DEVELOPMENT OF A MODEL FOR BLENDED LEARNING IN TRADITIONAL UNIVERSITIES IN PALESTINE

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ABSTRACT

Many institutions of higher education are incorporating e-learning into their curriculum. Several factors though, need to be taken into consideration when implementing e-learning. One way to help in overcoming barriers facing efforts of higher education in Palestine to move towards implementing e-learning is to adopt blended learning approach. The research is aimed at developing a model of blended learning that can be applied in traditional universities in Palestine. Information was first obtained through a questionnaire distributed among faculty members in Palestine to determine the problems and needs of implementing e-learning in higher education. Factors for blended learning were determined based on the literature and the input from the data. A blended learning model was then developed, consisting of blends of face-to-face and Internet settings, synchronous and asynchronous communications, learning theories, instructional strategies, delivery methods and types of contents, in addition to learning style test component. It is based on factors and quality criteria related to blended learning. Evaluation of the model design was carried out among faculty members in Palestinian universities through a questionnaire. The Cronbach's alpha value for all items was 0.963, and the mean for all items was 4.16, with 38 items scoring a Mean of >=4.0, and with minimum individual question mean of 3.67 and maximum of 4.55. This suggests that the model is acceptable. Then, software was developed and implemented to proof the applicability of the model. The model was then tested in one university in Palestine. Volunteer lecturers tested the model for 2 weeks, as part of their taught courses, where they gave feedback on the model execution. Students were also asked to complete a questionnaire regarding their experience with the model. The model was tested for learner satisfaction, motivation, communications between learners and lecturer, and cost. The Cronbach's Alpha for all items was 0.982, and 0.984 for Likert-type items, with 48 valid cases out of 57. The mean was 4.768 indicating the model was evaluated considerably good. Exploratory factor analysis was conducted and six factors - *motivation*, *satisfaction*, *communication and interaction*, *time and cost saving*, *ease of use*, and s*upport and needs* - were extracted. The results showed good level of satisfaction, motivation and improved communications among participating students, while *time and cost* factor scored the highest mean of 4.968 which indicate that students were concerned about it, and perceived the model as decreasing cost and providing flexible time. Students and lecturers indicated that they prefer this model over traditional one. The main contribution of this research is the development of a blended learning model for traditional universities based on factors such as instructor characteristics, learner characteristics, infrastructure, cost, pedagogy, time, political, legal, language, delivery mode and instructional technology factors, incorporating learning style test results and using them as guide for both learners and lecturers in the learning process. Another contribution is a guidelines document for traditional universities to implement blended learning. In addition, the study contributed in filling the gap of scarce literature about e-learning in Palestine.

ABSTRAK

Terdapat banyak institut pengajian tinggi yang menggabungkan e-pembelajaran ke dalam kurikulum mereka. Namun, terdapat beberapa faktor yang perlu diambil kira semasa pengendalian e-pembelajaran. Satu cara bagi membantu mengatasi rintangan-rintangan berhadapan dengan usaha institut-institut pengajian tinggi di Palestin melaksanaan e-pembelajaran ialah untuk mengadaptasi kaedah kombinasi pembelajaran. Penyelidikan ini bertujuan membangunkan sebuah model kombinasi pembelajaran bagi universiti-universiti tradisional di Palestin, dan mencadangkan garis panduan bagi pelaksanaan kombinasi pembelajaran. Data dari senarai soal jawab yang diedarkan kepada ahli-ahli fakulti di Palestin telah dianalisa untuk mengenalpasti masalah-masalah dan keperluan-keperluan bagi melaksanakan e-pembelajaran di peringkat pendidikan tinggi. Faktor-faktor dikenalpasti berdasarkan sastera dan input dari data. Model kombinasi pembelajaran kemudiannya dibangunkan, terdiri daripada kombinasi muka-ke-muka dan tetapan internet, komunikasi selaras dan tidak selaras, teori-teori pembelajaran, strategi-strategi berarahan, kaedah-kaedah penghantaran dan jenis-jenis kandungan, tambahan kepada komponen ujian gaya pembelajaran. Ia berdasarkan faktor-faktor dan kriteria kualiti berkaitan dengan kombinasi pembelajaran. Penilaian model tersebut dan rekabentuknya dilakukan oleh ahli-ahli fakulti di universiti-universiti Palestin melalui pengedaran senarai soal jawab yang menggunakan 5-tahap skala Likert. Nilai alfa Cronbach bagi semua perkara ialah 0.963, dan min bagi semua perkara ialah 4.16, dengan 38 perkara mendapat min >= 4.0, dan dengan min soalan individu 3.67 dan maksimum 4.55. Ini mencadangkan bahawa model ini boleh diterima. Kemudian, berdasarkan kepada model tersebut, sebuah perisian telah dibangunkan dan dilaksanakan. Model tersebut kemudiannya diuji di sebuah universiti di Palestin oleh pelajar-pelajar dan pensyarah-pensyarah. Perisian itu telah dimuat naik ke laman

sesawang universiti tersebut. Pensyarah sukarela menjalankan model tersebut selama 2 minggu, sebagai sebahagian daripada kursus-kursus yang diajar, mereka mendapat maklum balas tentang pelaksanaan model. Pelajar-pelajar diminta untuk menjawab senarai soal jawab berkenaan pengalaman mereka dengan model tersebut. Model tersebut telah diuji untuk kepuasan pelajar, motivasi, komunikasi antara pelajar dan pensyarah, dan kos. Alfa Cronbach bagi semua perkara ialah 0.982, dan 0.984 bagi perkara-perkara jenis Likert, dengan 48 kes sah daripada 57 kes. Minnya bernilai 4.768. Analisis faktor eksploratori telah dijalankan dan 6 faktor-faktor; *motivasi*, *kepuasan, komunikasi dan interaksi*, *penjimatan masa dan kos*, *kemudahan penggunaan*, dan *sokongan dan keperluan* telah diekstrak. Keputusan menunjukkan tahap yang baik bagi kepuasan, motivasi dan peningkatan komunikasi antara pelajar-pelajar yang mengambil bahagian, sementara faktor masa dan kos mendapat markah min tertinggi iaitu 4.968. Pelajar-pelajar dan pensyarah-pensyarah telah menyatakan bahawa mereka lebih menyukai model ini berbanding model tradisional. Sumbangan utama penyelidikan ini ialah pembangunan model kombinasi pembelajaran untuk universiti-universiti tradisional berdasarkan faktor-faktor seperti perwatakan pengajar, perwatakan pelajar, infrastruktur, kos, pedagogi, masa, politikal, undang-undang, bahasa, mod penghantaran dan faktor teknologi berarahan, menggabungkan keputusan ujian jenis pembelajaran dan menggunakannya sebagai garis panduan untuk pelajar dan pensyarah sepanjang proses pembelajaran. Satu lagi sumbangan ialah penyusunan dokumen garis panduan untuk universiti-universiti tradisional menjalankan kombinasi pembelajaran. Tambahan lagi, ia memberi sumbangan terhadap megisi ruang sastera yang jarang tentang e-pembelajaran di Palestin.

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DEDICATIONS

I dedicate this work to

Omar Ibn Al Khattab

and to

those I love

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CHAPTER 1

INTRODUCTION

1.1 Background

Ever since humankind was created on Earth, teaching and learning have taken place in various forms, and knowledge has been transmitted and constructed. Humankind has been experimenting and exploring new ideas, places, and gaining new knowledge. As a result of this new knowledge, mankind has progressed from one type of society to another, usually in an upward manner i.e. from a hunting society to industrialized society, and lately to a knowledge society. This advancement in people's life could not be possible without teaching and learning. Conventionally, this is done based on a hierarchical model where "*those who know teach those who do not know*"(Cross, 1999), and "*those who do not know seek knowledge*" (Sorin Cerin, Romanian Philosopher and Essayist)

1.1.1 Learning Evolution

Traditionally, teaching and learning took place in a environment, where both teachers and learners had to meet in the same place and at the same time. This method dominated the teaching and learning process in the past eras, and continues to exist these days. However, advancements in technology no longer necessitate the teachers and learners to be together. Once the condition for teachers and learners to meet at the same place at the same time has changed, new forms of learning emerged with new terminologies, such as distance learning and distance education. (King, Young, Drivere-Richmond, & Schrader, 2001) distinguish between distance education and distance learning. They define distance learning as: "*improved capabilities in knowledge and/or behaviors as a result of mediated experiences that are constrained by time and/or distance such that the learner does not share the same situation with what* *is being learned*" (King, et al., 2001). Out of this definition, they propose a definition for distance education as:

> *"distance education is formalized instructional learning where the time/geographic situation constrains learning by not affording in-person contact [] between student and instructor"(King, et al., 2001).*

However, (ITC, 2006) - the Instructional Technology Council - defined distance education as

> *"the process of extending learning, or delivering instructional resource-sharing opportunities, to locations away from a classroom, building or site, to another classroom, building or site by using video, audio, computer, multimedia communications, or some combination of these with other traditional delivery methods" (ITC, 2006).*

Distance education has passed through different stages of using media for the delivery of educational materials. It started with printed material, and now relies heavily on electronic media. With the emergence of computers and communication technologies and the wide spread of Internet, one method that emerged from distance learning was e-learning. One definition of e-learning is that of Tsai & Machado (2002), where they define e-learning

> *"is mostly associated with activities involving computers and interactive networks simultaneously. The computer does not need to be the central element of the activity or provide learning content. However, the computer and the network must hold a significant involvement in the learning activity"* (Tsai & Machado, 2002).

