A CASE STUDY FOR DESIGNING AN ADAPTIVE LEARNING ENVIRONMENT BY APPLYING VARK MODEL

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IN

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ATILIM UNIVERSITY

BY

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A CASE STUDY FOR DESIGNING AN ADAPTIVE LEARNING ENVIRONMENT BY APPLYING VARK MODEL

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Approval of the Graduate School of Natural and Applied Sciences, Atilim University.

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ABSTRACT

A CASE STUDY FOR DESIGNING AN ADAPTIVE LEARNING ENVIRONMENT BY APPLYING VARK MODEL

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The styles of learning are personal traits that affect how students relate with their learning environment, peers, and instructor. Four of the most popular are reading / writing, visual, auditory and kinetic, which used by students to gain information. Number of students is visual learners, while others are kinesthetic or audio or read /write learners. While some other students use a combination all of them to gain information, they seem to have preferences in how to learn better. Teachers must teach as more of these preferences as possible, in order to assist students learn. Teachers can put together these learning styles into core curriculum activities so that students can succeed in their classes. This study shows some parts of development framework to identify students learning styles and combination it automatically. This system is based on VARK learning style model and VARK questionnaire to measure students' learning styles, it is hosting by internet to help students to use it. This study has used a sample of participants that consisted of 50 of engineering students from Atilim University. In addition, this study contain, an experimental design with a pre-post test Control group was utilized. Accordingly

analysis of the data, the results show that distribution for t-test for two groups (Control group and Experimental group) was normality distribution and it was determined that the difference in mean scores between the Experimental group and the Control group was significantly in help of the Experimental group and the achievement level in the Experimental group, which applied the VARK teaching model, was higher compared to the Control group. In addition, student satisfaction questionnaire instrument, 10-items that measure students' satisfaction by using the system, as the results found that students' satisfaction with the system was significant very high.

Keywords: Adaptive Learning, Learning styles, VARK learning style model.

ÖZ

VARK MODEL UYGULAYARAK BİR UYARLANABİLİR ÖĞRENME ORTAMI TASARIMINA YÖNELİK BİR DURUM ÇALIŞMASI

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Öğrenme stilleri öğrencilerin kendi öğrenme ortamları, akranları ve eğitmenleriyle etkileşimde bulunurken tercih ettikleri yöntemlerdir. En popüler olanlardan dördü öğrenciler tarafından bilgi elde etmek için kullanılan okuma / yazma, görsel, işitsel ve kinestetiktir. Bir takım öğrenciler öğrenirken görsel yöntemleri tercih ederken, diğerleri kinestetik veya işitsel ya da okuma / yazma yöntemini tercih eder. Bazı öğrenciler bilgi elde etmek için bunların hepsinin bir kombinasyonunu kullansa da, daha iyi öğrenmek için kendi öğrenme stilini kullanması öğrenmelerinde daha faydalı olabilir. Öğretmenlerin öğrencilerin bilgi öğrenmesine yardımcı olmak için bu tercihlerden mümkün olduğunca daha fazlasını öğretmeleri gerekmektedir. Öğrencilerin sınıflarında başarılı olabilmeleri amacıyla öğretmenler bu öğrenme stillerini mevcut müfredata dahil edebilirler. Bu çalışma öğrencilerin öğrenme tarzlarını ve bunların kombinasyonunukullanarak bir uyarlanabilir öğrenme ortamı geliştirme çalışmasıdır. Bu çerçevede öğrencilerin uygulamalarında yardımcı olmak için internette sunulan ve öğrencilerin öğrenme tarzlarını ölçme amaçlı VARK anketi ve VARK öğrenme tarzı modeli kullanılmıştır. Çalışmada Atılım Üniversitesinden

50 mühendislik öğrencisinden oluşan bir katılımcılar grubunu kullanmıştır. Çalışmanın deseni öntestsontest kontrol gruplu yarı deneysel desendir. Verilerin analiz edilmesinin bir sonucu olarak, Deneysel grup ile Kontrol grubu arasındaki ortalama puan farkının önemli ölçüde Deneysel grup lehine olduğu ve VARK öğretme modelini uygulayan deneysel gruptaki başarı seviyesinin Kontrol grubuna kıyasla daha yüksek olduğu belirlenmiştir. Bununla beraber, sistemin kullanılmasıyla öğrencilerin memnuniyetini ölçen 10 maddelik Öğrenci memnuniyet anketine göre, sistemle birlikte öğrencilerin memnuniyet seviyesi önemli ölçüde daha yüksektir.

Anahtar kelimeler: Uyarlanabilir Öğrenme. Öğrenme stilleri, VARK öğrenme stili modeli

To My Parents

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Firstly, I would like to express my sincere gratitude to my thesis supervisor Asst. Prof. Dr. MELTEM ERYILMAZ for continuous support of my study and research.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

LMS - Learning Management System

VLE - Virtual Learning Environments

CMS - Course Management System

MLE - Managed Learning Environment

ILS - Integrated Learning System

LSS - Learning Support System

LP - e-learning platform

CBL - Computer Based Learning

IBT - Internet Based Training

WBT - Web Based Training

CBT - Computer Based Training

MBTI - Myers-Briggs Type Indicator test

VARK - Visual, Aural, Read/Write, kinesthetic

ELT - Experiential Learning Theory

LSI - Learning Style Inventory

ILS - Index of Learning Styles

SPSS - Statistical Package for the Social Sciences

URL - Uniform Resource Locator

ANS - Adaptive Navigation Support

UML - Unified modeling language

HTML - Hyper Text Mark-up Language

SQL - Structured Query Language

HTTP - Hyper Text Transfer Protocol

PHP - Personal Home Pages

SQL - Structured Query Language

CHAPTER1

INTRODUCTION

Today, access to the web and the general use of computers offers several opportunities for e-learning systems, such as fully online and blended learning systems. The environments of E-learning, similar to whole other tools, provide rewards like access to resources which are online and different, self paced and directed learning. In spite of all the advantages, this learning form environment lacks to the necessary gravity and dynamic and interactive face-to-face features of good learning services. In another words, it is necessary to pay concern to the features of student and use that features in the development after designing environments of e-learning, achieving the aim of making the learn action further factual and attractive [1].

As a result, matching environments of e-learning with students' wants and personality features assist them to get learning further competently, than a system not permitting any variation to the students' characteristic features. The most vital of the further most essential characteristics in the process of learning is learning style that can be different between every two students. When students disable to learn materials of the course's, in order that a mismatch with their modes of learning, they miss their wishes for more learning [1].

Technology is increasing not only in trend of rate, but also in the necessity of extend. The technologies like Learning Management Systems (LMS) is no longer just accessories for learning and teaching , but have become necessary tools for the processes of teaching [24].

Through the adoption of technology in the a variety of learning sector, the state and thus the following creation for the place of work that grows agitated extra day after day preparation. Learning Management Systems (LMS) extends the classroom and online activities, there by connecting students with everyone to other and also with their teachers. Enable the sharing of online library resources and materials, for example e-books, thesis, and even research papers. The mingling of learning activities with administrative systems. By faculty members of the LMS technology can now grow up their teaching with powerful online tools, so the students can use these tools to growing the communication with teachers who teaching them, associate students, and information [24].

1.1 Electronic Learning (E-Learning)

The learning based on electronic, which is a learning method, formed by the interaction amongst content which delivered digitally, services offered on network and support of tutoring [7].

The platform of E-learning is a programs collection that stepped at the server machine and accessed over the International network (Internet) that permits teachers to manage and submit online courses after creating it. Or to provide face-to-face integrated teaching materials for education. This concept could be identified by using a vast domain of terms, such as the environment of Virtual learning (VLE), System of Learning Management (LMS), System of Course Management (CMS), Environment of Managed Learning (MLE), System of Integrated Learning (ILS), System of Learning Support (LSS) or platform of e-learning (LP) [18].

E-Learning is one of the new buzz words that circulate, however it has its extraction in the preceding CBL system or Computer Based Learning System and in addition on Training Based on Web (WBT) or Training Based on Internet (IBT).E-Learning is done by the using of technology of new digital revolution to design, administer, deliver, select, support and extend learning. In E-Learning the computer's role has moved away from just click on and does exercises of the original CBT systems to being greater interactive and collaborative systems allowing information to be take part among learners [16].

E-learning is any education, which is to provide a computer that has several characteristics the following is some

- Included content material that is applicable to the learning feature
- Uses educational strategies such as examples or practice exercise to help to learning
- Uses a range of media elements to supply the content material and methods
- Builds modern knowledge and capabilities which are associated to extend organizational Skills [16].

The term, e-learning can be defined in three ways according to cognitive design solutions. As shown in **Figure 1.1** below.

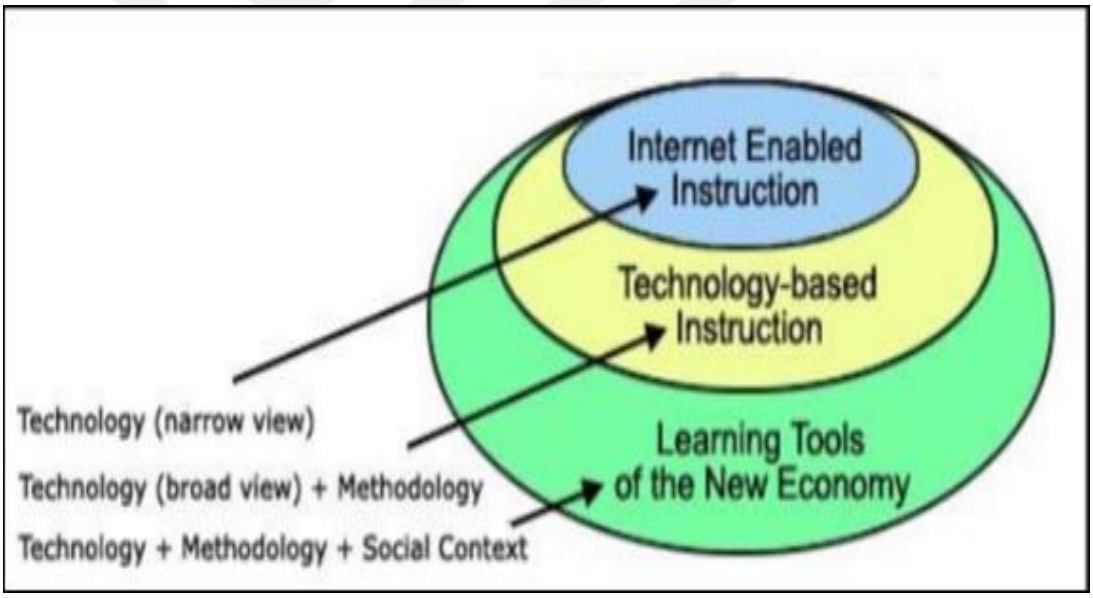

Figure 1.1 Definitions of E-learning [7]

It uses Internet-based education and network technology for example the Internet or Intranet during a learning procedure. The technology can be take consideration along with method counting application for instance education design, blended education, personalization or collaboration [7].

The infrastructure functions for e-learning are:

- Learning: It includes concepts such as the production of information in the brain, remembers the lessons learned and the such information that will be used
- Supporting of information and coaching
- Management of information
- Contact and collaboration [7].

E-learning have important requirements are:

- Creating multiple distribution methods ,use student-centered approach, and learning styles
- For 24/7 can use educational materials
- Support more contact among teachers and with their students
- Can develop computer skills and new technologies related to the Internet and learning methods with education and training [7].

There are number of advantages when implementation of e-learning technology in any institution such as:

- Controls drive business alteration or change
- Removed geographical barriers learning
- E-learning to reduce costs, reduce cycles of product development, and less expensive for production and maintenance, decrease the costs of service of providers of e-learning [7].

Learning Management Systems (LMS) is one of the major technology innovations to support e-learning programs.

1.2 Learning Management Systems (LMS)

Learning management systems (LMS) are a prime class of platforms of software which used presently. An LMS is a technology based on web application programs or used for the planning, implementation and evaluation of specified process of learning [8].

Learning Management Systems (LMS) played a fundamental part in the situation of e-learning on the internet. It connects the contents of learning and learners both in a unified manner. It manages users, educational materials (in the format of objects in a management system of content) and learning events. It administers and manages progress of learning and tracking on performance of learning. It manages and operates the administrative tasks.LMS can be seen as a software designed system to simplify tasks of administrative, as well as allowing students to share materials of e-learning [24].

Learning Management Systems (LMS) is incorporation of the very common e-learning functions one request. An LMS also can be seen as an incorporated collection of software / programs that automate management, reporting and tracking for online courses / programs. It make available a middle dictatorial approach for learn to identify and record the dates of courses, learners, and assessment of learning outcomes [41].

There are some functions of LMS are:

- Centralization and automation of management
- Use self-service and self-guidance services
- Collecting and delivering content of learning speedy
- Combine education activities on a platform that is scalable and based on web.
- Backing the ability of portability and requirements.
- Modify content and offer the ability of reuse knowledge [41].

The System of Learning Management (LMS) has been adopted by many universities in the world. It is expected to increase with the use of university management systems of learning in an attempt to accommodate today's students who expect a rich learning environment technologically [18].

CLAROLINE

The Catholic University of Louvain (Belgium) was developed the Claroline platform in 2001 and started used it. Many institutions used this platform in about 101 countries [18].

DOKEOS

There are about 300 universities used this platform. This platform contains above 250.000 active e-courses [18].

dotLRN

Massachusetts Technology Institute (MIT) in 2006 developed dotLRN. Over 500.000 persons are using this system [18].

ILLIAS

Between 1997 and 2000 this platform developed by Cologne University. It contains more than 20 languages, different interfaces and styles [18].

Moodle

The Australian inventor Martin Dougiamas was developed this system, in 1999. It is the further most utilized virtual learning environment around worldwide. This system is now used by more than 2 million customers [18].

SAKAI

SAKAI software developed at the Universities of Michigan and Indiana. At present, further than 100 international universities, colleges and commercial affiliates are using this software [18].

1.3 Traditional Learning

Traditional learning is like learning that takes place in the classroom, requiring the teacher and student to be in the same place at the same time [48].

The traditional learning system means the earliest and oldest system that has been developed on how to get education and how to transfer the education system to others. Traditional learning that which provide education to students in a way that provides the student with overall benefit .This system consists of a one-way communication system by teachers for students, consisting of the transfer of education to the student in the best probable way. The purpose of education is to

acquire knowledge and skills and make them productive in life for the comfort of the individual and others. Consequently traditional learning is to supply all these benefits to society as a complete as it is reasonable by any group of people [47].

1.4 Adaptive Learning

The term “adaptation” is associated with a wide range of system features and capabilities in the e-learning industry, making it necessary to interpret the characteristics of one element of the system when using the term [49].

Adaptive learning uses PC / interactive tablet devices for students’ attention with educational supplies according to students’ learning requirements. The extent to which it is adapted to the individual depends entirely on the evolution of the program that drives the device [50]. In this study we use the learning style for adaptation.

1.5 Learning Styles

There are probably a number of methods to learn as there to teach. May be the very essential thing is to understand that everyone in the world do seen in the different way by people. They may have so diverse refer because of differences than you for how, when and where and how often to learn [43].

Felder and Silverman [13] pointed out that, learners with the intense preference for a particular style of learning may have difficulties among lesson condition; the teaching style does not suitable along their style of learning. The style of learning refers to the learner’s preferences in learning. It is a subset of a broader concept of the character. Experts identify learning style in dissimilar ways.

Kolb [4] defines learning styles as a means of personal preferences on understanding and addressing the information.

Zhou [10] points out that as students may appoint a range of learning styles, instructors must be prepared to contract with this country of dealings by altering their possess instructing styles in order to make sure an excellent competition.

The phrase styles of learning are also mentions to opinion that the information learn by several people in many ways. The method of learning and its style, in which every

learner begins to focus on, process, ingest and keep recent and difficult knowledge [5].

Formative students' style of learning is required so as to aid students in identify the further most in effect way for them to attain a deeper perception on certain topics and make the process of learning less tricky for them [5].

1.6 Learning Theories

Aspect of the process of learning, which in relative terms than has come only recently to the fore is that the individual learning preferences. The conception behind the thought that we as particular learners choose our method of learning are based on survey that distinguish humans as further or lower receptive to various stimuli. There are some most important theories of learning, for example Behaviorism, Cognitivism, Constructivism and Multiple Intelligence [3].

Behaviorism is the theory of behavioral learning; it is focused on noticeable behaviors and deducts every cerebral activity. Simply defined of Learning is as acquiring new behavior. Behavioral scientists call this method of learning "conditioning" [3].

- The constructivism field, in the scope of learning, under the broad title of cognitive science. The extensive locale is cognitive science. It has its ancestry in the five beginning decades of the century of twentieth, at a time when academics from the discipline of psychology, artificial, intelligence, attitude, anthropology, linguistics and neuroscience absorbed that they were all trying to solve problems associated to the brain and the mind [3].

- **Cognitive Science:** study of cognitive (as well as other things) focus on mental processes, a general focus on modern technology, learning, interaction, and how to remember.
- **Cognitive Psychology**: psychology of cognitive is the scientific learning of process of psychology for example the perception and learning, and remembers, using the language, thinking and problem solving [3].

Constructivist learning view display as a result of mental construction. Learns that happen when it was based on new information in Le Pen labeled the current structure of the individual's knowledge, considerate and skills. We get best learn when actively build our own comprehension [3].

Multiple intelligences are theory of Howard Gardner's of numerous intelligences (Gardner 1993) suggests the idea that we all have different levels of intelligence through ideological fields' variation. Gardner's theory comes in part of the concern that when intelligence is measured, the most common tests (nonverbal standard verbal tests) often do not let that test-proof what is really good at or where their intelligence lies [3].

1.7 Classification of Learning Styles

Learning styles is complex field and influenced by several aspects, leading to different concepts and opinions. Several educational researchers and theorists are learning patterns as a significant factor in the process of learning, possibility to make learning very easy for students by integrated education [44].

Styles of learning have considered in dissimilar ways. The first phase is to make the learners knowing of their own method of learning and show them the individual's weaknesses and strengths. Knowledge about their styles of learning to help student's comprehend why occasionally the learning is hard for them, and is the basis for the development of their weaknesses [44].

Furthermore, learners possible are provided by equivalent the mode of learning with their style of teaching. With offering learning activities and materials to students that suit their preferred methods of learning, this can make learning process easier for them [44].

For students who have various kind preferences tend to differently of react to several cases of instruction. Streamers like working in the environment that provides the activity and teamwork. Inverts prefer the conversion settings that people have opportunities for internal processing. Sensors such as explicit learning of concrete and specific expectations of experience. Sensors dislike heavy teaching in abstract theories of mathematics and modeling. Intuition is like instructions to emphasize

conceptual understanding and stress memorizing facts, replacing spells in formulas, and repetitive calculations. Thinkers like rationally organized resentment of the course material and reactions related to their work; feelers like instructor who set up a personal relationship with them and feedback that shows appreciation of their efforts. Judgers like well-structured instruction with clearly defined tasks, goals, and milestones; perceivers like to have choice and flexibility in their tasks and dislike the need to observe strict schedules [34].

1.8 Why Learning Styles are Important?

Individual education conducting is the further most essential part in the traditional as well as learns the improved technology. Every learner has the individual and personal needs such as various former knowledge, cognitive skills, methods and motives of learning. Others discover the difficulty of a single unit, this is why the personal differences affect the learning process and some students find it easy to learn in certain units. Prior knowledge is one of the main and reliable forecasters contrast personal triumph [19].

Consider learning styles, Research are raised by instructive and psychosomatic theories, which claim that learners own unlike habits of acquiring knowledge. Learners with a better predilection for a certain method of learning may have difficulties in learning if the type of education does not match with their style of learning. The result is that they accommodate the patterns of learners in learning environments for easier learning formulation, can be developed to enhance the end result and the effectiveness of learning. Conversely, learners who are learning styles are not supported by the environment of learning may have troubles in the process of learning [19].

1.9 Research Problem

Learning style is complex and is influenced by a number of aspects, leading to dissimilar concepts and perspectives. The beginning step is to give information to the learners about their styles of learning and to show their weaknesses and strengths. Knowledge about their private styles of learning helps students understand why learning difficult sometimes for them and it is the basis for the development of their

weaknesses. Furthermore, it is possible that students be provided by matching the method of teaching with the styles of learning [44].

There are many studies for identify student's learning styles using models learning style in education system for example David Kolb's model, Honey and Mumford's model, Felder-Silverman's model, and Neil Fleming's VARK model. But there are a small number of studies focused specially on the combination of learning style preferences. The main problem that we discuss in this study is how to find or determine learning styles of a student's automatically and focus on determine the combination of learning styles preferences for students.

In this study, we present assistance framework, which is learner- centric. This framework based on VARK learning style model, which consist of VARK questionnaire to helps students to identify and determine their learning style. The model of VARK is power students and teachers to understand it intuitively, it seems to fit practice, and it provides a useful method for learning, therefore, to begin a discussion about learning.

This proposed framework describes learners in four modes as visual, auditory, write/read or kinesthetic. Learners of Visual most effectively process visual information; learners of auditory understand best through hearing; read/write learners prefer read and write words, and learners of kinesthetic learn done by movement and touch. In addition, there are many students learn best by a collecting of more than one method.

CHAPTER 2

LITERATURE REVIEW

Rapid advances in technology have changed the ways in which people converse labor access to information, and learning as the world becomes smaller and more universal. The impact of the World Wide Web on student learning patterns is reflected in their need for motivation, interaction and participation [31].

2.1 Learning

Learning is how complex human absorbs information and experiences; memories and processes them to be further converted into knowledge, behavior and attitudes and it is lifelong process of education. In these days knowledge financial system and it is careful the key importance of education important to determine the career path of the individual and ensure economic prosperity and progress. However, with a lot of focus because of the importance for the individual to get an education and the question of whether students are learning in a way that favors are still debatable [45].

Research in modern dictionaries expose that learning is "gaining or acquiring knowledge of a topic or skill via study, instruction, or expertise" . The main concept of learning if we need to know mean of learning:

- Learning is the gaining or "increase"
- Learning is save the information or skills
- Learning is retention means store methods, retention, and cognitive organization.

- Learning includes an active, aware concentrate on and acting on events within or outside the organism.
- Learning is a comparatively persistent; however, the topic was discouraging.
- It includes several form of practice, possibly strengthened practice.
- Learning is a variation in attitude [28].

It distinguishes eight types of learning that differ according to the context and the subject to be learned:

1. Signal learning: the persona learns to provide widespread public reply to the signal
2. Learning of stimulus-response: learner acquires accurate response to stimulation discriminatory
3. Chaining: what gain is a series of two or additional contacts motivations and reply
4. Verbal society: verbal society is learning from the verbal chains.
5. Multiple differences: the individual learns to provide a number of distinct responses to define for many various motives, which may look alike each other in physical consider to a degree that could be lower or higher.
6. Notion learning: student gains the capability to make a prevalent response to a group of catalysts, though the members of that group may vary quite from each other.
7. Precept learning: in the plainest terms, a precept that is a series of two or further notions.
8. It works to regulate the behavior and experience
9. Problem solving: solve the problem is a form of learning requires internal events usually referred to as the "thinking". Concepts that attained previously and principles are combined in a conscious focus on the group without a solution or mysterious events [28].

Learning of human is a multifaceted process that can be defined broadly as the way we acquire the skills and knowledge through experience or through education or study. The concept of "one size fits all" instruction has changed to one that

recognizes individual differences and the role played by these differences in learning and understanding. The interaction between the learners' educational and design of online courses has a fundamental role in the outcome of the learner. In the event of a mismatch between learning style and method of teaching can have an unenthusiastic impact on the performance of learners and attitudes toward class [31].

2.2 Learning Styles Defined

Learning preferences are personal learning strengths and weaknesses, or different ways of learning and curriculum. Many educators believe that the learners have a clear preference for how to go about learning new material, and will be teaching these patterns would prefer to increase the educational success [14].

Researchers interested in design focus on the ways in which individuals acquire the working and custody of information in different situations and how to interface with natural capacity and paths. Although their definitions vary, researchers see these processes as collective learning styles. There are lots of definitions of learning style and has written several methods have been proposed for the learning styles yet [31].

Learning styles which are defined as a favorite among student's conduct of learning can play a significant role in the growth of e-learning system. Knowing the different styles, the system can provide insights and advice for a wide range of stakeholders, such as students and teachers to organize effective educational materials and activities of a study to improve learning paths [21].

Learning styles square measure one amongst the most contributors to individual variations [41]. Thus, the learning style is one of the main differences between many theories, one that is believed to be stable education on the physiological basis of the methods and fixed to some extent for the individual, while others describe them change with each new experience or situation [31].

Learning style can be recognized as a student agrees to respond to and the use of stimulants in the context of learning. The models of learning are actually concerned with "how" they desire to learn rather than "what" learners learn. According to [28]

the learning style in a very similar way, as the way more or less agrees on the person who realizes, as a concept, organize and recall information.

2.3 Learning Style Models

There are more interfaces, navigation complexities, and transfer, making the application of traditional theories of learning complex patterns within the setup on the Internet. Research conducted using learning style to provide students with an idea of how best to learn in traditional, face-to-face classes. Associate examination of the common models was utilized in learning style analysis and whether or not they outline learning designs as being primarily based in psychological feature structures, temperament sorts, learning preferences or learning approaches will offer tutorial designers with the inspiration they have to develop tutorial content for a multicultural student population. Choosing an appropriate tool depends on understanding the commonalities and differences in these models, what measures, strengths and weaknesses, and their applicability to the online learning environment [31].

Myriad learning style model that have been proposed by scientists to describe the learning styles of learners. Can be classified these models into 4 categories on the basis whether they focus on external conditions or personality.

Learning style models Classification into 4 groups are:

1. Class of environmental and instructional preference as (Model of Neil Fleming's VARK)
2. Social interaction preference as(Grasha –Reichmann model)
3. Information processing as (Felder-Silverman's and Kolb's learning style inventory model)
4. Class of personality level as (Myers-Briggs's model) [45].

We can display many of these learning comparable models such as Myers Briggs model, Dunn and Dunn Model, Kolb's Learning Model, Felder–Silverman Model, and VARK learning style model.

2.3.1 Myers-Briggs's Model

For many years there have been several dissimilar ways to the methods, initially a Carl Jung Swiss, the analytical psychology classifies people learn in terms of eight personal patterns. Such as, learners do not prefer to work in the extroverted or introverted groups alone. He also suggested that students learn through the sense or intuition, thoughts, or a sense of management or fiction [16].

Carl Jung's theories lead to the growth of 44 of the Myers-Briggs test by Isabel Briggs Myers in 1943.These tests have resulted in the magnitude of information about how personal learning styles impact. Myers-Briggs Type Indicator Test (MBTI) focuses on the description of personality types normally seen [16]. As shown in **Table 1**.

Extravert (E)	Introvert (I)
Sense (S)	Intuition (N)
Think(T)	Feel(F)
Judge(J)	Perceive(P)

Table 1 The MBTI and Four Bipolar Scales [16]

2.3.2 Dunn and Dunn Model

Dunn and Dunn model is another model that has used on a large scale. This model indicates that a spread of 5 different stimuli and twenty one different elements will have an effect on the means in which we tend to learn, work and study. A number of these are biological elements while others developmental. This model takes into account the actual environment in which the learner excels; cooler with a music studying hall may be preferred by so some of the learners, while others may excel in a warm silent hall. This could provide a challenge if this model was to be used in a classroom environment. The **Figure 2.1** shows the whole elements of stimuli and elements [16].

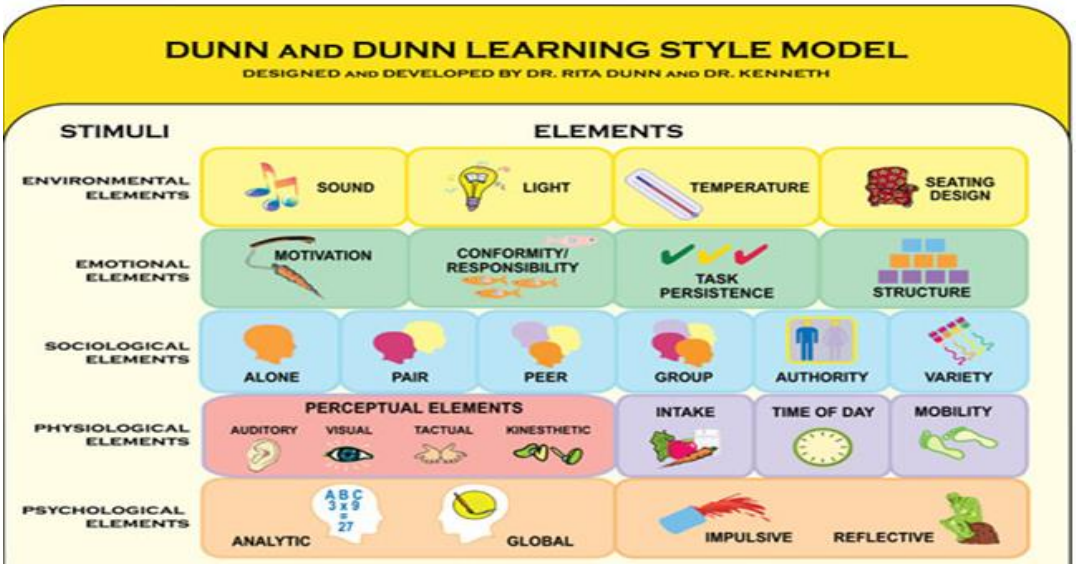

Figure 2.1 Dunn and Dunn learning style model [16]

The model of Dan and Dan is founded on the basis to selected elements of learning style is the result of genetic makeup, and it can be refined in all development parts and accumulated experiences .The interaction of the contained elements in different form for each individual, it is to identify the triggers related to the concentration of the individual, how to respond to his or her style ,and how to maintain it and of treatment that are necessary for the production of long-term memory and keep them[31].

