:

Contents of DB

NO	NUMBER	NAME	GENDER	ACT_REF	SNS_INT	VIS_VRB	SEQ_GLB	SOC/EMO	FEEDBACK
2	001	KHS1	male	Some Active	Moderate Sensing	Well Balanced	Moderate Sequential	Well Balanced	right
3	002	KHS2	male	Some Active	Moderate Sensing	Moderate Visual	Some Sequential	Some Social	moderately right
4	003	AUST1	male	Well Balanced	Moderate Sensing	Some Visual	Well Balanced	Well Balanced	right
5	004	BUK1	male	Moderate Active	Well Balanced	Some Visual	Some Sequential	Moderate Social	right
6	005	BUK2	male	Well Balanced	Well Balanced	Some Visual	Well Balanced	Moderate Social	moderately right
7	006	AUST2	male	Well Balanced	Well Balanced	Moderate Visual	Some Sequential	Moderate Social	right
8	007	BUK3	female	Well Balanced	Moderate Sensing	Well Balanced	Some Sequential	Some Social	right
9	008	BUK4	female	Well Balanced	Well Balanced	Moderate Visual	Some Sequential	Well Balanced	moderately right
10	009	BUK5	female	Well Balanced	Well Balanced	Well Balanced	Some Sequential	Some Social	moderately wrong
11	010	BUK6	female	Well Balanced	Well Balanced	Well Balanced	Moderate Sequential	Moderate Social	moderately wrong
12	011	AUST4	male	Moderate Active	Moderate Sensing	Moderate Visual	Well Balanced	Strong Social	moderately right
13	012	BUK7	female	Moderate Active	Some Sensing	Moderate Visual	Moderate Sequential	Moderate Social	moderately right
14	013	BUK8	male	Some Active	Some Intuitive	Well Balanced	Well Balanced	Moderate Social	moderately right
15	014	BUK8	female	Well Balanced	Moderate Sensing	Some Verbal	Moderate Global	Moderate Social	right
16	015	BUK10	female	Well Balanced	Well Balanced	Moderate Visual	Well Balanced	Some Social	right
17	016	BUK11	male	Some Active	Well Balanced	Some Visual	Well Balanced	Moderate Social	moderately wrong
18	017	BUK12	female	Some Active	Well Balanced	Well Balanced	Well Balanced	Moderate Social	moderately right
19	018	BUK13	female	Well Balanced	Well Balanced	Well Balanced	Well Balanced	Moderate Social	right
20	019	AUST3	male	Well Balanced	Moderate Sensing	Moderate Visual	Moderate Sequential	Moderate Social	right
21	020	AUST5	male	Well Balanced	Well Balanced	Well Balanced	Well Balanced	Moderate Social	wrong
22	021	AUST6	male	Well Balanced	Some Sensing	Moderate Visual	Well Balanced	Well Balanced	right

23	022	AUST7	male	Moderate Active	Some Sensing	Moderate Visual	Some Sequential	Moderate Social	moderately right
24	023	KHS3	male	Some Active	Well Balanced	Moderate Visual	Well Balanced	Some Social	right
25	024	KHS4	male	Well Balanced	Moderate Sensing	Well Balanced	Moderate Sequential	Well Balanced	moderately right
26	025	KHS5	male	Well Balanced	Some Sensing	Moderate Visual	Moderate Sequential	Well Balanced	right
27	026	AUST8	male	Some Reflective	Some Sensing	Moderate Visual	Moderate Sequential	Well Balanced	moderately wrong
28	027	KHS6	male	Some Active	Some Sensing	Some Visual	Strong Sequential	Some Social	moderately wrong
29	028	AUST9	male	Some Active	Some Sensing	Moderate Visual	Moderate Sequential	Some Social	right
30	029	NSUKA	female	Well Balanced	Moderate Intuitive	Well Balanced	Moderate Global	Well Balanced	moderately right
31	030	AUST10	male	Well Balanced	Some Sensing	Moderate Visual	Some Sequential	Moderate Social	right
32	031	KHS7	male	Moderate Active	Strong Sensing	Moderate Visual	Strong Sequential	Moderate Social	moderately right
33	032	KHS8	male	Moderate Active	Strong Sensing	Some Visual	Moderate Sequential	Well Balanced	moderately wrong
34	033	AUST11	male	Well Balanced	Well Balanced	Well Balanced	Well Balanced	Moderate Social	moderately wrong
35	034	AUST12	male	Well Balanced	Well Balanced	Moderate Visual	Some Sequential	Moderate Social	right
36	035	AUST13	male	Well Balanced	Some Sensing	Some Visual	Some Sequential	Well Balanced	moderately right
37	036	KHS9	male	Well Balanced	Well Balanced	Moderate Visual	Some Sequential	Well Balanced	right
38	037	AUST14	male	Some Active	Moderate Sensing	Moderate Visual	Moderate Sequential	Moderate Social	moderately right
39	038	BUK14	male	Well Balanced	Well Balanced	Some Visual	Some Sequential	Some Social	right
40	039	KHS10	male	Well Balanced	Moderate Sensing	Moderate Visual	Moderate Sequential	Well Balanced	right
41	040	KHS11	male	Well Balanced	Moderate Sensing	Some Visual	Some Sequential	Moderate Social	right
42	041	KHS12	male	Moderate Active	Moderate Sensing	Some Visual	Strong Sequential	Some Social	right
43	042	AUST15	male	Well Balanced	Moderate Intuitive	Moderate Verbal	Well Balanced	Moderate Social	moderately right
44	043	BUK15	female	Well Balanced	Some Sensing	Well Balanced	Well Balanced	Moderate Social	moderately right
45	044	KHS13	male	Moderate Active	Strong Sensing	Moderate Visual	Some Sequential	Moderate Social	right