1.1.2 Blended Learning

With this mostly *electronic* learning, compared to traditional non-technology based learning, blended learning has emerged which tries to combine both ends of the spectrum i.e. e-learning on one side and traditional non-technology based learning. It contains combined elements, which includes, for example, learning theories, synchronous and asynchronous learning, delivery modes, and educational modalities among others. There is not yet an agreed upon definition of blended learning; therefore several definitions exist. "Rather than offer another insufficient definition, we synthesized eight dimensions that embrace the possibilities of blended learning" (Sharpe, Benfield, Roberts, & Francis, 2006). Those dimensions are delivery, technology, chronology, locus, roles, pedagogy, focus, and direction. To address blended learning, several researchers have proposed models of blended learning such as that of Carman (2002), Valiathan (2002), Driscoll (2002), Sharpe, et al. (2006) and Shaw & Igneri (2006). For the purpose of this research, a working definition of blended learning is used. This definition is based and derived from the work of Carman (2002); Valiathan (2002); Driscoll (2002), Rossett, Douglis, & Frazee (2003); Heinze & Procter (2004); Oliver & Trigwell (2005); Dewar & Whittington (2004); Sharpe, et al. (2006); Shaw & Igneri (2006), and influenced by theories such as transactional distance theory, learning style theory, variation theory, blended learning theory and theory of online learning (see Section 1.6 for details on theories). The operational definition used for this study is:

> *blending face-to-face and Internet-based settings, where synchronous and asynchronous communications are used between learner(s) and lecturer to deliver a variety of contents through various delivery modes and media, framed by a blend of instructional strategies based on a blend of learning theories, while acknowledging the differences in learners' characteristics, to promote and enhance learning/teaching effectiveness, where learner experiences a degree of freedom in learning* (Carman, 2002; Driscoll, 2002; Rossett, et al., 2003;Heinze & Procter, 2004;Oliver & Trigwell, 2005; Dewar & Whittington, 2004; Sharpe, et al., 2006; Shaw & Igneri, 2006)

This definition was derived from the work of others and influenced by various theories as mentioned in the previous paragraph. As shown later in Chapter two – sections 2.4, 2.5 and 2.6 - during the course of literature review, the single definitions provided in the literature do not satisfy the intended model proposed and developed through this study, as they take limited or specific element(s) of the blend when defining and/or proposing models of blended learning. Therefore, elements and concepts from previous work have been extracted, and the theoretical framework (Section 1.6) which guides this research has provided input for suitable blended learning definition in this study. The key elements of this definition are that it blends face-to-face and Internet-based settings, blends and uses synchronous and asynchronous communications methods, uses a blend of delivery media and methods to deliver a blend of learning contents, blends variety of instructional strategies, blends learning theories, acknowledges differences in learners' characteristics, and it promotes learning effectiveness where learners experience some degree of freedom in learning i.e. promotes and encourages self-paced learning.

The definition of blended learning usually would guide the implementation efforts of blended learning models and systems. Models and systems of blended learning do exist as a result of research efforts and/or business initiatives. These efforts can be categorized into four levels according to Graham (2004). These are: 1) Activity level, 2) Course level, 3) Program level, and 4) Institutional level. On the institutional level, the institution would commit itself to blended learning. On the program level, either, the program itself arranges the mixture between online and face-to-face courses; or the student chooses the mix of courses. On course level, it comprises a mixture of face-to-face activities and computer based activities, while on the activity level the blend occurs when a learning activity contains both face-to-face and computer mediated elements (Graham, 2004).

1.1.3 E-learning in the Context of Palestine

In order to understand the status of e-learning in Palestine, it is necessary to provide some background information on Palestine.

1.1.3.1 Geography of Palestine

Historical Palestine lay at the southern part of the east coast of the Mediterranean Sea, with Lebanon at the north, Jordan and Syria at the east, while Egypt is at the south. Naturally, Palestine has a variation of climates and topologies, although the total area is very small, of approximately 27,000 km^2. The topology varies from the deepest point on Earth (Dead Sea) in the Jordan Valley, to moderate mountains, to versatile landscape in the coastal area of the Mediterranean Sea, to a desert in the south, then to high mountains in the north, as shown in Figure 1.1. This variation in topologies and landscapes allows for the growth of various plants and vegetables.

Figure 1.1: Topography of Palestine;

Source: http://www.palestineremembered.com/Acre/Maps/Story584.html

1.1.3.2 History

The history of Palestine goes back to the very beginning of mankind on Earth. Over the years, Palestine has been subject to various invasions and occupations of the various super powers at the time, ranging from the ancient Greeks, Jews, Persians, Romans, and Byzantines. It remained so until Muslims assumed power almost 1400 years ago, and remains so despite some 100 years or so of Crusaders' occupation. In recent history, it was under the British mandate for almost 30 years, between 1916 and 1948, before they handed it over to the Jews to establish what is called the State of

Israel on almost 80% of historical Palestine in 1948. In 1967 Israel has managed to occupy the remaining of Palestine and some other Arab territories.

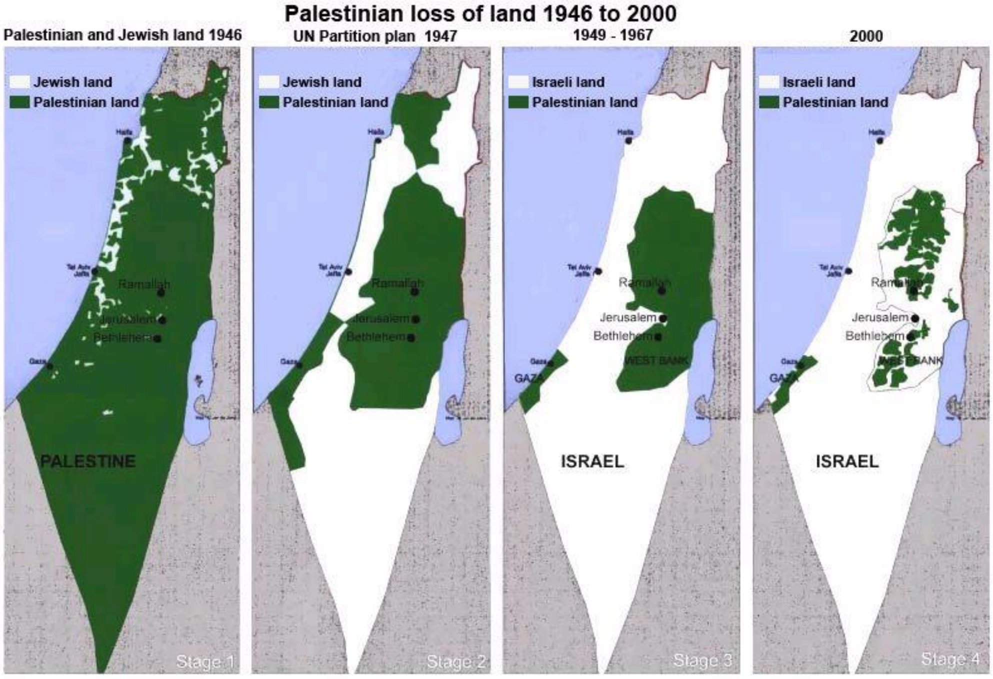

Figure 1.2: Palestinian loss of land
Source: http://changingfaceoftime.com/Palestine.htm

In 1987, the first Intifada (Uprising) against Israeli occupation forces started in Gaza and West Bank, and continued until mid 90s, when the Palestine Liberation Organization (PLO) and Israel signed the Oslo Accord for peace. In 1994, the Palestinian Authority was established based on this accord, which recognized a two-state solution. However, despite the PLO acceptance of a two-state solution giving up more than 80% of historical Palestine to the Jews (Israel), the negotiations did not achieve a solution, and the Second Intifada (Uprising) erupted on 28th September, 2000 after the then Israeli opposition leader Mr. Sharon forcefully entered the Holy Al-Masjed Al-Aqsa (Al-Aqsa Mosque). The deterioration of the political situation and the consequences of that on loss of Palestinian land are depicted in Figure 1.2 which summarizes the situation since early mid-20th century. The effect was the thousands of refugees and internally displaced people, in addition to stripping Palestinians off their land and natural resources.

1.1.3.3 E-learning in Palestine

In Palestine, e-learning can be described as being at a beginning stage. Some efforts are materializing, such as BirZiet University 'Ritaj' portal (Calvo and Ghiglione, 2005). Other universities are participating in Palestine Education Initiative (PEI) for schools, and a higher education initiative for e-learning, and the private sector is also participating in such efforts through a cooperation and collaboration framework (PEI, 2006). However, there are many problems facing the higher education particularly traditional universities including lack of funding, capacity limitation, impact of occupation, hard economic situation, and high student-to-lecturer ratio. In addition to these, several problems facing the implementation of e-learning in traditional universities have been revealed later in this research such as those related to lecturer, student, infrastructure, computers, and facilities and equipment. With all such problems, one possible solution could be to adopt blended learning, where it has been identified by faculty members, as the preferred setup for traditional universities in Palestine to move towards e-learning (Shahin & Singh, 2007).

The following section gives brief information on Palestine in general and on education in particular.

