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A Framework for Adopting Blended Learning in Traditional School Based Learning

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ABSTRACT

Poor traditional learning methods have been a main concern in learning and teaching activity. These traditional methods ("talk and chalk") is being replaced by online learning, it helps students to get all the knowledge using diversified tools, it places the student at the centre of the educational process rather than the teacher, and the role of the teacher is to improve their skills, and promote research and curiosity to seek the information, and then analyse, evaluate and use it. Generally school-based learning (SBL) and laboratory-based learning (LBL) activities are delivered via a blended learning approach. The novel framework includes an e-learning package which enables the development and improvement of students' ICT skills, digital age literacy, inventive and higher-order thinking before they attend the practical lab sessions. The proposed pedagogical approach will enable the current generation of students to be better prepared for a workplace where computers, the Internet and related technologies, are becoming more and more ubiquitous.

Keywords: blended learning; ICT skills; laboratory based learning; virtual learning environment; digital literacy.

1. INTRODUCTION

More and more lecturers in higher education have experience with technology, and are looking for new ways to adapt their traditional ways of training and teaching and for flexible tools capable of supporting blended learning. As lecturers in higher education institutions all over the world with experience of technology attempt to take advantage of it in their profession, it is important to realize that their role as lecturers has remained basically the same over the years: to inspire students, to educate, and to provide them with the necessary means to build solid foundations for a effective future. Given the significance of the usage of new technology to the different areas of the state, online learning is a significant modern method for delivery, facilitation and interaction of both learning and teaching processes. With access to this new technology assisted by globalisation trends there appears to be a significant opportunity to develop the higher education in the Arab countries. [1]

There is an urgent desire to develop the quality of higher education. In fact, current Libyan higher education is still based on traditional methods; however, as far as Libya is concerned, a set of studies has been conducted in relation to higher education (HE) exploring improvement potential. These studies have underlined the significance of training the teaching team to employ electronic education methods [2],[3],[4]. As a matter of fact the institutions of HE in Libya are facing several of problems, for example the growing number of students. Other issues take account of the lack of teachers. There is, however, still further research required to fully understand what needs to be done to develop the competence of the institutions and the performance of higher education overall in Libya [5],[6]. A review of previous research concerning the employment of modern technology in HE in Libya indicates that most of these studies have focussed on the theoretical perspective like identifying the potential barriers as well as defining the use of modern technology [6]. Also, these studies have analysed the different opinions of students and academics related to the application of modern technology in international HE. By contrast, a limited number of studies have concentrated on the practical application of modern technology in education particularly in Libya. The current research is attended to provide a contribution to developing the competence and performance of the Omer AL-Mukhtar University in Libya. The implementation of digital tools in learning and teaching has attracted significant interest from practitioners in Libyan higher education.[7] Several public universities have started to implement and adopt (ICT) solutions such as the online environment as a tool for flexible learning and teaching processes either in the classroom

outside. This method is referred to as the online learning method. They aim to position it as a transmission centre in the educational process from the teacher. to the student, to build interest in online learning in public education, and for it to be an important pillar for the upgrading of knowledge for students. A virtual environment based on e-learning technology is used to send and receive information. However, for online learning to be interactive, it has to be blended with face-to-face forms. This method is called the blended learning approach. This paper proposes a pedagogical framework for a computer programming module to improve the effectiveness of lab based learning.[8]

Traditional classes require the teacher to provide interaction and discussion, demonstration and communication with students face-to-face. In addition learners communicate and interact with each other. Teachers have to give all the exercises and assignments to students by themselves. The traditional classroom provides many chances for interaction between learners and teachers and among learners. However, this interaction is restricted to one place at one scheduled time which may not be convenient. Furthermore, the lack of tools in the laboratory or class session may not support an effective learning and teaching process. Integration of information and communication technology in learning and teaching has changed the design of the curriculum, the way students learn, and the way they and the teachers communicate. Online learning has become an increasingly important part of the experience in the field of teaching and learning for teachers as well as students. Online learning allows the difficulties and restrictions imposed by the traditional school based learning to be overcome. This method makes a variety of sources, global networks managed to provide resources and information for educational communities available. Yet, e-learning has some limitations; one being that it requires more discipline from students. It has limited communication between the teacher and students, and may lead to lower attendance. All of these obstacles and constraints tend to lead to reduced efficiency of teaching and learning.[9]

An advocate of the concept of online learning believes that this style of education has its tools and methods, and is not merely random requiring simply the plugging in of technology in our schools and universities, but rather we need to have a set of steps based on evidence and research to teach the inputs, processes and outputs to cover the full gamut of elements and components to be integrated into the learning environment where there are communication channels and digital interaction between students and teachers through the exchange of experiences and educational views, discussions and dialogues aiming to exchange views with the aid of various communication channels such as, email and online chat and virtual classroom. The present disadvantages of e-learning include: [10]

- Focus on the skills side without paying attention to the emotional side and encourages inwardness in the students. Furthermore, it uses only two senses, hearing and sight, and not the others.
- Difficulties can be encountered in applying these methods and it requires a certain type of teacher. It also neglects human interactions and relationships between teacher and student and many students still prefer the traditional way of attending lectures.

From the above, we find that online learning is difficult to apply, so we are still in need of a transition that will move from traditional learning to online learning and this stage should be a specific period for the institution before it enters the world of E-Learning. This transition phase is sometimes called blended learning. It represents a mix between traditional education and e-learning and helps us to train in E-Learning and build knowledge of its features and disadvantages so that its usefulness for students can be fully understood. As both traditional education and e-learning have strengths and limitations, it is best to blend the best parts of both approaches. This paper focuses on understanding the implementation steps for blended learning and the definition of blended learning. It also suggests the advantages of blended learning in order to improve learning and teaching experiences.[10] This approach blends traditional learning and e-learning together, in the processes of teaching and learning, so that the use of e-learning tools become a part of education in the classroom. Many specialists who support this theory see its relevance in the application of e-learning, as it combines the advantages of e-learning with

classroom benefits. This approach will be discussed in more detail further on in this paper.

'Blended Learning' is a term that refers to the confusion between face-to-face and e-learning; it does not require the use of high-quality techniques, but instead consists of multiple approaches to teaching and learning. *"learning is facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning, and founded on transparent communication amongst all parties involved with a course."[11].*For the majority of people who apply this model, blended learning is a combination of traditional learning and e-learning, which can be used to teach and learn in the classroom, where the virtual environment becomes a natural extension for face-to-face learning. For this study, blended e-learning shall be employed. Blended E-Learning has an important role, and real potential to gather the best elements of the e-learning approach and traditional learning in university teaching. The significant benefits are: flexibility, reduction of cost, and the saving of time. The next section aims to present the main benefits for blended e-learning. [12]

2. QUALITIES OF THE TEACHER EDUCATION UNDER THE BLENDED LEARNING

Blended Learning needs a special type of teacher who has the ability to deal with modern technology and modern software, use the Internet and understand the design of electronic tests so that he or she can explain the lesson in the traditional way and then conduct the practical application on the computer, solving electronic tests and using the links related to the lesson, which explain the subject and enables the student to share in the search process so that the role of the student is important and participative and is not merely a recipient in the process. The teacher also has greater flexibility in designing the lesson themselves and is not necessarily restricted to the material physically available within the school. It is important the teacher has the ability to combine traditional teaching with skills such as designing electronic tests, multimedia, email as well as creating spirit of participation, and interactivity in the classroom.