46	045	KHS14	male	Well Balanced	Moderate Sensing	Moderate Visual	Some Sequential	Moderate Social	moderately right
47	046	KHS15	male	Moderate Active	Strong Sensing	Some Visual	Moderate Sequential	Moderate Social	right
48	047	KHS16	male	Some Active	Some Sensing	Moderate Visual	Moderate Sequential	Well Balanced	right
49	048	AUST16	female	Moderate Active	Some Sensing	Moderate Visual	Well Balanced	Moderate Social	moderately right
50	049	KHS17	male	Moderate Active	Some Sensing	Some Visual	Moderate Sequential	Well Balanced	moderately wrong
51	050	KHS18	male	Well Balanced	Moderate Sensing	Moderate Visual	Some Sequential	Moderate Social	moderately right
52	051	BUK16	male	Well Balanced	Well Balanced	Some Verbal	Well Balanced	Some Social	right
53	052	KHS19	male	Moderate Active	Moderate Sensing	Moderate Visual	Some Sequential	Well Balanced	moderately right
54	053	BUK17	male	Well Balanced	Some Intuitive	Moderate Visual	Well Balanced	Moderate Social	moderately right
55	054	KHS20	male	Well Balanced	Some Sensing	Well Balanced	Some Sequential	Well Balanced	right
56	055	AUST17	male	Well Balanced	Moderate Sensing	Moderate Visual	Well Balanced	Some Social	right
57	056	AUST18	male	Well Balanced	Well Balanced	Some Visual	Well Balanced	Well Balanced	moderately right
58	057	AUST19	male	Well Balanced	Well Balanced	Some Visual	Moderate Sequential	Some Social	right
59	058	AUST19	female	Moderate Active	Moderate Sensing	Some Visual	Moderate Sequential	Moderate Social	moderately right
60	059	Sample1	female	Some Reflective	Moderate Sensing	Well Balanced	Well Balanced	Well Balanced	moderately right
61	060	Sample2	female	Well Balanced	Well Balanced	Some Visual	Well Balanced	Some Emotional	right
62	061	Sample3	female	Strong Active	Moderate Sensing	Strong Visual	Some Sequential	Moderate Social	right
63	062	Sample4	female	Well Balanced	Well Balanced	Well Balanced	Well Balanced	Well Balanced	moderately wrong
64	063	Sample5	female	Well Balanced	Well Balanced	Some Visual	Well Balanced	Well Balanced	wrong
65	064	Sample6	female	Some Reflective	Well Balanced	Moderate Verbal	Well Balanced	Well Balanced	moderately wrong