1.1.3.4 Existing Situation

Palestinians in the 1967 occupied territories, i.e. West Bank and Gaza, have suffered from the Israeli occupation for many years "Israeli occupation since 1967 has deteriorated living conditions for the Palestinians" (Toprak, Banar, & Özkanal, 2009). The situation on the ground improved after 1994 with the establishment of the Palestinian National Authority as a result of Oslo Accord. However, with the start of the second *Intifada* (uprising) on September 2000, the overall situation in the Palestinian Territories started to deteriorate on almost all levels. For example, unemployment rate has increased from 17.3% in 1999 to 39.8% in 2004 (PCBS, 2005), and GDP per capita was US$1,609.7 in 1999 (PCBS 2002), US$1272.3 in 2003 (PCBS, 2006) and US$1,298.0 in 2007 with a noticeable difference between the West bank and Gaza where it is US$1,555.3 in West Bank and only US$911.0 in Gaza (PCBS 2009b). In the year 2008, despite a little calm in the situation, the unemployment rate was 26.0% (PCBS, 2009-a). On the other hand, statistics by the Ministry Of Education & Higher Education (MOEHE, 2010) show that in the year 2009/2010, there are thirteen (13) traditional universities, one Open University with 17 centers, 15 university colleges, and 20 community colleges. These higher education institutions (HEI) have a total of 196,625 students registered in the academic year 2009-2010 (MOEHE, 2010). In the higher education sector, the system is considered a traditional one, as it is somehow a continuation of the school education system in the sense that it mainly follows a traditional approach of teaching/learning. This might be one of the main barriers of quality education to produce competitive graduates (World Bank, 2005). The document expresses that, among other problems, relevance and quality of the supply and efficiency in managing available resources are two main problems facing higher education in Palestine. Another issue facing the higher education sector in Palestine is the unrest and the problems associated with it, like Israeli closures and restrictions on movements of people between towns, cities and areas (Van Dyke & Randall, 2002; Al-Salqan, 2005; Itmazi & Tmeizeh, 2008). This puts more burdens on the higher education in general and, particularly, on students and lecturers alike. While struggling to keep up with technological trends and advancements and to survive in a hostile environment, universities try to improve the quality of education and graduates. One aspect of such struggle is the efforts to introduce e-learning into such universities. Examples of such efforts could be seen at BirZeit University (Calvo and Ghiglione, 2005), and the participation of five Palestinian universities – Al-Quds Open University, Birzeit University, An-Najah National University, Palestine Polytechnic University, AL-Quds University- in RUFO[1] project (RUFO website). Some evidence on the efforts of traditional universities to implement e-learning could be seen on their websites (PPU, online; Alquds, online; An-Najah, online; Bethlehem, online).

Although several universities such as Birzeit, An-Najah national Universities, Palestine Polytechnic University, Al-Quds University, Bethlehem University, Islamic University in Gaza, have engaged in such e-learning efforts, other higher education institutions may have not follow similar steps at the time. Even with the involved universities, their efforts perhaps, might not been conducted and implemented in a systematic way with a clear vision and strategy. For example Birzeit University's initiative was a reaction to students' inability to reach campus due to Israeli restriction and closure (Al-Salqan, 2005). Palestine Polytechnic University, which was involved in RUFO, established an e-learning unit to promote and manage e-learning efforts at the university (PPU online). However, efforts are mostly expressed in *course* presence in the Moodle e-learning platform, and do not reflect fully online courses, neither satisfy blended learning concept as students attend normal classes fully (PPU online). In addition, RUFO for example, has an aim of assisting universities to launch complete e-learning courses - where they define that to be at least 80% delivered online (RUFO, online). This effort – if implemented on large scale- contradicts existing rules and regulations governing the accreditation of higher education institutions and degrees awarded by them, which do not recognize nor accredit degrees and programs offered online and or in distance (DFT, 2006; Tesdell & Mimi, 2009). On the other hand, data on number of students registered and enrolled in e-learning based programs and/or courses could not be found or tracked. However, the question might be whether that would be really feasible within the present environment.

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[1] RUFO is the name of one of Tempus projects called InterUniversity Network for Open and Distance Learning

1.2 Statement of the Problem

To transform traditional educational settings to e-learning settings, educational institutions need to think of the challenges; one of which is to reconsider their environment incorporating emerging technologies in a global competitive challenges (Cantoni, Cellario & Porta, 2004). The transformation from traditional learning to e-learning needs proper planning and execution (Cantoni, Cellario & Porta, 2004). Adopting technologies for e-learning has to take the available infrastructure into consideration, which varies between countries and communities. Usage and availability of telecommunications technologies gap is wide and evident when comparing developed and developing countries (United Nations, 2005a, 2005b, 2005c, 2005d, 2005e and 2005f). The Factors; affecting blended learning implementations is one of the main issues to be addressed; in addition to meeting learner's expectations, learning style and needs, and teacher's preferences and teaching style are other issues to be addressed, so are social and psychological aspects of the learning process among others (Kirschner, 2004; Koohang & Plessis, 2004; Muilenburg & Berge, 2005; Lim, 2005; Tham & Werner, 2005; Mortera-Gutiérrez, 2006). However, those were not addressed in one single study; therefore, resulting in models being developed with limited focus and/or for specific purpose.

In Palestine, higher education community believes that with the introduction of "e-learning" in schools and in higher education, most of the problems of Palestinian educational system would be tackled and solved according to the Palestinian Education Initiative (PEI, 2006) and RUFO. Although RUFO project, for example, pushes for online courses [more than 80% online], this might not be feasible for all courses due to the many problems and constrains facing the education system and e-learning implementation in particular (World Bank, 2005; Tesdell & Mimi, 2009; Van Dyke & Randall, 2002; Al-Salqan, 2005; Itmazi & Tmeizeh, 2008; PCBS, 2009-a). In addition, no formal model has been followed or adopted by any of the traditional universities in Palestine for either e-learning or blended learning. Therefore, any effort to implement blended learning would not be successful if the factors that play major role in the development and implementation of such model are not considered formally. Moreover, such factors – which are many - have not been identified and put in context in Palestine.

In summary, Palestinian traditional universities in particular and higher education in general, face several problems and issues. Some of those are specifically concerning the implementation of blended learning. There is a lack of formal model of blended learning to be followed (Itmazi & Tmeizeh, 2008), therefore, this might put high risk on the efforts to implement blended learning. Evidences of UK e-University failure can be seen as an example (Garrett, 2004; Bacsich, 2005).

The aim of this research is to develop a model for blended learning in traditional universities; considering the above issues especially those pertaining to Palestine. This was accomplished through the achievement of the stated objectives of the study.

1.3 Objectives of Study

The main objective of the research is to develop a blended learning model for higher education in Palestine.

In particular, this study aims at achieving the following objectives:

1. To identify factors affecting blended learning in traditional universities in general and in Palestine in particular.

   These factors will be identified based on literature review and data related to Palestine.

2. To develop a model of blended learning for traditional universities in Palestine.

   This model will be developed based on the factors identified in objective 1 above.

3. To implement the model at an activity level based on objective 2 above.

4. To propose guidelines document for blended learning implementation in traditional universities in Palestine.

1.4 Research Questions

In order to achieve the objectives of the research, five questions were put forward to guide the research.

1) What factors need to be taken into account in developing a model of blended learning for traditional universities in Palestine?

   The Factors – enablers and disablers – need to be determined before engaging in the development of a model of blended learning. This was extracted from the literature and data from Palestine.

2) What are the requirements for developing blended learning model?

   To develop a model of blended learning, a set of requirements must be stated and made known to the developer. In this research, a generic set of requirements was compiled by extracting requirements based on factors, concepts, needs, problems, and quality of blended learning.

3) How can factors and requirements above be used to develop a model of blended learning for traditional universities in Palestine?

   The factors and the requirements compiled are used as guidelines for the design and the implementation of the new blended learning model. The new model tries to satisfy these requirements by taking into account the factors.

4) What are the dimensions for evaluating model implementation and its applicability?

   Once the model is developed and evaluated, it is implemented and tested at an activity level in one of the traditional universities in Palestine. The testing involves students, where a questionnaire is distributed to them at the end of the testing period.

5) Based on the model and its implementation, what guidelines can be put forward to Palestinian Higher Education Institutions, particularly traditional universities, to follow in implementing blended learning?

   The guidelines are compiled based on the results of the implementation of the new blended learning model, the literature, and data from Palestine.

1.5 Scope

This research develops and implements a blended learning model for traditional universities in Palestine. In this capacity, the research will cover issues related to e-learning and higher education in general. This model takes into account various aspects, variables, elements and dimensions related to blended learning both technical and non-technical. The model takes into considerations factors affecting blended learning and integrates them in harmony. These factors are determined based on the literature review, since a wide range of researches on such issue have been conducted. In addition, data collected from Palestine is used to determine the factors.

The work capitalizes on the working definition of this study as shown in Section 1.1.2 and blends those elements together to develop a blended learning model. On the implementation level, a system is mainly constructed on the activity level[2] based on the model developed. While the program and institutional levels of blend (Graham 2004) concerns overall programs of study and the overall institution policy and settings i.e. the institution would implement blended learning setting for all programs and courses, the course and activity levels concern the individual course and individual activities within a course. The first two are beyond the capacity and scope of this research. The course level could have been adopted, however, for implementation and testing purposes, this could not be achieved because it involves whole courses at the university under

[2] Four levels of blended models exist: Activity, course, program, and institutional (Graham, 2004)

consideration. The courses could not be used in whole for the test as this would violate the existing rules and regulations governing the university. In addition, it is hard to find committed lecturers who would accept to test the model for the whole course over the semester. In addition to this, activity level blend is representative of the whole course as it consists of several activities. However, the system has the ability to handle more than one course at a time, and for each course it can handle more than one activity, making it applicable for course level blends.

The model does not study the contents that would be used in such model; leaving it to the instructor to decide. Content creation and development is a research topic by itself, where concerns are directed more towards pedagogy and instructional design. In addition, content development depends mainly on individual lecturer, course and activity. However, the model does give guidelines on general principles and criteria on contents and delivery. CD/DVDs are not created for delivery purposes, though students may download and save learning materials on their machines.

Higher education sector in Palestine is the main application domain, since the implementation and testing of the model is conducted at a higher education institution in Palestine. School education is not considered in this research. E-learning related to training and to professional courses is also excluded from the research.

1.6 Theoretical Framework

As shown in the previous sections (1.1.2, 1.1.3.4, and 1.2), there is a lack of blended learning model for traditional universities, particularly in Palestine, to be adopted where several factors and issue are considered. In the attempt to develop and implement such model, this study had to be framed by theory related to the domain. A theory is “a set of hypotheses that apply to all instances of a particular phenomenon, assisting in decision making, philosophy of practice and effective implementation through practice” (Nichols, 2003). Several theories exist which could be related and applied to e-learning and blended learning. However, as argued earlier in regards to the existing models, could also hold true for the existing theories. Nichols (2003) indicates that there is a lack of unified and clear theory for e-learning which resulted in e-learning being practiced in bases of trial and error. In this section, only brief highlights of existing theories on and related to blended learning will be given. Details on these theories are provided in chapter two – literature review.