3. IMPORTANCE OF LAB-BASED LEARNING

Firstly, the laboratory enables students to develop experience and skills in conducting experiments, and to gain familiarity with the use of devices as well as the ability to define some of the materials used. Secondly, since laboratory experiments often rely on accuracy, students develop awareness of the need to be accurate in the weights of materials used and the importance of precision in operating conditions. Finally, laboratory experiments encourage students to think, discover and research, which helps to familiarize them with the methodology and design of scientific research [6].

Henige [7] identifies five categories of aims that may be achieved by usage of the lab in science classes:

2. **Skills -** investigative, organizational, manipulative, inquiry, communicative;
3. **Concepts -** for instance, taxonomic category, hypothesis, theoretical model;
4. **Cognitive abilities** - application, analysis, critical thinking, problem solving, synthesis;
5. **Understanding of scientific learning** - scientists, scientific enterprise and how it works interrelationships between technology and science; Attitudes - such as risk taking, objectivity, curiosity, interest, precision, responsibility, consensus, collaboration, confidence, perseverance, satisfaction and enjoyment of science.

The computer science lab: is an academic place within the university for students who have already learnt the principles of computer use and followed preparation courses in the field of computers, as they will have studied in the information technology teaching lab for basic computer education classes. In the computer science lab, the computer can be used as a means to design research programs, print reports and undertake activities. Students can use the lab during leisure hours to gain further computing skills; it can also be used for team training if a particular school chooses to hold workshops in the computer lab [8]. The computer lab is a designated, separate room within the university department, and is designed to accommodate approximately 35 computers. Learners should have an understanding of the majority of the

software in the computer science laboratory. The main goal is to gain practical experience and to learn teamwork through the use of a set of software programs, as well as to develop knowledge and skills. Such skills include the implementation and testing of programmable hardware; programming language; the design and testing of software and supporting tools which can be used to conduct practical work; research, and exploration of various aspects of computing knowledge. The lab can also be used to do homework.

Students attend obligatory schoolroom laboratory exercises and tutorials. To get an acceptable final mark the students must pass a written test at the end of the schoolroom lectures, achieve all the exercises in the LBL and pass the final examination, in the form of a computer-based exam. Undergraduates are not allowed to take the final examination unless they have finished the laboratory exercises which are based on LBL and classroom tutorials which are based on SBL. The learners have classes and lectures (SBL), which are obligatory, and include the introduction of new concepts.[12] Students are expected to prepare the programming exercises in the (LBL) and complete this in their own time. Of course, the main assessment of the session is currently considered a closed book containing a mixture of multiple choice questions and article questions. The computer learning course is a hard course, with an average exam pass rate of 50%. The aim of the course is to offer students introductory knowledge of programming languages and computing based learning to make them capable of solving problems using search production rules and algorithms. In the LBL, students use computers in order to solve some practices which are taught theoretically in SBL. Each year, more than 100 learners apply for this course. Some students are "ghosts" who never come to the labs or show up at lectures. Recently, the academic staff within the department has observed that students display a lack of practical experience and understanding of theoretical subjects that are essential to the success of lab sessions. Internal review reports show issues related to the learning processes and traditional teaching methods, limited access to IT, a lack of development processes, poor curriculum review, and a limited link between the practical tasks and course material.[13]

Due to the large class sizes, especially at undergraduate level, many Libyan universities face significant challenges in adequately assessing student learning and providing feedback to students. Additionally, there are shortages of adequate teaching facilities and science educators. Some universities have opted to increase the number of faculty members, or to alleviate some of the strain by increasing the number of students who use one computer, but the majority of students still display a lack of practical experience and understanding of theoretical subjects during the computer lab sessions.

For the above mentioned reasons, the novel framework includes an e-learning package which enables the development and improvement of students' ICT skills, digital age literacy, inventive and higher-order thinking before they attend the practical lab sessions.

First, we will decide which is the most appropriate delivery method for the content and objectives of the course. The theoretical lessons are still delivered via a traditional way which is face-to-face and tutoring in the LBL within three months (one semester). The rest of the activities and communication will be conducted using an e-learning package though we will add blend where appropriate. Course conversion will organize in four steps according to the Process model of the blended LBL module (see figure 2). The conversion of the course will be realised in three steps; the first step is to upload and prepare the content which will be delivered. Because the teachers in the department do not have enough experience of e-learning we recommend a full month for the processing of pre-existing content and advise them to study the opportunities and possibilities offered by the platform, as well as the study of digital tools that can help strengthen the traditional education to design a new educational model. The second step is to organize the community and adjust the content and organization of activities on a discussion board, which will evaluate the activities of students and application groups of students, including a laboratory and send mail and download links for students. The third step is to ask students to fill in a questionnaire to evaluate the effectiveness of web based learning