2.3.3 Kolb's Learning Style Model

David Kolb model deals with experiential learning, depends on four elements which are concrete, experience, observation and reflection where they "touches all bases". Kolb's style of learning was published first in 1984, after that, Kolb's both Theory of Experiential Learning Theory (ELT) and Learning Style Inventory (LSI) was published. Learning Style Inventory has been revised from the unique nine items on the scale and self-determination on the twelve items in 1985, **Figure 2.2** below shows the elements of Kolb's model [16].

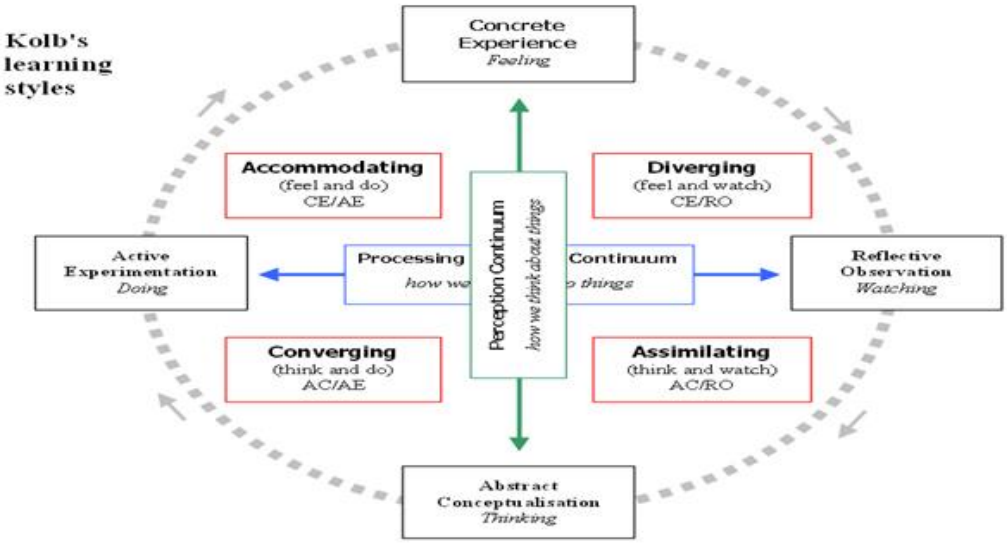

Figure 2.2 Kolb's model [16]

The main difference with the learning style is that the Kolb learning style is fixed and persistent but its understanding that it is not changeable from another state. He, however, tell a longer period may not be radical changes in. A divergence from model of Kolb which consists of four elements, is that model which planned by Honey and Mumford, however, they shaped their own eighty questions learning styles form in 1982 and revised this form down to forty queries in 2000 to allow for a longer efficient survey. These styles closely match Kolb's styles but they need modified the titles [16]. **Table 2** below shows a table that represent the differences between Kolb's style and Honey and Mumford style.

Kolb's	**Honey and Mumford**
Active Experiment	Active
Reflective Observation	Reflect
Abstracting Conceptualize	Theorist
Concreting Experience	Pragmatic

Table 2 Kolb's Styles and Honey and Mumford [16]

2.3.4 Felder-Silverman Learning Style Model

The Felder and Silverman's learning style Model (1988) is predicated on the theory that instructors ought to attempt for a balance of educational methods instead of teach to individual student preferences. Felder and Silverman classified student learning designs in keeping with 5 questions see **Figure 2.3** that maybe assessed by mistreatment their Index of Learning styles (ILS). This model measures preferences of student learning style on 4 dimensions: sensing/intuitive, visual/verbal, active/reflective, and sequential/global. This model has been utilized in the web learning area the current research utilizes this model as result of its emphasis on designing instruction that's tailored to students' numerous learning styles [31].

Questions	Student Learning
What type of information does the student preferentially perceive?	Sensory learners: sights, sound, physical sensations Intuitive learners memories, ideas, insights
Through which modality is sensory information most effectively perceived?	Visual: pictures, diagrams, graphs, demonstrations; Verbal: sounds, written and spoken words and formulas
With which organization of information is the student most comfortable?	Inductive: facts and observations are given, underlying principles are inferred; Deductive: principles are given, consequences and applications are deduced
How does the student prefer to process information?	Actively: through engagement in physical activity or discussion; Reflectively: through introspection
How does the student progress towards understanding?	Sequentially: in logical progression; Globally: in large jumps

Figure 2.3 learning styles of students according to the five questions of Felder Silverman [31]

2.3.5 Bernice McCarthy- 4MAT

The 4MAT is system based on instruction delivery those appeals to any or all types of learners. It differentiates support, people think and those that relate achievement,

and people that have and people that conceptualize. It lays out a program to be followed that moves dextrorotary during the quadrants starting with Why, What, How and If [16].The following **Figure 2.4** shows this system.

- In the WHY phase, the teacher connects the learner to the thought and Attend guide learner to mirror
- In the WHAT phase, the teacher provides a Met read of the subject- Image and references the body of knowledge – Inform
- In the HOW phase, the teacher provides active activities- observe and encourages increasing the tutored ideas- Extend
- IF guidance and feedback are final phase given refine and support is provided within the learning and sharing of the thought perform [16].

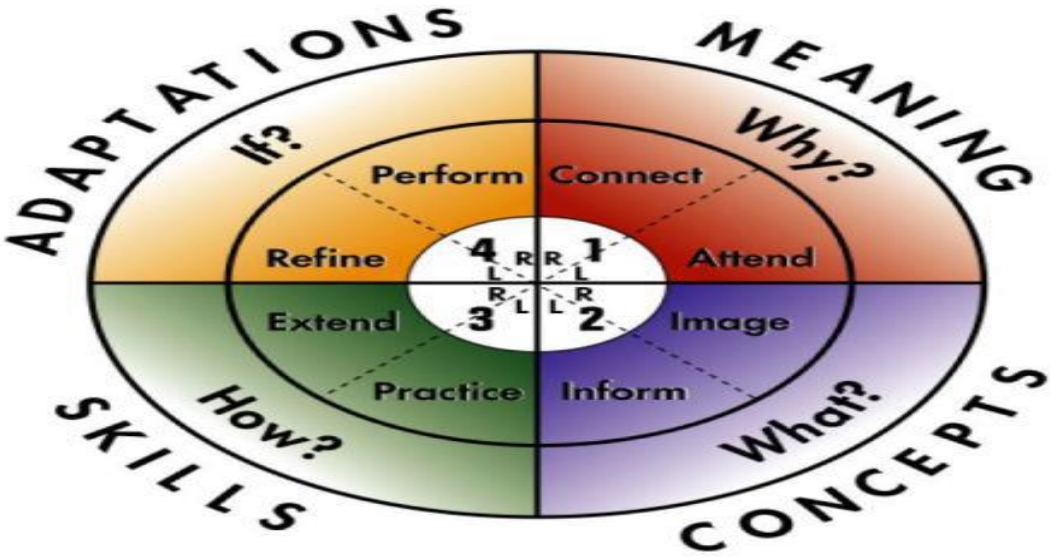

Figure 2.4 McCarthy 4Mat system [16]

2.3.6 VARK Learning Style Model

Neil Fleming and C Mills is developed VARK learning style model in 1992, when they're operating as associate inspectors in nursing lecturers at that year. VARK is help form for visual, Aural, Read/Write, and kinesthetic. Fleming extra the R to the

pre-existing VAK systems because he supposed that some learners are prefers visual whereas others prefers the use of pictures and/or symbols. The VARK system is takes into account consultative instead of prognostic or analytic [16].

The VARK to participants a profile of their style of learning and isn't a learning style in itself. A learning style would have eighteen or more different dimensions to it which might embrace participant's preferences for light, heat, operating in teams or alone, food intake etc. Learning styles may be a wont term to seek advice from the ways of gathering, processing, interpreting, organizing, and thinking about information. Fleming looks primarily at how learners receive information rather than how the information is processed .Neil Fleming has proposed a new form of a categorization of learning styles of VARK to exchange information conditions [16].

The modes of VARK are:

- Visual
- Aural
- Read/Writer
- Kinesthetic [16].

Visual learner method is based on information concern if it is seen or visualized exploitation images, graphs, flowcharts, mind maps, and photos. The Seers [16].

Aural learner square measure best suitable to lecture style things wherever they will hear the data being given. They will conjointly get pleasure from tape and radio playback systems to receive their information. Aural learners conjointly prefer to state their learning in order that they will hear it back. The emergence of the podcast has massively extra this group of learners. The Hearers [16].

Read/Write learners square measure visual except that their preference is the word. Note taking is one between their tough points in order that they will examine over them once more and again. Text based information is moreover a major supply of data that offered by the net, PowerPoint and computers in general, square measure concern on the awaiting knowledge for these learners. The Readers [16].

Kinesthetic learners desire to acquire their data during knowledge and put into practice. The best Learning happens by once representative videos of actual things, and studies of case. The Doers [16].

However many learners can be multimodal, which means that they can learn while more than one mode, such as a learner may be Aural and Read/Write.

2.4 Limitations of the Models

The previous studies gave a summary of a number of various different models of learning styles that are in use in teaching and dealing.

The Indicator Myers – Briggs type tests are very complex, however that the correct training could not be very simple to misinterpret the results. The main opposite censure with the check is that the user should choose one between the alternatives for each question even though none of them appear suitable [16].

Although the Dunn and Dunn model cover several external stimulus and environments to make easy the teaching knowledge of the learner, it wouldn't be associate degree applicable model for a classroom setting. The model of Dunn and Dunn is very personalized to each individual's favorite for environment of learning. In a very large cluster, this model could become impossible; some learners would like sound/music whereas others would require silence, some will prefer a cold space whereas others a heated space, some will choose early study within the morning whereas the rest would like later within the day [16].

Kolb's learning style form's classes for learners per their learning orientation; however, responsibility tests have presented a mixed image suggesting a possible for change in style [16].

The Felder–Silverman model assesses preferences on four dimensions of learning however that it does not rank these per dominance [31].

The 4Mat system which projected by McCarthy is additional united with the education of a topic rather than the teaching of the subject, thus for the research, this could be unproductive [16].

In this study we have chosen to use the VARK learning style model to work out with the learning style of the learners which are concerned within the research. The reasons for choosing this model are:

- The VARK Model is simple to use, understand and there's no need for advanced teaching
- VARK model permits students to exclude questions which are not be deemed relevant or can't be answered
- VARK permits for multiple answers to every question. As a typically one simple result doesn't match solution absolutely
- Learners are often deemed to be Multimodal in different terms they will use 2 or further modes of learning style [16].

There are many studies used these models for studding the learning styles but the best studies uses combination of more than one learning styles for students. In this thesis we proposed a new system to determine student learning styles automatically and find combination between number of learning styles for students, some students selects learning by visual and aural style, while others may prefer read/write , visual, and Kinesthetic. By our proposed system they can choose any of this.

CHAPTER 3

METHODOLOGY

3.1 General Background of Research

To achieve the objectives of this study, we presented a system which contained the two types of learning, the traditional learning and style learning. The Fleming and Mill learning style model (VARK) was adopted as the theoretical structure of the study. The VARK questionnaire was used for recognizing students learning styles.

3.2 Participants

This study connected total of 50 students which attends Atilim University, academic years 2017-2016. Participants were first-year students who enrolled in introduction to computer and programming, it comprises five chapters following a subject's syllabus and these are engineering students. Because of this, we think that or assume, they are in the same level.

3.3 Learning Materials

The researcher utilized three materials in this study

3.3.1 The VARK Questionnaire

The VARK questionnaire survey was used in order to determine the learning styles of the participants in the study. This survey consisted of sixteen multiple choice questions with four response options. Every choice is related to a unique learning style preference, which allows the learner to choose more than one answer to the

question. These questionnaires put inside the system to help student to find their learning styles, associate example question is shown below:

Do you like a lecturer or a presenter is uses?

- Demonstrations, models or sensible sessions
- Handouts, books, or readings
- Question and answer, talk, discussion, or guest speakers
- Diagrams, charts, or graphs.

This study also includes discussing intimidation related to validity and reliability consideration.

3.3.2 Validity and Reliability Tests

Validity refers to the ability of the researcher to draw meaningful and justified conclusions from the results of test search instrument [46].In this study used a t- test for two groups, which are Control group and Experimental group. The t-test survey included 12 of multiple chose questions see (Appendix B); which regarding students' previous experience with system it was given to students in the beginning.

Reliability is found when individual grades of the implement are even it will be approximately the similar on the frequent departments of the implement [46]. We used reliability analysis to validate tools in the current study.

The parametric statistical analysis depends on the ability of the researcher to identify or control the state of natural distribution. It is possible when the researcher has essential data of the essential distribution of the variable, allowing for predictions of how an equal sample of population will emerge or be distributed. The parametric statistical analysis is possible if the variable in question was normally distributed 46].

3.3.3 Student Satisfaction Survey

The evaluation of the system was conducted in introduction to computer and programming course, for the duration of five weeks. The questionnaire to determine student satisfaction was developed by the researcher and is referred to as the satisfaction survey see (Appendix C).The student satisfaction survey consisted of 10 items with options, this evaluation included 50 students for 2 groups, 25 in Control

group and 25 for Experimental group. After five weeks of using the system, students were asked to rank satisfaction about system usage and provide written feedback through a survey. Thus, for each student surveyed, data on their opinion, their perception of, participation in and overall performance in the system was collected.

3.4 Data Analysis

Data collected according to the research objective were analyzed with SPSS application (Statistical Package for the Social Sciences) using appropriate statistical analysis techniques to information characteristics, and results was obtained as numbers, and %, means, for data analysis were used standard deviation statistics as the descriptive statistics. Additionally for independent-samples t-test were used to test the differences information between before and after used the system.

3.5 The Application

The study was conducted in five weeks. In the first week, prior to the use of the system, the pre-test was given to two groups of the students, which are Control group and Experimental group to answer 12 questions, these questions include information about computers ,and then during the tutorial, participants were given URL address to access the system. They used the system during the tutorial for five weeks. In the fifth week, the post-test was given to the students to test their information after using the system.

CHAPTER 4

DESIGN AND DEVELOPMENT

Adaptive learning refers generally to a learning development where the content educated or the way such content exists changes, or "adapts" founded on the responses of the individual learner. An adaptive system is a Learning Management System (LMS) that, quite simply, can adapt to the needs of the learner [9]. As shown in **Figure 4.1**.

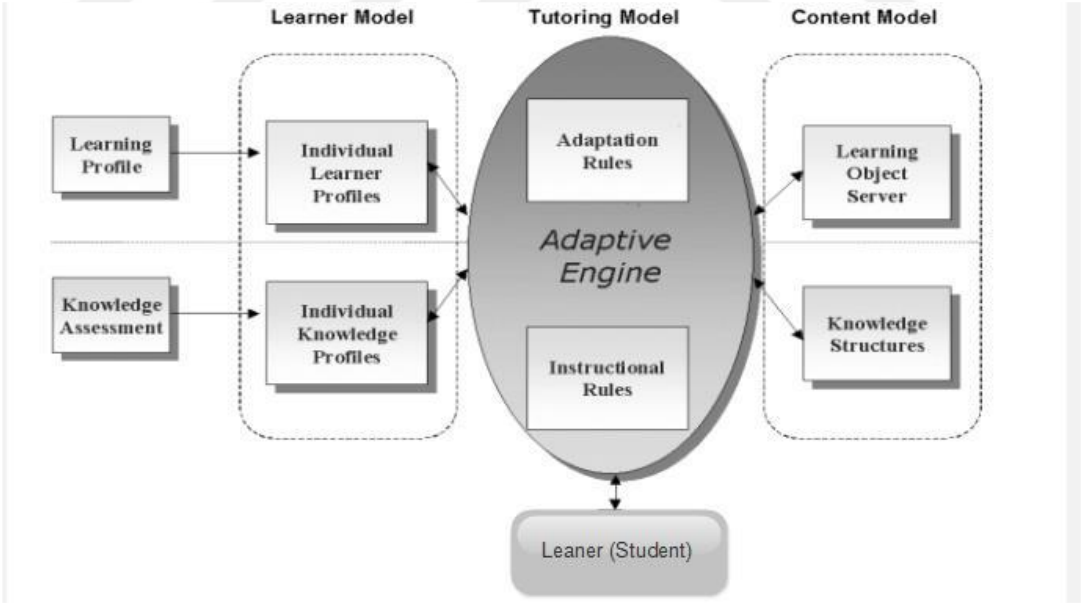

Figure 4.1 Adaptive Learning Management System Framework [33]

The adaptive learning system has goal that is the share of teaching in order to get better or speed up the achievement of student performance gains. In essence, these

systems are designed to determine what the student does not understand, identify and provide content that will help the student to learn it, and evaluate again, help again, and so on, with the aim of achieve certain learning objectives set [32].

The goal of the adaptive system is to give a personal learning resource for students, particularly learning content and user interfaces preferred to address their learning [17]. In addition, some learning systems address the adapt and respond to student's preferences in learning, such as whether the information in the form of text or voice, whether they prefer to learn the use of case studies or testing of multimedia tools, and so by making a personal learning scalable, and adaptive learning system has the ability to:

- Lose of course, drop-out rates
- Be more effective in achieving results
- Be more efficient for students and helping them achieve faster results
- Frees faculty to focus on direct aid to the much-needed members [32].

The simple adaptive learning style system includes at least three elements as, Domain Model, User Model, and Adaptation Model. See **Figure 4.2**.

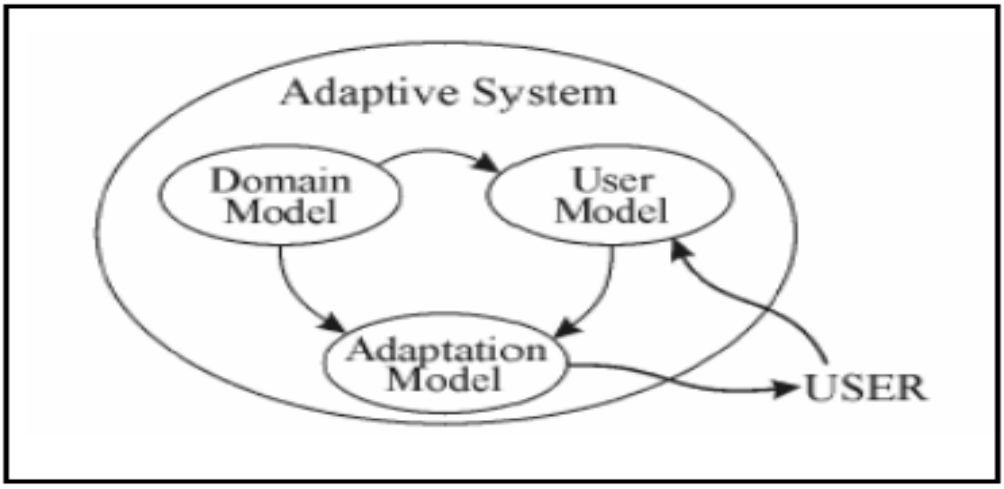

Figure 4.2 Modules of an adaptive system [15]

Additionally to these models, our system includes user interface module. This module contains two of sub modules as input and output. The input module receives input from the student in the question of solutions and passes on the unit of results a

question for evaluation. An output module shows the types of learning, courses sections, courses topics.

4.1 User Model

Information about user in side user model. "Without the user model, the system could not distinguish between the different users and would treat all users in the same manner" [23].

User model in our system includes student model and teacher model. User model contains the student modeling process and some features such as student's attention, learning style and the relations between goal, task, and topics may be measured. Many adaptive learning systems form a student model containing the student features by seeing the feedbacks from surveys, analyzing the navigation ways, through the information upon measuring the answers to its questions.

4.2 Content Model

This refers to the way in which specific topic, area of contented, organization, and learning outcomes finally detailed, and identify the tasks that learned in necessary. Some of the early sequence of the content is prearranged in spite of in many situations the concept of adaptive learning is that the sequence that can be changed on the basis of student performance [32].

The developed system contains the some information as questions, results of questions, courses, and topics of courses.

4.3 Domain Model

Domain model show knowledge about the teaching domain or knowledge representation of the student model and includes the knowledge to be transmitted to the student [15]. In our system Domain model is based on courses' topics.

- The system contains student learning
- The system contains the student courses
- In system, the sections and topics that each course contains.

Brusilovsky [29] indicated that two adaptation methods can be applied in evolving web-based adaptive learning systems, that is, “adaptive presentation” which presents personalized content for individual students, and “support of adaptive navigation” which guides individuals to find the learning content by suggesting personalized learning methods. Other researchers have further specified the prominence of providing personalized user interfaces to meet the learning habits of students [11].

4.4 Adaptive Content Presentation

The adaptive content presentation includes personalizing the contents submitted to the user to develop their usability and accessibility. To attain this successfully, it is needful existing of a careful disclosure of the user accessibility requirements through a technique and profiling of user that allows clear chose and presentation of the suitable adaptations according to the recorded requirements [25].

4.5 Adaptive Navigation Support (ANS)

Adaptive Navigation Support (ANS) is a particular set of techniques that support the navigation in hyperspace to user, by regulating to the knowledge, individual user goals, and preferences. Adaptive Navigation Support (ANS) consider as an overview of curriculum sequencing technique in a hypermedia state [22].

According to Peter [22] there are different existing techniques for adaptation of navigation as direct guidance, link sorting, link hiding, link annotation, and link generation. The following section describes these techniques.

4.6 Adaptation Technologies

4.6.1 Direct Guidance

Direct guidance, It is easier suitable technology, is to offer information to the user about “the next best node”. It permits navigation, as stated by those targets of the user, knowledge, Furthermore different parameters. These principles point out the user model. This might a chance to be clarified concerning illustration those two formats of the user. There may be also a connection of the page is accessible to the

node, Also this could make known may be in turn. For example, **Figure 4.3** shows the links for example Web Watcher and Personal Web Watcher [22].

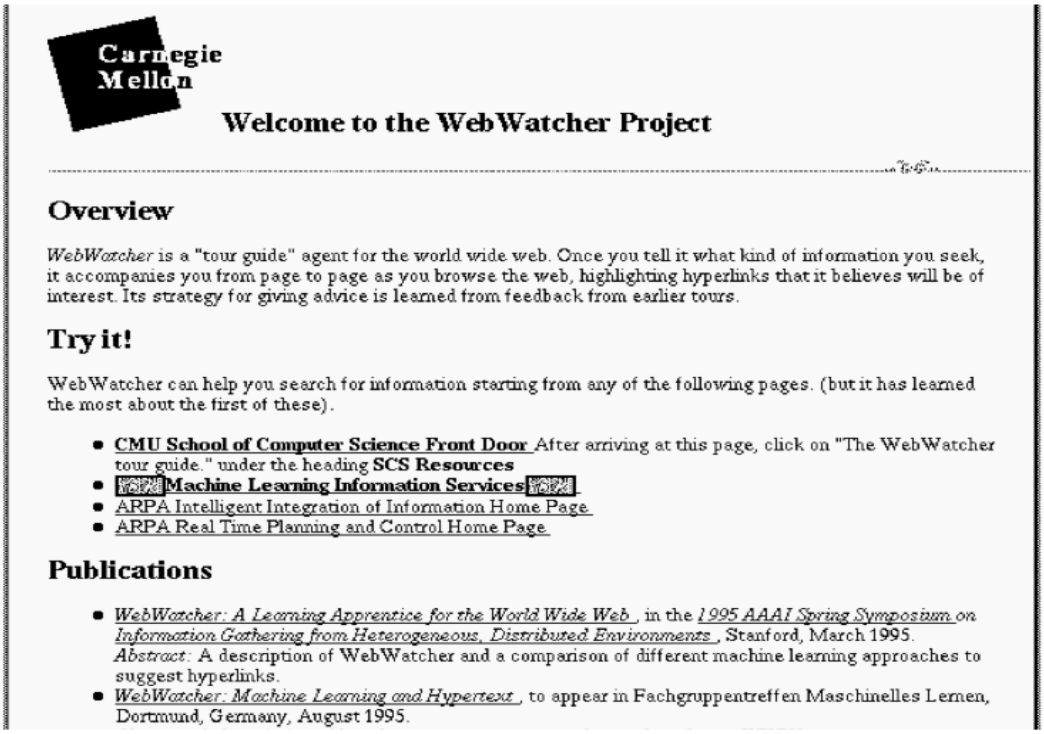

Figure 4.3 Direct guidance in Personal Web Watcher [22]

Direct guidance does not provide comfort for users who do not want to observe the recommendations of the system. This may be a referred to issue for direct guidance. Those joined together direct guidance in the prior times of hypermedia should adjust. However, now, it used to support other navigation techniques. This is in some systems, such as adaptive navigation technology, Hyper -Tutor, ELM-ART and Inter Book. These frameworks have likewise the hypermedia type of the conventional program. Entry-level users, having the poor space information, experience with the issues utilizing the option route alternatives. Those issues might be fathomed with the direct guidance innovation [22].The system containing the direct guidance as ELM-ART, ISIS-Tutor, and Hyper-Tutor.

4.6.2 Link Ordering

The user model and all links are a form of a particular page, and there are no specific criteria for some users, that are made importance with the ordering technology. It

asked the applicable connections as indicated by the critical criteria to the client. HYPERFLEX and included it in the order of change system hyper adapter, 1990. HYPERFLEX, which stretches out from requesting the links from the present page to the pertinent pages, is a framework that includes the innovation, as per the significance of such pages in one bearing, which is client sees. If the system is exposed incorrectly, it can be reordered by the link physically (link reordering, feedback tool related to the system).

They are employed to updating the model of user. If it is determined the goal of current research in the list of targets by users, and there after the importance of the aim of a specific link in the link ordering. Although the special adaptive technology is not HYPERFLEX, it is determined by the action of the user's link ordering. Thanks to the adaptive link ordering, this study explained that there was a decrease in the navigation time. Does not reduce the examination time and navigation using a classification technique only, but the techniques of navigation and other support, such as hiding the link and annotation [22].

Because of their limited applications and the classification restrict of the common link. It is hard to use a page or pages from the contents table, directory, and may not be used with background links or maps. All time when the user log in to the page, the problem of unstable links will occur as a result of the change in their order [22].

Benefit is acquired with refreshing link arrangement features used on a long-term framework. Different users may use different links ordering. For example, many of the e-learning systems are adapt to have ordered links including various educational resources to the subject according to the method of the user learning. And it covers the different types of systems through the context of another suitable case. Some pages of some system types have unstable links. To solution this problem ordered link may be a good. In this case, the ordering is provided “conceptually stable”. As adapted News systems for this situation. Links are provided in a single list and according to the category or through adaptive materials, News, newsletter systems in the various pages. Since this list is not steady and usually adds new material, old material is removed. Existing mechanisms provide the content of this ordering [22].

In the combination of mutual resources systems, users receive useful network resources according to the links of the topics. They can include a short introduction to each of the subjects and a set of links that are unstable. The application of social mechanisms by regulations predictable to sort subjects' links, admiration for the benefit of society in order to show these links. Sorting link is used often with a link generation [22]. The system that contains on the order link ELM-ART, ISIS- Tutor, HYPERFLEX, IMANIC .

4.6.3 Link Hiding

Link hiding is the restraint of navigation area. Links to immaterial pages are hidden by related technology to hide or disable the support of navigation link. The links in the page may be immaterial for several causes. For instance, if it is not directly connected to the learning objectives of users, it may be difficult to be understood by users [22].

The adaptive hiding techniques are optional for use and analysis systems Hypermedia educational fields which is the basic application. Link hiding, which allows for up to disable and enable the page, apply during the hypermedia systems to adapt. ISIS- system of tutor of educational hypermedia is an example for the hidden links. When a student begins to work with the link, as there are less links in the page, and the system reacts to enhance students' knowledge about the subject and links become further observable. A variety of other variables are advised to get a link hiding on the basis of the division of three features of the link; communication, visualization and functions [22].

The link communication was restricted by hiding hot word of link. Removed all indicators such link is down and underline. Disabling Link will prevent the link from directing the user to the pertinent page. **Figure 4.4** shows that hide link De Bra's AHA method [22]. The system contains on the AHA, ISIS-Tutor, and HYPERFLEX.