66	065	Aust20	female	Well Balanced	Moderate Sensing	Some Visual	Moderate Sequential	Well Balanced	moderately right
67	066	Sample7	female	Well Balanced	Moderate Sensing	Well Balanced	Well Balanced	Some Social	moderately right
68	067	Sample8	female	Well Balanced	Moderate Intuitive	Well Balanced	Well Balanced	Well Balanced	right
69	069	Sample10	female	Well Balanced	Well Balanced	Some Visual	Well Balanced	Moderate Emotional	moderately right
70	070	Sample11	female	Well Balanced	Some Intuitive	Well Balanced	Well Balanced	Some Emotional	wrong
71	071	Sample12	female	Some Active	Some Intuitive	Some Visual	Well Balanced	Some Social	moderately wrong
72	072	Sample13	female	Well Balanced	Well Balanced	Well Balanced	Some Sequential	Some Social	right
73	073	Sample14	male	Well Balanced	Well Balanced	Well Balanced	Well Balanced	Moderate Social	moderately right
74	074	Sample15	female	Well Balanced	Well Balanced	Moderate Visual	Moderate Sequential	Some Social	right
75	075	Sample16	female	Well Balanced	Well Balanced	Some Visual	Moderate Sequential	Some Social	moderately right
76	076	Sample17	female	Some Active	Some Intuitive	Well Balanced	Well Balanced	Well Balanced	moderately right
77	077	Sample18	female	Some Active	Well Balanced	Well Balanced	Some Sequential	Moderate Social	right
78	078	Sample19	female	Well Balanced	Well Balanced	Some Visual	Moderate Sequential	Some Social	moderately wrong
79	079	Sample20	female	Well Balanced	Well Balanced	Some Visual	Well Balanced	Well Balanced	right
80	080	Sample21	female	Moderate Active	Well Balanced	Moderate Visual	Moderate Sequential	Well Balanced	moderately wrong
81	081	Sample22	female	Well Balanced	Some Sensing	Well Balanced	Well Balanced	Moderate Social	right
82	082	Sample23	female	Well Balanced	Some Sensing	Well Balanced	Moderate Global	Well Balanced	moderately right
83	083	Sample24	female	Some Reflective	Well Balanced	Moderate Verbal	Some Sequential	Well Balanced	right
84	084	AUST22	male	Well Balanced	Some Sensing	Some Visual	Well Balanced	Moderate Social	right

The fifty-five (55) sample questions of the questionnaire can also be displayed as follows:

Number	Question	Answer
1	I understand something better after i a) try it out. b) think through it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
2	I would rather be considered a) realistic. b) innovative.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
3	When I think about what I did yesterday, I am most likely to get a) a picture. b) words.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
4	I tend to a) understand details of a subject but may be fuzzy about its overall structure. b) understand the overall structure but may be fuzzy about detail.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
5	When I study in a group/team, a) I like to lead other members. b) I like to follow other members.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
6	When I am learning something new, it helps me to a) talk about it b) think about it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
7	If I were a teacher, I would rather teach a course a) that deals with facts and real life situations b) that deals with ideas and theories.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
8	I prefer to get new information in a) pictures, diagrams, graphs, or maps b) written or verbal information.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
9	Once I understand a) all the parts, I understand the whole thing b) the whole thing; I see how the parts fit.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
10	When I feel my colleague is wrong, a) I can point it out b) I can't point it out.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

11	In a study group working on difficult material, I am more likely to a) be involved and contribute ideas. b) sit aside and listen.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
12	I find it easier a) to learn facts. b) to learn concepts.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
13	In a book with lots of pictures and charts, I prefer to a) look over the pictures and charts carefully. b) focus on the written text.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
14	When I solve math problems a) I usually work my way to the solutions one step at a time. b) I often just see the solutions but then have to struggle to figure out the steps to get to them.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
15	When I set my goal, a) I decide it based on others' opinions and my experience. b) I change my goal depending on my feelings at that time.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
16	In the classes I have taken a) I usually gotten to know many of the students. b) I rarely gotten to know many of the students.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
17	In reading nonfiction, i prefer a) coming across something that teaches me new facts or tells me how to do something. b) something that gives me new ideas to think about.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
18	I like teachers a) who draw a lot of diagrams on the board. b) who spend a lot of time explaining.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
19	When I'm analyzing a story or a novel a) I think of the incidents and try to put them together to figure out the themes. b) I try to know what the themes are when I finish reading and then I have to go back and find the incidents that demonstrate them.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
20	When I make a presentation or express my opinions at a conference/meeting in front of many audience, a) I keep calm and clearly express any opinion/presentation verbally. b) I feel nervous and my emotions are clear on my face and try to use gestures and other body languages.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