One of the theories is the transactional distance theory (TDT) which was presented in 1972 by Michael Moore, and then developed and enhanced by Moore (1997). The core elements of this theory are learner autonomy, *dialog* and *structure*.

Variation theory of learning is “based on the idea that for learning to occur, variation must be experienced by the learner” (Oliver & Trigwell, 2005). In other words, it means that learner must see/experience the differences between at least two things to appreciate one or both, and therefore learn.

Another theory is the learning style theory. This theory acknowledges the differences among learners in the way they learn and therefore, tries to use the student learning style as a way to enhance learning (Sutliff & Baldwin, 2001).

A theory of online learning has been proposed and advocated by Anderson (2003). It is mainly concerned with the interaction in the learning process. According to the theory, there are three kinds of interactions “student-teacher; student-student; student-content” (Anderson, 2003).

Blended learning theory (BLT) is another theory which could be thought of as the most close to the blended learning domain. However, looking beyond the name, it could be noticed that it tries to combine theories of cognitivism, constructivism [which are learning theories] and performance in an integrated manner. The BLT has been advocated by some researchers such as Allison Rossett (Carman, 2002), who tries to integrate these theories in a balanced way.

Nichols (2003) reported on efforts to come up with a theory for e-learning. These efforts – in a form of discussions among key scholars – resulted in ten (10) statements formulating a base for the establishment of a theory for e-learning.

From an information systems perspective, Nunamaker & Chen (1990) argues that research and development is one of the research classification schemes and they cited Hitch and McKean (1960) as classifiying development into "exploratory, advanced, engineering and operatinal development" (Nunamaker & Chen, 1990).

These theories comprise the theoretical framework of the study, and guide the development and implemenatation of the new blended learning model for traditioanal universities. More details are provided in section 2.2.

1.7 Significance of the Research

For any research to be of value, it should contribute to the field under which it was conducted. This research has contributed to the field of e-learning and particularly to that concerning Palestine. Within the existing environment in Palestine, the research intends to assist HEI, and to act as a supportive and leveraging element in the overall learning and teaching process, towards the advancement of the Higher Education sector and therefore the society. It provides a "way" to help Higher Education Institutions, especially traditional universities, transform to blended learning settings, and therefore offer better quality education. "Educators could use effective technology-based applications, …, along with a quality computer management system (CMS), to stimulate active and quality e-learning environment that might otherwise be unavailable to the learner" (Almala, 2006).

It also intends to help university students to adjust to new learning practice through a blend of learning theories such as behavioral and constructivism. "… current learning theories, such as constructivism, emphasize reasoning, critical thinking, social negotiation, self-regulation, and mindful reflection" (Almala, 2005). Students will be assisted in becoming knowledge constructors, so that they are better qualified to join the work force.

The research shows how multi-blended learning settings can be constructed and employed for a better quality of education and effectiveness of learning. This actually comes from the combination of learning theories, the combination of face-to-face with e-learning, synchronous with asynchronous communications, instructional strategies, contents delivery types, and variety of contents.

As a major contribution to the body of knowledge, the research has identified several factors that affect blended learning models, through intensive literature review combined with data gathered from and on Palestinian higher education which is most probably the first of its kind on Palestine. By identifying those factors and combining and integrating them in one model that includes different blends, the research contributes in finding a suitable blended learning model for traditional universities. A main feature is the integration of learning style test component with other components using the results of such tests to better assist both learner and instructor during the learning/teaching process. The study showed that a comprehensive model of blended learning could be developed and implemented. It also proofed that multiple theories (TDT, BLT, Learning style theory …) can be integrated to guide the development of such model. The outcome of the study shall add to the existing literature on how and what to blend, and more importantly, to that on, and for Palestine. In addition, this model can act as a guide to transform higher education institutes from traditional settings to actual blended. It is anticipated that this research will spark more research work on e-learning and blended learning in Palestine.

1.8 Benefits of the Research

A number of direct and long-term benefits can be expected out of this research

1.8.1 Direct Benefits

1- It contributes to the e-learning efforts in Palestine by providing a model that is applicable to Palestinian traditional universities.

2- The research is expected to help students improve their learning by being exposed to a blend of teaching and learning settings including a mixture of learning theories, classroom and online settings, instructional strategies, among others.

3- The research is expected to provide students with the opportunity to ‘learn” independently and conveniently, while providing various communication methods with lecturers and peer students through synchronous and asynchronous methods.

4- The research is expected to assist lecturers in meeting the different student demands and abilities through the use of the learning style test results which provide recommendations for both learners and lecturers on suitable contents and delivery media, communication methods, instructional technologies and learning theories. This would result in improved teaching and learning

5- The research is expected to benefit HEIs in smoothing the transition to blended learning settings.

1.8.2 Long-Term Benefits

6- Cost reduction: It is expected that in the long run, the adoption of e-learning would save around 20% of the traditional courses, according to Frank Mayadas, director of the Alfred P. Sloan Foundation’s Asynchronous Learning Network, quoted in Chassie (2002). It is expected that the same would hold true for Palestine.

7- Improving quality of education: The adoption of blended learning, and in particular the proposed model, is expected to help in improving the quality of education offered at Palestinian Higher Education Institutions.

1.9 Limitations of Study

The researcher faced some limitations while conducting this study. The main ones are highlighted below.

a) Limitations related to access to information and data in regard to Palestine. There is a lack of literature on higher education in Palestine, particularly on e-learning and blended learning. Very few and limited published studies exit, though not enough nor satisfactory. Statistical data is available in the form of reports and leaflets by Palestine Central Bureau of Statistic and Ministry of Education & Higher Education website. However, nothing in these reports and publications concerns e-learning, with the exception of some minutes of meetings and reporting on some workshops that took place within the Palestine Education Initiative and Tertiary Education Project, the first is concerned with school education, and the second for higher education sector [these are two projects funded by the World Bank during the years 2005-2010]

b) Limitations related to data collection. The main limitation was to distribute the instruments among faculty members at Palestinian universities. The first instrument was distributed at a time of internal conflict which hinders a better and more representing sample. Friends in West Bank were asked to distribute the instrument among lecturers in various universities, randomly, by personally visiting each university. The second instrument was distributed electronically via email to lecturers at traditional universities in Palestine. All lecturers were originally the target, but only those with accessible email on their respective university website were directly contacted. Others were contacted through the Public Relations unit, or academic department, dean, or vice president of their respected university. The response was low

– as anticipated – though it was hoped that more responses would be received. In testing the model, experiment could not be used, nor the quasi method due to the fact that the researcher was not present and could not conduct the test himself. In addition, the test involved lecturers, courses and students at Palestine Polytechnic University, where the researcher did not have the authority to conduct the experiment and formulate the needed groups. The test was conducted at only one university in Palestine, although it would have been more reliable and credible if the test was conducted in more than one, which was difficult for logistic, technical and administrative reasons. This would have affected the sample size and diversity of courses and students. The other issue was that the test could not be run for a whole semester because courses at traditional universities in Palestine cannot be run completely in blended learning settings according to the accreditation rules and regulations.

1.10 Definitions Used in the Study

Some terms used in this study need clarification within the context of this research. Therefore definitions of such terms are given below.

Distance Education: "the process of extending learning, or delivering instructional resource-sharing opportunities, to locations away from a classroom, building or site, to another classroom, building or site by using video, audio, computer, multimedia communications, or some combination of these with other traditional delivery methods" (ITC, 2006).

E-learning: "is mostly associated with activities involving computers and interactive networks simultaneously. The computer does not need to be the central element of the activity or provide learning content. However, the computer and the network must hold a significant involvement in the learning activity" (Tsai & Machado, 2002)

Web-Based Learning: is associated with learning materials delivered in a web browser, including when the materials are packaged on CD-ROM or other media" (Tsai & Machado, 2002).

Instructional Design: (IEEE 2001, p.1) defines ID as "Instructional design is the process through which an educator determines the best teaching methods for specific learners in a specific context, attempting to obtain a specific goal" (Botturi, 2003).

Traditional University: in Palestine, two categories of higher education institutions exist. Open education [only one Open University exists] is one, where students do not have to attend full classes, and traditional universities, where attendance is mandatory for all courses; and all classes are held in physical campus as students and lecturers meet face to face in a normal classroom.

1.11 Organization of the Thesis

This thesis consists of Nine Chapters. Chapter 1 is an introduction to the research where it defines the problem; identifies the purpose and objectives of the study; as well as the research questions; scope and expected benefits; in addition to definitions related to the study.

Chapter 2 reviews the relevant literature. It highlights the approach and strategy used in handling the research, and highlights the main areas of the research through an intensive review of previous works.

Chapter 3 is about the research methodology employed explaining the methodology used in conducting this research, and providing explanations on the data collection methods and techniques, and.

Chapter 4 describes the process of reaching the design of the proposed model. It analyses data collected from the first questionnaire – qualitative data, and combines the results with those concluded and found in the literature. It lays the foundations for the new model design.

Chapter 5 describes the new model and its evaluation, and analyzes the evaluation results.

Chapter 6 describes software construction and implementation; based on the evaluated model. It also reports on the system usability test results using heuristic evaluation technique.

Chapter 7 is on testing the model and analyzing the test results. The test was conducted at Palestine Polytechnic University involving four (4) courses. Descriptive statistics are reported, in addition to employing data reduction technique through factor analysis.

Chapter 8 discusses the results and findings of the research in relation to the objectives and research questions.

Finally, chapter 9 presents the conclusions and recommendation of the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this study, the researcher aims at producing a general guidelines document for the proper adoption and implementation of e-learning setting in higher education institutions in Palestine. Through the course of producing this document, a model for blended e-learning for higher education shall be developed and a 'system' shall be built, then tested in Palestine Polytechnic University. The model and therefore the system will be constructed taking into account the various factors that would affect it especially within the Palestinian context.