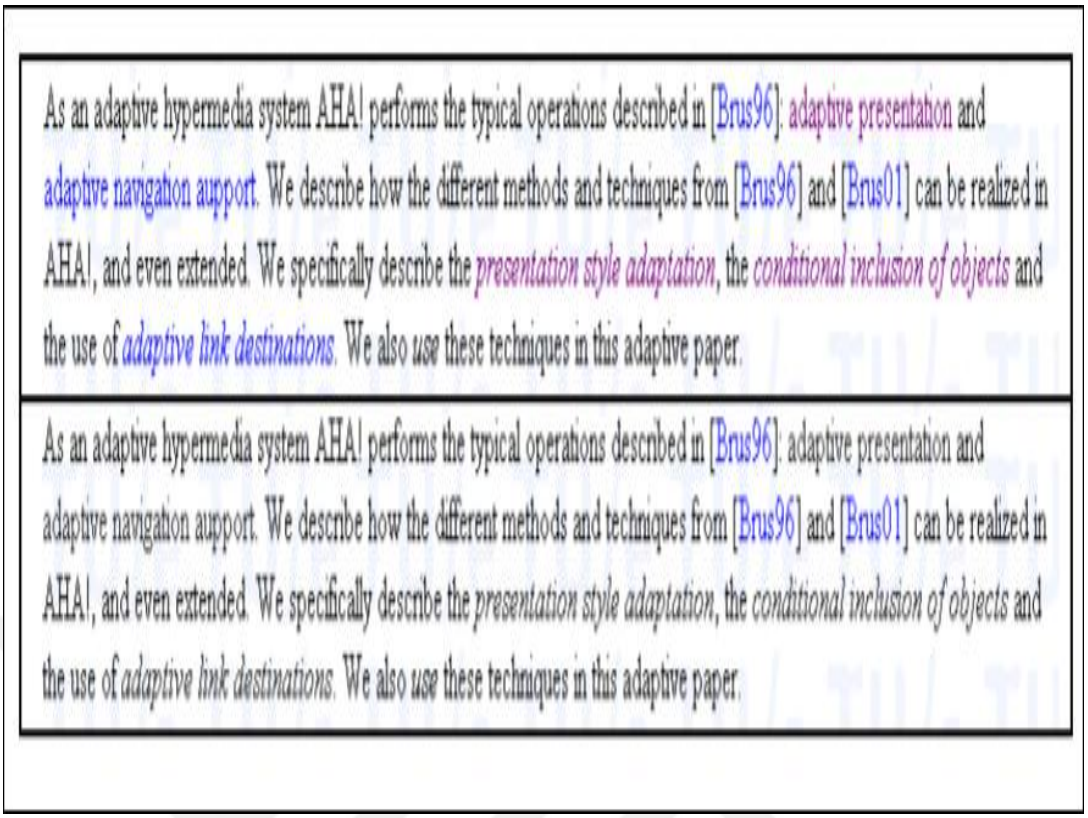

Figure 4.4 Links Hiding in AHA [22]

4.6.4 Link Annotation

Link annotation is adaptive technology which having the form of annotation is used in order to provide more knowledge about the existing case of the contract behind annotated links to users. Some of benefits adapting by link annotation. such as, three versions ISIS- Tutor taught system ISIS- Tutor who is a system that involves a lack of adjustment, hiding the adapt of the annotation and the annotation to conform. The results of the studies to the same educational goal are achieved through one of the formulas to adapt to less support for the process of navigation version is not adaptive. Other normally used Web hypermedia is ELM-ART, which have link annotation to adapt and direct guidance for Web. Is shown in **Figure 4.5**, it shows the status of education of the page with traffic-light annotation. And offers the annotation on the basis of the growth of information of the user content LISP regarding of this page level. Those kinds explanation two very common in hypermedia on educational adjustment [22]. The system contains on the link annotation as AHA, ISIS-Tutor, HYPERFLEX.

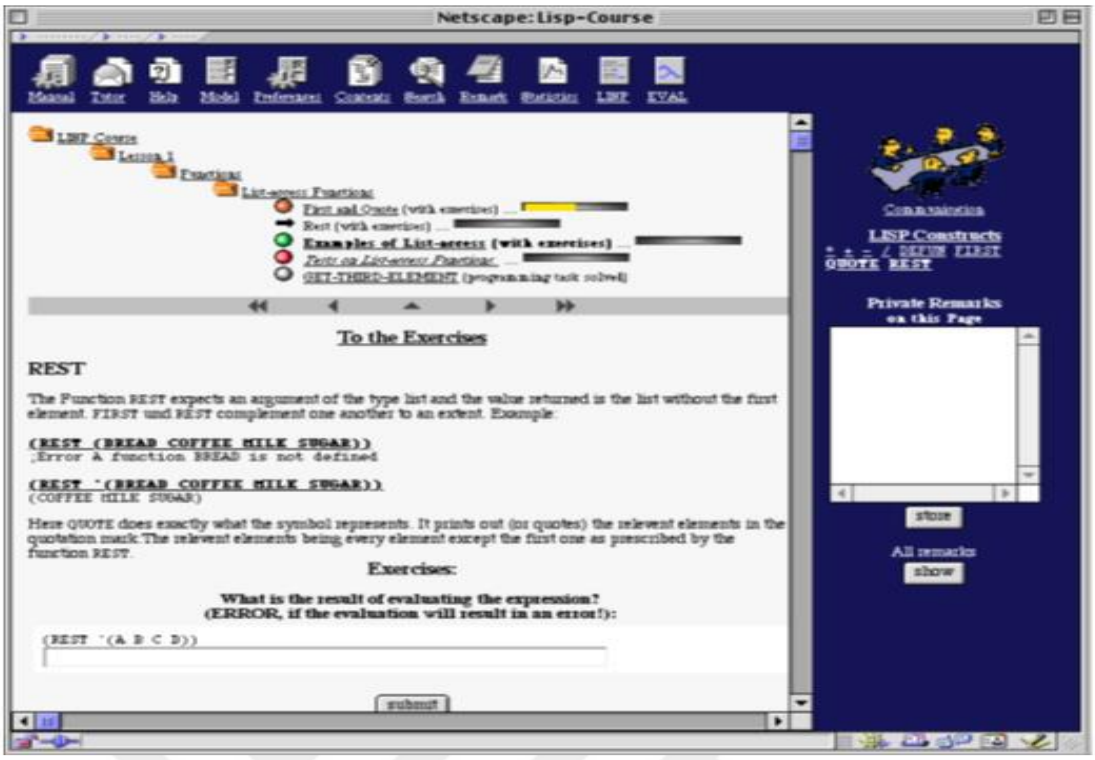

Figure 4.5 Adaptive Annotation Link and Direct Guidance [22]

4.6.5 Link generation

Link generation is the latest of navigation adaptation technology. The use of this technology began in the first different Web systems to adapt in 1996. Link generation technology is used generally in many systems on the Internet to adapt now [22].

There are three aspects of link generation that are as follows:

1. To explore new and useful links between documents and add the current link to them that has permanent status
2. Generation of navigation links based on the similarity between the elements
3. The recommendation for adding the dynamic links those are useful in the current context for the user to the menu, for example the current target, knowledge or interest as shown in the user model [22].

They are checked by recommender systems in order to provide a list of items or (that are not a piece of hyperspace) compatible with the short-term and long-term attention

of the user. The major goal of supporting navigation systems is to help users. It helps users to find their ways in hyperspace adapt to the links on the page. Navigation techniques also give support and guidance to think the current site of the user in hyperspace [22].

Example for generate a link is ALICE system, it uses a generation navigation support approach. **Figure 4.6** shown it, because it is not created vital links on the current level of the user's knowledge. Stable links between the sections are not available. It joined that dynamically links to the end of that which is considered the next units, the basic units and all the necessary modules learned [22]. The system contains on the link generation as Inter Book, Hy-SOM, and ELM-ART

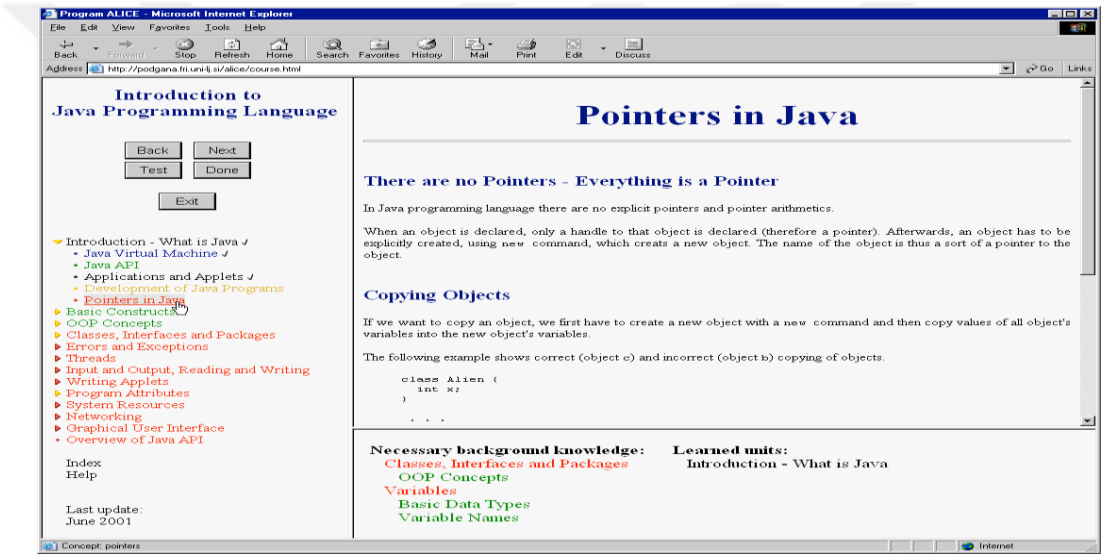

Figure 4.6 Link Generation and Link Annotation in ALICE [22]

4.7 General Description

The system contains two main interfaces as following:

4.7.1 System Interfaces

All information for students, teachers, questions, and courses will keep on a database. The system can access information about teachers and students over the database.

4.7.2 User Interfaces

There are two dissimilar user interfaces for system, as interface of teacher and interface of student. These interfaces efficient to categorize users according to their approval to clarify practice of user interface clearly. Also, each user has different menus on their web site. User interfaces of system occurs interface of web user.

Interface of web user ensures different access menus for teachers and students. It is shown below;

- Interface of web user
    - Interface of teacher web
    - Interface of student web

According to needs of special users these interfaces can be set. All users can request to design interfaces according to their desires.

4.7.2.1 Interface of Teacher Web

Interface of Teacher web includes extra functionalities like adding, updating, and deleting questions information.

4.7.2.2 Interface of Student Web

Interface of student web includes answering of questions. Interface of student web includes adaptive learning style system which was provided in the four VARK modes. VARK modes (Visual, Aural, Read/Writer, and Kinesthetic).

4.8 UML Diagrams for System

Unified modeling language (UML) is a modeling language based on graphical symbols. Can be used during modeling the analysis and design of systems. UML make complex design process very simple by providing a set of graphical images that help the expression of object-oriented analysis and design of software projects. We can get a comprehensive overview of the system using UML. It considered as best modeling language, developers build UML diagrams that can be collected, then they can write the source code for the program of system application [12].

Two types of UML diagrams as following:

1. Structural diagrams
2. Behavioral diagrams

4.8.1 The Structure Diagrams

They are center on the generally structure of the modeled system.

- Class diagram
- Component diagram
- Composite structure diagram
- Deployment diagram
- Object diagram
- Package diagram
- Profile diagram [12].

4.8.2 The Behavior Diagrams

We can distinguish two groups of behavior diagrams that are:

1. The diagrams of function (diagram of state machine, diagram of use case, and diagram of activity).
2. The diagrams of interaction (diagram of sequence, diagram of communication, diagram of interaction overview and diagrams of timing) [12].

Activity diagrams and use diagrams are clarified in the following four **Figures**.

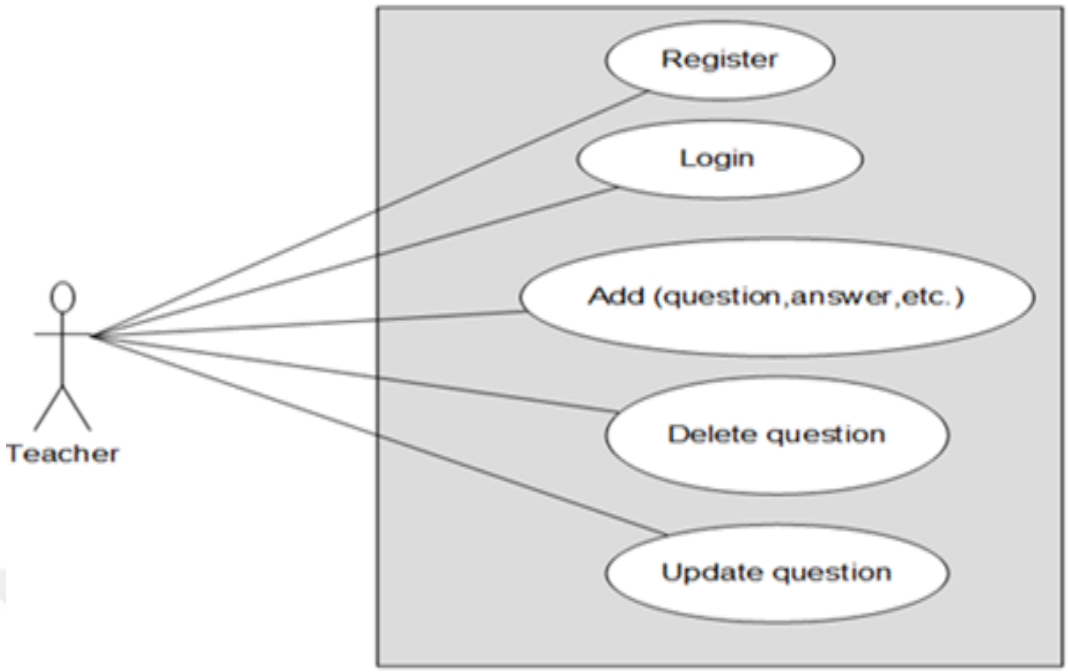

Figure 4.7 Use Case Diagram for Teacher

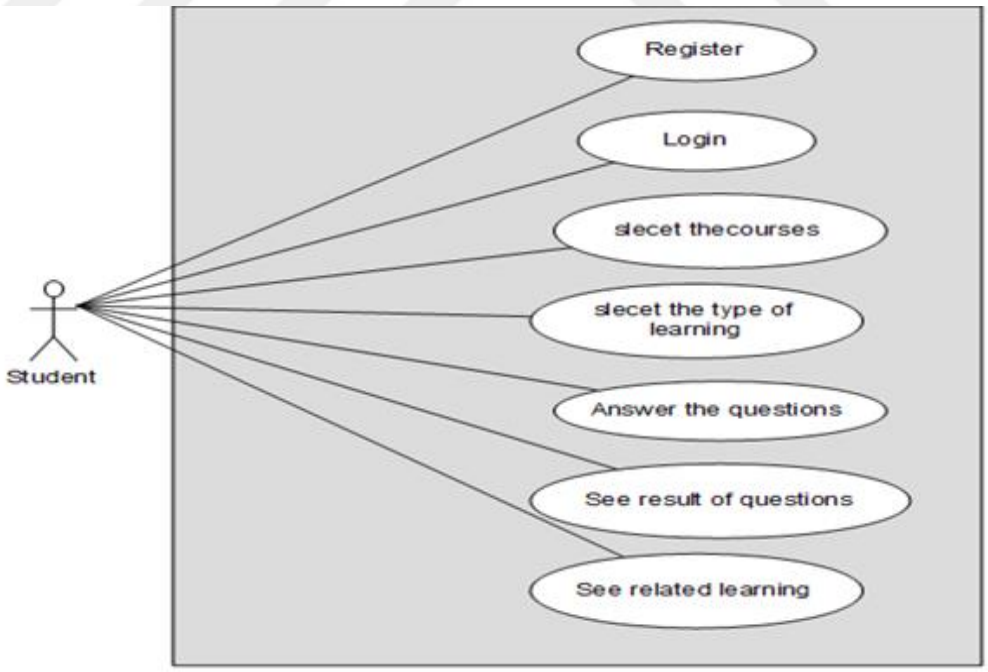

Figure 4.8 Use Case Diagram For Student

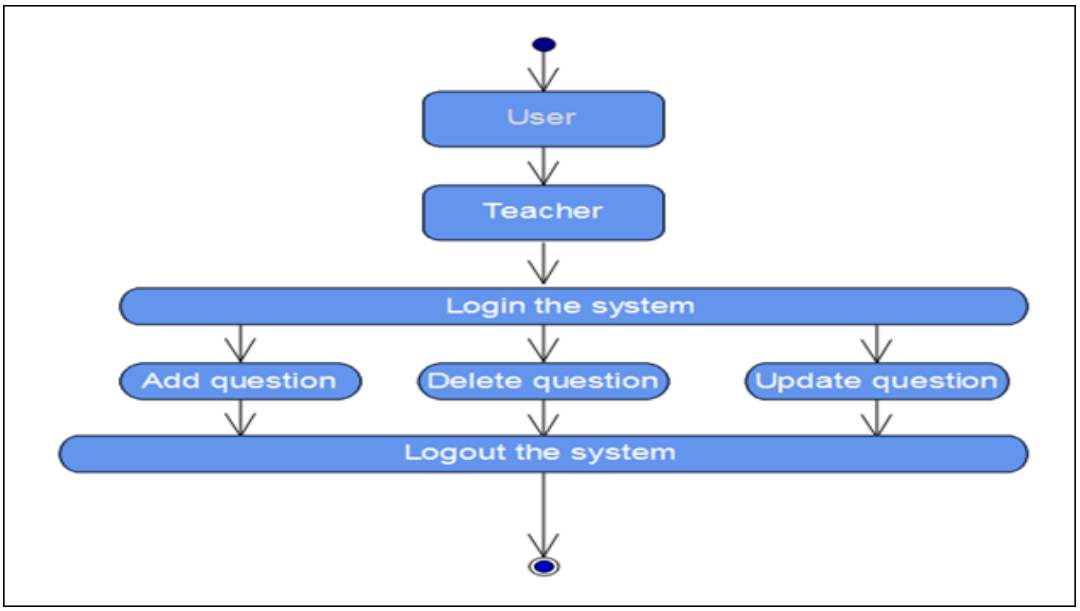

Figure 4.9 Activity Diagram for Teacher

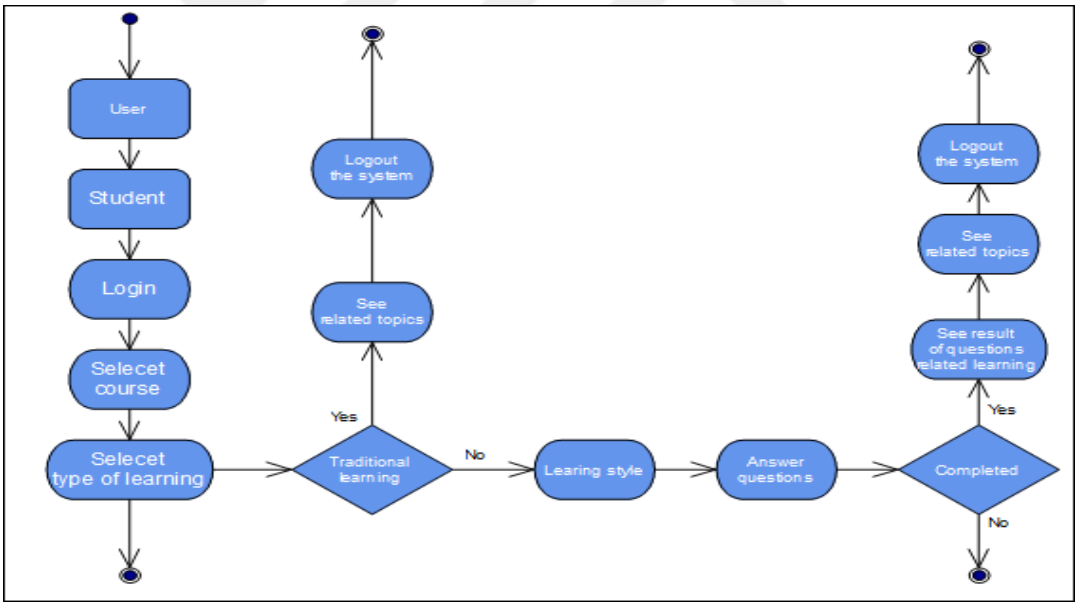

Figure 4.10 Activity Diagram for Student

4.9 Notepad++

Notepad ++ is an intelligent editor of source codes for Operating System of Windows. Notepad ++ can be utilized with a collection of several programming languages. Notepad++ is text editor utilized in Web development. Notepad ++ has

much features over traditional (Notepad) which it the built-in text editor in Windows like tabbed editing support and permits the user being able to edit a number of code documents in the same time [30].

Attractive characteristics' of Notepad++:

- Syntax highlighting: notepad ++ can recognize where the main HTML and put different types of terms in different colors. For example, blue is served all HTML tags and text in black, making it easy to see if you have made certain types of errors, such as forgetting to end the mark. Note that the colors are not saved in the document. Coloring features are there to help you understand the code.
- Several documents: you'll often wish to use a document further than one at a time. In the same time, you can have several diverse documents in memory.
- Multi-language support: offline support, your pages consist of nothing but XHTML. Soon enough, you'll use some other languages, such as SQL, CSS, and PHP. Notepad ++ is smart enough to distinguish these languages, too.
- Macros: when you find yourself doing something over and over, and consider writing a macro keyboard. Notepad ++ has a wonderful macro feature. Macros are easy to record and play back a series of keystrokes, which give you the ability to keep a lot of work.
- Page Preview: after you write a page, test it. Notepad ++ and shortcut keys built in to allow you to quickly view your page in Internet Explorer (the Ctrl + Alt + Shift + I) and Firefox (the Ctrl + Alt + Shift + X).
- Text FX: the design of Notepad ++ editor which is an open source, makes it easy features adding. Extend Text FX (built-in Notepad ++) let you to make all forms of pleasant things. One group, especially in the hand of tools works uncluttered HTML on your page and fixes any problems [26].

4.10 XAMPP Web Servers

XAMPP is light and small Apache web server that contains the further most public web development techniques in one distribution package. The portability and small

size of its contents, makes it best tool for students to test after develop applications in PHP and My SQL.As the name indicates, the light version is a small package containing the MySQL server, PhpMyAdmin or , Apache HTTP web Server, PHP, SQLite database, and Open SSL [40].

XAMPP offers the ability to develop PHP applications and scripts from the server based on the Pearl without the need for a web server remotely, and offer you the opportunity to work faster, put things safer, and work on your own applications without need for existing of any internet connection [41].

4.11 PHP

PHP is a server-side and scripting language particularly suitable for the development of the applications of web, this refers to that it is operates generally on the web server. Any PHP code is needed to be executed by PHP runtime file, and it often times used to create content of dynamic web page. PHP is the main common language for communicate with the MySQL database server, Dreamweaver takes care of much of the complex coding on behalf by offering an extensive suite of behaviors of server.

PHP language used on many platforms and heterogeneous operating systems, many web servers, it also could be utilized with several management systems of relational database. It is available for free, and provides full range PHP source users to build code, customize and expand their private use [38].

4.12 MYSQL Database Server

Structured Query Language (SQL) is the language of relational data bases, the system data base management server casts a smulti-user provided access to several of databases server. MySQL is a common option from data base servers for utilize in Web based applications, a key part of the vastly used application on the internet LAMP. The software stack of LAMP is an acronym for Linux, Apache, MySQL, and PHP. Its popularity came from that is widely related to the popularity of PHP [38].

MySQL and PHP work very well jointly. This vital partnership is what makes MySQL and PHP attractive to be used to develop database applications on the web.

MySQL currently used by several of the World Wide Web's (WWW) further most repeatedly visited web sites. The MySQL can be constructed manually and install from source code, but this can be boring even be installed additional common than bilateral deal unless it is asked for allocations. A number of the MySQL's to appeal invents in its relative easiness of use and simplicity, which enabled the ecosystem of open source tools such as phpMyAdmin [38].

4.13 Advantages of Using PHP/MYSQL

All programming languages supported by perfect Dreamweaver, however, it's a good idea to select one and get to know them quite well. Once you have become adept at the language from a single server-side, it can be found to move to another much easier, because it is a server-side technology in the same website, as long as the server depends on it [38].

The good features of PHP make it the most commonly obtainable server-side language on the web. MySQL is also hypothetical to be the further most general open source database server, as PHP language in a server-side; it requirements to work in link with a web server. Further often than not, found that it in combination with Apache, the software that runs further than two out of every three web servers .Apache, PHP, and MySQL that every operating system can execute them[38].

4.14 PhpMyAdmin

XAMPP contains an application called phpMyAdmin, which allows developers to maintain and manage MySQL data bases. Database management tools and exactly the type of application you need. And it can perform a lot of tasks such as changing the structure of the database, create new tables and modify old. You can also query the database and get all the different types of information about what is currently contains. PhpMyAdmin is exactly one of these database management tools. Web PHP is being developed as an application so that it runs in your browser. It is designed for use with the MySQL database management system [27].

4.15 Properties of System

4.15.1 User Page Layout

To outline a supportive adaptive learning system with a specific end goal to make simplicity to the client, the system is created by utilizing Notepad++ and XAMPP server interfacing with database that is using 'PHP' language as the dialect or guideline of the system. **Figure 4.11** show adaptive learning style system first page. This page includes picture of ATILIM UNIVERSTY and some information about ATILIM UNIVERSITY.

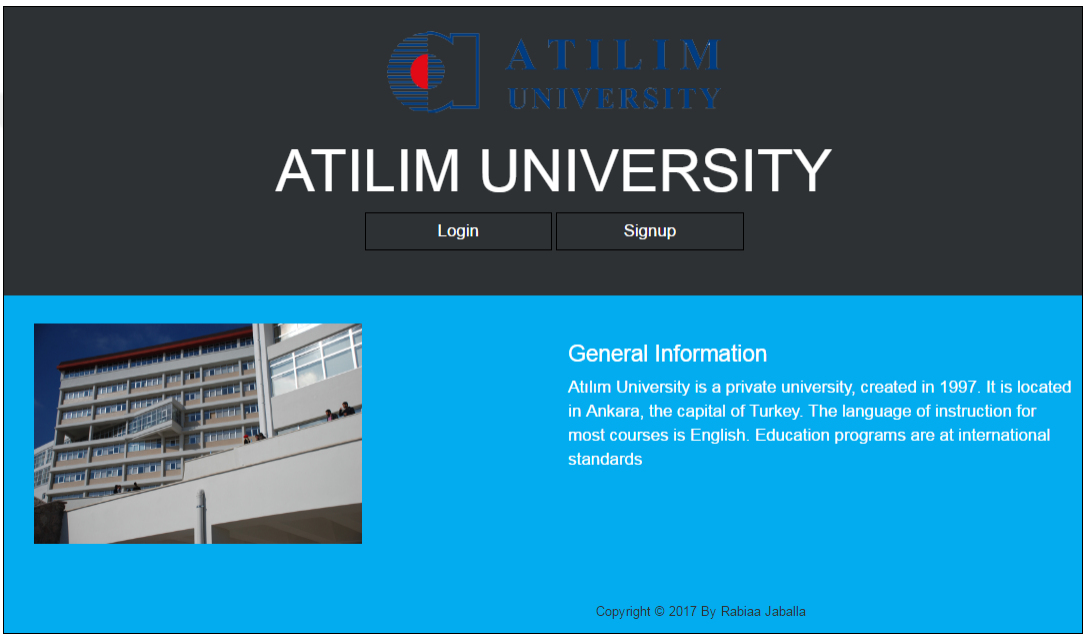

Figure 4.11 Starting page of system

Figure 4.12 shows that users as student or teacher can record and go in to system with links of "Sign Up" and "Log In"

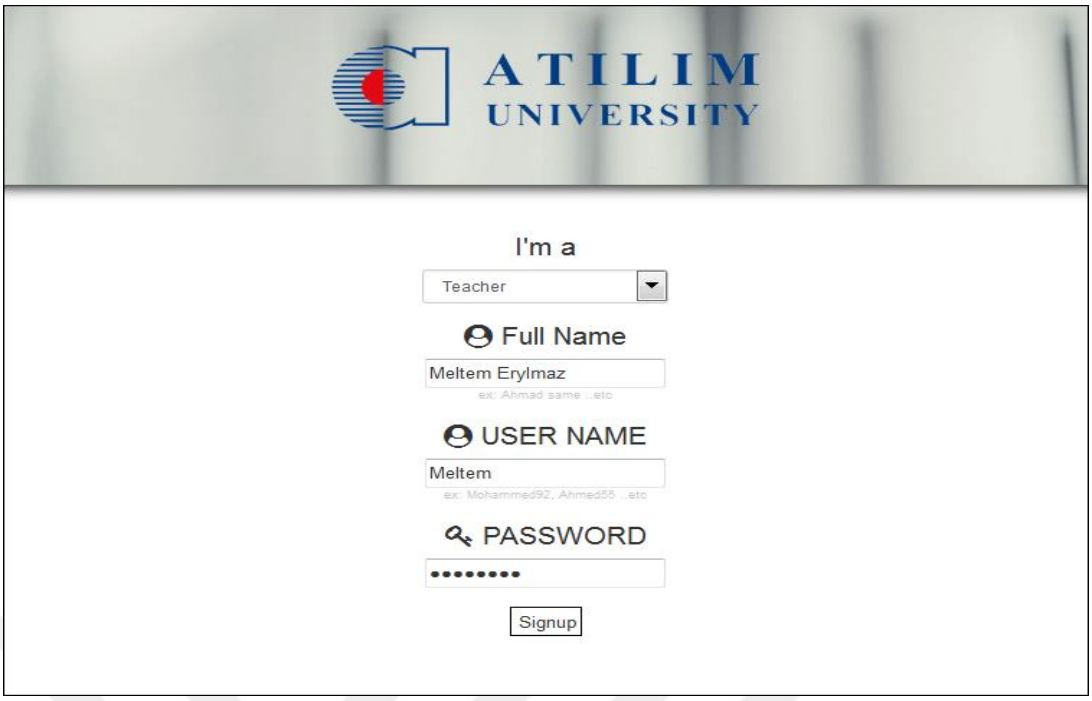

Figure 4.12 Sign up page

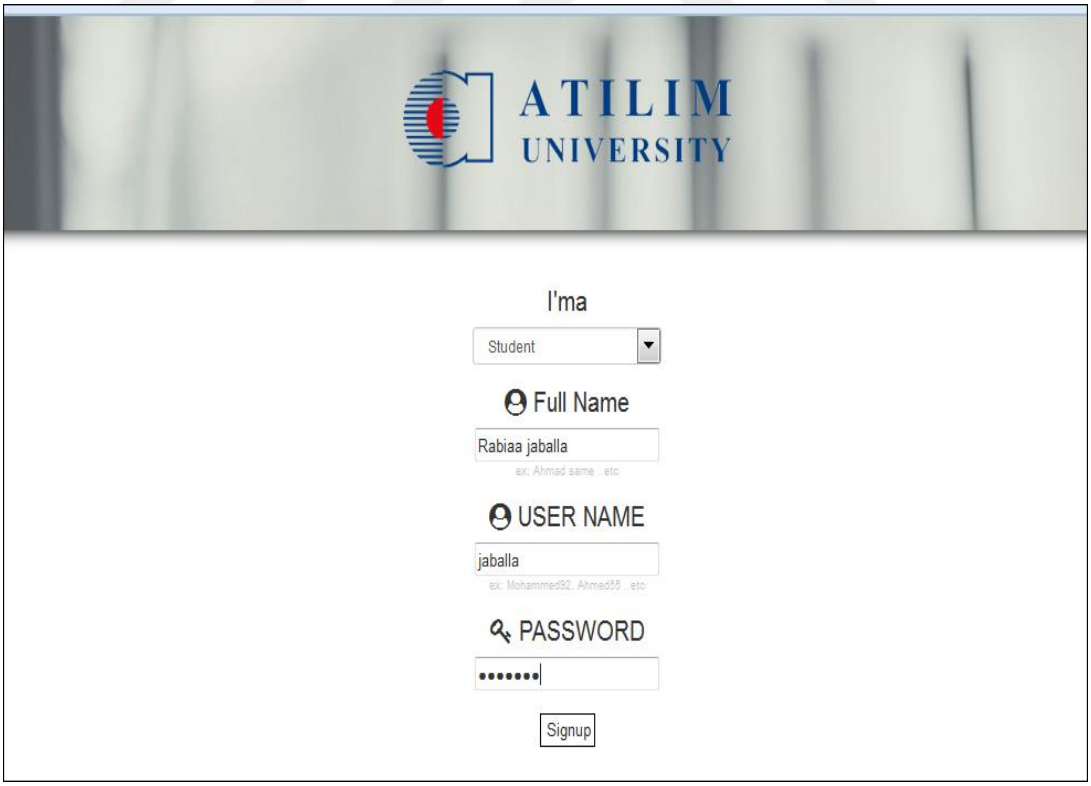

Figure 4.13 Sign up page

4.15.2 Student Module

Figure 4.14 show that when students click the button of "Log in", system will direct login page.