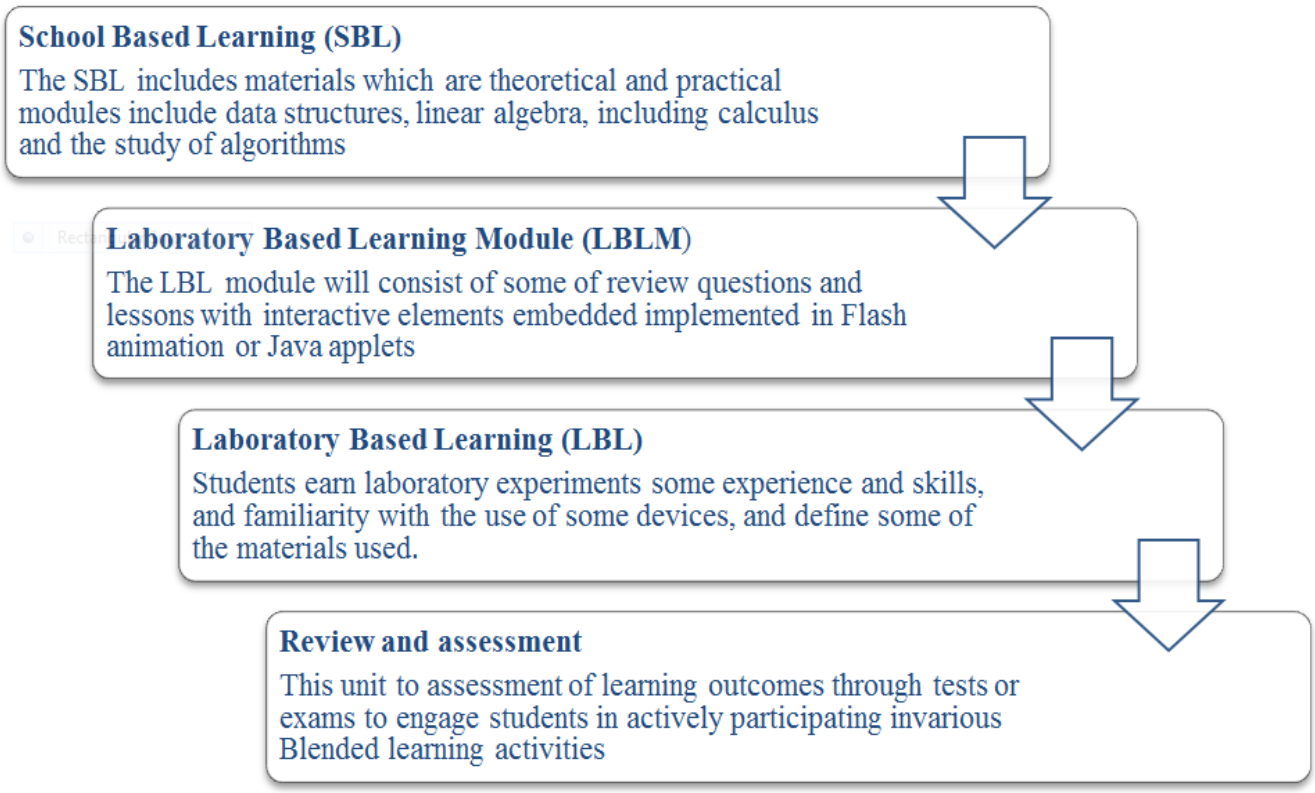

Figure 2. Process model of the blended LBL module

The course content will be provided via the Internet, audio and video tapes, satellite and CD-ROMs. Tavangarian et al. (2004) indicated that online learning is a comprehensive term that includes each form of educational technology that technologically and electronically support teaching and learning., Online learning may be described computer-based training (CBT) or digital educational collaboration [9]. Online learning is a method of learning where the delivery of information to the learner is based on the modern technologies of the computer and the World Wide Web such as: CD-ROMs, educational software, e-mail, chat rooms and discussion forums.[2]The content and sources will be developed in such a way that many features are available through a range of software programs that can be used with all of the e-learning packages and interactive CD-ROMs.

Content delivery: The key elements to provide content for the proposed computer programming course are:

- Multimedia components will be on CD only. The purpose of this is to help the student understand the step-by-step lesson without the risk of a slow Internet connection, and to provide self-learning materials through PowerPoint slides and e-tutorial to supplement the text before going to the lab.
- Feedback with self-evaluation (both on e-learning package and CD). This will consist of self-evaluation and continuous assessment for all modules in the form of learning practical tasks, short answer questions, quizzes, and a questionnaire to assess the modules. All of these are part of the educational curriculum.
- An interactive learning forum will be provided in the prototype via email, blog, wiki, and discussion board.

Synchronous teaching lessons: This kind of e-learning needs instructors and students to be involved online at same time from anywhere. Style and learning techniques based on the global information network "Internet" to connect

and share lectures and research topics between the learner and the teacher in real-time via: Virtual Classroom, Videoconferencing, and Chat rooms. The positives of this type of education for learners include immediate feedback and reduced cost and time attending the place ofstudy, and the disadvantages are the need to acquire modern equipment and a good communications network. The most common types of e-learning are complex and sophisticated, involving online 'meetings' between learner and teacher. The author agrees with specialists who see that synchronous e-learning may also occur in the classroom and using the media of computer technology and the Internet and under the supervision and guidance of a teacher.

Asynchronous teaching lessons: In indirect education, students get educated on courses which permint them to select times and places that suit their circumstances, by employing some of the methods and tools such as e-learning, e-mail, the World Wide Web (www), file transfer, and CDs. Positive: This kind of education in which the learner chooses a time and place appropriate to them also enables them to refer to learning materials in electronic form at any time. Negatives: the learner is unable to get immediate feedback from the lecturer. It is indirect education which does not require the presence of learners at the same time .However,, there is a global development in both the technology and e-learning, and this has lead to the emergence of various ways and techniques of learning and teaching; for example virtual classrooms. This classroom can work more effectively offering an easy way to share materials, uploading and reviewing students' tasks, and for holding debates through online chats. The virtual classroom is a teaching and learning environment located within a computer-mediated communication system . A set of software tools that enables the teacher to design activities for the modules is to be considered (such as Author Plus) with which you can design activities according to the inclinations and abilities of the students studying the module. These tools can be used to design individual lessons or entire courses and are suitable for all teachers with basic computer skills.

Personal computer-based flash technology, for instance Camtasia Studio and Adobe Captivate, can be used to make asynchronous lessons. It can simply produce demonstrations and software tutorials in streaming video and flash models for students. Camtasia is also good for making lessons for learning management systems and software packages. When presented in the laboratory, the demonstrated actions are frequently too difficult or too quick to see and absorb. It is a screen recording platform that records both the audio and video elements of any action that can be presented or demonstrated on a computer screen including demonstrations of Java applets, PowerPoint lectures, computer labs assignments, software. This video can be converted to Real Player, Flash, and Media Player, which then can be offered for viewing on the Internet. The microphone, Camtasia Studio and a web camera are all that is needed to make the video. Recording of PowerPoint lessons in video presentations is also possible. The researcher has been developing a complete e-learning solution based on users' requirements. The text content is integrated with the application. Integration of the electronic modules is in progress. After integration, the e-learning package of the training program is to be hosted on the network, and flash technology will based on the personal computer. Furthermore, a flash file is highly compressed which requires only small storage space; also it has a good level of synchronous audio and visual integration. Flash can be good for creating step by step corresponding and animations to make the learning materials more persuasive and memorable. For instance, when programming in C++, the lecturer could encounter mistakes after the software package is compiled. This package software is very helpful for recording the common errors and how these can be corrected in the real application. The course will be completed by the author using PC-based flash technologies like Camtasia Studio. The author suggests these teaching materials will be more effective for students in support of the learning experience in both lab and classroom learning environments associated to normal PowerPoint notes. There are specialized programs and websites on the Internet that can be used to design lessons and create teaching material such as Program Author Plus which is used in the

design of lessons and modules of the English language, and the program Hotpotatoes which is used in the design of lessons and modules of the read-only variety, and there are also programs available that can be used in the design of any module in any discipline including Macromedia, Authorware, and programs such as PowerPoint and Netscape Communicator which can be used in the design of lessons and to conduct presentations and can be used on the Internet and outside the network. The teacher completes the entire design process, writing texts, forming questions adding still and moving images, sounds, music, links etc.

4. PROPOSED PEDAGOGICAL FRAMEWORK FOR ICT MODULE

The pedagogical design should link together the course contents, learning environments, teaching and learning styles, assessment methods, learning outcomes, learning processes, and learning activities. The design of the proposed pedagogical framework considers these aspects (see Figure 3).

Step 1 - Pre-analysis

In order to make sure that blended learning can be utilized, a set of analyses and observation must first be carried out. These analyses should contain three elements:

(1) Analysis of student characteristics, learning styles and preferences, and an assessment of learners. It is important to identify learner characteristics, and to assess the extent of their readiness to learn the material. A diagnostic test should be conducted to determine students' range of mastery of the subject matter, and to identify any obstacles to learning. Once a lecturer knows how students approach learning, the lecturer can offer more support and encouragement by building a blended learning environment to meet students' learning needs . Table 1 shows details about considering a new dimension for affective skills. The proposed pedagogical framework will be applied for a computer programming course which is generally attended by students who are between 22 and 24 years old. Most students lack practical experience and understanding of theoretical subjects that are essential to the success of lab sessions. Students have studied an introductory module during their third year of study. So they should have a clear understanding of the Higher Education demands, familiar with the classroom technology, and have the basic skills in using those tools and technology.