The literature review of related works to the research topic is divided into different segments to ease the handling of the topic and to help in making it as clear as possible. The research topic is inter- and multi-disciplinary in nature. It covers areas like information technology, education, pedagogy, management, and some more. Having this in mind, the researcher opted to "partition" the main topic into sub-topics, and therefore highlights the related work accordingly in detail without losing the big picture. It has been decided to divide the topic into two main dimensions, and each one may divide into further sub-dimensions. These two dimensions are technical dimension, and non-technical dimension. In addition to this, a separate section is devoted to literature related to e-learning in higher education institutions in Palestine, as it is the main issue of the research. Another section highlights some of the barriers to blended learning, and another one talks about model building.

2.2 Theories behind the Study

One of the theories is the transactional distance theory (TDT) which was presented in 1972 by Michael Moore, and then developed and enhanced by Moore (1997). The core elements of this theory are learner autonomy, *dialog* and *structure*. The *dialog* is concerned with highly quality interaction depending on the communication media used, while *structure* is concerned with how the teaching program is structured to be delivered by such media. The third is the learner autonomy which means learner has control over his/her own learning (Moore, 1997).

Variation theory of learning is “based on the idea that for learning to occur, variation must be experienced by the learner” (Oliver & Trigwell, 2005). In other words, it means that learner must see/experience the differences between at least two things to appreciate one or both, and therefore learn. Examples in the learning context could include the different educational resources, and teaching media (Oliver & Trigwell, 2005).

Another theory is the learning style theory. This theory acknowledges the differences among learners in the way they learn and therefore, tries to use the student learning style as a way to enhance learning (Sutliff & Baldwin, 2001). It has been asserted that “retention may be increased when a teacher address all learning modes” (Sutliff & Baldwin, 2001). Furthermore, Stice (1987) as cited by Sutliff & Baldwin (2001) concluded that similar outcome of increased retention is evident in both the four stages of learning cycle and the use of three methods of learning: visual, auditory and kinesthetic. Lecturers/instructors need to recognize these differences between students and try to meet their needs.

A theory of online learning has been proposed and advocated by Anderson (2002) and has been emphasized in his later works Anderson (2003, 2004). It is mainly concerned with the interaction in the learning process. According to the theory, there are three kinds of interactions “student-teacher; student-student; student-content” (Anderson, 2002). The main idea here is that as long as one kind of interaction is highly present and conducted, the other two need not be at the same level, if at all present provided that the learning experience is not negatively affected (Anderson, 2002, 2003, 2004).

Blended learning theory (BLT) is another theory which could be thought of as the most close to the blended learning domain. However, looking beyond the name, it could be noticed that it tries to combine theories of cognitivism, constructivism [which are learning theories] and performance in an integrated manner. The BLT has been advocated by some researchers such as Allison Rossett (Carman, 2002), who tries to integrate these theories in a balanced way. The theory builds on the work of several scholars’ works which compose the three theories, such as that of Grey, Bloom, Keller, Merrill, Clark, and Gagné (Carman, 2002).

Nichols (2003) reported on efforts to come up with a theory for e-learning. These efforts – in a form of discussions among key scholars – resulted in ten (10) statements formulating a base for the establishment of a theory for e-learning.

From an information systems perspective, Nunamaker & Chen (1990) argue that research and development is one of the research classification schemes and they cited Hitch and McKean (1960) as classifiying development into “exploratory, advanced, engineering and operatinal development” (Nunamaker & Chen, 1990). They argue further that system development is a research method where the system building process consists of “construct a conceptual framework, develop a system architecture, analyze and design the system, build the system, observe and evaluate the system” (Nunamaker & Chen, 1990).

These theories comprise the theoretical framework of the study, and guide the literature review, the research methodology, and the development and implemenatation of the new blended learning model for traditioanal universities.

2.3 Approach and Search Strategy

2.3.1 Search Criteria

Following are some criteria used in searching for literature related to the research topic:

2.3.1.1 Scope of the Search

In searching for the literature, the researcher put forward the following criteria when searching and considering various literatures:

- Higher education related articles
- Articles and research related to third world countries, and especially to Palestine, in the field of e-learning.
- School-related articles and research (pre-university/K12 and under) are excluded from basic search. Though some articles will be read for personal interest and to gain some insights on the school-related e-learning experience. This will hopefully widen the researcher's knowledge on e-learning in general.
- Training-related articles/research are excluded (though might be looked at for the sake of knowledge and experience)
- Professional certification-related e-learning articles are also be excluded

2.3.1.2 Search Places

The Library of the University of Malaya website will be the main entry point for online searching, due to the fact that the site offers great deal of online resources, links, affiliations, and subscriptions to invaluable online digital resources. Other portals and websites will be accessed individually on free access mode or free subscription and memberships. Some of these places are: Web of Science, IEEE Xplore, ACM, Emerald, Science Direct, Springler, Digital Dissertation, DOAJ, Local journals and conferences in addition to local authors/researchers output (published articles, conferences, …), Associations /listservers, Books 24X4, Ebrary, Google Scholar, etc… Palestinian website, especially governmental ones and universities' website are searched for related literature.

2.3.2 Search Methodology

Several websites containing databases of published articles, and conference proceedings have been visited during the months of July, August and September 2005. These sites have been visited few times each. Initial search was conducted using some key words like e-learning, higher education, framework, model, multimedia, web-based, internet. Initially, some articles were downloaded from these sites, for initial look. As of October 2005, these databases websites have been visited frequently in a systematic way to search for suitable and useful articles/papers supporting the research.

Standard method and criteria were used and applied whenever any of these sites/databases are accessed. For example, same key words were mostly used in all search attempts at these sites/databases. However, as the research develops, some refinements to the search method were applied, i.e. to look for most recent literature, or to look for some specific terms or keywords combination to narrow the search result.

Some of the key words which have been used in the search were: E-learning, Blended Learning, Higher education, Framework, Model, Web-based, Instructional Technology, Educational Technology, Multimedia, Internet, Constructivism, Behavioral, synchronous/asynchronous learning, learning style, Palestine, etc…

As for search (online) results, all articles that met the criteria were initially read - Abstract and Conclusion. Then, those with a "would be" strong support to the research topic were considered for thorough reading and analysis. Those that did not fall within the research scope were excluded.

Articles stated as references in the bibliography of selected articles, were traced if and only if it is found to be of good contribution to the research.

Emphasis is given on recent articles due to the *nature* of the research topic, mainly of 2000 and later. As research progresses, more recent articles were considered. According to the downloading criteria, even if an article is "old", it was considered only and only if it was found to be of great value to the research.

2.4 E-Learning Concepts and Background; an Overview

As mentioned in the introduction, distance education or learning has started many years ago, even some researchers claim it goes back to the early 1700, and technology-based form might be linked to the early 1900 (Jeffries, 2006). The term distance education or learning has been used for quite many years, and still in use. However, with the emerging of World Wide Web and the Internet, e-learning, as another term, has been introduced and being used in the last few years. The "e" is added to "learning" to mean "electronic". It indicates that learning is conducted through electronic form or with the help of electronic media. "… the term e-learning includes the use of instructional media technologies in its definition, hence the 'e' for electronic" (Holden & Westfall, 2006). The parent of e-learning is 'communication media (technology-enabled)', which is itself a child of Distance Learning, according to Holden & Westfall (2006). Despite that "e-learning was defined by American Society for Training & Development (ASTD) as the delivery of content via the Internet, intranet-extranet, audio and videotape, satellite broadcast, interactive TV, and CD-ROM, the marketplace has generally accepted it as applying only to the Internet" (Holden & Westfall, 2006). Many interpretations of e-learning are still evident, and Holden & Westfall (2006) have included different definitions of e-learning as defined by different organizations. Other organizations and individuals also define e-learning differently, even though the core is generally the same.

University of BATH (online), includes a definition of e-learning on its website under glossary section, which states that e-learning is

> *"learning facilitated and supported through the use of information and communications technology, e-learning can cover a spectrum of activities from supported learning, to blended learning (the combination of traditional and e-learning practices), to learning that is entirely online. Whatever the technology, however, learning is the vital element. E-learning is no longer simply associated with distance or remote learning, but forms part of a conscious choice of the best and most appropriate ways of promoting effective learning" (BATH, online).*

Tsai & Machado (2002), in their effort to clarify some confusion in the e-learning definition, came up with a specific definition of e-learning and compare it with other definitions of online learning, web-based learning, and distance learning. They define e-learning

> *"mostly associated with activities involving computers and interactive networks simultaneously. The computer does not need to be the central element of the activity or provide learning content. However, the computer and the network must hold a significant involvement in the learning activity" (Tsai & Machado, 2002).*

While, "Web-based learning is associated with learning materials delivered in a web browser, including when the materials are packaged on CD-ROM or other media" (Tsai & Machado, 2002). They also define "Online learning is associated with content readily accessible on a computer. The content may be on the Web or Internet, or simply installed on a CD-ROM or the computer hard disk" (Tsai & Machado, 2002). In another study, e-learning has been defined as

> *"E-learning is a teaching and learning method that involves the formative product and process. Formative product means every type of material or content made available in digital format by means of computer or network channels. Formative process means the management of the entire didactic itinerary that involves aspects of distribution, fruition, interaction and evaluation" (ANEE, E-learning Observatory 2003) quoted by Bonafede (2005).*

2.4.1 Pros and Cons of E-Learning:

Cantoni, Cellario & Porta (2004) and Zhang *et al* (2004) have identified some advantages and disadvantages of e-learning. The researcher has tabulated these for easier understanding and comparison, which can be found in Table 2.1.