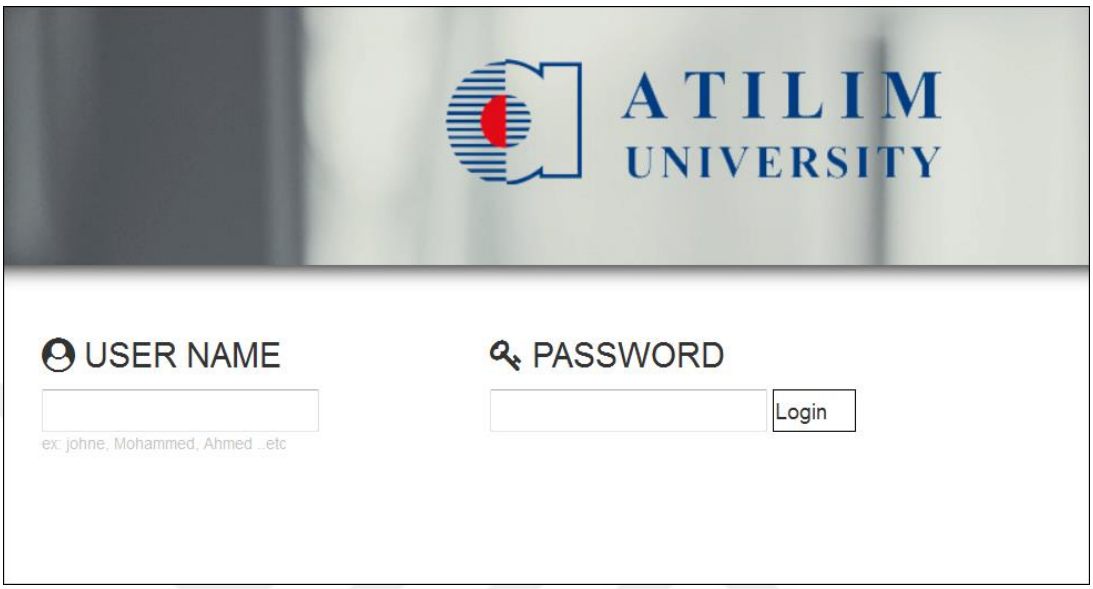

Figure 4.14 Log in page for student

Figure 4.15 show that when students enter their username and password after that click the "Log in", system will direct their courses page.

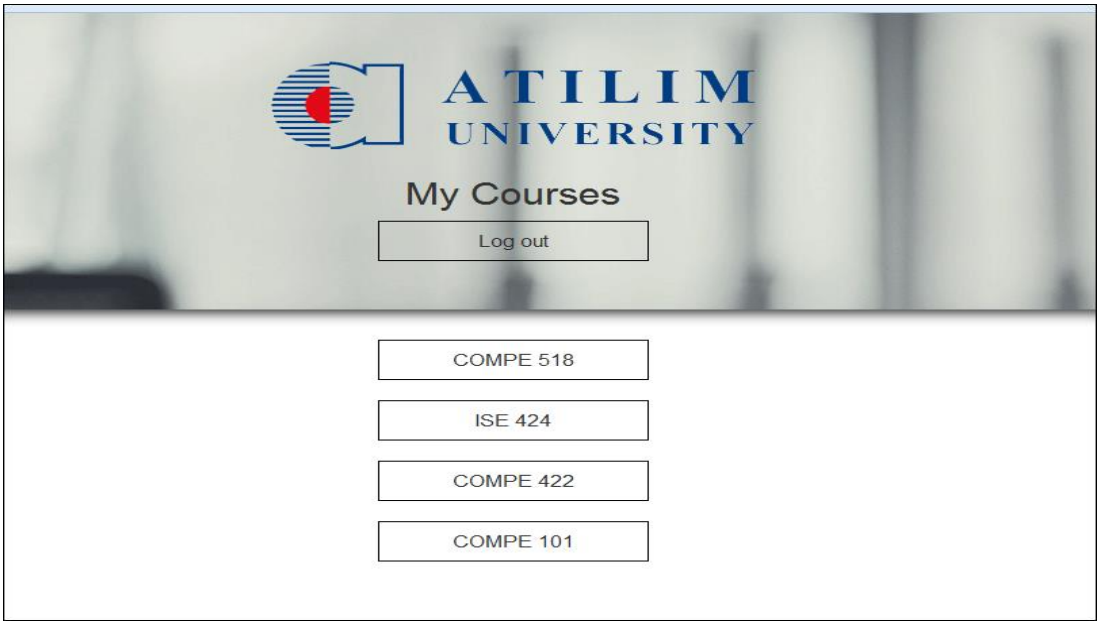

Figure 4.15 Student's courses page

When students click the bottom of course, directly system give student's learning type page as shown in **Figure 4.16.**Students choose the type of learning they prefer and their study course .The system contain two types of learning, traditional learning, style learning. If student don't have any prefer of preference, they can learn by traditional learning .In this type of learning the topics are prepare by traditional way.

Figure 4.16 Student's learning page

When students click the links of traditional learning, directly system will give students page course topics, as shown in Figure **4.17**.

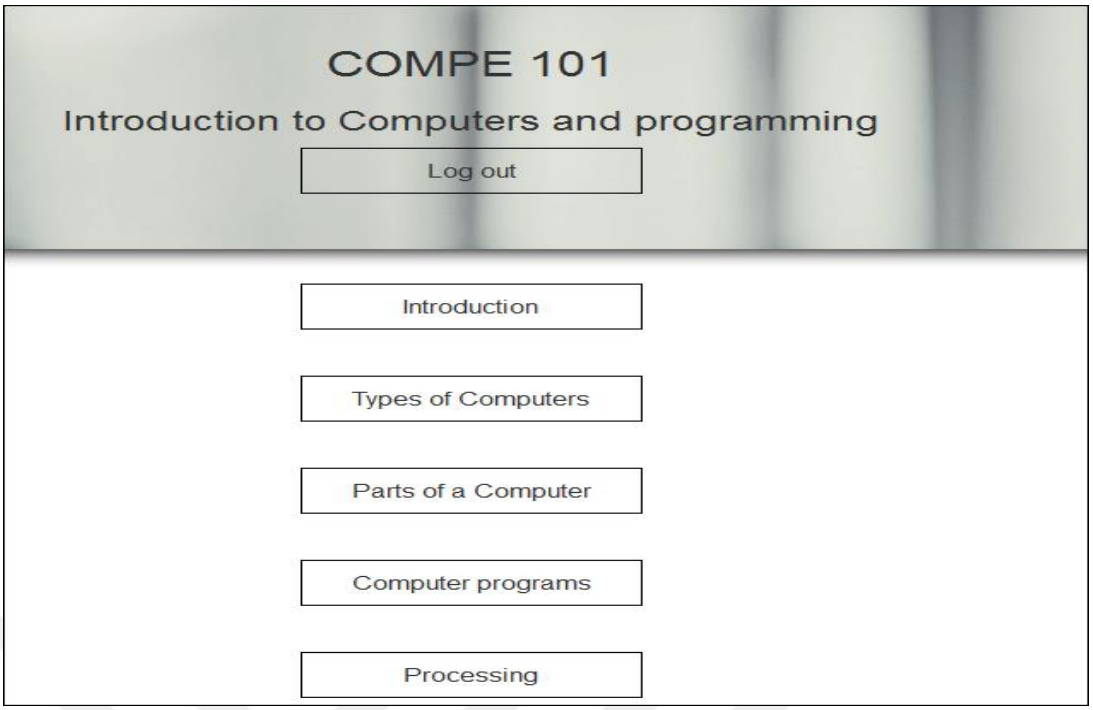

Figure 4.17 Student's courses page

When students click traditional learning bottom details of courses will show. These details include some parts of course such as courses' topic detail, as shown in **Figure 4.18**.

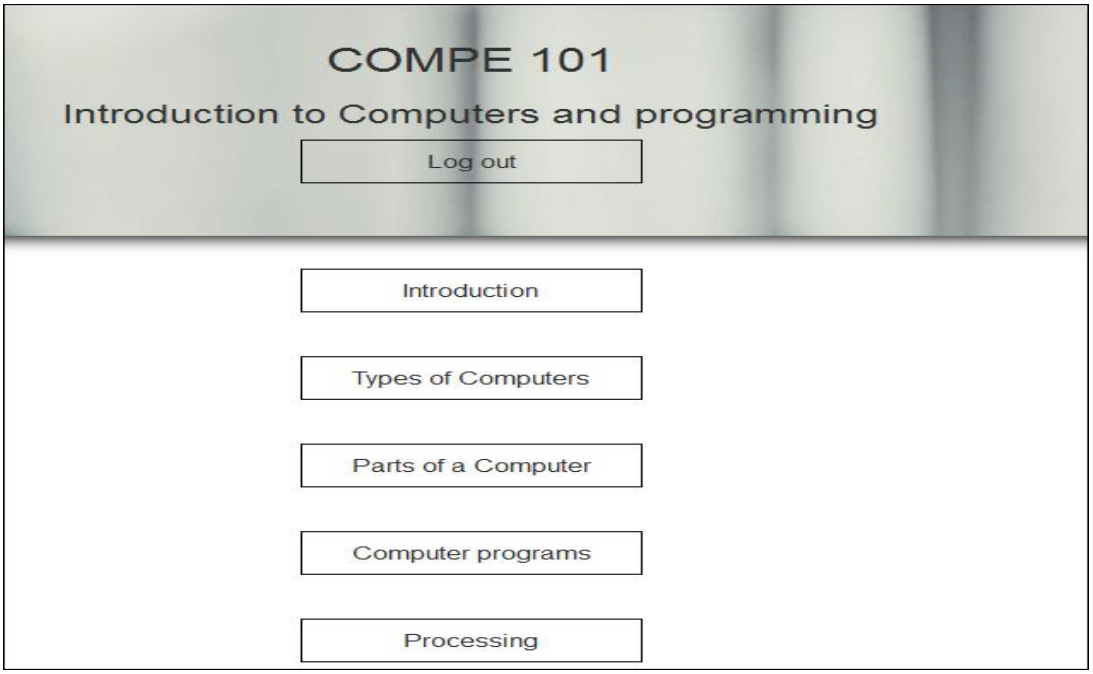

Figure 4.18 Student's courses page

For example, If the students click links topic' types of computers, topic' details will appear. It is shown **Figure 4.19, Figure 4.20**

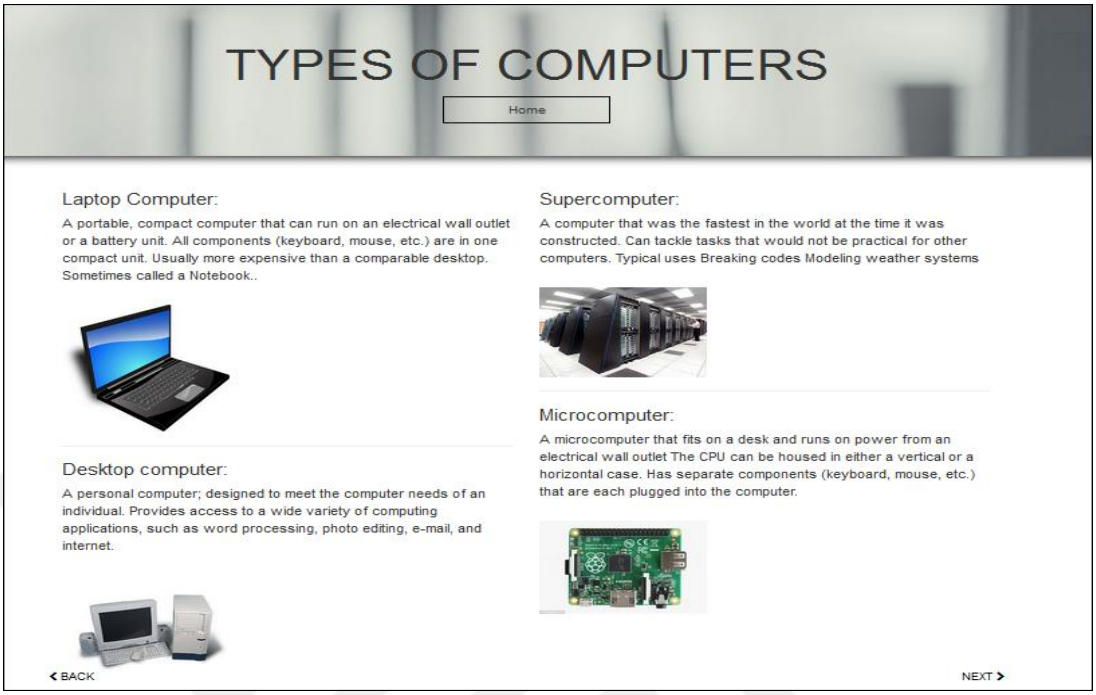

Figure 4.19 Topic' details page

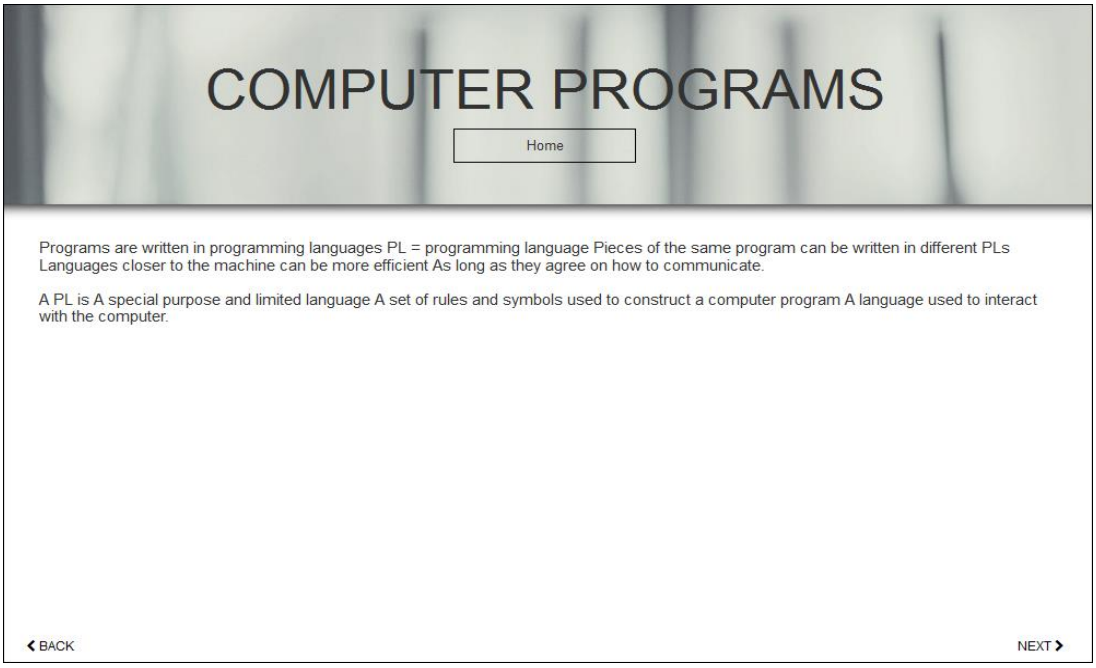

Figure 4.20 Topic' details page

When student click on the links of learning style, system will direct to student questions page. The student must answer the questions for define their learning style.

The system contains a set of multiple questions based on VARK model, for these questions students can choose one or more than one answer for each question. Modes of VARK model are: Visual, Aural, Read/Writer, and Kinesthetic.

If the students prefer learning by Visual mode he/she will choose visual option. It is shown in **Figure 4.21**, **Figure 4.22**, **Figure 4.23**, **Figure 4.24**, and **Figure 4.25**.

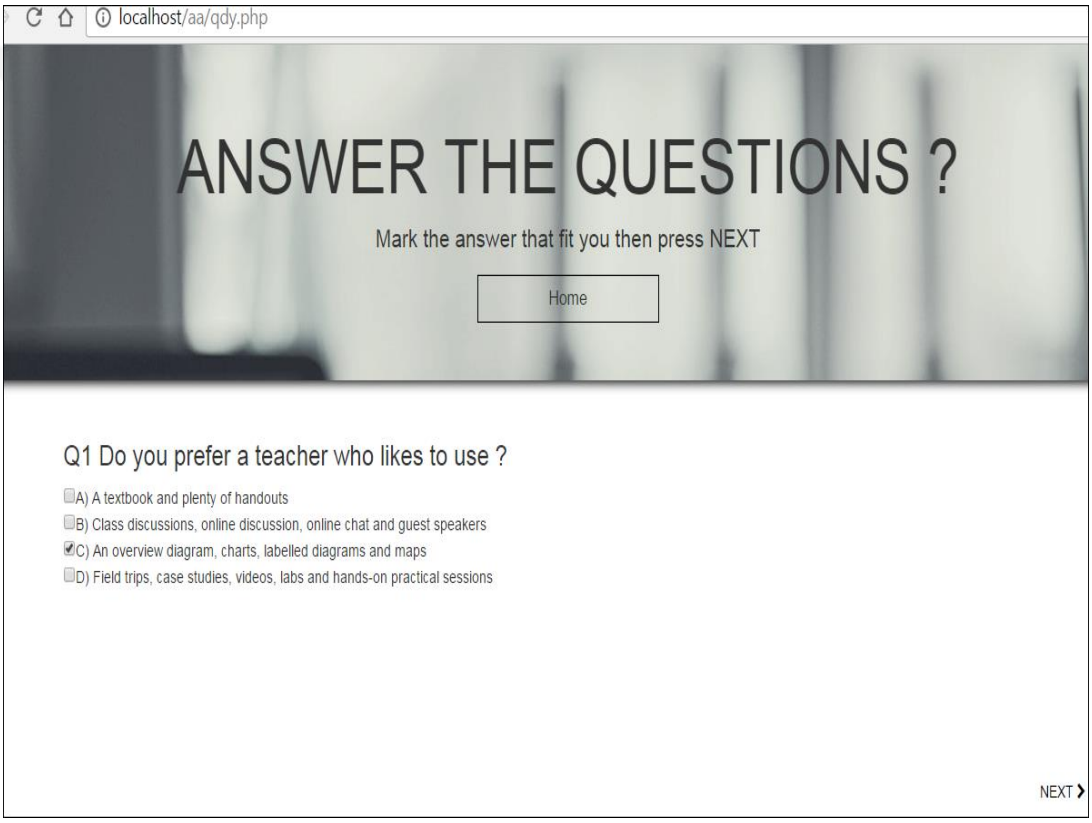

Figure 4.21 Student's questions page

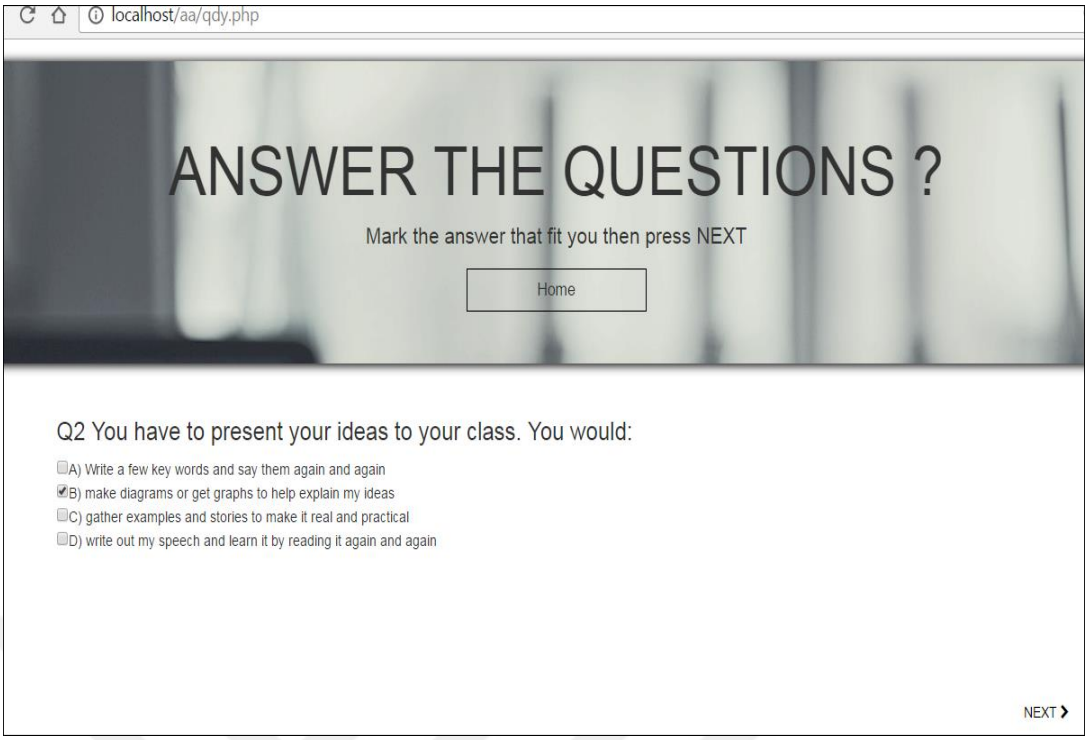

Figure 4.22 Student's questions page

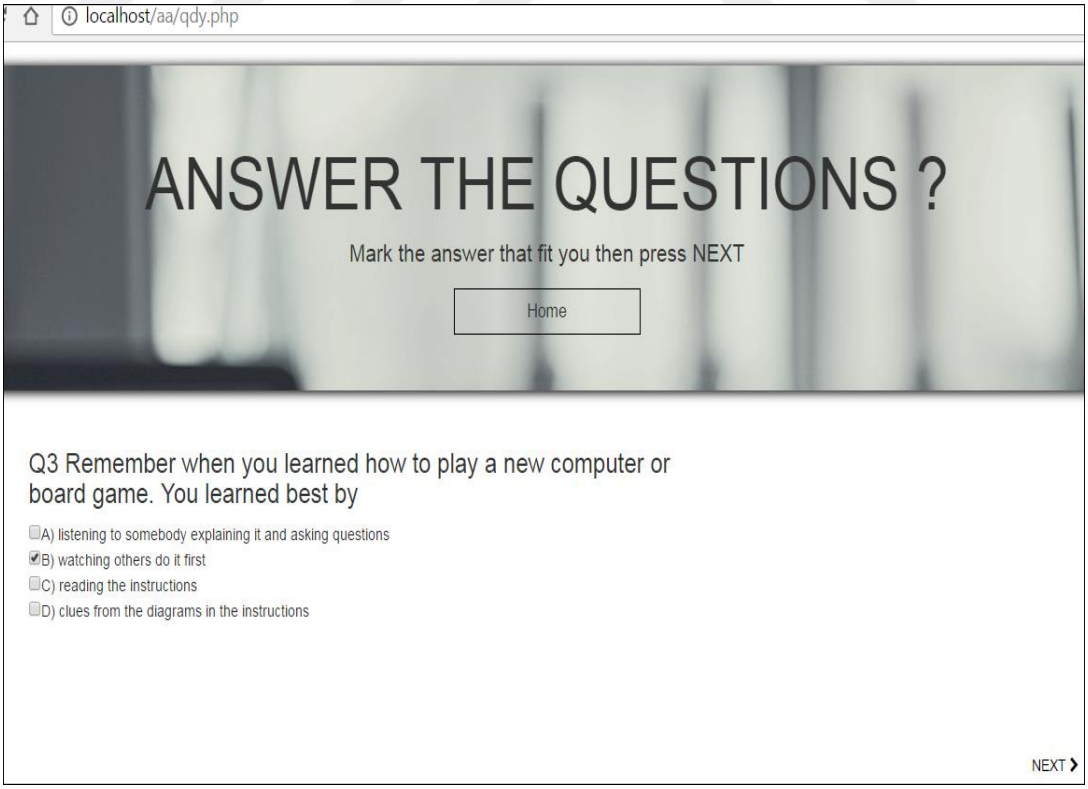

Figure 4.23 Student's questions page

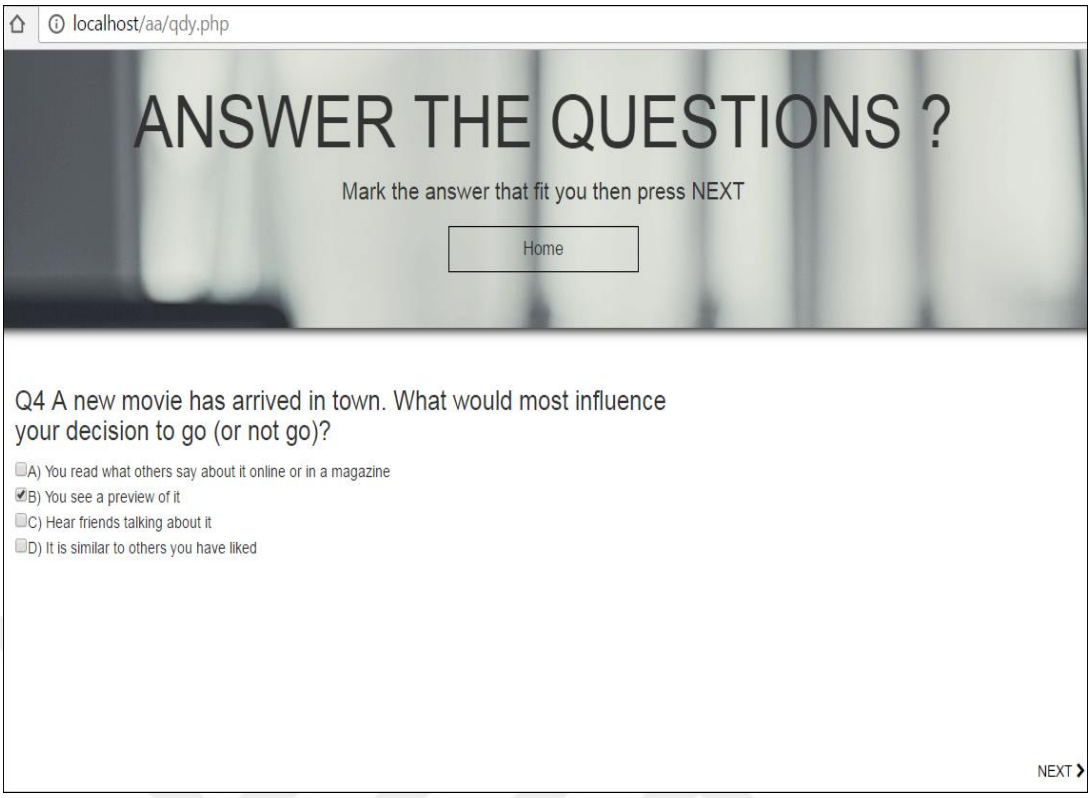

Figure 4.24 Student's questions page

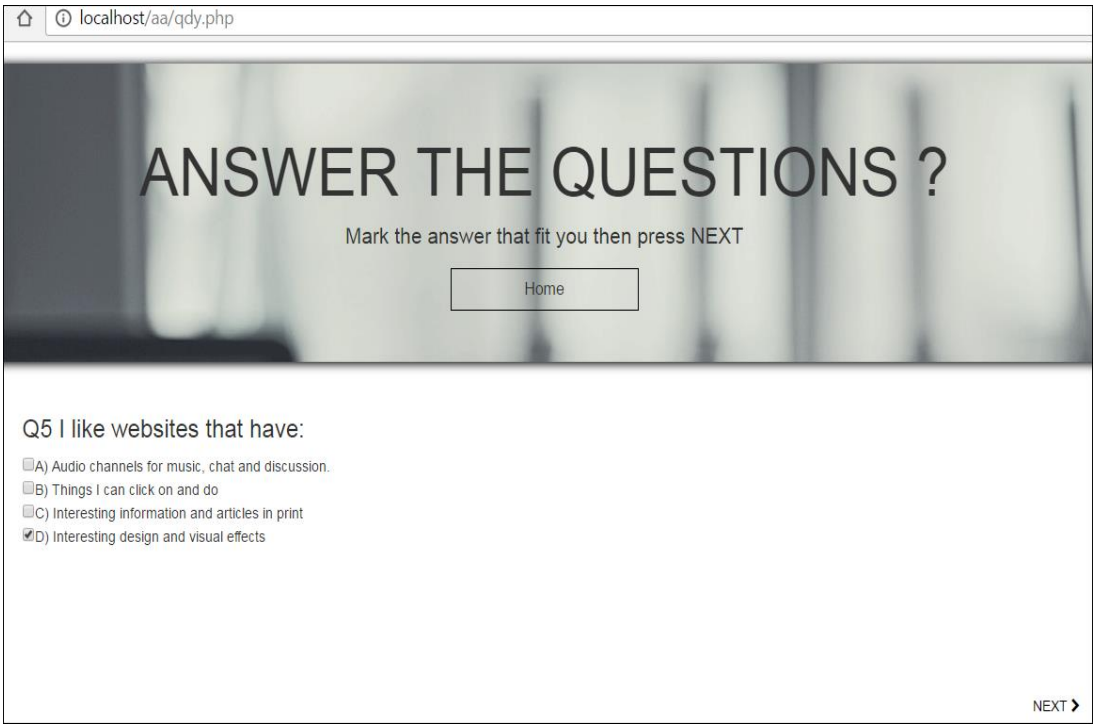

Figure 4.25 Student's questions page

When studentes complete the answers of all quetions ,the system will gives result related learning style of the students . It is shown in **Figure 4.26.**