Language needs	Meeting soctial needs	Meeting emotional needs	Meeting learning needs
• Learners need to develop a 'language of learning' and move into a 'language of thinking' using sensory cues (video, movie picture) objects, pictures, symbols, signs and/or words as appropriate to their developmental level • Language can be 'strong' with appropriate support through objects, pictures and symbols helping learners to develop 'Libyan students 'and support a move towards more conventional communication. • Online quiz can be used to develop a positive SBL environment and encourage more independent thinking	• Meeting social needs - providing a SBL environment where learners feel they belong, feel accepted and supported and have opportunities to work with others. Teachers can model effort and perseverance through their own approaches in the classroom, including ways of giving and accepting feedback	• Meeting emotional needs – ensuring learners feel safe, secure and able to explore and make mistakes from a 'safe' position will help them gradually become less dependent on structure. Learners need to be trusted, with opportunities to care for others, have fun and develop respect for self and peers and a pride in what they do. Teachers can move learners from compliance to greater independence, encouraging exploration and willingness to try out new ideas.	• Meeting learning needs – providing experiences which are relevant and connect to earlier learning to help learners make sense of the whole learning process and increase their independence. Develop the skills of student and teachers at the Faculty of Science specialization "computing" on the design and production of electronic lessons in the field of computer science.- Development of positive trends in students majoring teachers "computing learning" about the use of e-learning programs in teaching computing learning

Table 1. The new dimension for affective skills related to ICT course [6]

***(2)Needs analysis*.** Based on Bloom's Taxonomy and Kolb' model for the learning cycle, an analysis must be undertaken to determine and develop appropriate teaching and learning styles for the LBL module [3]. This analysis may consist of tests, questionnaires, discussions, or the examination of previous school records and documents. The model contains components of emotional intelligence which can enhance personal qualities, and assist in the intellectual growth of the students, as well as affecting emotions under the guidance of memory, judgment and final decision. As a result, learners can motivate themselves to manage their emotions to improve their relationships with others. So it seems that after entering the college of colleges, what distinguishes between the students and their success is not linked to their intelligence but is often linked to social and emotional factors and some studies indicate that emotional and social skills to help improve cognitive function. Moreover, the private sector as future employers require graduate recruits with high levels of emotional intelligence. The cultural awareness which is defined as [9] being prepared to realize the behaviour of others and to react in a positive manner to the differences between cultures. Moreover, students must be able to make a better impression and should be more culturally aware in the LBL. This should also assist students of computer science to understand the acts of others, beliefs and values. Social competence is an individual's ability to interact effectively with those around him, which includes the ability to find a suitable place for the individual in social situations, and determine personality traits and emotional situations for others successfully, and the selection of appropriate means of treatment and to achieve these means during the interaction, and develop social competence at a time where the individual learns how to relate during joint activity with others. Lab demonstrators confirmed that social competencies should be taught to students of computer science in the SBL to be seen in reality during the LBL.

(2) This dimension concentratess on the way which things can be dealt with things emotionally, such as appreciation, enthusiasm, feelings, values, attitudes and motivation.

(3) This analysis will provide the lecturer with an initial idea about various learners' needs. So one can decide how to utilize educational multimedia in order to advance the overall cognitive and emotional growth of the learners by taking into account any shortages in technology.

Computer science students transfer their knowledge in practice, mathematics and programming language skills. Students must know about the device processes, safety standards, computer applications, and the use of the device, etc. These skills are usually easy to monitor, measure and identify, through the SBL. Students must show a high level of competence in specific technical skills through the LBL program in order to increase the chance to get a job in future. In addition to the above, there are some skills that should be available to both the teacher and the student:

- Ability to use Windows commands
- Ability to use Word
- The ability to download software from the Internet and CD-ROMs
- The ability to move from one program to another
- Ability to use e-mail
- Knowledge of Internet terms.
- The ability to use search terms to locate required information
- The ability to communicate in writing.
- Considerations to be taken into account to increase the effectiveness of the online module.

Benjamin Bloom (1913-1999) was an educational psychologist who was interested in improving student learning. In the late 1940s, Bloom and other educators worked on a way to classify educational goals and objectives, which resulted in three learning categories or ―domains‖ and the taxonomy of categories of thinking. Each of the three categories requires learners to use different sets of mental processing to achieve stated outcomes within a learning situation. Thus, instructional goals and objectives should be designed to support the different ways learners process information in these domains.

- Cognitive domain (**knowledge**) verbal or visual intellectual capabilities
- Affective domain (**attitudes**) feelings, values, beliefs
- Psychomotor domain (**skills**) physical skill capabilities

There are some examples of students' future skills which should be developed in accordance with Bloom's Taxonomy:

Knowledge Level: Knowledge in this research context refers to the students' ability to recall software engineering concepts that they have learnt in classes. Knowledge level questions include the keywords define, list, arrange, order, and state. Below are some sample questions that fall under this level:

• What is a global variable?

• List 5 reserved words in C programming.

Understanding Level: Comprehension in this research context refers to the students' ability to understand and restate or describe a learnt concept using their own words or explanation. Comprehension level questions include the keywords explain, describe, discuss, identify,review, select, and predict. Below are some sample questions that fall under this level:

• Identify the value of x after running this program fragment:

```
x=0; y=0;
while (y<50) {x++; y=y+5}
```

• Predict the output of this program fragment:

```
i=0;
while (i<=10) {
   printf("%3d %3d\n", i, 50-i)
   i++;
}
```

•Describe 4 types of coupling in software design.

• Describe the Pareto Principle in statistical software quality assurance.

Application Level:Application in this research context refers to the students' skill in using the theories learnt to solve new problems. Application level questions include the keywords classify, write, apply, choose, and interpret. Below are some sample questions that fall under this level:

- Write a for loop that produces this output
- Write an if statement to compute and display the average of a set of n numbers. Calculation should only be done if n is greater than 0, or else an error message should be prompted.
- A software system is to be developed for Company XYZ. The client is unsure of what the final system should be. Which software development model would be

Analysis Level:Analysis in this research context refers to the students' ability to separate a whole into various component parts. Analysis level questions include the keywords analyze, compare, contrast, distinguish, categorize, calculate, differentiate, and test.

Below are some sample questions that fall under this level:

• Differentiate printf function calls for displaying prompts and for echoing data.

• Given that there are five members in a democratic team, calculate the number of communication paths needed.

Synthesis Level:Synthesis in this research context refers to the students' ability to relate learnt software engineering concepts and produce a new idea. Synthesis level questions include the keywords create, construct, design, develop, manage, organize, plan, predict,
and propose. Below are some sample questions that fall under this level:

• Construct a complete C program that reads text strings from a text file into a suitable data structure, sorts the list in ascending order, displays the list on the screen and stores the list in sorted order into the text file. Justify your choice of data structure.

• Write a C program that accepts integer inputs from the screen, computes the total and average values; and displays the values on the screen.

Evaluation Level :Evaluation in this research context refers to the students' ability to judge, critic and decide on value of ideas or materials. Evaluation level questions include the keywords argue, debate, recommend, prioritize, justify, rate, and decide. Below are some sample questions that fall under this level:

• Given the two solutions to the stated programming problem, rate the solutions in terms of efficiency and readability.

• Which of the two algorithms, bubbles ort or quick sort, is more efficient? Justify your answer.

• Given two possible solutions, A and B, to solving the given software development

problem, decide on the best solution. Give your justification.

(3) Analysis of the blended learning environment. It is necessary to define the features of the environment. The goal of this framework is to determine the level of proficiency of learners and to clarify the learning tasks [27].

Step 2 - Design of Resources and Activities

The blended learning design differs from normal instructional design, which focuses specifically on resources and activities that can be used within the SBL context. The process of identifying the main tasks students must perform in order to successfully function can be implemented as required. For example, the students can use multimedia to facilitate group discussion by using digital tools in an e-learning package. The digital tools can incorporate sound, moving pictures, and animation, which can prompt students to take a more active role in learning by allowing them to view practices in up close in action, and to engage with a keyboard or mouse to navigate interactive materials, simulation, and images. Multimedia allows quick and effective information transfer to all students engaged in SBL.