Table 2.1: Advantages and disadvantages of e-learning

Advantages	**Disadvantages**
Less expensive to deliver Self-paced Faster Provides consistent content Works from anywhere and any time Can be updated easily and quickly Can lead to an increased retention and stronger grasp on the subject Can be easily managed for large groups of students Students have more control over the learning process and have the possibility to better understand the material, leading to faster learning curve Students may have the opportunity to enter a risk-free simulation environment Reference: (Cantoni, Cellario & Porta, 2004)	May cost more to develop Requires new skills in content producers Has to clearly demonstrate a return on investment Related technology may be intimidating, confusing or simply frustrating, lacking part of the informal social interaction and face-to-face contact Enabling technology might also be costly, especially in case of advanced visually-rich content Requires more responsibility and self-discipline for the learner Reference: (Cantoni, Cellario & Porta, 2004)
Learner-centered and self-paced Time and location flexibility Cost-effective for learners Potentially available to global audience Unlimited access to knowledge Archival capability for knowledge reuse and sharing Reference: (Zhang *et al*, 2004)	Lack of immediate feedback in asynchronous e-learning Increased preparation time for the instructor Not comfortable to some people Potentially more frustration, anxiety, and confusion Reference: (Zhang *et al*, 2004)

In their work, Zhang et al (2006) highlight some benefits of e-learning compiled from other research; these include:

1- provides time and location flexibility;
2- results in cost and time savings for educational institutions;
3- fosters self-directed and self-paced learning …
4- creates a collaborative learning environment …
5- allows unlimited access to electronic learning material; and
6- allows knowledge to be updated and maintained in a more timely and efficient manner (Zhang et al, 2006).

As e-learning term emerged, two types of paradigms for university education have emerged; in-presence modality and distance modality (Cantoni, Cellario & Porta, 2004). The differences between the two can be summarized as in Table 2.2.

Table 2.2: Differences between In-presence and Distance modalities

In-presence modality	Distance modality
Characterized by the class	Personalized for the student
Centered on the teacher	Focused on the student and controlled by him/her
Has predefined schedules and time extents	Occurs only when required
May make use of technology based on teacher's competence	Conveyed by means of technology based on student's acquired knowledge
Student plays reactive role	Student plays proactive role

As these two paradigms have emerged, it means that some traditional universities might be converting their traditional education process into an e-learning format. By this, traditional universities might face some problems. The conversion process "may represent a complex endeavor, and require accurate planning; monitoring and control" (Cantoni, Cellario & Porta, 2004), so that the process is made "effective and economical" according to (Cantoni, Cellario & Porta, 2004).

In their work, Zhang et al (2006) state that, when supported by constructivist theory, "web-based learning should enable learners to engage in interactive, creative, and collaborative activities during knowledge construction." (Zhang et al, 2006). According to Yang & Liu (2007), despite advantages of web-based learning systems, there are some limitations. These limitations are: "No human teacher expression and explanation, No synchronization and match between course materials and their explanations, Lack of contextual understanding, just-in-time feedback and interactions, and lack of platform-independent standardized materials" (Yang & Liu, 2007).

Chassie (2002) shows some arguments and counter arguments related to e-learning. Faculty members from University of Washington quoted in Chassie (2002) argue that "education is not reducible to the downloading of information, much less to the passive and solitary activity of staring at a screen…". They also argue that "Distance education is not for students, particularly undergraduates." They claim that online learning is too private. This, they argue, reduces human interactions, which is not good for learning. Other people arguments include; the argument that distance education is not for every course and it is easy to lose interest when there is no peer pressure if there is no high level of motivation. As a result of this, it would be easy for students to drop out (Chassie, 2002). One of the counter arguments is that "research showed that e-learning can be as effective, and in some cases more effective than classroom-based programs", and "some students reported that they have received more attention and interaction with instructors than in traditional classroom" (Chassie, 2002).

Even within the e-learning setting itself, some learning environments might be better than others. It has been claimed that "distributed interactive learning environment (DIL) is superior to distributed passive learning environment (DPL)" (Khalifa & Lam, 2002) quoted in Yang & Liu (2007).

In summary, there are several advantages, disadvantages and limitations of e-learning/online learning. The limitations are:

1- No human teacher expression and explanation,
2- No synchronization and match between course materials and their explanations,
3- Lack of contextual understanding, just-in-time feedback and interactions, and lack of platform-independent standardized materials (Yang & Liu, 2007).

Some other disadvantages include those listed by Cantoni, Cellario & Porta (2004) and Zhang *et al* (2004). These are:

4- Cost more to develop,
5- Require new skills in content producers,
6- Has to clearly demonstrate a return on investment,
7- Related technology may be intimidating … lacking informal social interaction and face-to-face contact,
8- Enabling technology might be costly especially in case of advanced visually-rich content,
9- Requires more responsibility and self-discipline for the learner (Cantoni, Cellario & Porta, 2004),

10- Lack immediate feedback in asynchronous e-learning,
11- Increased preparation time for the instructor,
12- Not comfortable to some people (Zhang *et al*, 2004).

In addition to these, Chassie (2002) lists some of the arguments against e-learning/distance learning as

13- It is not for students especially undergraduates, and not for every course,
14- It is too private reducing human interaction, which may lead to losing interest; therefore resulting in high dropout rate (Chassie, 2002).

As we can see from the above, although e-learning has many advantages over traditional learning, it also has several limitations and disadvantages which make neither of the two extremes superior over the other. So, in the effort to move to e-learning or to distance modality, universities found themselves offering a mixture of the two (with the exception of pure virtual universities or pure e-learning settings), which is called blended learning.

2.4.2 The Concept of Blended Learning

With universities transforming to e-learning settings, another term or concept has emerged as a result or consequence of such move, or as an intended setting in some cases. The term "blended learning" popped up. It is meant to describe mixture or combination of two or more things. Heinze & Procter (2004) define blended learning in higher education as:

> *"Blended Learning is learning that 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"(Heinze & Procter, 2004).*

Oliver & Trigwell (2005) provide many definitions of blended learning of various researchers. One of these is Driscoll's four concepts for the blended learning term:

> *"1- combining or mixing web-based technology to accomplish an educational goal; 2- combining pedagogical approaches … to produce an optimal learning outcome with or without instructional technology; 3- combining any form of instructional technology with face-to-face instructor-*

led training; and 4- combining instructional technology with actual job tasks" (Oliver & Trigwell, 2005).

Another attempt was provided by Valiathan (2002) and is conceptualized in Oliver & Trigwell (2005)

"1- skill-driven learning, which combines self-paced learning with instructor or facilitator support to develop specific knowledge and skills; 2- attitude-driven learning, which mixes various events and delivery media to develop specific behaviours; and 3- competency-driven learning, which blends performance support tools with knowledge management resources and mentoring to develop workplace competencies" (Oliver & Trigwell, 2005).

The other definition is the one provided by Whitelock & Jelfs (2003), where they give three definitions of blended learning as quoted by Oliver & Trigwell (2005):

"1- the integrated combination of traditional learning with web-based online approaches (drawing on the work of Harrison); 2- the combination of media and tools employed in an e-learning environment; and 3- the combination of a number of pedagogic approaches, irrespective of learning technology use (drawing on the work of Driscoll)" (Oliver & Trigwell, 2005)

In their work, Oliver & Trigwell (2005) criticize all definitions by saying that "the term 'blended learning' is ill-defined and inconsistently used" (Oliver & Trigwell, 2005), and that "what all definitions lack is an analysis from the perspective of the learner" (Oliver & Trigwell 2005). However, their suggestion to shift towards student-centered learning to analyze student's experience in blended learning (Oliver & Trigwell, 2005) though sounds logical and makes sense; could be seen as a radical shift to the other extreme where teacher's role is almost neglected.

Dewar & Whittington (2004) compiled factors that have to be considered in blended learning definition based on the work of Singh (2001); Driscoll (2002); Selix (December, 2001); and Osguthorpe (2003), which include:

"1- blends of online and offline (or f2f) activities (Singh, 2001), 2- self-paced and live, collaborative learning (Singh, 2001), 3- structured and unstructured learning (Singh, 2001), 4- custom content with off the shelf content (Singh, 2001), 5- blending work and learning (Singh, 2001), 6- pedagogical models – blending constructivism, behaviorism and cognitivism

(Driscoll, 2002), 7- synchronous and asynchronous communication methods (Selix, December, 2001), and 8- blending online and f2f instructors and learners (Osguthorpe, 2003)" (Dewar & Whittington, 2004).

Rossett, Douglis & Frazee (2003) define blended approach in terms of what can constitute it, where they categorize those as live face-to-face (formal or informal), synchronous or asynchronous virtual collaboration, self-paced learning and performance support, and under each they show what tool or method could be used. This is depicted in Table 2.3.