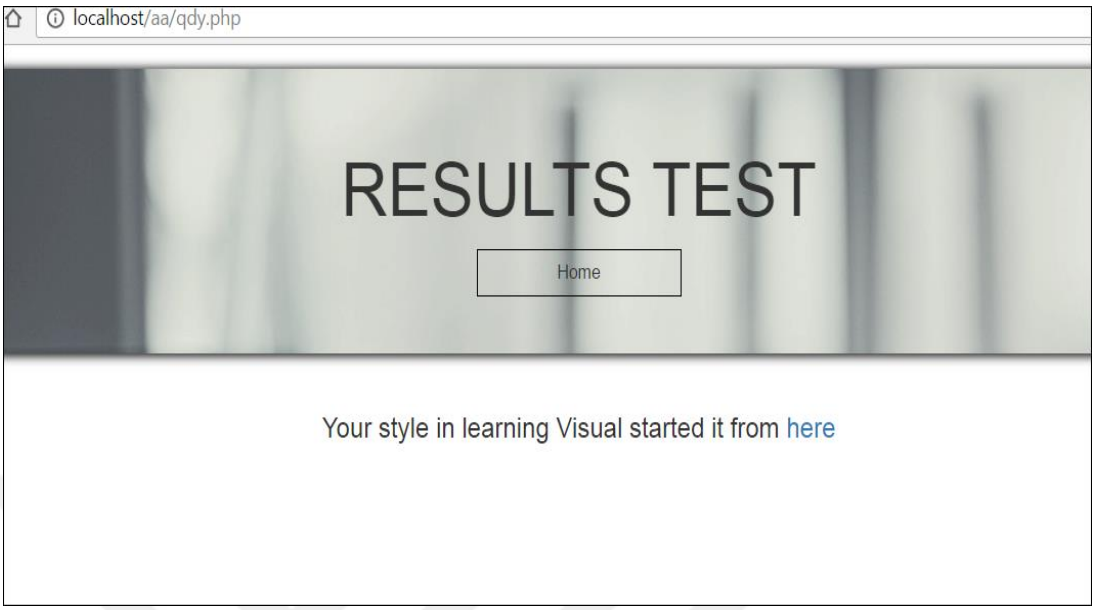

Figure 4.26 Student's result of test page

PHP code which used to create these questions that are used in system, is given in **Figure 4.27**with this code that is written using Notepad++, the system gives result related to the student's type learning style.

```
page01.php  qpage02.php
22      <link rel="stylesheet" href="style.css">
23
24          <form action='kpage17.php' method='POST' name='go17'>
25              <input type='hidden' name='ses' value='<?php echo $ses;?>' />
26          </form>
27  </head>
28      <body>
29          <div id="MainDiv" class="jumbotron text-center">
30              <h1 class="Title01">Answer the Questions ?</h1>
31              <p>Mark the answer that fit you then press NEXT</p>
32              <button class="Btn01" onClick="document.forms['go17'].submit();" type="button">Home</button>
33
34          </div>
35          <div class="container">
36
37                  <div class="col-md-8 col-centered">
38              <h3>Q1.Do you prefer a teacher who likes to use:</h3>
39                <form action='qpage03.php' method='POST' name='qform'>
40
41                <input type='hidden' name='ses' value='<?php echo $ses;?>' />
42                <input type="checkbox"  name="o1">A) A textbook and plenty of handouts.<br>
43                <input type="checkbox"  name="o2">B) Class discussions, online discussion, online chat and guest speakers.<br>
44                <input type="checkbox"  name="o3">C) An overview diagram, charts, labelled diagrams and maps.<br>
45                <input type="checkbox"  name="o4">D) Field trips, case studies, videos, labs and hands-on practical sessions.<br>
46
47          </div>
48
```

Figure 4.27 Questions PHP code.

When students click the links of here in result page, system will direct course's topics related visual learning page. It is shown in **Figure 4.28**.

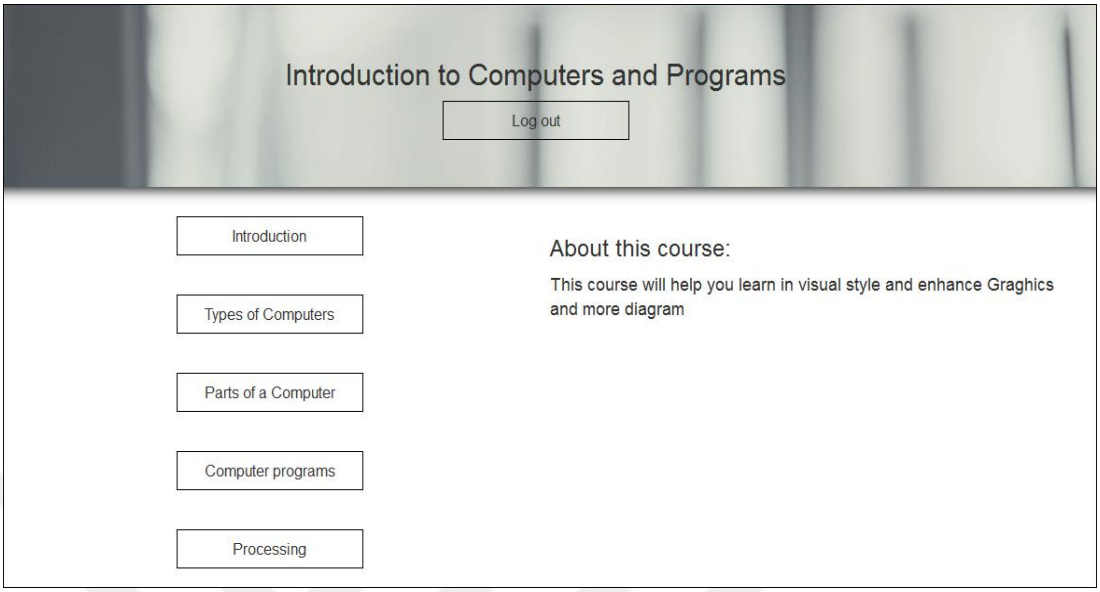

Figure 4.28 Visual learning pages

To aid with visual learning the lessons was provided by color, pictures, diagrams, and video .With this option the learners can take lessons by see the picture, diagrams and they can watch video related the topic, as shown in **Figure 4.29, Figure 4.30.**

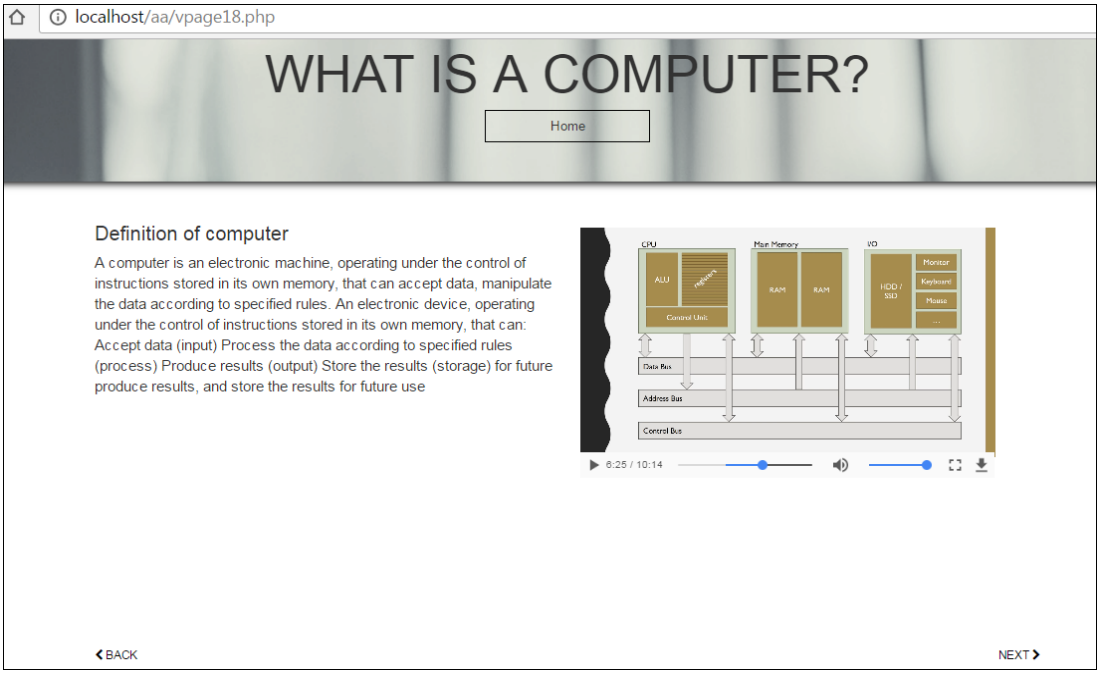

Figure 4.29 Visual learning page

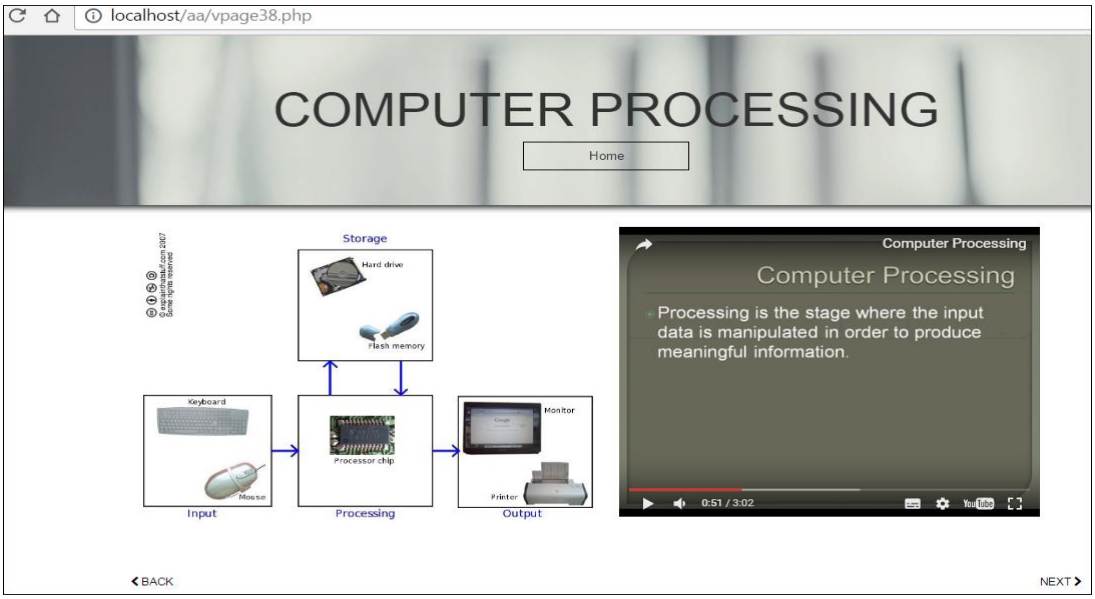

Figure 4.30 Visual learning page

If the students prefer learning by aural mode, they will answer questions by choose aural option. When studentes complete the answers of all quetions , system gives result related learning style of the students. It is shown in **Figure 4.31.** In this type of learning the topic prepared by using audio files. It is shown in **Figure 4.32** and **Figure 4.33**.

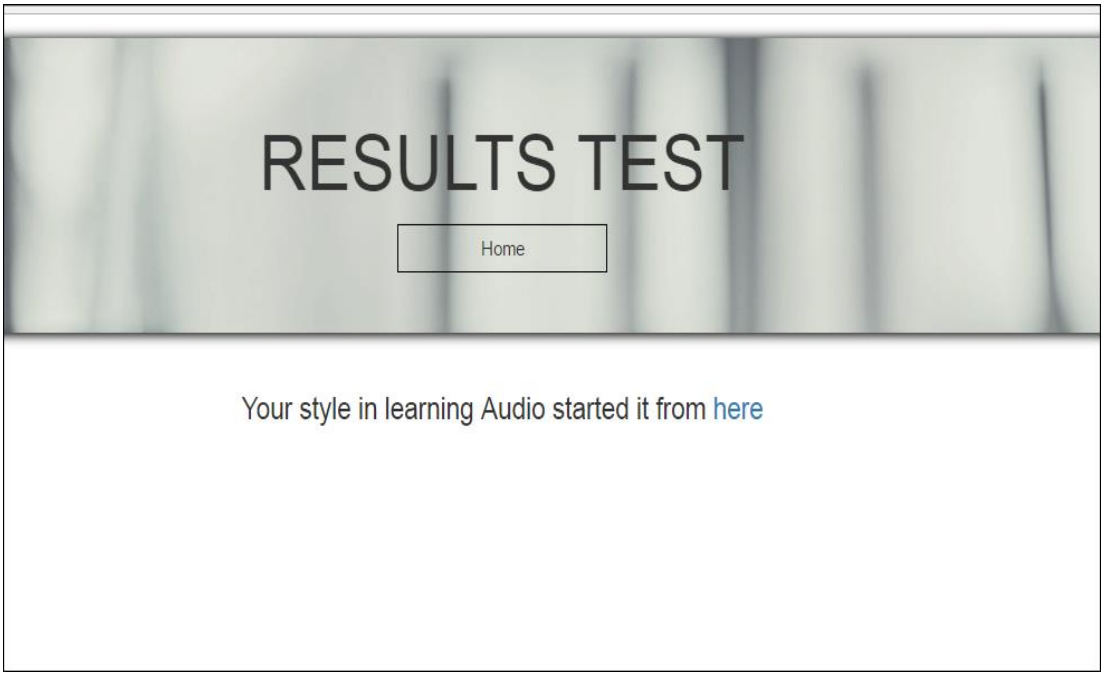

Figure 4.31 Student's result of test page

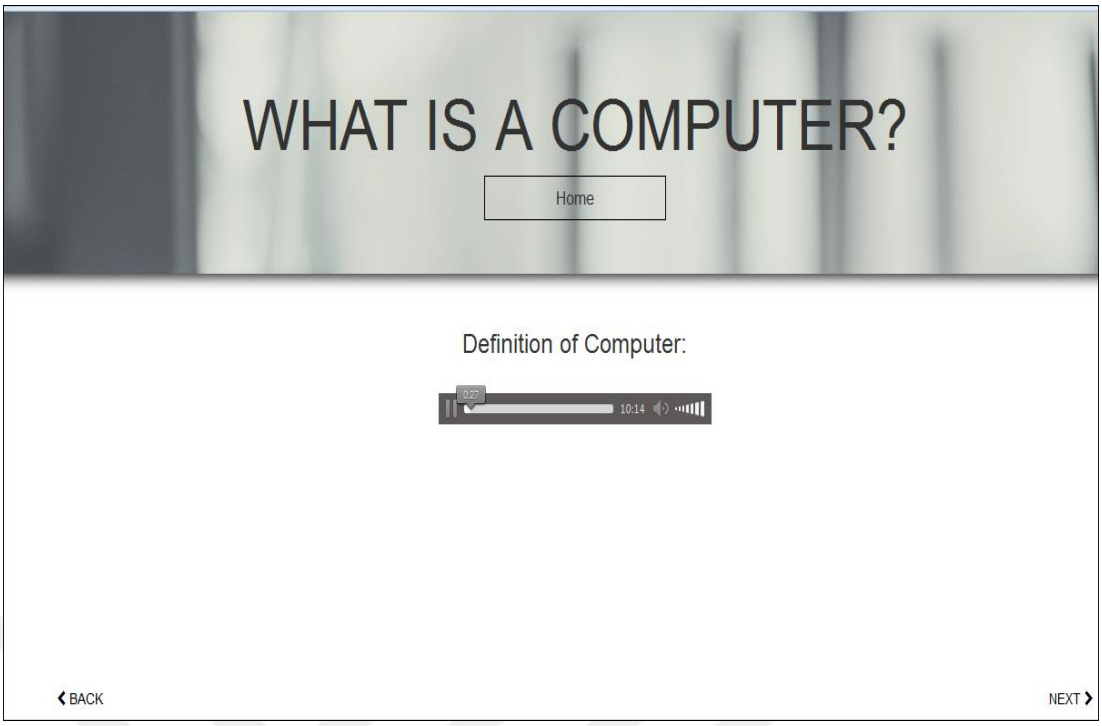

Figure 4.32 Aural learning page

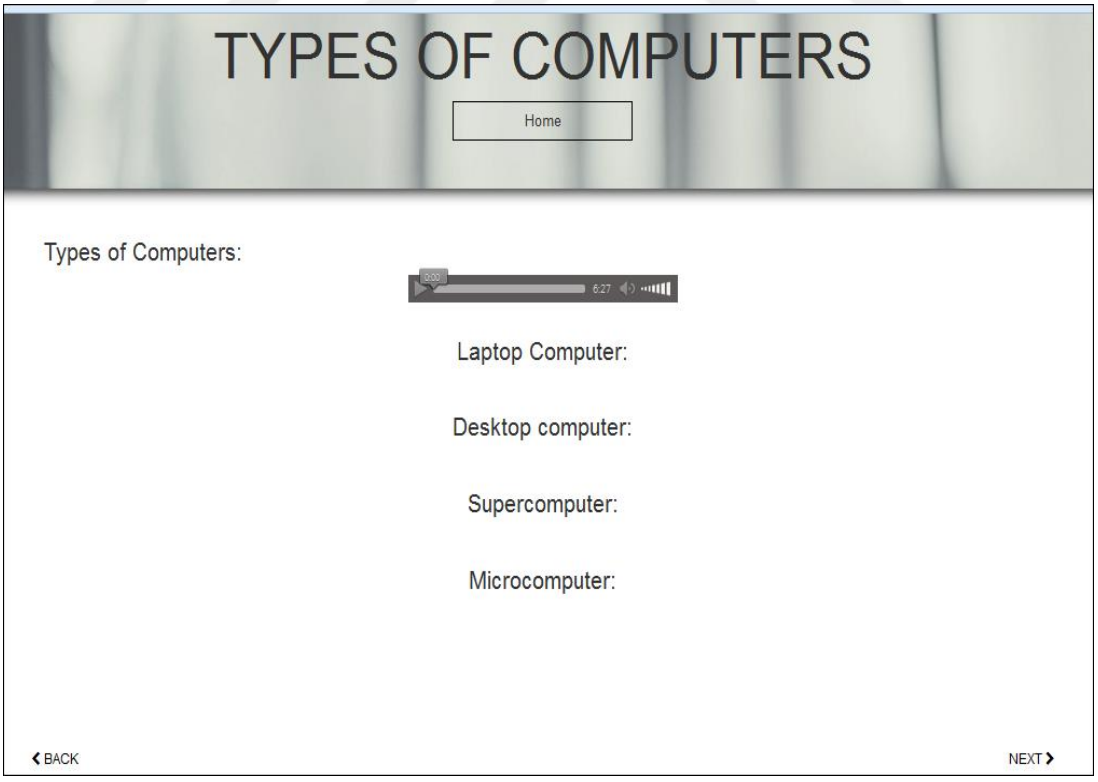

Figure 4.33 Aural learning page

If the students prefer learning by read/write mode, they will answer questions by choose read/write option. When studentes complete the answers of all quetions , system gives result related students learning style ,as shown in **Figure 4.34**.

In this type of learning the Student require to research and read by himself using Google, Wiki and then write what they learn by answering the questions, if student research and write the information ,the system check this information and then gives comment. It is shown in **Figure 4.35** and **Figure 4.36**.

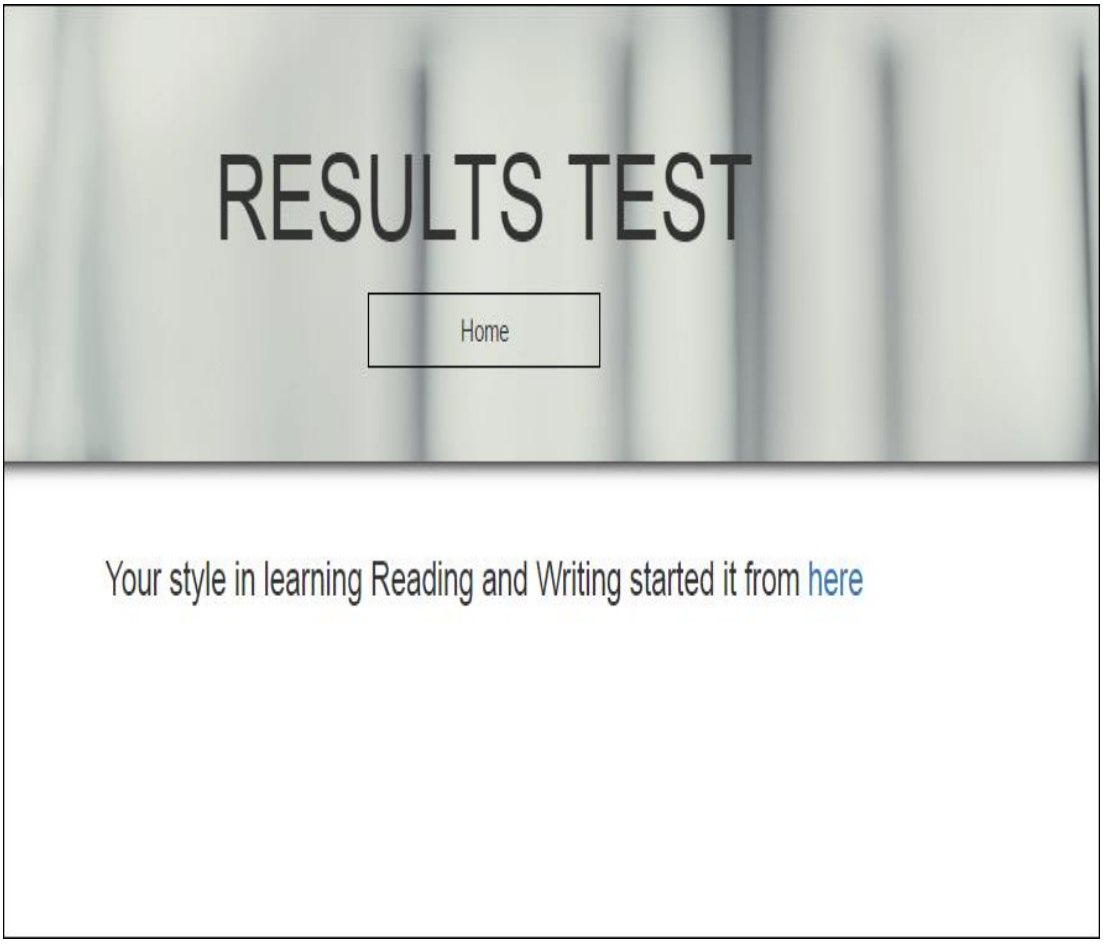

Figure 4.34 Student's result of test page

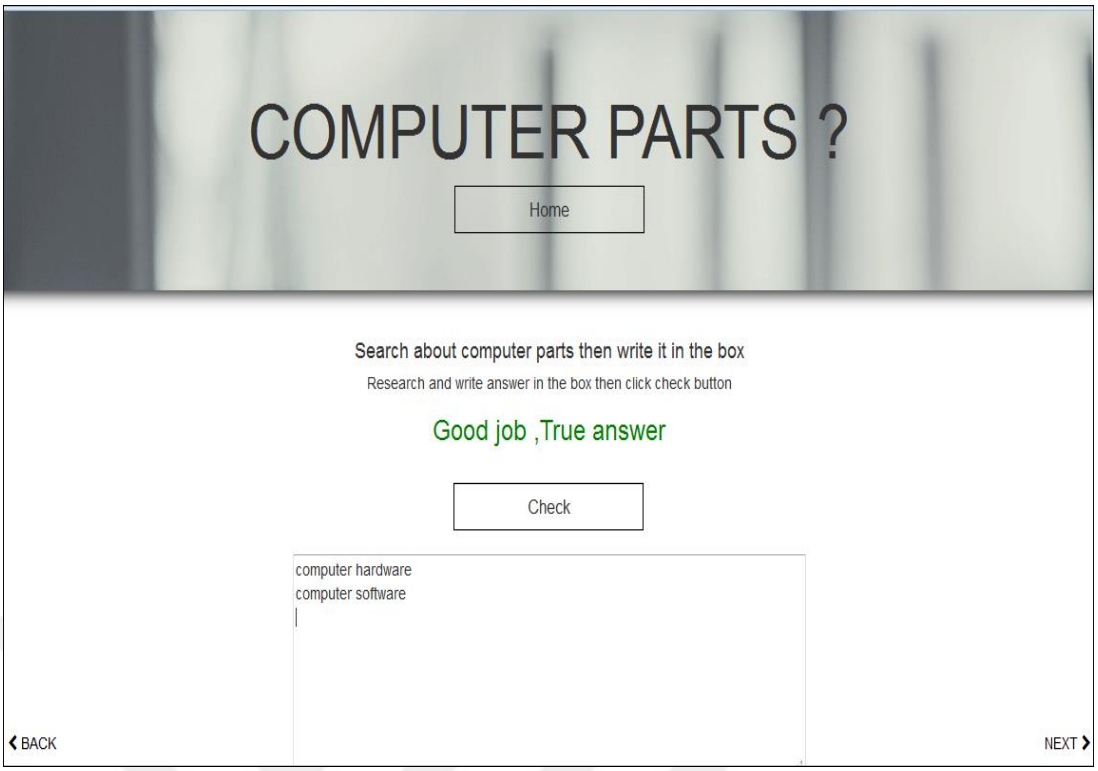

Figure 4.35 Read/write learning page

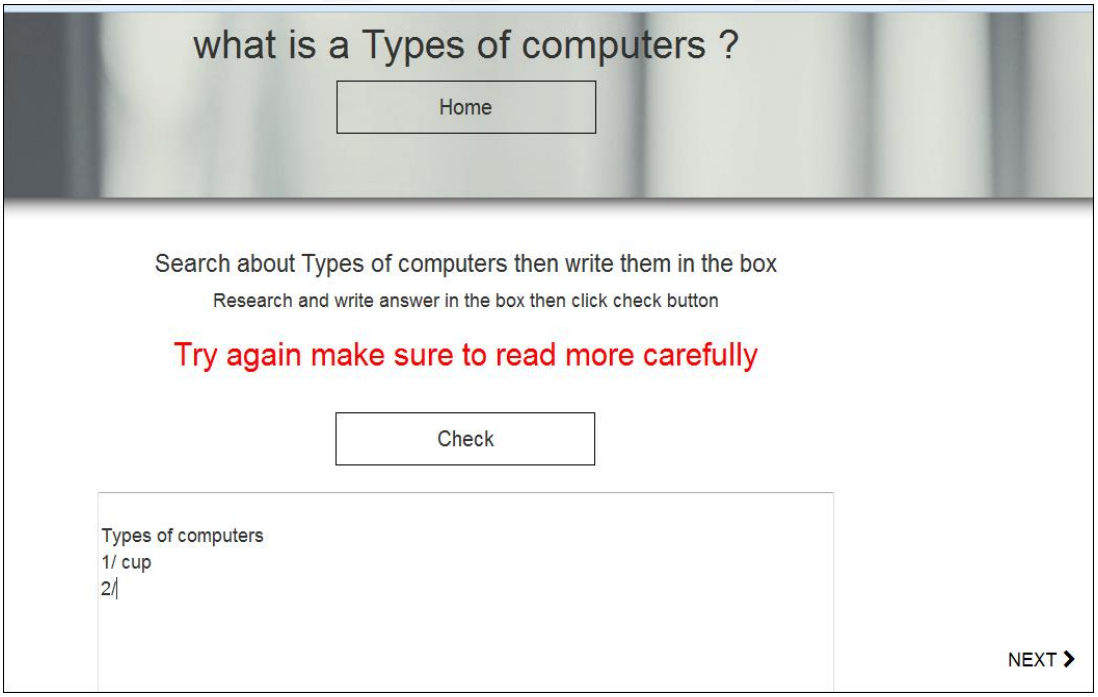

Figure 4.36 Read/write learning page

If the students prefer learning by kinesthetic mode, they will answer questions by choose kinesthetic option. When studentes complete the answers of all quetions , system gives result related kinesthetic learning style of the students. It is shown in **Figure 4.37**. In this type of learning the Students require to download PDF, print out, read it and answer the practical question related topics, as shown in **Figure 4.38**and **Figure 4.39**.