In our case, we will blend video, audio, text, simulations, images and multimedia into the e-learning package that will be available to students. The lecturer will choose suitable methods to deliver the necessary information, such as moving pictures or animation. This will help to engage the learners with the subject matter. For example the lecturer may organize the students into groups. One group may draw a flow chart for an exercise of C programming, and will present the idea to the other groups. A second group may take part in a simulation activity of C programming and discuss how to use the program step by step (perhaps using an online tutorial). Other students might work individually, using the Internet and various multimedia to carry out the editing and organization of the elements of code and writing scripts.

As appropriate, the lecturer and students will use a combination of the following materials:

- Flip-chart: A group of students may utilize a flip-chart to present their ideas and explain the use of basic commands for running programming.
- Computer: Individual students will use online tutorials and videos for solving problems.
- Handouts: The lecturer will give to students handouts to help them focus more on their research for specific functions and commands. Multimedia: Students will use multimedia tools on the e-learning package to discuss the issues and ideas as a group. The digital tools will allow the incorporation of sound into lessons, moving pictures, and animation, which gives students a more active role in the learning environment. They can watch practices in action, see small things up close, and use the keyboard or mouse to navigate interactive materials, simulations, and images. The use of multimedia helps to transfer information effectively and quickly to all students, and can keep students interested. The lecturer can blend video, audio, text, simulations, images and multimedia into a single online environment via a Moodle application available to students from school or home.It is more important to review and inspect each material before providing it to students; this stage can be used to pilot-test the lesson materials
- Review the materials. Learners will be aware that the lecturer needs to gather the tests, worksheets, and handouts distributed during the SBL.
- Prepare the materials. The lecturer will show students a visual display of the basic commands of the C programming by online tutorial or chart, and students can write notes during the explanation.
- Prepare the environment. The lesson will be in two different places: in the classroom and in a lab.
- The classroom setting (SBL) is arranged to encourage student participation. The tables are arranged for easy interaction in small group work. A Smart Board is connected to a computer and projected on a wall where all students can easily see it.
- The laboratory based learning (LBL)

provides students with access to computers that are connected to the Internet and on which are installed C programming and other required programs. Students can use the computer as a means to design research programs, print reports and activities, and can use the lab during leisure hours to gain additional practice. The computers can also facilitate team training and workshops in computer lab. Students receive practical experience learn teamwork with a set of software programs, they gain experience designing, implementing and testing programmable hardware and software which can use to do practical work, research, or homework.

Step 3 – Development of e-learning package

The e-learning package (which will support SBL and LBL activities) will include:

- Media unit (MU) will contain multimedia elements without further sections. The element of the media can be simulation, video, text, animation or audio sequences. This is the process of actually composing an LBL module and preparing and producing educational pieces and outputs (such as texts, audio recordings, video clips, still images, computer software, etc). This phase often begins with a prototype (a preliminary version of the product) in which the developer and programmer presents a storyboard for each screen that includes any links. This prototype allows for checking design specifications and may be modified once it is presented to a sample audience. Based on the resource and activities, the blended learning approach will be created so the learning activities will meet the requirements of all computer science students, regardless of their limitations on internet access. Consequently, a dual delivery status (ie CD-ROM based and e-Learning package) could be considered. While the e-learning package can be used to interact simultaneously asynchronous and synchronous, the CD will include self-learning materials multimedia.
- Learning unit (LU) is a composition of objects (learning elements and media elements) which contain slides for lectures, documents or questions for a test which include the components graphics, text, and user interactivity. Multimedia components will be on CD only in order to help the students understand the step-by-step lesson without the risk of a slow Internet connection, and to provide self-learning materials through PowerPoint slides and e-tutorials.The feedback with self-evaluation will be included in the e-learning package and CD. This will consist of self-evaluation and continuous assessment for all lectures in the form of performing practical tasks, multiple-choice questions, quizzes, and questionnaires. Also an interactive learning forum will be provided so the students and lecturers can communicate through emails, blogs, wikis, and discussion board. Blending technology with traditional education in an integrated manner will enable the students' active participation to the teaching and learning activities through co-operative and experiential learning. For example if the students have read a CD with relevant material before coming to the lecture then they have developed an initial perception of the lesson. So they will be able ask more questions and to become involved in the process of their own learning by doing the thinking and drawing the conclusions from their own thinking and experiences.

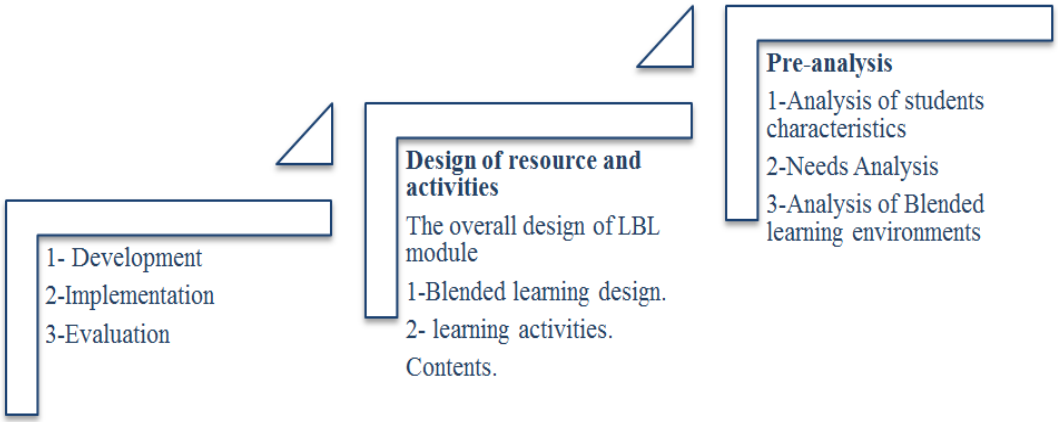

Figure3. The pedagogical framework of the blended learning approach

Step 4 – Implementation of e-learning package

The computing science courses are more than theoretical courses because the lecturer should provide explanations about how to write programmes. Bath and Bourke [10] underline that "it is important to have course aims and learning objectives set before considering blended learning opportunities for your course". So the students will attend the lecture presented by an experienced lecturer where the theoretical concepts will be introduced.
Then they will have to access the new e-learning package which will contain the lecture notes and supplementary material and exercises which will enable the development of students' skills which will be relevant to the practical lab sessions. So resources and time will be offered to the learners in order to acquire the knowledge and skills required to use certain technology before they will actually use it.
The students will attend the practical lab session and their answers will be stored in e-wallets that can be accessed by different lecturers, demonstrators, and students themselves. These records offer evidence that students achieved their work in a good way or not by providing the best skills and competencies.There are three element will cosider when implement the e-learning package

Material to be learned: The material to be learned refers to the techniques and conceptual ideas that could be presented in the session. These materials can be regulated and identified by two key headings - technology and concepts. The materials used will be independent of the method used to provide information; effectively, 'what' will be learned is independent of 'how' this material is offered. The split between technique and concepts will be developed from the idea of a computer programming course provided in two formats. Concepts may be presented, for example, through a project, where students can discuss issues via an online module which is not possible in school-based learning .Teacher's comments are also a useful source of materials for acquisition of knowledge-based learning, and this approach enables students to review the content of the module at home at any time. Techniques which are usually taught through methods such as the teacher drawing a technical flow chart or demonstrating how to write programming software can be learned via the interactive facilities which are available on the online module. The authors seek to increase the use of digital tools in computer programming courses, in order to help students organize information and to visualize and understand the internal relationships between different components of the scientific content. This can be achieved through cooperative educational activities, wherein students are divided into small electronic discussion groups to achieve common educational goals. The online module will contain multimedia elements as additional sections. The media elements may include simulations, video, text, animation or audio sequences. This part of the process involves actually composing an LBL module by preparing and producing educational elements and outputs

(such as text, audio recordings, video clips, still images, computer software, etc.). This phase often begins with a prototype (a preliminary version of the product), in which the developer and programmer presents a storyboard for each screen that includes any links. This prototype allows design specifications to be checked, which may be modified once it has been presented to a sample audience. Based on the resources and activities, a blended learning approach will be developed to ensure that the learning activities meet the requirements of all computer science students, regardless of their limitations in terms of Internet access. Consequently, a dual delivery method (i.e. CD-ROM based and e-Learning package) could be considered. While the e-learning package can be used for simultaneous interaction, both synchronously and asynchronously, the CD will include multimedia self-learning materials.