Table 2.3: Blended Learning Approach; What Constitute it

Live face-to-face (formal) • Instructor-led classroom • Workshops • Coaching/mentoring • On-the-job (OTJ) training	**Live face-to-face (informal)** • Collegial connections • Work teams • Role modeling
Virtual collaboration/synchronous • Live e-learning classes • E-mentoring	**Virtual collaboration/asynchronous** • Email • Online bulletin boards • Listservs • Online communities
Self-paced learning • Web learning modules • Online resource links • Simulations • Scenarios • Video and audio CD/DVDs • Online self-assessments • Workbooks	**Performance support** • Help systems • Print job aids • Knowledge databases • Documentation • Performance/decision support tools

Source: Rossett, A., Douglis, F., and Frazee, R. V. (2003), "Strategies for Building Blended Learning", *Learning Circuits*, retrieved on 18/8/2006, from http://www.learningcircuits.org/2003/jul2003/rossett.htm

When it comes to making a decision on what to include in the blend, Shaw & Igneri (2006) suggests that there are various possibilities; such as:

- *Synchronous and asynchronous web-based collaboration, and different varieties of computer-mediated communications*
- *Different varieties of technology-based delivery (Internet, CD-ROM, video and audio podcast, etc)*
- *A blend of instructional resources and activities with performance support systems, information search and retrieval tools and content repositories, and knowledge management applications*
- *Different instructional modalities (face-to-face, event-driven instruction, etc)*
- *Custom content and off-the-shelf content*

- *Multimedia, technology-based delivery and conventional text-based material*
- *A variety of instructional strategies: discovery based approaches versus didactic strategies, case-based and scenario-based tactics, problem-based and project-based or design-based learning, independent versus collaborative approaches (Shaw & Igneri, 2006)*

In another, yet different attempt, Sharpe *et al* (2006) opt to define blended learning in terms of its dimensions not by stating a particular definition. They identified eight dimensions:

- Delivery – different modes (face-to-face and distance education)
- Technology – mixture of web based technologies
- Chronology – synchronous and asynchronous interventions
- Locus – authentic work or practice-based vs. class-room based learning
- Roles – multi-disciplinary or professional groupings of learners and teachers
- Pedagogy – different pedagogical approaches
- Focus – acknowledging different aims
- Direction - instructor-directed vs. autonomous or learner-directed learning (Sharpe *et al*, 2006)

From the above we can clearly see that there is no unified definition of blended learning. Various people define it differently, each from a different perspective or consideration to suite or to meet certain requirements or goals. In addition, the above definitions/perspectives of blended learning show the various interpretations of the term and how it can be used and implemented; each from different perspectives, for different reasons, and for different usage in different scenarios. The differences and incompleteness of each perspective, model or definition in relation to others are evident when they are compared to each other. However, these could be used as a base for different blended learning models, though none would be sufficient to cover all aspects and dimensions of the blend. These have been tabulated and labeled as categories of possible blended learning settings in Table 2.4. Each category is given a code (A, B, C …) and next to each is concept or idea it was based on, followed by a column showing what each category consists of as main elements. For example category A is based on Driscoll (2002) four concepts of blending learning, and those concepts are shown in the third column of the table.

Table 2.4: Categories of Possible Blended Learning Settings

Category	**Based on**	**Consists of**
A	Driscoll (2002) four concepts. Blended learning, as clarified by Driscoll, is based on four main concepts for such blend. Each concept is by itself a combination (blend) of various elements, as shown in the following four types of blends.	1- Combination of web-based technologies 2- Combination of pedagogical approaches 3- Instructional technology with face-to-face 4- Instructional technology with actual job tasks
B	Drivers. Valiathan (2002) classifies blended learning based on what drives it (driven by). These can be classified into three drivers, as indicated in the adjacent cell.	1- Skill-driven: self-paced with instructor or facilitator support 2- Attitude-driven: event and delivery media 3- Competency-driven: performance support tools with knowledge management resources and mentoring
C	Definition, by Whitelock & Jelfs (2003). It is derived from how blended learning is defined	1- Traditional learning with web-based online approach 2- Media and tools employed in e-learning environment 3- Pedagogic approaches irrespective of learning technology used
D	Factors, based on the work of Dewar and Whittington (2004). They compile factors that have to be considered in blended learning definition based on the work of Singh (2001), Driscoll (2002), Selix (December, 2001), and Osguthorpe (2003)	1- Online and offline (face-to-face) activities 2- Self-paced and live collaborative learning 3- Structured and unstructured learning 4- Custom content with off-the-shelf content 5- Blending work and learning 6- Pedagogical models (constructivism, behaviorism, and cognitivism) 7- Synchronous and asynchronous communication methods 8- Online and face-to-face instructors and learners
E	Based on the work of Rossett, Douglis and Frazee (2003). They classify blended learning based on what it is composed of. This is related to settings, collaboration/ communication and pace.	1- Live face-to-face: formal and informal 2- Virtual collaboration: synchronous or asynchronous 3- Self-paced and performance support

Table 2.4, Continue

Category	Based on	Consists of
F	Shaw & Igneri (2006), possibilities of the blend. Shaw & Igneri (2006) has explored several possibilities of blended learning, showing that any of these can be considered blended learning by itself, but no mentioning of combinations of these possibilities.	1- Synchronous and asynchronous web-based collaboration, and different varieties of computer-mediated communications 2- Different varieties of technology-based delivery (Internet, CD-ROM, video and audio podcast, etc) 3- A blend of instructional resources and activities with performance support systems, information search and retrieval tools and content repositories, and knowledge management applications 4- Different instructional modalities (face-to-face, event-driven instruction, etc) 5- Custom content and off-the-shelf content 6- Multimedia, technology-based delivery and conventional text-based material 7- A variety of instructional strategies: discovery based approaches versus didactic strategies, case-based and scenario-based tactics, problem-based and project-based or design-based learning, independent versus collaborative approaches
G	Sharpe *et al* (2006). The researchers have identified 8 dimensions of blended learning, and they defined blended learning according to these.	1- Delivery – different modes (face-to-face and distance education) 2- Technology – mixture of web based technologies 3- Chronology – synchronous and asynchronous interventions 4- Locus – authentic work or practice-based vs. class-room based learning 5- Roles – multi-disciplinary or professional groupings of learners and teachers 6- Pedagogy – different pedagogical approaches 7- Focus – acknowledging different aims 8- Direction - instructor-directed vs. autonomous or learner-directed learning

2.4.3 Benefits of blended learning

Despite the fact that there are many variations and modes of blending as we see in the different definitions above, there are many benefits and advantages of blended learning. Some of these are related to "accessibility, pedagogical effectiveness, and course interaction" (Dziuban, Moskal & Hartman, 2005). Additional benefits are related to convenience and traveling time and cost (Dziuban, Moskal & Hartman, 2005).

2.4.4 Reasons for blended learning

Dewar & Whittington (2004) quote Osguthorpe (2003) as suggesting the following reasons behind blended learning in the academic world: "pedagogical richness, access to knowledge, social interaction, personal agency, cost effectiveness; and ease of revision" (Dewar & Whittington, 2004). According to Graham, Allen & Ure (2003), people choose blended learning for 1) improved pedagogy, 2) increased access/flexibility, and 3) increased cost effectiveness. A white paper by Shaw & Igneri (2006) lists some reasons behind the development and implementation of blended approaches. Among those reasons are: reduce costs; deliver training in a shorter period; provide more flexible learning models for learners to increase rate of learning …; align training with business objectives; manage change; increase collaboration among employees beyond the course or program lifespan; and accommodate different learning styles (Shaw & Igneri, 2006). Although those reasons are meant to be mainly for training, they, or some of them, are applicable to higher education. In a study about undergraduate experience of blended e-learning in UK, Sharpe *et al* (2006) found that there are many rationales for using blended e-learning. According to the study, the institutional rationales for blended e-learning are: "flexibility of provision; supporting diversity; enhancing the campus experience; operating in global context; and efficiency" (Sharpe *et al*, 2006). However; at the course level, rationales include "designs for large group teaching, engaging students out of class, and developing professional skills". While on the education level, it aims to improve learning, and explain the relation between expected learning and educational theories; mainly Associative learning, Constructivist learning, and Situative learning based on the framework from Mayes & de Freitas (2004) as quoted by (Sharpe *et al*, 2006).

2.5 Frameworks and Models

This section discusses the frameworks and model in general and those related to e-learning and blended learning in particular.

2.5.1 An overview

Wilson *et al* (2004) define framework as “A framework creates a broad vocabulary that is used to model recurring concepts and integration environments and is equivalent to the concept of a pattern in the software community”.

> *“The goal of patterns [frameworks] within the software community is to create a body of literature to help software developers resolve recurring problems encountered throughout all of software development. Patterns [frameworks] help create a shared language for communicating insight and experience about these problems and their solutions. Formally codifying these solutions and their relationships lets us successfully capture the body of knowledge which defines our understanding of good architectures that meet the needs of their users. The primary focus is not so much on technology as it is on creating a culture to document and support sound…design” (Appleton, Brad, 2000) quoted in (Wilson et al, 2004).*

While Holyfield (2005-a, b) says that “A framework provides a collection of possible services that will be relevant for a particular domain (e.g. education, research etc)”. Wilson *et al* suggest that “a framework does not aim to build” (Wilson *et al,* 2004) learning technology systems like LMS/VLE. They define reference model:

> *“reference model is a selection of Services defined in one or more Frameworks together with rules or constraints on how those Services should be combined to realize a particular functional, or organizational goal. A Reference Model constrains the number of unique organizational infrastructures” (Wilson et al, 2004).*

The relationship between Frameworks and reference Models is that a Reference Model can be derived from one or more Frameworks; and multiple Reference Models can be derived from one Framework (Wilson *et al,* 2004). A Service in the Framework context “refers to a pattern that can be used to solve a particular type of problem.” (Wilson *et al,* 2004).

When considering models in general, it may be viewed as an abstract representation of something in the real life. Different categories /types of models exist; such as narrative models, physical models, mathematical models, and graphical models. However, models differ from each other by the goal and function, and their usefulness is restricted to the scope of applications (Schichl, 2004). To represent e-learning, users need different models which could include: practice model, theoretical model, technical model, and organizational models (Beetham, 2004).

2.5.2 E-learning models

There are two main models of learning; face-to-face (in class) model and distance education (correspondence) model. These two lie on the two extremes of the education spectrum. However, with the evolution of technology (radio, TV, etc…), the purity of these two extremes start to decline, i.e., incorporation of the technology in the delivery of the contents, whether in the class room or in the distance education model, becomes evident. Instructional technology has been introduced in the classroom (face-to-face model), as well as in the DE model. When Internet became widely used in the late nineties, a new form of delivery emerged, and that is e-learning model. As has been shown above, e-learning is considered as a descendent of DE according to Holden & Westfall (2006). However, there is not an agreed upon definition of e-learning as we have shown above, and therefore, different interpretations and models exist. Among such “models”, which could be related to the different definitions and forms of delivery of contents, are online learning, web-based learning, Internet-based learning (Tsai & Machado, 2002). With the presence of Internet and communications technology, as we move along the spectrum; mixture of face-to-face and DE unveils. Thus, the ‘new’ term /model emerged; that is blended learning. However, as we see from the definition of blended learning above, the blend does not come only from the combination of face-to-face and DE. It could also come from combining other elements or dimensions of the learning/teaching process such as technology, educational theories, teaching styles, content delivery, etc… Factors influencing the mixture of face-to-face and online instruction as quoted in Dziuban, Moskal & Hartman (2005) based on Osguthorpe & Graham (2003) include "course instructional goals, student characteristics, instructor experience and teaching style, discipline, developmental level, and online resources" (Dziuban, Moskal & Hartman, 2005). According to Graham (2004), blending in learning can occur at four levels: 1) Activity level, 2) Course level, 3) Program level, and 4) Institutional level. In these levels, designers/ instructors have more roles in the first two, while blending is left to the discretion of the learner at the last two levels.