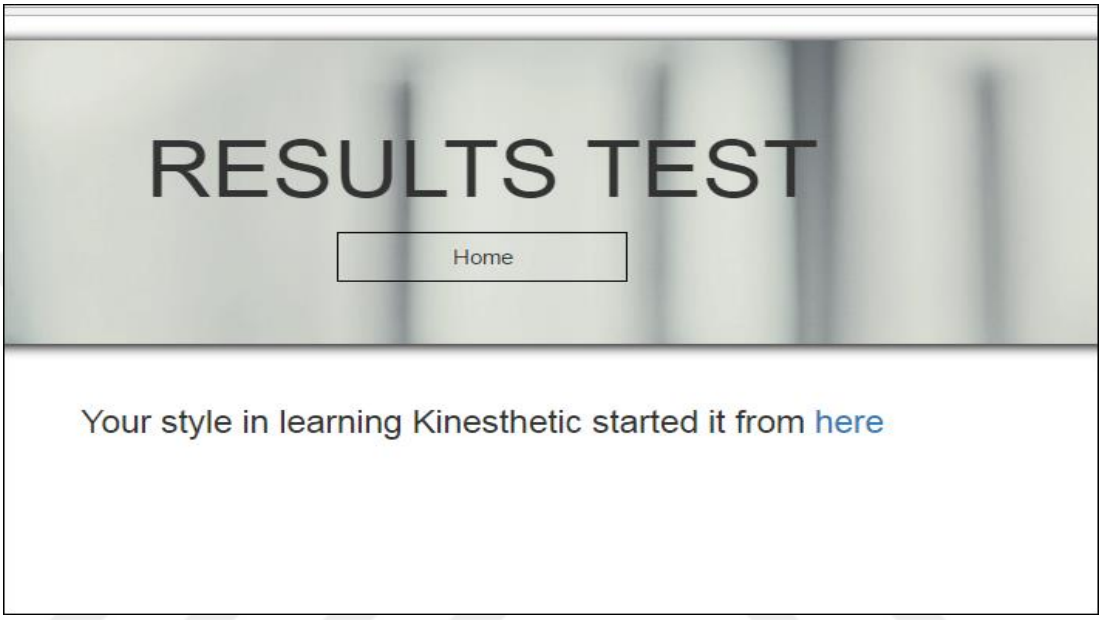

Figure 4.37 Student's result of test page

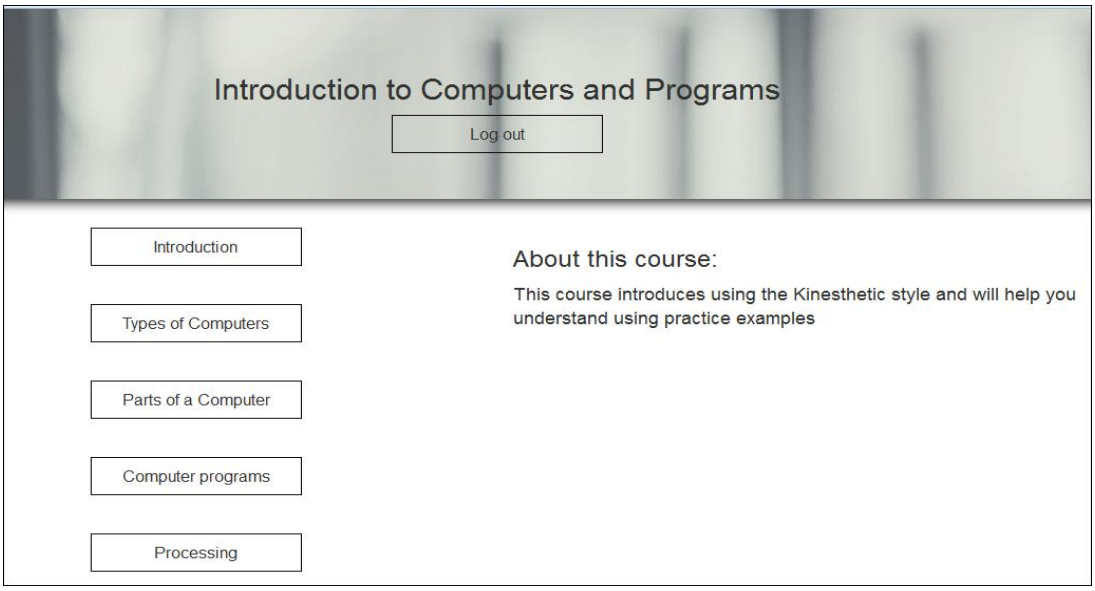

Figure 4.38 Kinesthetic learning page

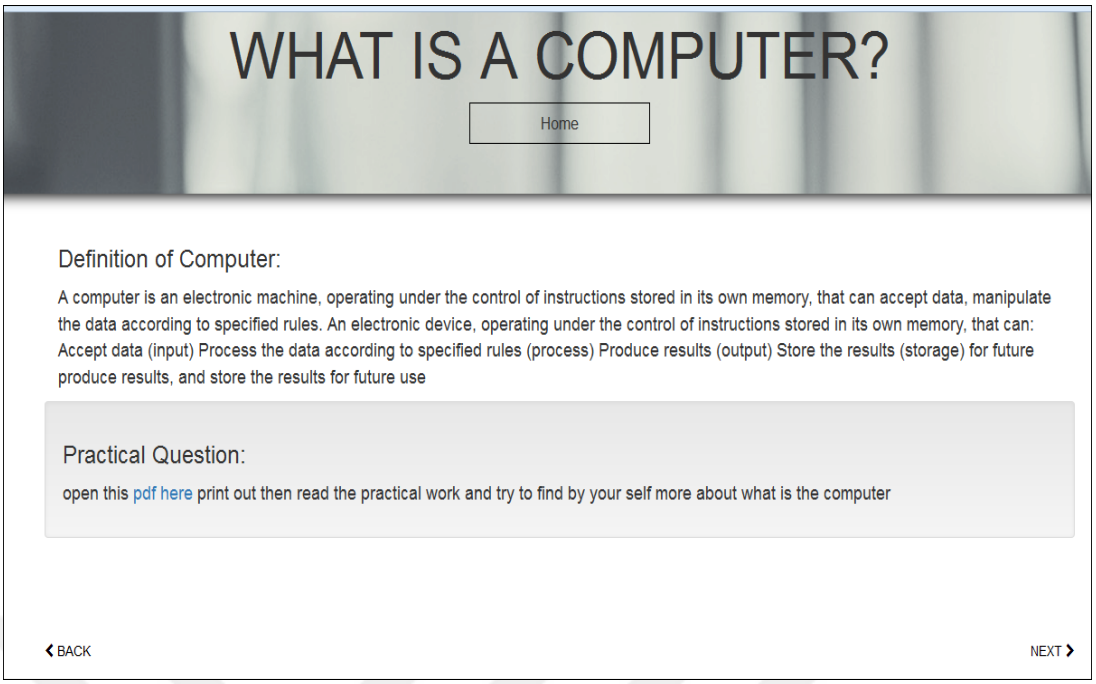

Figure 4.39 Kinesthetic learning page

Some students prefer learning by combination modes, students can answer questions by choose more than one answer of questions. It is shown in **Figure 4.40**, **Figure 4.41**, **Figure 4.42**, **Figure 4.43**, **and Figure 4.44**.

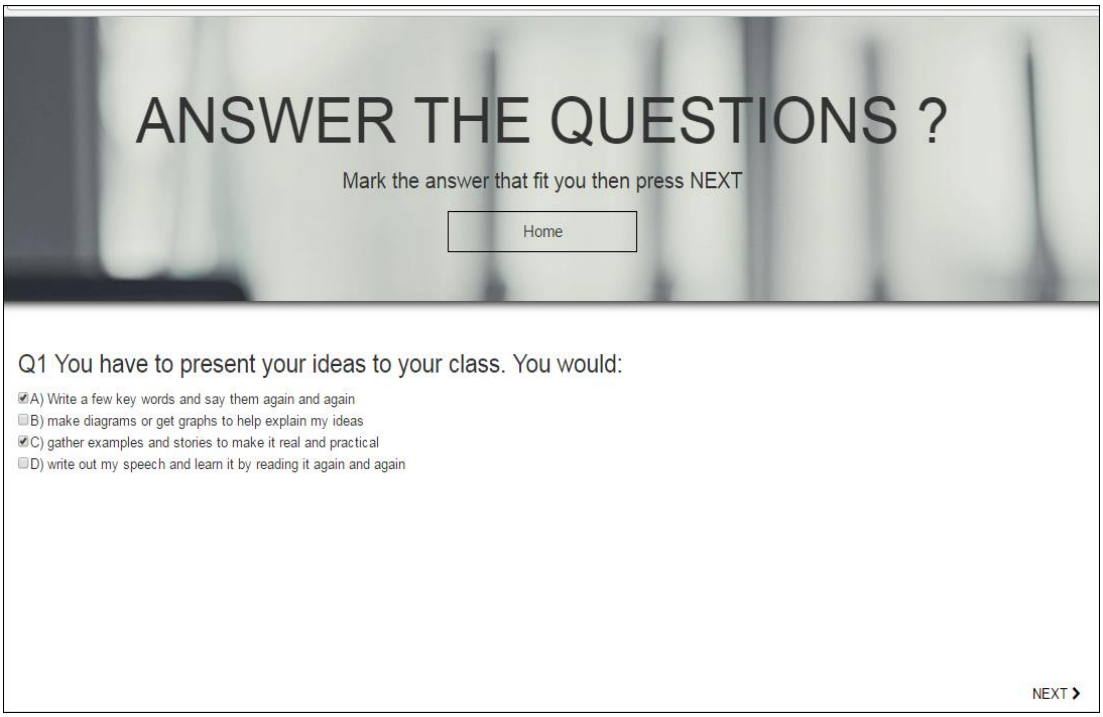

Figure 4.40 Student's questions page

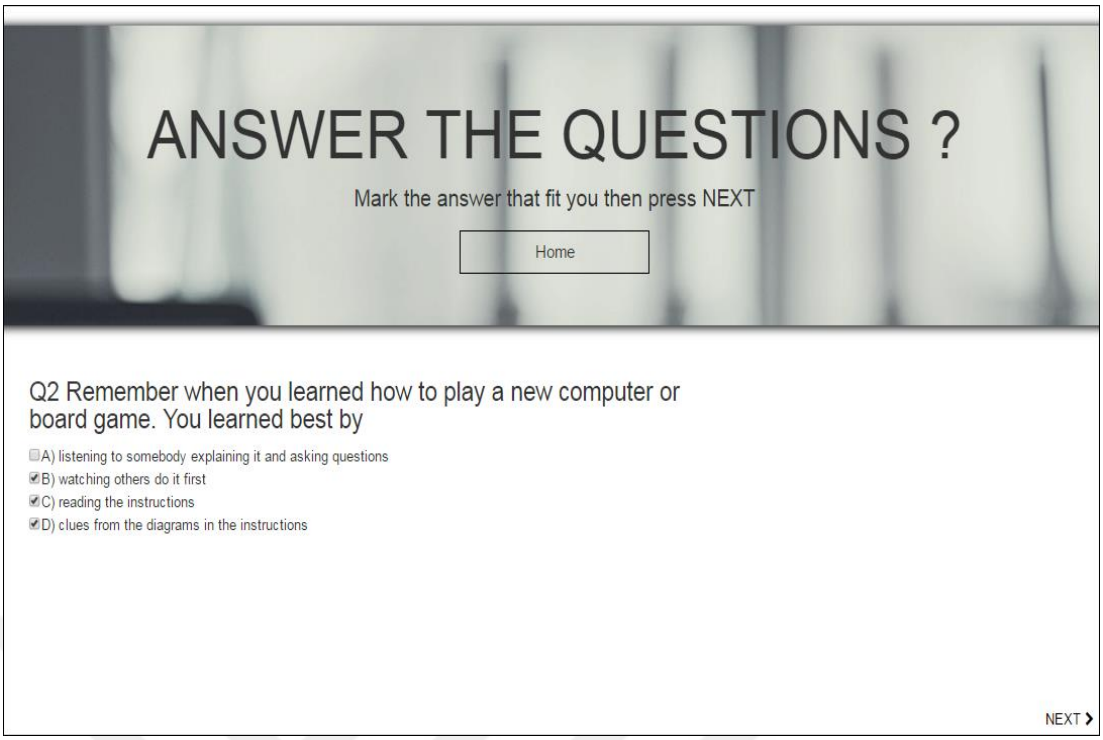

Figure 4.41 Student's questions page

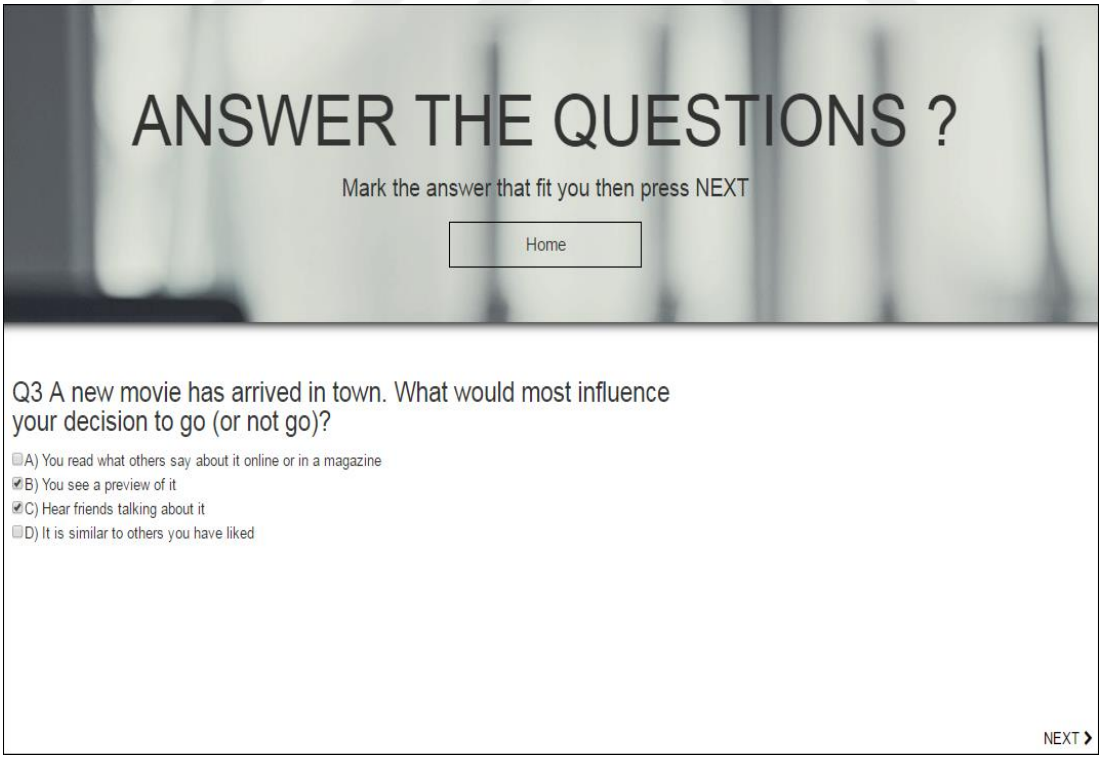

Figure 4.42 Student's questions page

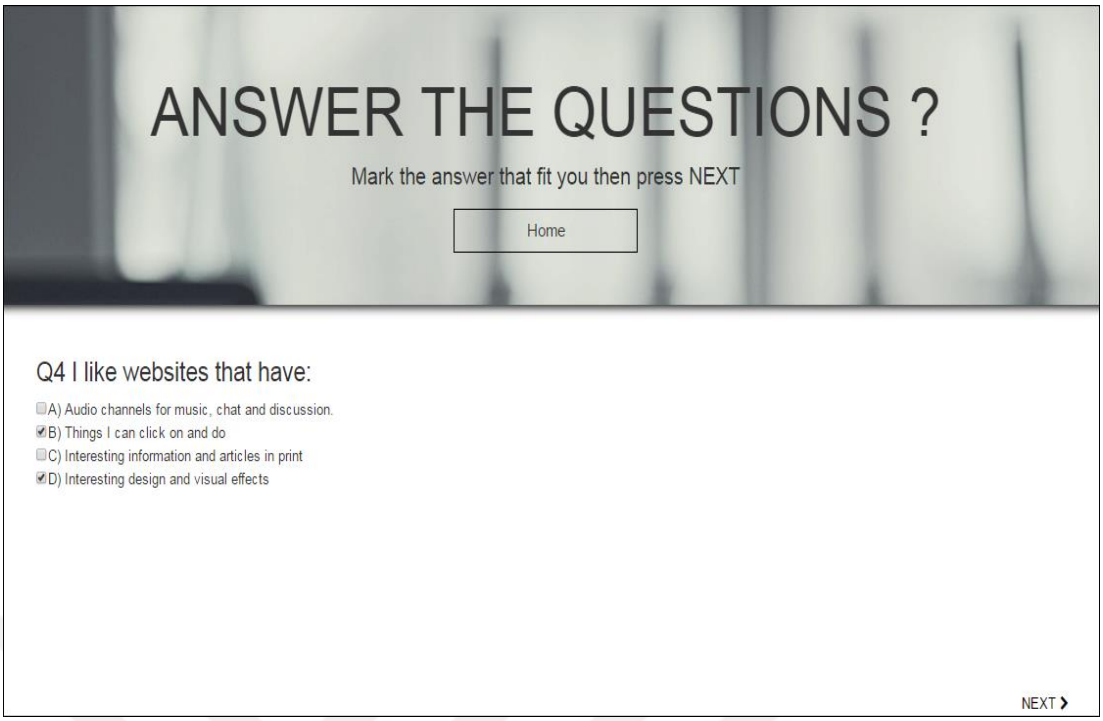

Figure 4.43 Student's questions page

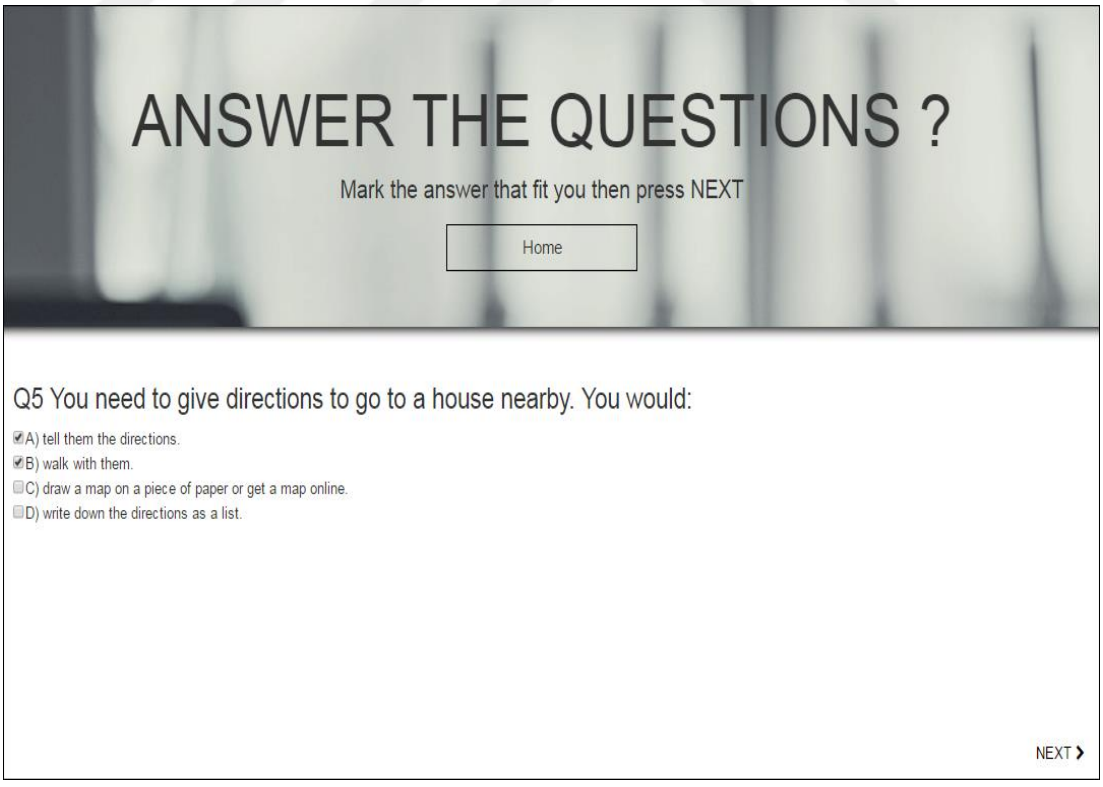

Figure 4.44 Student's questions page

When studentes complete the answers of all quetions , system gives result related learning style of the students. It is shown in **Figure 4.45**. In this type of learning the topic prepare by using combination four modes (visual, read/write, aural, and kinesthetic), as shown in **Figure 4.46** and **Figure 4.47**.

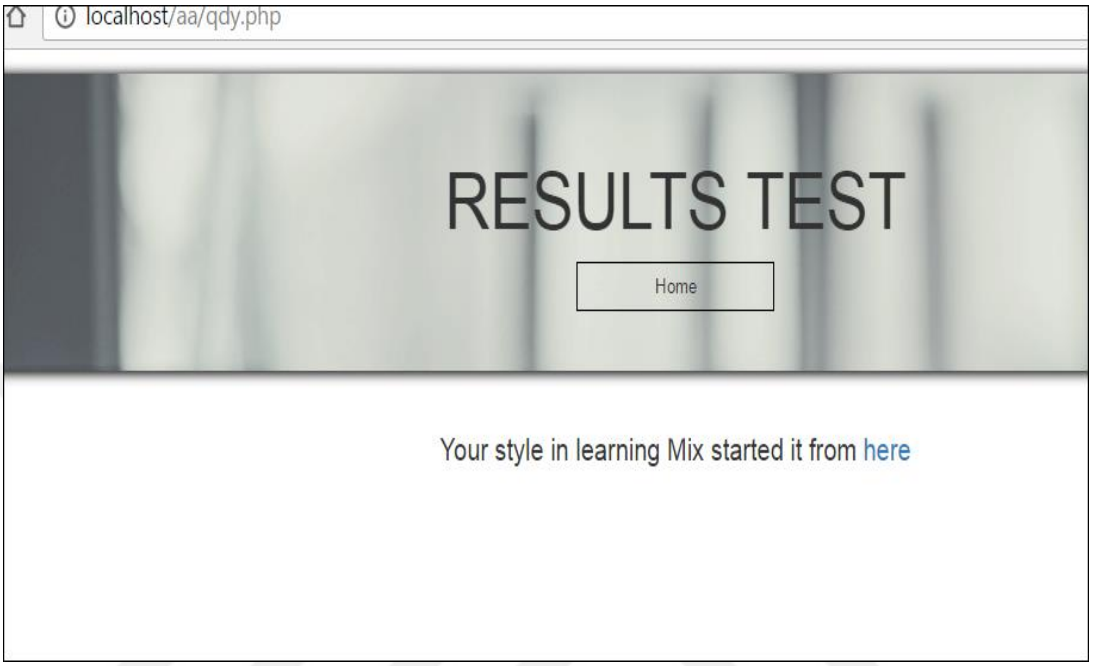

Figure 4.45 Student's result of test page

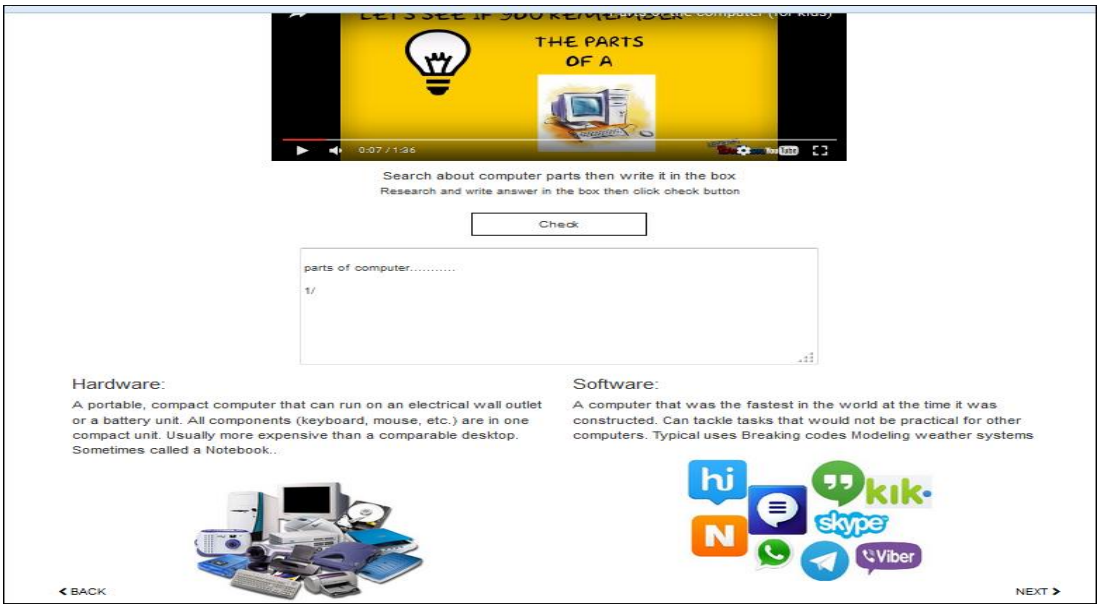

Figure 4.46 Mix learning page

Figure 4.47 Mix learning page

4.15.3 Teacher Module

Teacher's page shown in Figure **4.48** .Teachers can add information of question in this page. If teachers add information of question, directly system will give a warning as "**Success!** Successfully added new question", as shown in **Figure 4.49**.

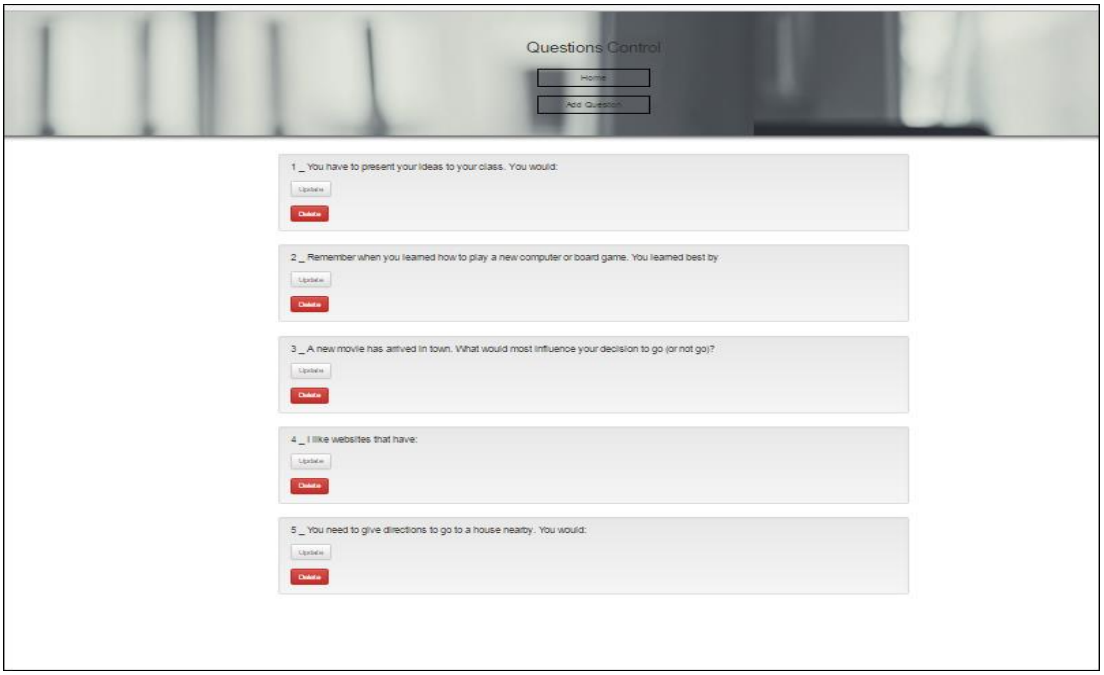

Figure 4.48 Teacher's questions page

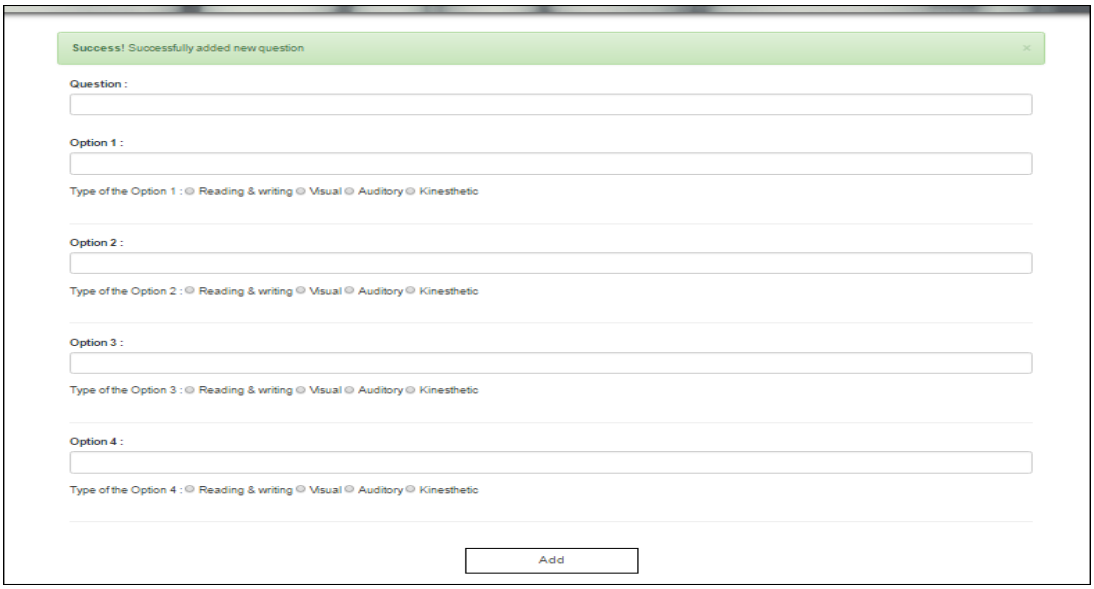

Figure 4.49 Teacher's questions page

4.15.4 Creating Database in phpMyAdmin

Figure 4.50 shows application of phpMyAdmin. When a user log into the application of phpMyAdmin a list related to the activities will be appear. Users can create their own databases on the application of phpMyAdmin. It is explained in **Figure 4.51**, **Figure 4.52**, and **Figure 4.53**.