21	When I start a homework problem, I am more likely to a) start working on the solution immediately. b) try to fully understand the problem first.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
22	I prefer the idea of a) certainty. b) theory.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
23	I remember best a) what I see. b) what I hear.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
24	It is more important to me that an instructor should a) lay out the material in clear sequential steps. b) give me an overall picture and relate the material to other subjects.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
25	When I face a serious situation stemming from my mistake, a) I try to find what to do and take an immediate action. b) I keep thinking about my unluckiness for a long time.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
26	I prefer to study a) in a study group. b) alone.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
27	I am more likely to be considered a) careful about the details of my work. b) creative about how to do my work.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
28	When I get directions to a new place, I prefer a) a map. b) written instructions.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
29	I learn a) at a fairly regular pace. If I study hard, I'll get it. b) in fits and starts. I'll be totally confused and then suddenly it all clicks.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
30	After I have decided my schedule, a) I feel obliged to carry out everything according to the schedule. b) I often change it depending on my mood and do something different.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
31	I would rather first a) try things out. b) think about how I'm going to do it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

32	When I am reading for enjoyment, I like writers to a) clearly say what they mean. b) say things in creative, interesting ways.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
33	When I see a diagram or sketch in class, I am most likely to remember a) the picture. b) what the instructor said about it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
34	When considering a body of information, I prefer to a) focus on details and miss the big picture. b) try to understand the big picture before getting into the details.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
35	When someone tells me an opinion, a) I consider whether the opinion is right and makes sense. b) I am influenced by the opinion.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
36	I more easily remember a) something I have done. b) something I have thought a lot about.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
37	When I have to perform a task, I prefer to a) master one way of doing it. b) come up with new ways of doing it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
38	When someone is showing me data, I prefer a) charts or graphs. b) text summarizing the results.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
39	When writing a paper, I am more likely to a) work on (think about or write) the beginning of the paper and progress forward. b) work on (think about or write) different parts of the paper and then order them.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
40	When I start something new, a) I can do it systematically. b) I get excited at the idea in the beginning, but I soon get bored with it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
41	When I have to work on a group project, I first want to a) have “group brainstorming” where everyone contributes ideas. b) brainstorm individually and then come together as a group to compare ideas.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

42	I consider it higher praise to call someone a) sensible. b) imaginative.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
43	When I meet people at a party, I am more likely to remember a) what they looked like. b) what they said about themselves.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
44	When I am learning a new subject, I prefer to a) stay focused on that subject, learning as much about it as I can. b) try to make connections between that subject and related subjects.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
45	When something didn't go well, a) I also continue making my effort to complete it. b) I immediately feel like giving off.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
46	I am more likely to be considered a) outgoing. b) reserved.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
47	I prefer courses that emphasize a) concrete material (facts, data). b) abstract material (concepts, theories).	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
48	For entertainment, I would rather a) watch television. b) read a book.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
49	Some teachers start their lectures with an outline of what they will cover. Such outlines are a) somewhat helpful to me. b) very helpful to me.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
50	When I'm given an interesting assignment, a) before working it on, I carefully think of its feasibility. b) I immediately work and devote myself to it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
51	The idea of doing homework in groups, with one grade for the entire group, a) appeals to me. b) does not appeal to me.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
52	When I am doing long calculations, a) I tend to repeat all my steps and check my work carefully. b) I find checking my work tiresome and have to force myself to do it.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

53	I tend to picture places I have been a) easily and fairly accurately. b) with difficulty and without much detail.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
54	When solving problems in a group, I would be more likely to a) think of the steps in the solution process. b) think of possible consequences or applications of the solution in a wide range of areas.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
55	When I study more than one subject, a) I study them systematically taking into account my schedule. b) I study interesting subjects when I am in the mood for studying.	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5

To access the website hosting the system, use the URL below to take you to the page shown in **figure7** at **section 3.2** above.

<http://hama-lab.u-aizu.ac.jp/LearningStyle/WebContent/view/English/> then click on the **program** tab at the left hand side of the page to take you to the next page where you can choose whether to login as a student or a teacher. The demo below shows this information pictorially.

If you are student, please click on the button below:



If you are teacher, please click on the button below:



Clicking as a student will take you to the page where you will be asked to enter the name of your teacher. While for the teacher button, teacher ID and password are required to be entered before proceeding to the next page. The following figures are the results of clicking “For Student” or “For Teacher” button respectively.

Please input the name of your teacher.
If you don't belong to any teacher, you don't need to input to this form.

ID
Pass

If you want to create teacher account, please contact manager. Mail address is ...

However, by successfully supplying your teacher name (ID) and submit, the system will take you to the questionnaire's page (student module) which is shown in **figure 9** under **section 3.3.1**. As we can see in the second figure (i.e. for Teacher), the teacher can reset either his ID or password. But clicking on Login, the system will go directly to the Teacher module which has been explained in **section 3.3.2**.