Presentation method: it refers to the method(s) used to present the material to students in various sessions. The style of presentation is the dimension in the framework whereby the academic staff decides how the materials will be presented and how the technology will be organised and structured. E-learning applications offer several flexible methods to deliver materials. This flexibility provides an exciting opportunity for teachers to take selective advantage of technological choices in their presentation. As an example of how presentation techniques can be organized, it will be useful to consider the difference between two methods of presentation. In a traditional laboratory-based learning environment, the materials provided can be presented to students in one classroom by a teacher who speaks, using a projector or chalkboard. The online learning module, in contrast, places more emphasis on student interaction, having several types of tutorial material (e-tutorials, activities, pictures and videos) instead of a personal face-to-face lecture.[10]

Learning strategies : it refer to the different ways in which material is presented to students by the teacher in order to achieve a goal, and these include the various means adopted by the teacher to adjust the levels and management of learning. This is in addition to the general atmosphere experienced by students and arrangement of the physical characteristics that contribute to the process of communicating the desired concepts and ideas. In our case, it is therefore important to consider learning strategies in building the online module. This means we need to consider the process of delivering knowledge to the learner, creating motivation and developing the learner's desire to research, explore and work towards access to knowledge; a clear method is required to allow him to achieve his goal. It is no secret to the practitioner that the process of teaching and learning entails teaching aids, which are of great importance in providing sensory experiences that are difficult to achieve in the natural conditions of the educational experience, and which help to overcome obstacles that hinder the process of clarification.[10].An interactive learning strategy depends on the method of interaction between student, lecturer and scientific material, and this concept can be applied through several means such as collaborative learning, e-learning, brainstorming, problem solving, etc

Step 5 – Evaluation of e-learning package

- Expert evaluation - the e-learning package will be initially reviewed by the original designer and other design experts regarding the following aspects: content, interface design, technical functionality, timing, and interaction. The prototype will be improved in accordance with the experts' comments.
- User evaluation – the improved prototype will be tested on a small number of individual students in the first instance. They have to complete a questionnaire and adjustments may be made before the e-learning package will be field-tested again on a larger group.

5. CONTEXT ANALYSIS FOR THE DEVELOPMENT OF LBL MODULE

User analysis: The author suggested that the framework must consider stakeholders profiles, technological, institutional and the pedagogical contexts of products implementation. The designed e-learning package's stakeholders are the lecturers, demonstrators, and students.

- **Stakeholders**

Faculty science lecturers: They teach computer programming language at postgraduate and undergraduate level to learners over the age of 19. The lecture is delivered by an academic teacher based on traditional facilities, e.g. blackboard and chalk and other basic electronic facilities (within LBL and SBL). The lecture material is hard copy sheets and students notes recorded in a textbook. The lecturers, who deliver practical and theoretical modules during SBL, are required to hold a PhD or Masters degree.

Faculty science Demonstrators: The demonstrator who works in the lab enables students to understand theoretical subjects during SBL and prepare learners for the lab exercises. Demonstrators write programmes and solve the most difficult problems. Demonstrators also observe learners during their LBL programmes.

Faculty science students: are enrolled into faculty science at age 19 based on their learning capabilities and preferences; also they must obtain the secondary school certificate. The degree which they can get from faculty is the Bachelors degree which needs four years of study on most courses.

- **Institutional context**

Strategy and policy - Omer AL-Mukhtar University needs a clear mission and well designed academic programs. The mission of the Department of Computer Science is to prepare graduate and undergraduate students for productive careers in government, academia and industry by offering an outstanding environment for learning, teaching and research in applications of computing and the associated theory. The department provides theoretical and practical educational services to colleges and departments that need this specialization and implementation of training courses in the use of computers for staff and students at the university and to supervise and follow-up and provide maintenance of the computers at the university. The department performs research and scientific studies and practicals in the field of computers and the relationship of this discipline to other academic areas.

Qualification offered-The science faculty offers the B.S. degree in Computing and other degrees for different departments. The computer science course is a compulsory course offered throughout the eight semesters of studies of the Department of Computing which take four years study each year comprises two semesters, and each semester takes three months. Learners who register for the course come from all over Libya, as the Department of Computing is extremely popular with learners who need to study programming. The computer science course is organized into two parts, as at all universities, one delivered through lectures which is the theoretical part also known as School Based Learning (SBL), with three hours of lecturing for each module per week. SBL is based on a lecturer-centered approach in which experienced lecturers offer information and theoretical knowledge via traditional tools (e.g., a chalk and blackboard), and the students receive textbooks and printed lecture notes. The other is the laboratory part, with two hours per week of lab instruction which is called laboratory based learning (LBL). The LBL part aims to apply empirical theories for understanding, measuring, and improvement of the software improvement process in the computing department. The main objective of LBL is to train students in techniques, technologies and equipment used on the computing learning course. Currently, the LBL and SBL are not working well, so it is necessary that the faculty change the strategy of the teaching system. Students have only two hours each week for exercise and practical learning in LBL, the rest of time going to theoretical learning.

Form and assessment - Students attend obligatory schoolroom laboratory exercises and tutorials. To get an acceptable final mark students must pass the written test at the end of the schoolroom lectures, achieve all the exercises in the LBL and pass the final examination.. Undergraduates are not allowed to sit the final examination unless they finish the laboratory exercises which are based in LBL and classroom tutorials which are based on SBL. The learners have classes and lectures (SBL) every week. Lectures, which are obligatory, introduce new concepts. Students are expected to prepare and complete the programming exercises in the LBL

in their own time. Of course, the main assessment of the session is currently considered a closed book assessment and contains a mixture of multiple choice questions and article answers. The computing course is a hard course, with average exam pass rate of 50%. In order to develop the computing course to support the establishment of more effective learning activities, it is necessary to review the institutional context currently available to support the implementation of the e-learning package (see Figure 4).