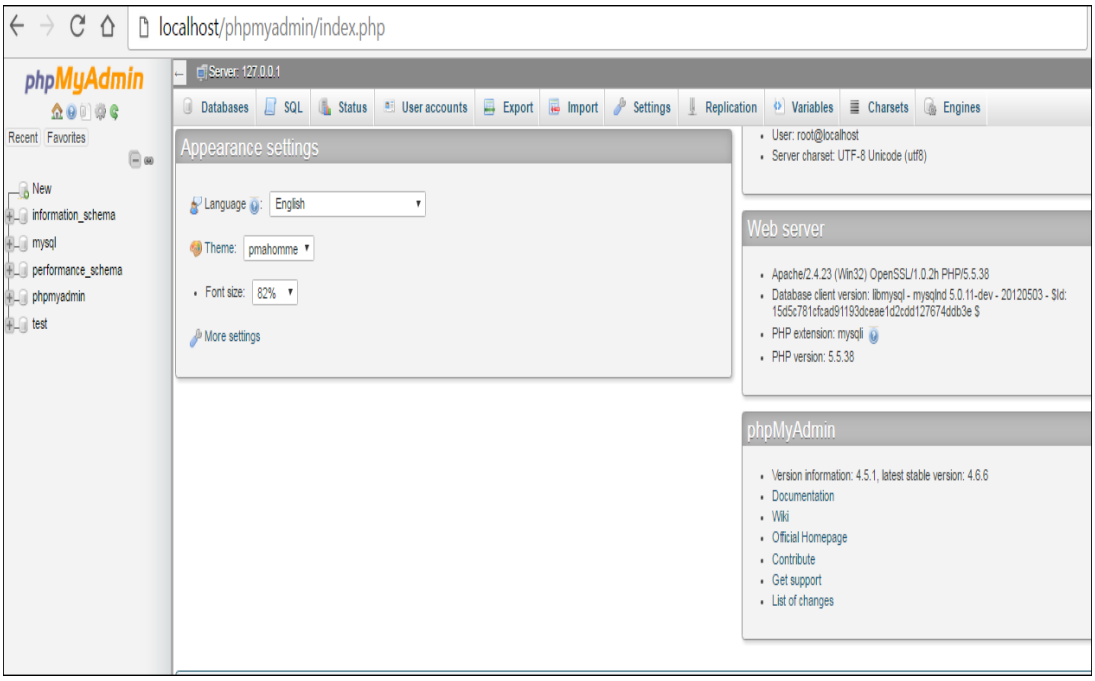

Figure 4.50 PhpMyAdmin application

For create database: you can create new databases and generate new or import exist tables using phpMyAdmin. Database creating by click on the “New” link at the top of the left panel, or navigate to the databases tab .here create new databases. It is shown **Figure 4.51**.

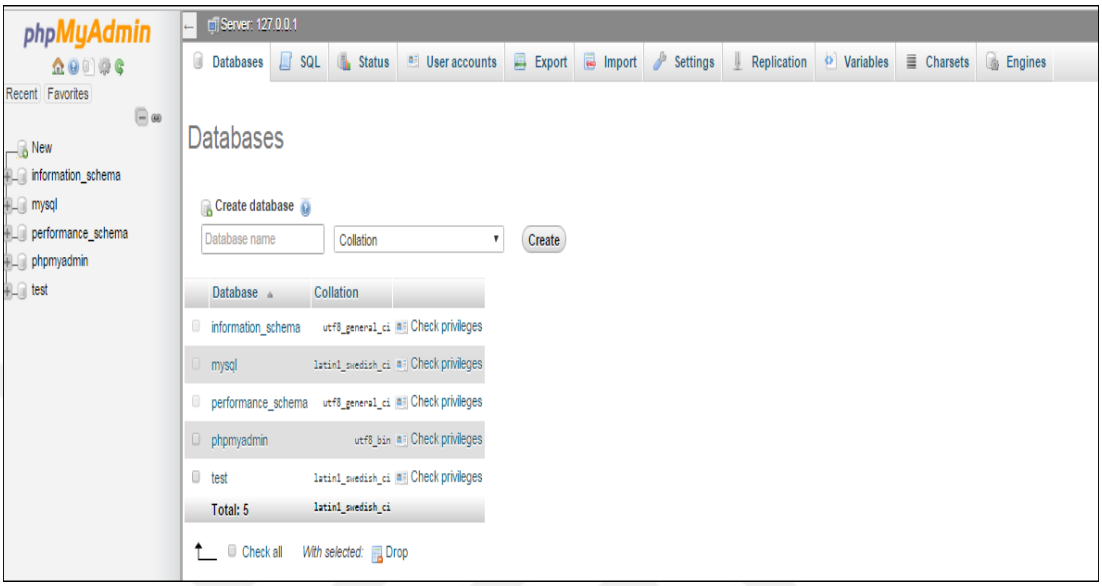

Figure 4.51 MySQL databases for adding database in phpMyAdmin

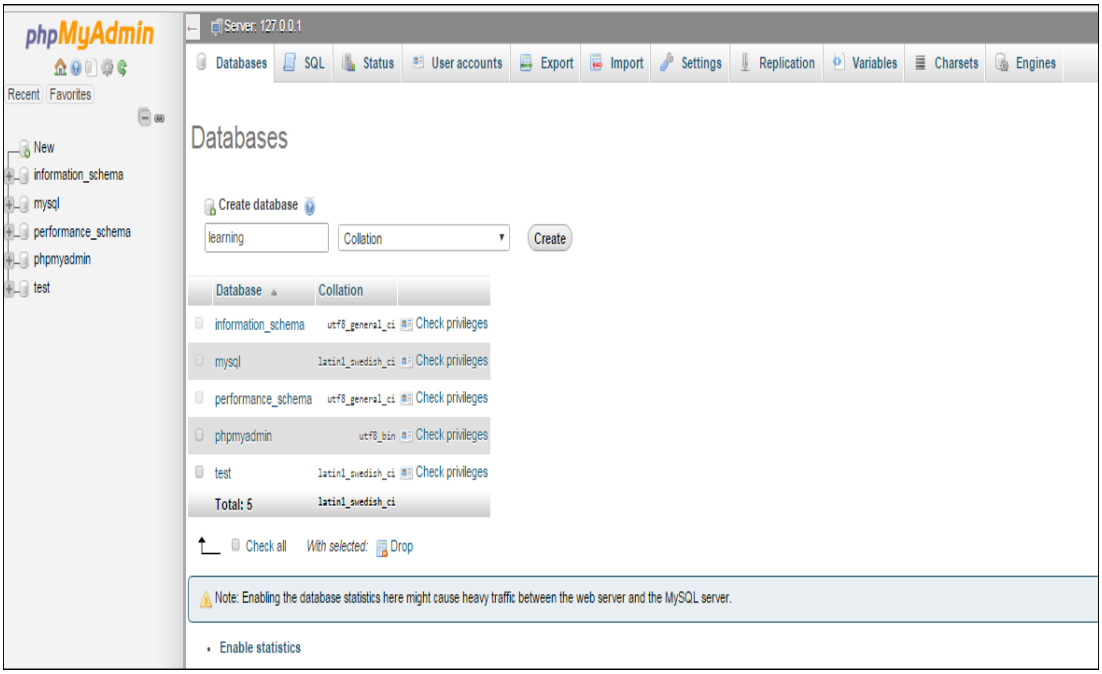

Figure 4.52 MySQL databases for adding database in phpMyAdmin

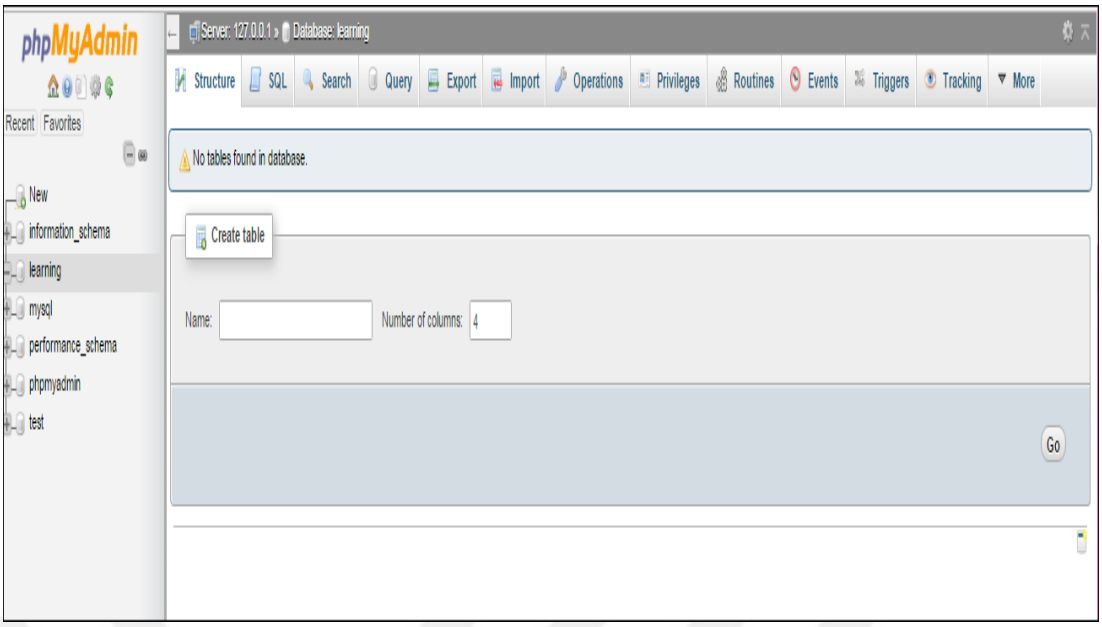

Figure 4.53 MySQL databases for adding database in phpMyAdmin

To create or import table: you can create tables that you fill with new data, or import exist tables of data. Here is import existing data from a file. **Figure 4.54** and **Figure 4.55** show screen view of using the import tab in phpMyAdmin; enter the name of the file using the file dialog button. Also, **Figure 4.56** and **Figure 4.57** show import tables.

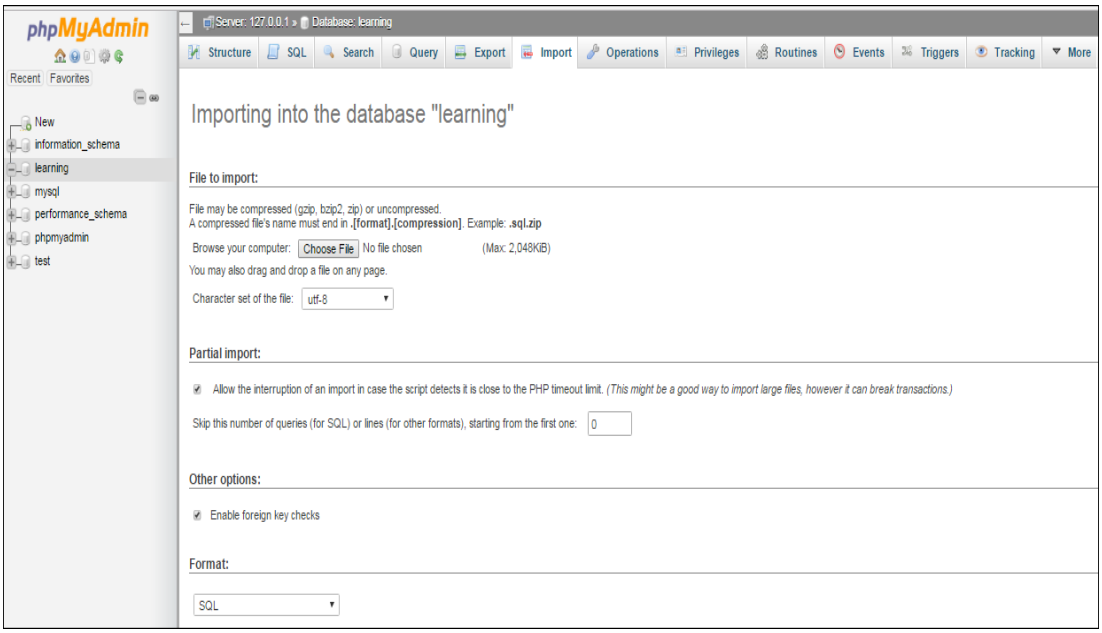

Figure 4.54 MySQL databases for import the table in phpMyAdmin

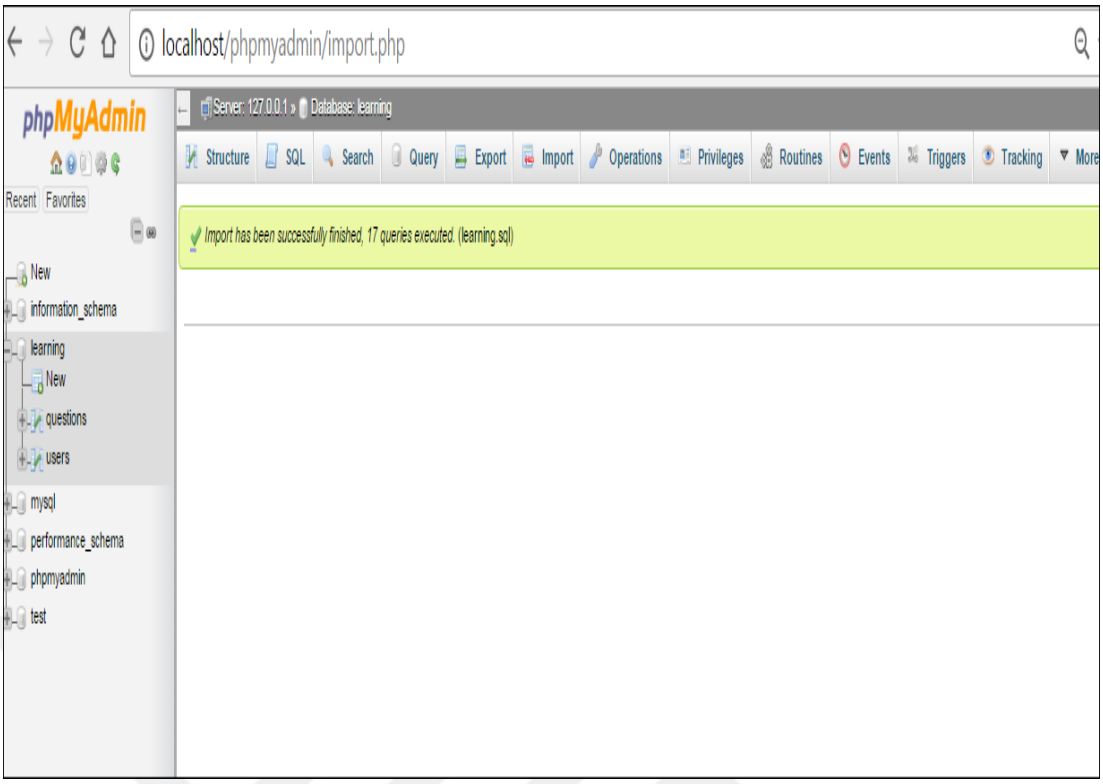

Figure 4.55 MySQL databases for import the tables in phpMyAdmin

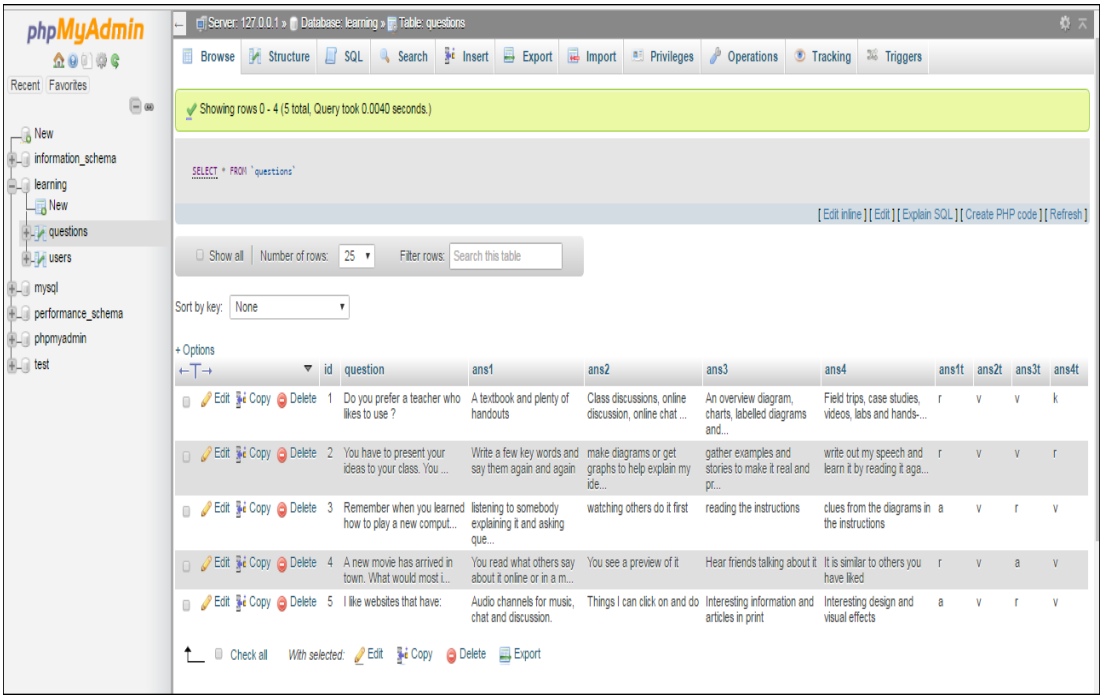

Figure 4.56 MySQL databases for import the questions table in phpMyAdmin

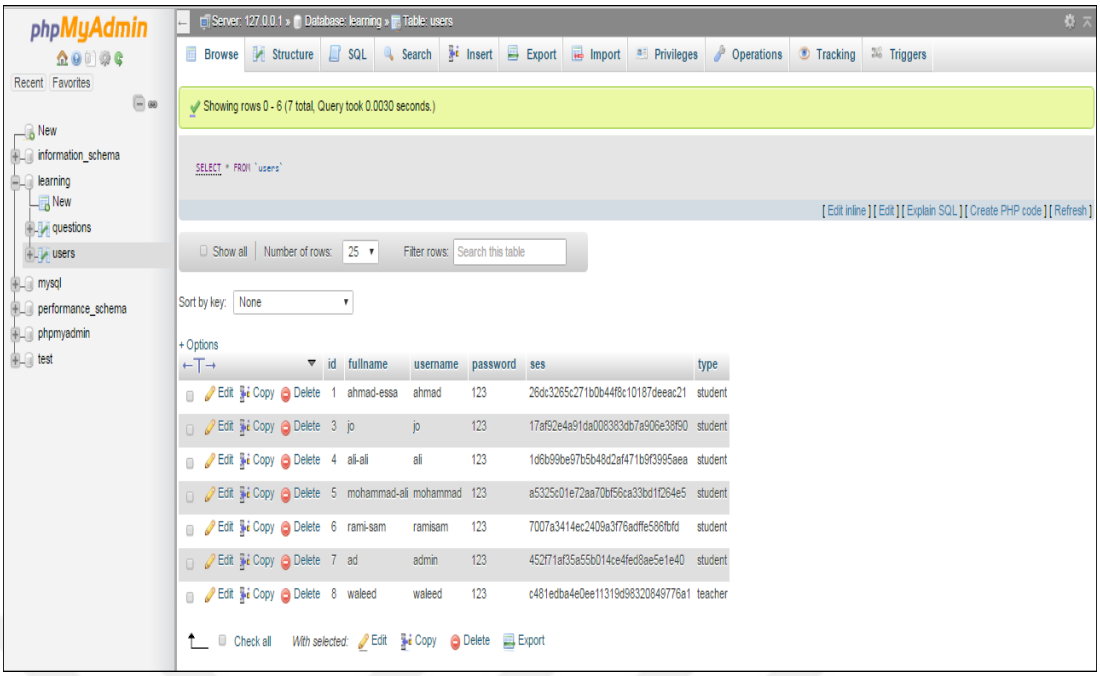

Figure 4.57 MySQL databases for import the users table in phpMyAdmin

CHAPTER5

IMPLEMENTATION

Higher education continues to expand by diversity of students participating. colleges incloued students with variety ethnic and cultural, from a large number training programs and institutions, and with different methods of learning. with this growth in diversification increase was in distance programs of learning and expansions in the kinds of educational media used for information providing. These changes are progressing in technology has led many educators to revisit traditional, standardized teaching methods, and stressed the necessity of considering the learning styles approaches of students in presenting after designing the content of course.The mismatch between teacher teaching and student learning was cited as possible learning barriers within the classroom and a reason for provide using instruction by utilizing a diffirent of teaching methods[6].

There are some variation in styles of learning that useuse in some classrooms. Some authors suggested that students must adapt to their own styles of learning to coincide with a particularmethod of teaching that allows trainers to dictate the methods utilized to guide the classroom. Also this approach allows instructors to ‘‘Learning from their strengths,’’ taking into account a few external factors such as learning styles of students.It may be better to make learning process easy , this can be get by making the instructors are familiar with both the teaching of styles and learning methods of their students. To understandand appreciat a particular individual’s teaching method needs self-reflection and reflection, and should be a component of a good maintenance portfolio[6].

5.1 Implementation Process

The system application as website was developed with using Notepad++, PHP, MySQL data base, Java script, CSS, and HTML. Application was hosted on web .The implementation process lasted for five weeks. Prior to the application. Applied in order to determine student's learning styles preferences. We implemented this system for graduate students from engineering department of Atilim University, system helps students to contact with subject of course. Subject of the (introduction to computer and programming) course have been carried out in the system to provide students with environments of personalized learning and also with dissimilar styles of learning and learning achievements. **Figure 5.1**shows the interface of administrator of the system.

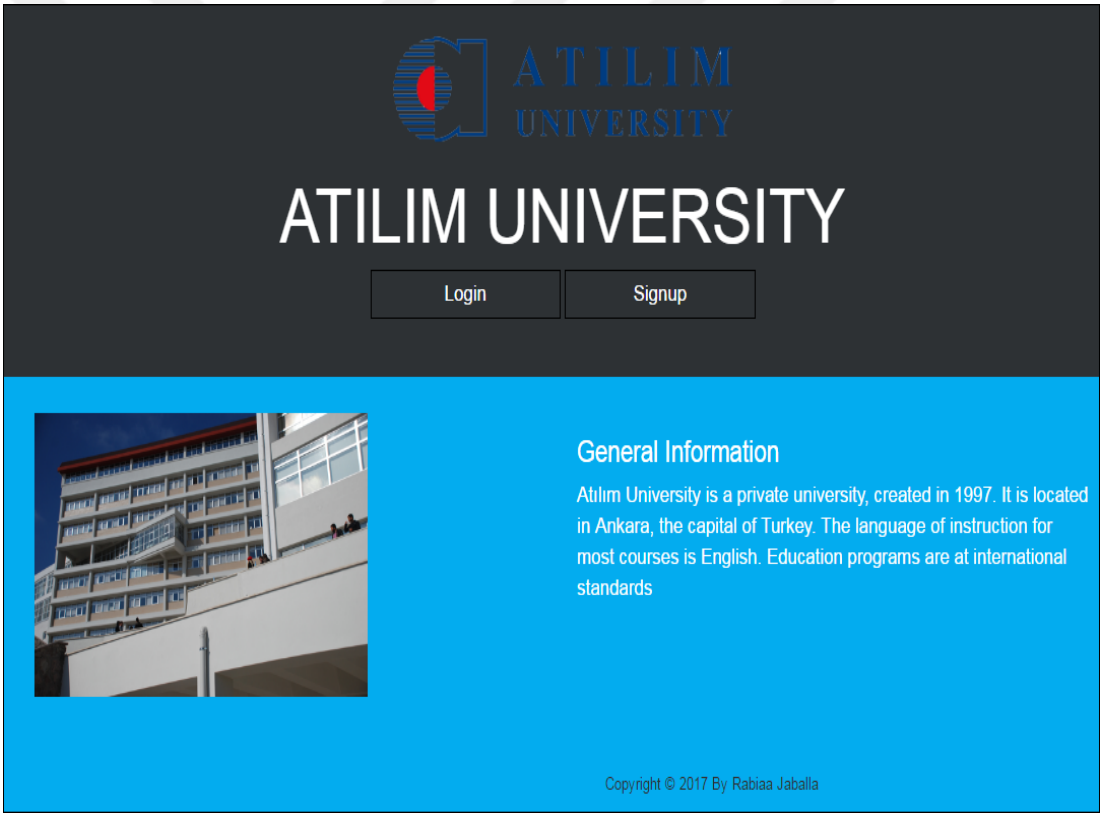

Figure 5.1 Interface of the system page.

System contains two types of learning as shown in **Figure 5.2**. Traditional learning as shown in **Figure 5.3**, in this type students are learning by traditional way.

Figure 5.2 Two types of learning page

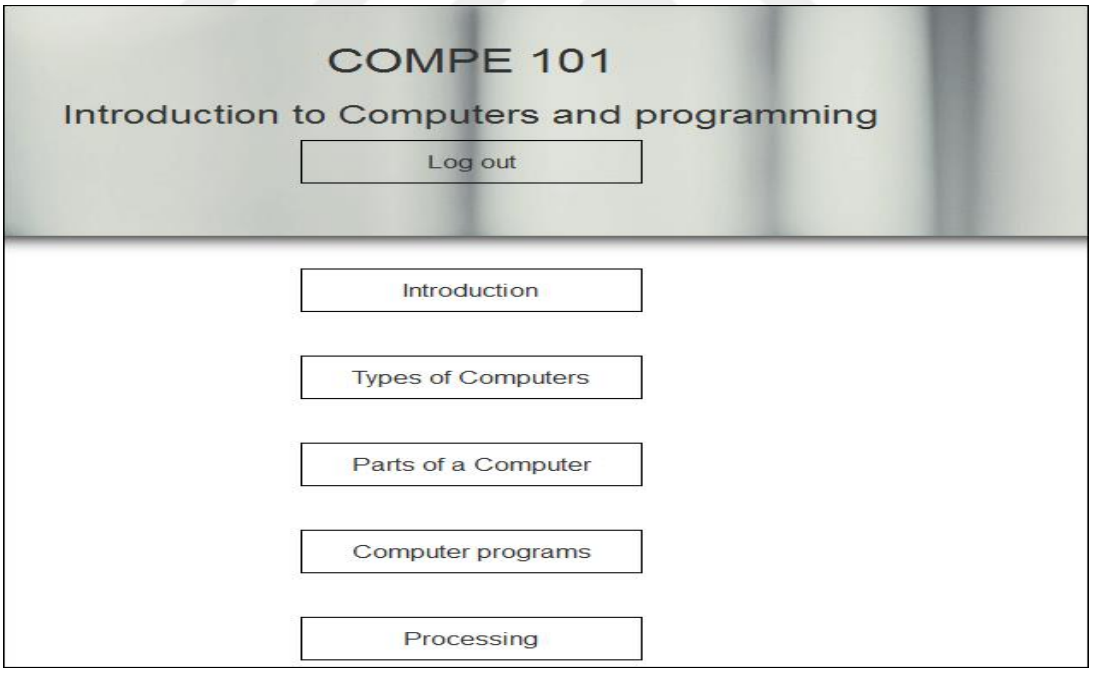

Figure 5.3 Traditional learning page

Style learning as shown in **Figure 5.4**, this type of learning contain of VARK questionnaire when students login the system for the first time, they must students answer these questions , after students answer these questions ,system will

determine learning styles of each student automatically according to the student answers **Figure 5.5** shown that.