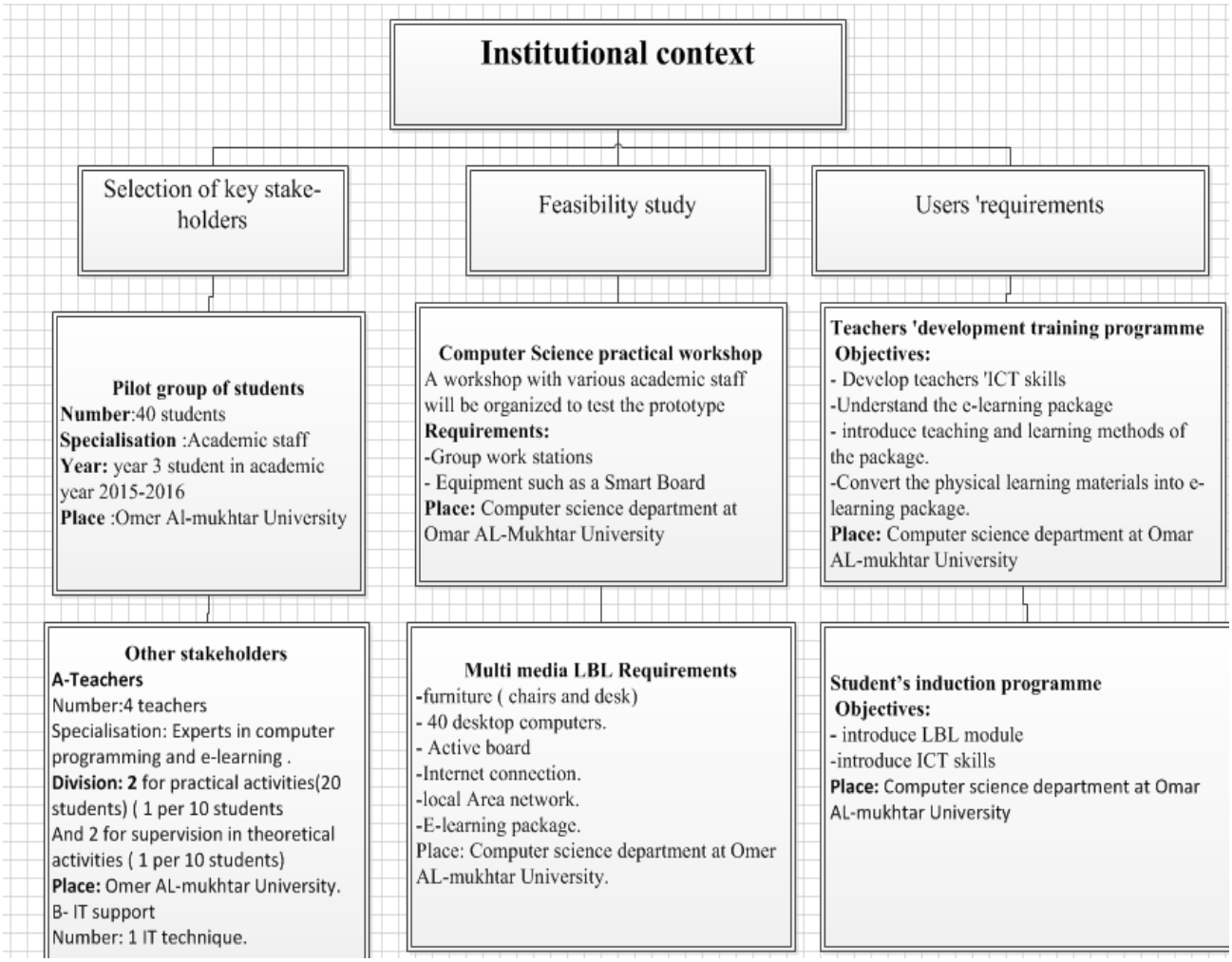

Figure 4: Institutional Context

Pedagogical Context

The learning context: In order to develop the computing course to support the establishment of more effective learning activities, it is necessary review the tools which are used currently to support learning along with a summary of the theoretical understanding of learning and how these can be applied in the context of e-learning. For more details see figure 5. Learning is influenced by a set of interrelated factors. Biggs (1999) describes the design of a good education to ensure that there is no conflict between the teaching methods, environment, curriculum, and evaluation. He discusses learning activities within a particular context (in terms of the environment in which it occurs activity, institutional procedures and educational methods adopted restrictions), and aims to meet a set of learning outcomes with specific evaluation criteria through a series of tasks using a range of tools and resources

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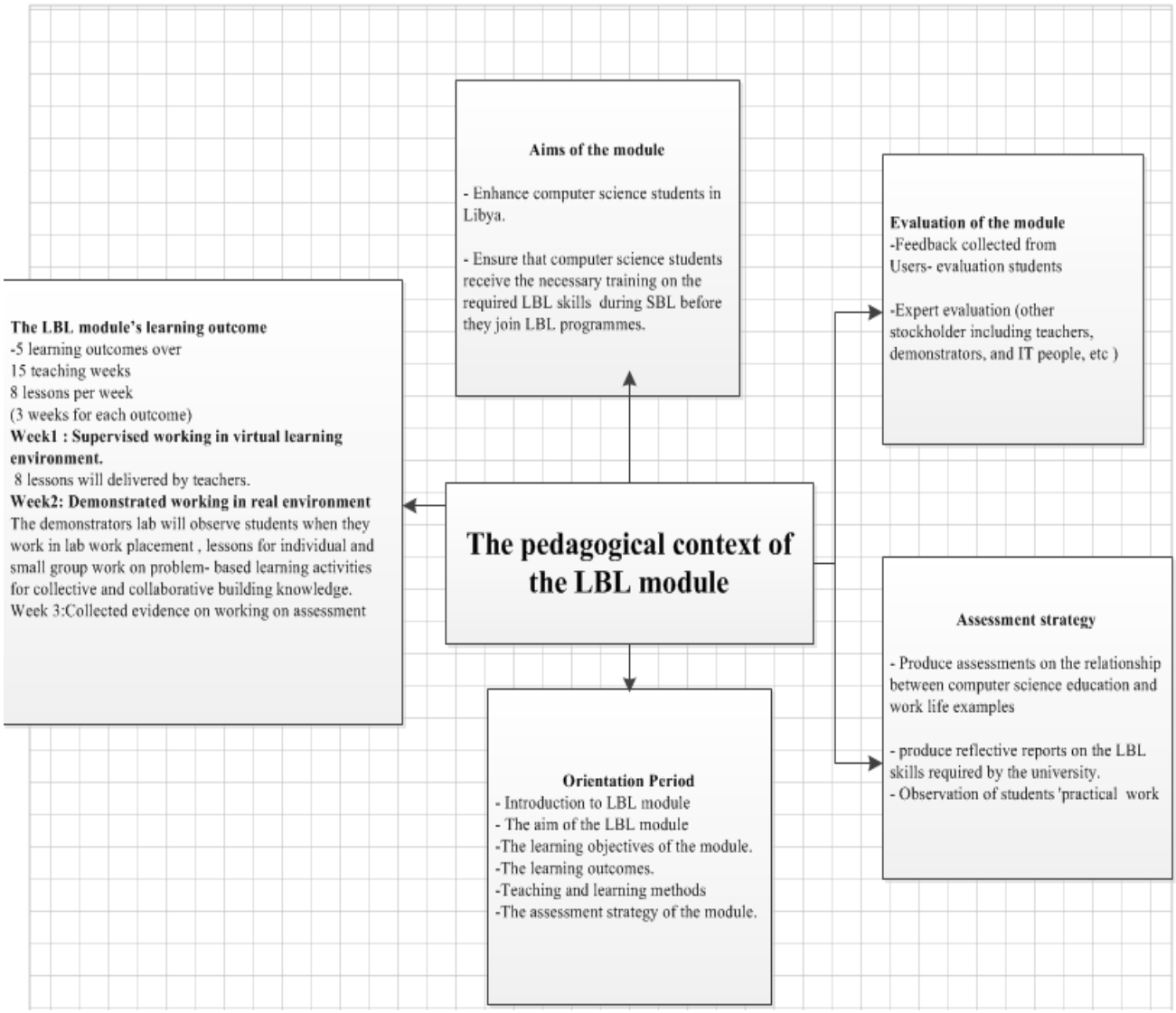

Figure 5: Technological contexts

- **Technological contexts**

The *LBL module* is based on a simple website, which contains a set of drawings and texts on the module, and a set of exercises and tests and records kept of test scores. This module may be developed to contains the animation, simulation and audio group and the visuals and add links to scientific material, all of which can be found on the World Wide Web. The online module includes a set of tools that enable the student to communicate with the teacher and his or her fellow students, and to look at the information and participate in discussion. There is also the module home page, module tools, academic calendar, bulletin board, panel discussion, room dialogue, module-specific information. The course content includes scientific articles and accompanying multimedia, readings and tasks, lectures and special instructions and glossary, notes and so on, both in written and spoken format,, photos and simulations, slide shows, and attached documents, notes, images and organizes topics scheduled in the form of files and folders with links leading students to different scheduled classes.

Requires the use of online module: A PC, operating system Windows 95, 98, 2000, 23 MB of available memory, minimum 28.8 kbps modem, sound cards, screen resolution of 600 x 800 pixels, earphones**,** storage media**,** certain programs (Realplayer, Acrobat Reader, InterVideo Win DVD), browsers, such as Internet Explorer**,** Internet connection**,** E-mail account.

A camera and special software so the student and the teacher can capture and send images**,** microphone, VOIP software and file transfer capabilities**,** authoring software such as Author Plus, Hotpotatoes, Macromedia Authorware)**,** programs to prepare a slide presentation and

visualization, such as PowerPoint**,** and design programs such as Adobe Photoshop.

6. STRATEGY PLAN

If Omer Al-Mukhtar University wants to implement blended learning then it needs to produce a strategy plan, which would offer a clear starting point. This plan will define the new environment and will explain the main steps which may include challenges faced by Libyan universities when introducing e-learning, it requirements which are essential to adopt a successful blended e-learning programme. The strategy plan of implementing blended learning has the following summaries:

In general, behind each successful project is leadership. Leadership plays an important role in implementing a new project which offers significant support for new training; without leadership the organisational acceptance could be slow. As research has shown that the success or failure of an e-learning operation depends on the structure of the organisation that is expanded by an institution's leaders, to prepare for the adaptation of e-learning, in order to improve teaching and learning methods. Leaders at all levels should reinforce participation across the university to implement e-learning. Each leader must have ownership of the plan of the change management for adopting blended learning. They should help in performance, execution and full development.

The University should offer the essential technical infrastructure to build an on-line environment that is accessible to all its students. This means providing good-quality computer rooms and a minimum technological platform, such as necessary access to software, current browser versions, hardware, etc. As part of adopting a new environment, the University will have to provide suitable technological capability. The system must be fully tested and anticipated problems addressed. The University must select the model of on-line environment and the appropriate on-line environment platform Learning Management System (LMS).It's essential that the University provides training for the tutors, to give them the essential technical skills necessary to use the system. Since staff development training is the main concern for institutions in implementing any form of new learning methods, it is essential to focus lecturers' training on how to use hardware and software.

At the beginning of their study, the University should provide necessary training for students to realize a new environment, and to get the essential skills. Quite simply, the University should provide the students with a profile of Internet skills, computers, understanding of Windows and basic typing abilities, and give students English courses to learn English language because most of the e-sources, like software and web content are in English, which makes ICT and e-learning in the Libyan education system more difficult. The government must offer the money for: an ICT structure; a proper e-learning infrastructure ;Libyan experts to develop an online learning and teaching environment; tutors, due to the increase in work; developing a software environment ;courses to train developers and technical departments, who can help in operation and installation of software.

7. CONCLUSIONS

The proposed pedagogical framework is intended to raise the educational competencies and performance of computer science lecturers and students, and to help them achieve their educational goals. It will encourage lecturers and students to employ ICT in the classroom, and this can be achieved by properly utilizing a blended learning environment. This will ultimately foster a spirit of cooperation and understanding between lecturers, administrators, and students. This study has shown that the use of computer animations can assist students to better understand complex and difficult concepts in various computer courses. The LBL course training will allow the incorporation of sound, moving pictures, and animation into lessons, which extends lecturers' capabilities to deliver materials that increase learners' interaction with the subject matter. Through these media, students can watch practices in action, see micro-views of larger structures, and navigate interactive materials, simulations and images. E-tutorials will offer step-by-step directed tours of the entire e-learning package. Multimedia can transfer information effectively and quickly to all students, and can keep students interested in

SBL. The authors intend to blend video, audio, text, simulations, images and multimedia into online applications available to students at school or home. The e-learning package will help learners to improve research and technical skills, which cannot be accomplished by reading a textbook during SBL or LBL activities.

REFERENCES

1. Arab Bureau of education for the Gulf States. Education and the electronic government. Riyadh: Arab Bureau of education for the Gulf States.(2003)
2.Artemi, M., Ajit, K. "A SWOT Analysis of E-Learning Model for the Libyan Educational Institutions", The 3rd National Conference of Basic Science 25-27/4/2009 Aljabal Algharbi University Gharian – Libya.(2009)
3. Kenan, T. (2009) The Barriers of E-learning in higher education in Libya. MSc Thesis. In: UK, University of Salford, (March, 2009).
4. Hamad, N. "Higher education, technology, and development process In: Alaour, M., ed. Symposium of HE and Development in the jamahiriya (Libya). Tripoli, Libya International center of green book research. Tripoli-libya.(2006)
5. Haidar, G. Studies of technologies. Faculty of Education, University of Ajman for science and technology.(2001)
6. Othman,.A, Pislaru, C. and Impes,.A. "Improving Students' ICT Skills By Using A Novel Framework For A Lab-Based Learning Module. In Proceedings of the Fourth International Conference on e-Learning (ICEL2013), Ostrava, Czech Republic, pp. 106 - 113. (2013)
7. Othman, A., Pislaru, C. and Impes, A. "Attitudes of Libyan students towards ICT's application and e-learning in the UK". Proceedings of the Fourth International Conference on e-Learning (ICEL2013), Ostrava, Czech Republic, pp. 123 – 129, ISBN 978-0-9853483-9-7 .(2013)
8. Othman, A.. Investigating an On-line Teaching and Learning Environment for the University of Omar Al-Mukhtar, Libya ,MSc Thesis. In: UK, University of Huddersfield, (2010).
9. Othman,.A, Pislaru, C. and Impes,.A.Online Interactive Module for Teaching a Computer Programming Course the procedding if the 12th European Conference on e-Learning ECEL-2013 (to be published)(2013)
10. Othman,.A, Pislaru, C. and Impes,.A. ''Improving the Quality of Technology-Enhanced Learning for Computer Programming Courses'' . Proc. of 4th Int. Conf. on Distance Learning and Education The Proceedings of 4th International Conference on Distance Learning and Education (ICDLE) (to be published)(2013)
11. Othman,.A, Pislaru, C. and Impes,.A. ''Determination of generic skills gap between school-based learning and laboratory-based learning in Omar Al-Mukhtar University ''. The Proceedings of the International Conference on Electrical, Computer, Electronics and Communication Engineering FR, Paris (to be published)(2013)
12. Omar Al-Mukhtar University: Computer Science Department homepage. Online available at http://www.omu.edu.ly/. Accessed 25 May 2013.