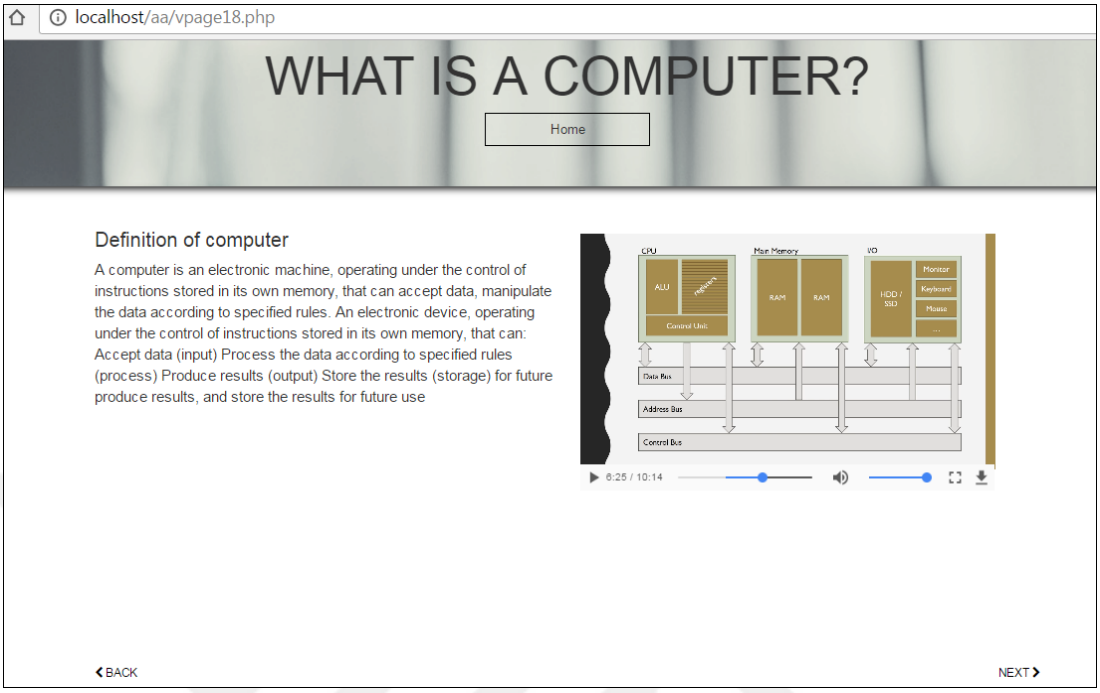

Figure 5.4 Style learning page

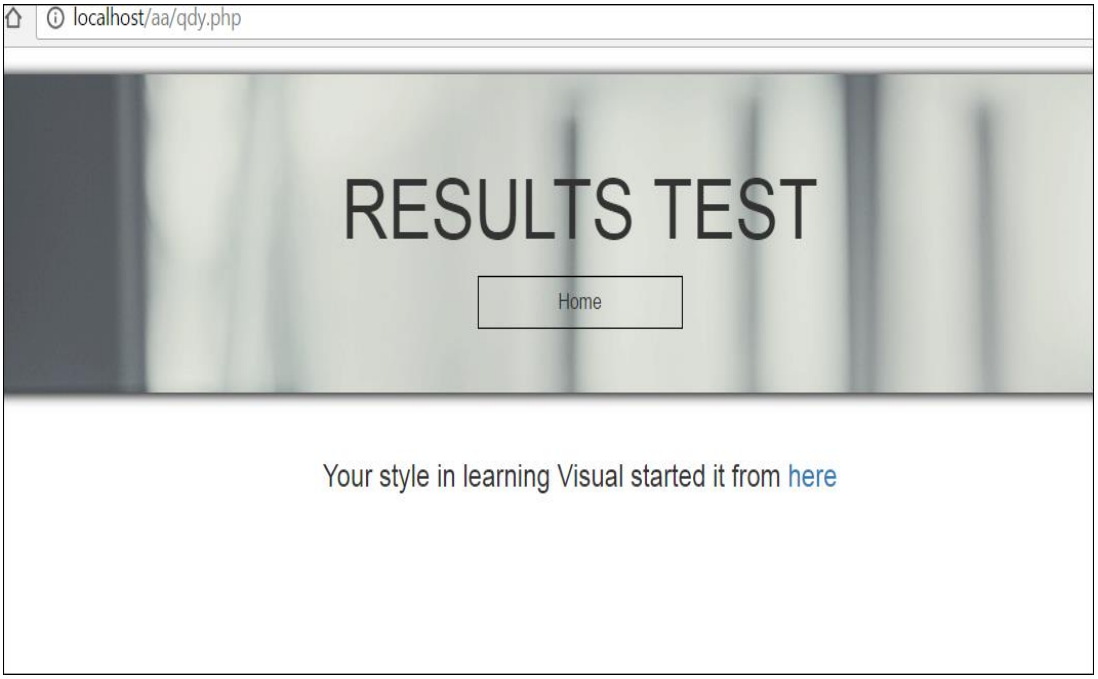

Figure 5.5 Student's result of test page

5.2 Experiment Design

In our thesis, we have two groups consisting of 50 students from the first- stage , these are engineering students at the same level , randomly 25 students has been selected as the group of Experimental (group of learning style) and 25 students as the group of Control (group of traditional learning).

Students were given knowledge of evaluation test so as to determine their knowledge in the domain. They ought to answer a total of twelve questions (seen in Appendix B) concerning to the domain. In this study used model of experimental design with a Control group of post-test, pre-test.

Before starting the experiment study, in first week pre-test are given for both of the groups before use the system, after the pre-tests had been administered during the period of experiment; the scale of attitude towards the introduction to computer and programs course before begin in the experiment, has been applied to both of the groups of Control and the Experimental. The group of Experiment has been taught at for 5 weeks according to the VARK model of learning style, the group of Control has been taught for five weeks with traditional methods, after five weeks which both groups interaction with the system and performing the activities requested, the post-test has been utilized to all the students to whom the pre-test has been utilized.

CHAPTER 6

RESULTS AND EVALUATION

6.1. Results of VARK Questionnaire

According to the VARK learning style, the majority of people have a leading or preferred learning style. The VARK model uses the four main dimensions: visual, auditory, read/write, and kinesthetic to determine the dominant learning style of learns. This self-evaluation questionnaire was put inside the system given URL for students at the Atilim University to take part in the study. 5-dimenasion scale are "Visual (V)", "Auditory (A)", "Read/Write (R)", " Kinesthetic(K)" and "Multimodal(MM)". The VARK questionnaires are results shown in **Table1** according to different learning preferences**.**

Table 1.
Distribution students learning style preference

Learning Styles	N	Percentage
Visual (V)	7	28%
Read/Write (R)	4	16%
Auditory (A)	1	4%
Kinesthetic (K)	3	12%
Multimodal (MM)	10	40%

Table1 show that distribution of student's preferences. The majority of the students preferred Multimodal (40%) and Visual (28%) learning styles to Read/Write (16%), Kinesthetic (12%), and Auditory (4%) learning styles. Accordingly, most students

stated that they learned most of the information when presented in Multimodal formats such as combination Visual, Read/Write, Kinesthetic, and Auditory. The distribution graph of all students according to VARK dimensions is given in **Figure 6.1**.

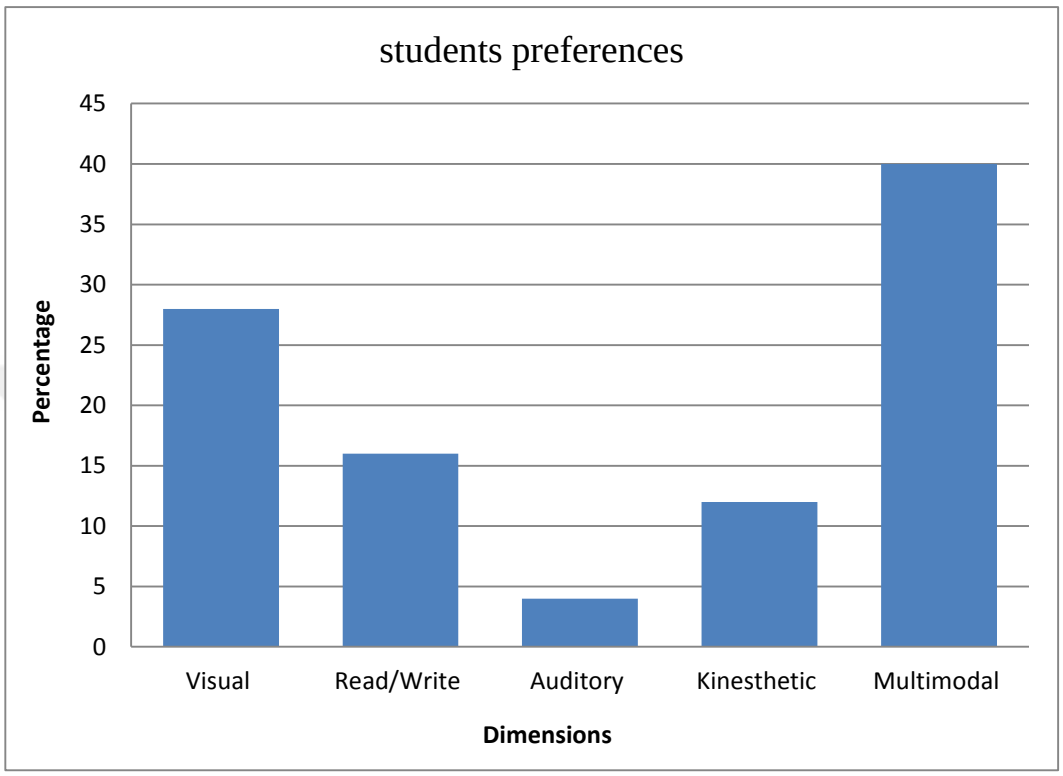

Figure 6.1 Distribution students according to VARK dimensions

6.2 Statistical Results

There were 50 student's participants in this study; we conducted reliability analysis to validate the T-test instrument, for this instrument Cronbach's α was 0.80. **Figure 6.2** shown the normal distribution of 25 student scores in Control group. The mean was 5.3 with standard deviation (SD) of 1.6. The scores on the Control group t-test ranged from a minimum of 2 to a maximum of 9, signafical of p value 0.15 is not less 0.05 .then the signafical level of t-test is normal.

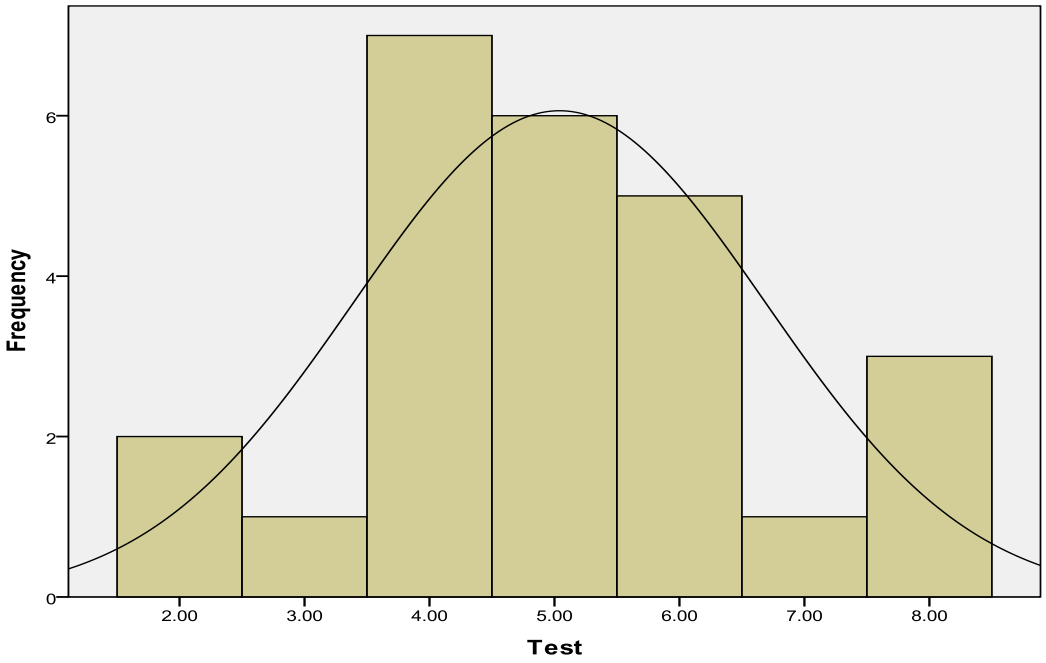

Figure 6.2 Distribution of Control group t-test scores

For Experimental group the mean score was 5.04 and standard deviation (SD) =1.6. The range statistic was 6 and p=0.12, According these results the signafical level of t-test for Experimental group is normal distribution as shown in **Figure 6.3** .

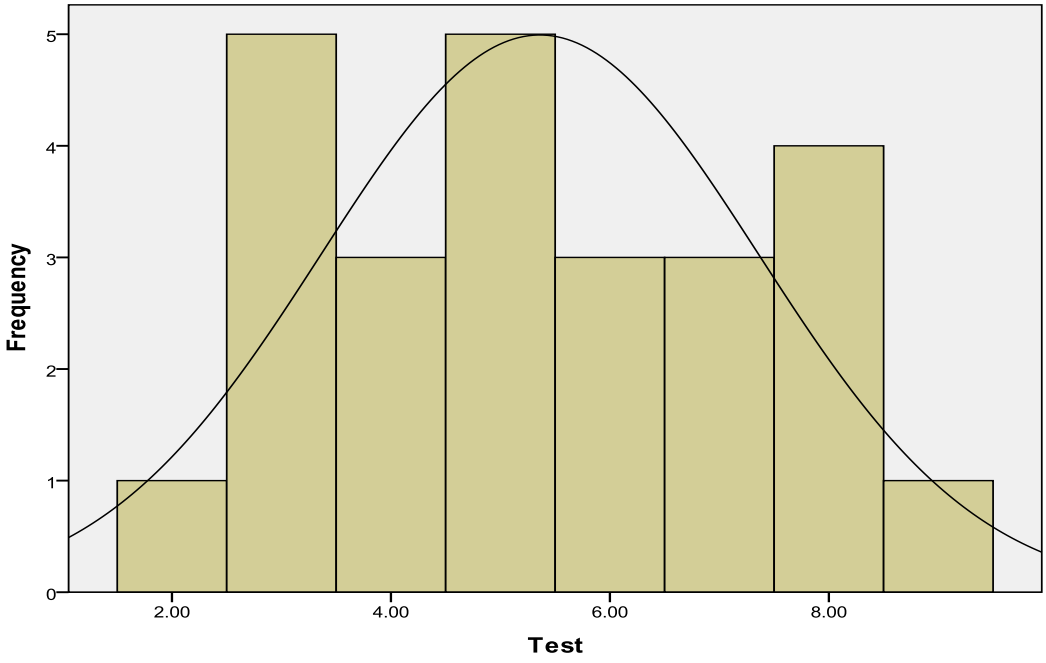

Figure 6.2 Distribution of Experimental group t-test scores

The post-test and the pre-test results to be compared, we used a double samples t-test. The methods of post and pre -achievement tests were compared to the Experimental group and the Control group within the groups and between the groups. **Table 2** shows the percentage results of students who used the system for Control group.

Table 2.
The Comparison Grades of Pre-Post Tests for Control Group

Group	N	Test	Mean	Score	Mean difference	SD	t	p
Control	25	Pre	5.00	1.70	2.00	1.97	5.05	.00
		Post	7.00	2.34				

Note. *p< .05

As it is seen in **Table 2**, the average = 5.00 points for students in the Control group in the pre-test evaluation before used the system and they got an average of 7.00 points in the post-test administer after the using the system. Founded on the gained results, there is a 2.00 points difference in favor of the post-test between the means of the grades that the students in the group of experiment got in the post and pre achievement tests. This difference can be named as the average achievement grade that the students in the Control group obtained after using the system. "t" value has verified to be important according to the results of a paired t-test that has been conducted to learn the significance of the dissimilarities between these average grades that the students in the Control group obtained in the post and pre tests [t =5.05; (p=.00<.05)]. According these results, we can say that the traditional method that has been applied inside the system has been effective for the success of the students in the Control group in the introduction to computer and programming.

Table 3.
The Comparison Grades of Pre-Post Tests for Experimental Group

Group	N	Test	Mean	Score	Mean difference	SD	t	p
Experimental	25	pre	4.92	1.65	3.64	1.18	15.34	.00
		post	8.56	1.66				

Note. *p< .05

Table 3 shows that results of Experimental group in this group students got an average of 4.92 points in the pre-test and they got average 8.56 in the post test administered after using the system. According to the results obtained, there is a 3.64 point difference in favor of the post test between the means of the grades that the students in the group of experiment got in the post and pre achievement tests. This difference can be named as the average achievement grade that the students in the group of experiment obtained after using the system. The "t" value has verified to be important according to the results of a paired t-test that has been conducted to learn the importance of the variance among these average grades that the students in the group of experiment obtained in the post and pre tests [t=15.34; (p=.00<.05)]. Depending upon the findings, it can be said that the experimental program that has been constructed according to the VARK model of learning style has been effective for the not failure of the students in the group of experiment in the introduction to computer and programming course.

Table 4 show that the measure examined, the mean of post-test grades of Experiment group is 8.56; the post-test mean of the Control group control is7.00. The post-test grade mean of the group of experiment is upper than the group of control. Also, there is a difference of 1.56 points in desire of the Experiment group among points of post-test of two groups.

Table 4.
Comparison Grades of students in the Experimental and Control Groups in the Post-Test

Group	N	Test	Mean Score	Mean difference	SD	t	p
Control	25	post	7.00 2.34	1.56	3.12	-2.49	.02
Experimental		post	8.56 1.66				

Note. *p< .05

These results shown that , there are significance of the difference between the means of post-test grades of Experimental group and Control group, [t = -2.49; (p=.02<.05)]. Depending on the fact, the VARK learning style model applied to the

Experimental group has proved to be more effective than the traditional teaching model applied to the Control group in regards to the students' success in the introduction to computer and programming course.

6.3 Results of Students satisfaction Survey

Descriptive statistics provided information about the distributions of the study of satisfaction for control group and experimental group with the educational experience and satisfaction with the system.**Table5** showed that, Results analyses of student's in control group satisfaction of usage of system.

Table 5.
Descriptive Statistics of Control group

Questions	N	Sum	Mean	SD
Q1. Overall, how would you rate the system?	25	62.00	2.48	.82
Q2. Proceeding to the system, how much of the information that you wanted did you find?	25	56.00	2.24	.879
Q3. How easy was the get information from this system?	25	55.00	2.20	.50
Q4. How useful was the information presented at this system?	25	91.00	3.64	.81
Q5. How helpful was the content presented at this system	25	56.00	2.24	.83
Q6. How organized was the system?	25	58.00	2.32	.69
Q7. How well-information is the facilities at this system?	25	56.00	2.24	.72
Q8. How likely are you to recommend this system to others?	25	54.00	2.16	.55
Q9. Please indicates your overall satisfaction with this system?	25	99.00	4.08	.73
Q10. Is there anything else you'd like to share about the system?				

From **Table 5** above, the author found students in this sample rated themselves fairly high with using system , such as Q1 (rate the system?, mean score = 2.32), Q2 (the information?2.16, mean score =2.16), Q3 (easy to get information?, mean score = 2.44), Q4 (useful , mean score = 3.08), Q6 (organize, mean score = 2.72) Q3 (easy to get information?, mean score = 2.44), Q4 (useful , mean score = 3.08), Q6 (organize, mean score = 2.72). Q3 (easy to get information?, mean score = 2.44), Q7 (the facilities, mean score = 2.44), Q8(likely is you to recommend this system, mean score = 2.40) and Q9(satisfaction, mean score = 4.08). The data shows that most of the student's were satisfied from the system application.

The **Table 6** below showed that, the descriptive statistics for the questions items of student experimental group based on VARK learning style model.

Table 6.
Descriptive Statistics of Experimental group

Questions	N	Sum	Mean	SD
Q1. Overall, how would you rate the system?	25	52	2.08	.70
Q2. Proceeding to the system, how much of the information that you wanted did you find?	25	50	2.00	.57
Q3. How easy was the get information from this system?	25	47	1.88	.92
Q4. How useful was the information presented at this system?	25	104	4.16	.55
Q5. How helpful was the content presented at this system	25	47	1.88	.66
Q6. How organized was the system?	25	54	2.16	.62
Q7. How well-information is the facilities at this system?	25	52	2.08	.40
Q8. How likely is you to recommend this system to others?	25	56	2.24	.72

Q9. Please indicates your overall satisfaction with this system?	25	107	4.28	.61
Q10. Is there anything else you'd like to share about the system?				

The results showed that, students in this sample rated themselves fairly high with using system, such as Q1 (rate the system, mean score = 2.08), Q2 (the information, mean score =2.00), Q3 (easy to get information?, mean score = 1.88), Q4 (useful , mean score = 4.16), Q5 (helpful, mean score = 1.88),Q6 (organize, mean score = 2.16) , Q7 (the facilities, mean score = 2.08), Q8(likely is you to recommend this system, mean score = 2.24) and Q9(satisfaction, mean score = 4.28). The data shows that most of the student's were satisfied from the system application.

The ANOVA procedure was used to comparison rate student's satisfaction between groups and within groups, **Table 7** below showed results for this comparison.

Table 7.

ANOVA students satisfaction with the system

Measure Satisfaction	Sum of Squares	Df	Mean Square	F	*p*	F crit
Between Groups	.50	1	.50	1.61	.21	4.04
Within Groups	14.88	48	.31			
Total	15.38	49				

Note. *p< .05

The calculated F value (1, 48) = 1.61 in the ANOVA table is younger than the Critical F value (F = 4.04) and p > 0.05, this results indicate that there are no significant difference satisfaction between the Experimental group and Control group with the system.

CHAPTER 7

CONCLUSION AND FUTURE WORK

Customized mastering occurs while e-learning structures make on purpose efforts to design academic experiences that healthy the wishes, dreams, capabilities, and blessings in their novices. In this study, we conducted a study on the effects of student's learning style to improve their learning performance. We recommend a system of personalized learning which based on VARK model of Neil Fleming to determine student's learning style preference automatically. The Neil Fleming learning style model is easy to use and understand and there's no would like for advanced training, permits learners to exclude questions to not be deemed applicable or disability to answer, permits for answers to every question to be multiple. Moreover, learners are often deemed to be multimodal in different words they will use two or more than of learning style. In this system, some modules are used to recognize the personality and choose the suitable training plan to get learning.

The results specify that the student's situation along with the appropriate teaching method that corresponds to learner preference leads to improved learning outcomes for students. The result of students presented that the Multimodal (40%) was preferred by the majority of the undergraduate students and Visual (28%) of learning styles.This was linked to the study of James [35], which found that learning style were linked to teaching style. Student's Thai also had different learning styles with relevantarguments as learning achievement Jantarawerakul [38]. Moreover, Song [39] deduced that students in Taiwan for secondary stage have a different learning styel beasd on Grade Point Average (GPA), the secondary students' learning achievement in Korea possiblebe estimatedby learning style Yoon [40]. In other words,in this study there has been a difference in degree among students who have

learned by learning style preferences and who have not. The students in the group of Experimental achieved greater gains when their pre-post test scores were compared to those of the group of Control.

From the statistical analysis results we conclude that the provision of adaptable subjects helps students improve their educational achievements or enhance the effectiveness of learning; furthermore, providing methods with adaptive performance and materials with enhance study is useful for students in improving both their learning achievements and learning efficiency.

The innovative approach presented in this study has proven its benefits, but the actual practice is strained. The main difficulty is to develop six versions of the same session to meet the customization of the learning process. Finally, evaluation results show that students understand the process and like to participate, although it is not a simple task.

7.1 Future Work

In this study there are some areas which could lead to further work and research;

- The results of this research indicate that for all teachers should consider how to change their instructional practice in order to contribute to the development of the learning styles of student's
- The results of this study should be carefully interpreted as VARK model is only one of many popular personality assessment tools, and oursystemcan be changed in severaldissimilar ways.It may be developed our system by adding the different models of learning style to the model that system contains in order to meet the different learning style.
- We like to develop our system to meet students with specific needs. This will empower the students to learn.
- Develop a learning system that may combine a number of learning styles with participant students from more than one college and different stages and may from a number of universities.

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Appendix A: VARK Questionnaire

Choose the answer which best explains your preference. Please click more than one if a single answer does not match your perception. Leave blank any question that does not apply.

Q1. You want some feedback about an event, competition or test. You would like to have feedback:

- That used graphs showing what I achieved.
- That used a written description or table of my results.
- That used examples of what I have done
- From somebody who discussed it with me

Q2. Remember when you learned how to play a new computer or board game. You learned best by:

- Listening to somebody explaining it and asking questions.
- Watching others do it first.
- Reading the instructions.
- Clues from the diagrams in the instructions.

Q3. A new movie has arrived in town. What would most influence your decision to go (or not go)?

- You read what others say about it online or in a magazine.
- You see a preview of it.
- Hear friends talking about it.
- It is similar to others you have liked.

Q4. You have a problem with your knee. Would you prefer that the doctor:

- Gave you an article or brochure that explained knee injuries.
- Showed you a diagram of what was wrong.
- Demonstrated what was wrong using a model of a knee.

- Described to you what was wrong?

Q5. I like websites that have:

- Audio channels for music, chat and discussion.
- Things I can click on and do.
- Interesting information and articles in print.
- Interesting design and visual effects.

Q6. You have been selected as a tutor or a leader for a holiday program. This is interesting for your friends. You would:

- Show them the list of activities in the program.
- Describe the activities I will be doing in the program.
- Show them the map of where it will be held and diagrams about it.
- Start practicing the activities I will be doing in the program.

Q7. Do you prefer a teacher who likes to use?

- A textbook and plenty of handouts.
- Class discussions, online discussion, online chat and guest speakers.
- An overview diagram, charts, labeled diagrams and maps.
- Field trips, case studies, videos, labs and hands-on practical sessions.

Q8. After reading a play you need to do a project. Would you prefer to:

- Draw or sketch something that happened in the play?
- Act out a scene from the play?
- Read a speech from the play?
- Write about the play?

Q9. You are about to hook up your parent's new computer. You would:

- Phone, text or email a friend and ask how to do it.
- Read the instructions that came with it.

- Unpack the box and start putting the pieces together.
- Follow the diagrams that show how it is done.

Q10. You want to plan a surprise party for a friend. You would:

- Invite friends and just let it happen.
- Draw a map and make a special design for the invitation.
- Talk about it on the phone or text others.
- Make lists of what to do and what to buy for the party.

Q11. You are going to make something special for your family. You would:

- Find written instructions to make it.
- Make something I have made before.
- Decide from pictures in magazines.
- Talk it over with my friends.

Q12. You need to give directions to go to a house nearby. You would:

- Tell them the directions.
- Walk with them.
- Draw a map on a piece of paper or get a map online.
- Write down the directions as a list.

Q13. You are learning to take photos with your new digital camera or mobile phone. You would like to have:

- A chance to ask questions and talk about the camera's features.
- Examples of good and poor photos and how to improve them.
- Clear written instructions with lists and bullet points.
- Diagrams showing the camera and how to use it.

Q14. You have to present your ideas to your class. You would:

- Write a few key words and say them again and again.
- Make diagrams or get graphs to help explain my ideas

- Write out my speech and learn it by reading it again and again.
- Gather examples and stories to make it real and practical.

Q15. You are about to buy a new digital camera or mobile phone. Other than price, what would most influence your decision?

- The salesperson telling me about it.
- Trying it.
- Reading the details about its features.
- It is the latest design and looks good.

Q16. A website has a video showing how to make a special graph. There is a person speaking, some lists and words describing what to do and some diagrams. You would learn most from:

- Seeing the diagrams.
- Reading the words.
- Listening.
- Watching the actions.

Appendix B: Pre and Post Test Survey

Answer The Questions.

Q1. _____ is a set of computer programs used on a computer to help perform tasks.

A. An instruction

B. Software

C. Memory

D. A processor

Q2. System software is the set of programs that enables your computer's hardware devices and _____ software to work together.

A. Management

B. Processing

C. Utility

D. Application

Q3. The PC (personal computer) and the Apple Macintosh are examples of two different :

A. Platforms.

B. Applications.

C. Programs.

D. Storage Devices.

Q4. _____ are specially designed computers that perform complex calculations extremely rapidly.

A. Servers

B. Supercomputers

C. Laptops

D. Mainframes

Q5. All of the following are examples of storage devices EXCEPT :

A. Hard Disk Drives.

B. Printers.

C. Floppy Disk Drives.

D. Cd Drives.

Q6. The name for the way that computers manipulate data into information is called:

A. programming.

B. Processing.

C. Storing.

D. Organizing.

Q7. _____ controls the way in which the computer system functions and provides a means by which users can interact with the computer.

A. The Platform

B. The operating System

C. Application Software

D. The motherboard

Q8. The operating system is the most common type of _____ software.

A. Communication

B. Application

C. System

D. Word-Processing Software

Q9. Computers gather data, which means that they allow users to _____ data.

A. Present

B. Input

C. Output

D. Store

Q10. After a picture has been taken with a digital camera and processed appropriately, the actual print of the picture is considered:

A. Data.

B. Output.

C. Input.

D. The Process.

Q11. The two broad categories of software are:

A. Word processing and Spreadsheet.

B. Transaction and Application.

C. Windows and Mac Os.

D. System and Application.

Q12. Which of the following is the correct order of the four major functions of a computer?

A. Process - Output - Input - Storage

B. Input - Output - Process - Storage

C. Process - Storage - Input - Output

D. Input - Process - Output - Storage

Appendix C: Students Satisfaction Survey

1. **Overall, how would you rate the system?**
    - Excellent
    - Very good
    - Good
    - Fair
    - Poor
2. **Proceeding to the system, how much of the information that you wanted did you find?**
    - All of the information
    - Most of the information
    - Some of the information
    - A little of the information
    - None of the information
3. **How easy was the get information from this system?**
    - Extremely easy
    - Quite easy
    - Moderately easy
    - Slightly easy
    - Not at all easy
4. **How useful was the information presented at this system?**
    - Not at all useful
    - Not very useful
    - Neutral
    - Useful
    - Very useful
5. **How helpful was the content presented at this system**
    - Extremely helpful

- Very helpful
- Somewhat helpful
- Not so helpful
- Not at all helpful

6. **How organized was the system?**
    - Extremely organized
    - Very organized
    - Somewhat organized
    - Not so organized
    - Not at all organized
7. **How well-information are the facilities at this system?**
    - Extremely well-information
    - Very well-information
    - Somewhat well-information
    - Not so well-information
    - Not at all well- information
8. **How likely are you to recommend this system to others?**
    - Extremely likely
    - Quite likely
    - Moderately likely
    - Slightly likely
    - Not at all likely
9. **Please indicate your overall satisfaction with this system?**
    - Very Dissatisfied
    - Dissatisfied
    - Neutral Satisfied
    - Very Satisfied

10. **Is there anything else you'd like to share about the system?**