2.6 Elements in Blended Learning Models

When considering a learning model, one should look at the various aspects, elements and factors of such model. As we can see from the definitions above, a framework or a model, consists of a number of components (services), and has to serve (a) goal(s). The "put together" of those components to serve the intended goal(s) must be done in the right way, taking all elements and influential factors into consideration, in order for such model to be successful. Realizing the existence of various learning models – as seen above, each type has its own unique characteristics and requirements. For example, face-to-face model has different requirements and settings from that of DE model. The same holds true for blended model. However, because the model in consideration within this research scope is the blended model, emphasis and attention will be directed to elements/ factors and requirements related to such model. Taking into account the work of various researchers in defining blended learning, and in suggesting the types of combinations for the blended learning settings, we would come up with the following elements and factors comprising and influencing such model. However, to the best knowledge of the researcher, none of the previous works that the researcher has come through has tackled and identified all factors/elements listed hereafter. The following list is compiled based on the work of Chassie (2002), Forman (2002), Rossett, Douglis & Frazee (2003), Heinze & Procter (2004), Dewar & Whittington (2004) based on the work of Singh(2001); Driscoll (2002); Selix (December, 2001) and Osguthorpe (2003), Cantoni, Cellario & Porta (2004), Driscoll's four concepts; Valiathan (2002); and Whitelock & Jelfs (2003); all quoted in Oliver & Trigwell (2005), Osguthorpe and Graham (2003) as quoted in Dziuban, Moskal & Hartman (2005), Almala (2005), Zhang et al (2006), Yang & Liu (2007), Almala (2006), Holden & Westfall (2006), and others. These elements could be grouped into technical and non-technical. *Technical category of elements* include: Architecture, Multimedia, Educational technology, Networks (Internet, Intranet, Extranet), Web-based technology, Virtual resources, Communication methods, and Accessibility. While *Non-technical category of elements* include: Approaches/models of pedagogy or teaching, Styles of learning, Course instructional goals, Student characteristics, Discipline, Developmental level, Political factor, Economics and finance, Administrative, Social (online/offline activities, self-paced; live and collaborative learning, human interaction –with peers and instructors…), Delivery modes, Skills (learners, instructors), and Standards and Quality. However, regardless of the model to be used, a white paper published by Shaw & Igneri (2006) suggests that institutions and organizations can make good use of some hints based on literature and experience (cf. Driscoll, 2001; Rossett, Douglis & Frazee, 2003) when introducing blended learning, see box 2.1

In the following sections – namely 2.5.1 and 2.5.2 and their subsections- an attempt to explore the various dimensions of the blended learning settings, and identify the significant factors influencing blended e-learning was conducted.

Hints that institutions and organizations can use when adopting e-learning model

- *Identify and scope appropriate pilot projects. Leverage supporters and early adopters among senior management. Stakeholders and groups of end-users. Apply good communication and change management strategies as you introduce this approach as an innovation in your organization.*
- *Treat blended learning as a strategic initiative.*
- *Have an evaluation plan so that one can show the benefits at the end of the day*
- *Work across-functionally to take advantage of resources available throughout the organization and make these accessible within a blended learning framework.*
- *Start simply and grow into more elaborate strategies …*
- *Accept a degree of redundancy as a basis for flexible and robust learning.*
- *Place people at the centre of the blend: use mentoring and coaching; create "yellow pages' to link learners with expertise within the organization; have trained facilitators maintain discussion boards or computer conferences*
- *Check assumptions: involve end-users in a participative approach to design; conduct formal and informal formative evaluation.*
- *Identify components that truly require face-to-face instruction*. (Shaw & Igneri, 2006)

Box 2.1 hints for adopting e-learning models: source (Shaw & Igneri, 2006)

2.6.1 Technical Elements in Models of Blended Learning

In this section, the technical elements in models of blended learning are discussed below, after they are introduced in the previous page.

2.6.1.1 Architectures and Models

Within a framework, there exist some components that must be related to each other. The architectural aspect of the framework would have to deal with its components and how they are related to each other in order to serve the overall purpose of the framework. In frameworks related to e-learning, the case would not be different. According to Tortora *et al* (2002), there are three basic components of e-learning framework. They are: 1- Learning management systems, 2- Content composition and integration systems, and 3- Learning content metadata (Tortora *et al*, 2002). Many researchers have tackled the area of developing or proposing frameworks and/or architectures for e-learning. Examples of such efforts can be found in the work of Ubell (2000), Burger & Rothermel (2001), Anido-Rifón *et al* (2001), Saddik, Fischer & Steinmetz (2001), Tortora *et al* (2002), Atif, Berri & Benlamri (2003), Huang, O'Dea & Mille (2003), Kazi (2004), Trifonova & Ronchetti (2004), Ronchetti & Saini (2004), Brusilovsky (2004), Apostolopoulos & Kefala (2004), Zhang *et al* (2004), Koohang & Plessis (2004), Kawamura, Nakatani & Sugahara (2005), Keil-Slawik, Hampel & Eßmann (2005), Dara-Abrams (2005), Liu & Dafoulas (2005), Hasegawa & Ochimizu (2005), Anane *et al* (2005), Broisin, Vidal, Meire, & Duval (2005), Hameed, Badii & Cullen (2008), Hameed, Fathulla & Thomas (2009), (Hadjerrouit 2009).

However, most of them have concentrated on limited or focused issue, and for specific purpose. Burger & Rothermel (2001) propose a framework focuses on special form of content in the area of distributed systems and computer networks. Within this context, the main focus is on student's requirements for learning material and animation applets, and on teacher's requirements. The architecture is extensible and consists of simulation and animated visualization. The simulation model can be run automatically through a predefined script or by the user in an interactive mode. However, as the authors state, the focus has been on applets; and more concepts are needed for integration into a set of learning materials in multimedia form (Burger & Rothermel, 2001).

To support web-based collaborative applications; Anido-Rifón *et al* (2001) present a framework for developing interactive and collaborative web-based applications – 'SimulNet', and test it through the implementation of a web-based distributed educational platform. It is a layered architecture consists of commercial off-the-shelf (COTS) services and standard Internet protocols as the lower layer, then services layer, followed by components layer, and on top of that the application layer (Anido-Rifón *et al,* 2001). Services of the framework include *communications layer, virtual room service, virtual file system service, and database access service*. Components include;

user management, auditing tool, email, bulletin board, chat, whiteboard, agenda, project management, event deliverer, and producer-consumer manager. Despite the good evaluation results, the framework suffers from performance problems when overloaded because it is 100% Java, and also the server's multitasking model is based on Java threads where the operating system considers that there is one "large server process running one thread for each component" (Anido-Rifón *et al*, 2001).

In addressing some of the problems in multimedia-based e-learning systems, Zhang et al (2004) propose a concept called 'Virtual Mentor' influenced by constructivist learning theory, and consists of six principles. These are: *Multimedia-integration; Just-in-time knowledge acquisition; Interactivity; Self-directivity; Flexibility; and Intelligence.* A prototypical Virtual Mentor system called 'Learning By Asking LBA', was then developed and tested, and the results show that students in the e-learning group outperformed traditional classroom groups (Zhang *et al*, 2004).

Kawamura, Nakatani & Sugahara (2005) have presented a "novel framework for asynchronous web-based training" (Kawamura, Nakatani & Sugahara, 2005), and they claim that "the proposed system has solved the problems of scalability and robustness that the existing WBT systems have" (Kawamura, Nakatani & Sugahara, 2005).

Keil-Slawik, Hampel & Eßmann (2005) proposed "a framework for pervasive eLearning" in a distributed knowledge space, using executable learning objects (Keil-Slawik, Hampel & Eßmann, 2005).

In their work, Koohang & Plessis (2004) propose a framework for e-learning usability properties. Their framework is a five-category one based on usability properties which is based on "Looks Great" and "Works Well" paradigms. The five categories are Presentation [concerned with Looks Great paradigm], navigation, communicative enablement, technical functionality, and learner support [all concerned with Works Well paradigm]. The framework is based on the usability attributes of a usable product as defined by several experts and organizations. These attributes are, within e-learning context, "effectiveness, efficiency, flexibility, learnability, memorability, operability, understandability, attitude & satisfaction, and attractiveness" (Koohang & Plessis, 2004).

Others have talked about Learning Environment (LE), such as (Cristea, & Tuduce, 2004), (Siqueira, Braz & Melo, 2003).

Some other researchers have directed their work towards developing models for e-learning. Dewar & Whittington (2004) developed a model for the development of Blended learning called "VASE". The model was drawn on the work of others, especially that of Hocutt (2001) who argues for a "strategic blend that, and ensures: a) that components are appropriately interrelated; b) the transitions among components are smooth; c) there is consistency among the components in terms of message, language, and style; d) there is sufficient and appropriate redundancy among the components" (Shaw & Igneri, 2006). The Refinement of themes resulting from a workshop at Royal Roads University and considering Hocutt's model, resulted in the VASE model which is composed of: Build a **V**ision, Check **A**ssumptions, Take a **S**ystems View, and **E**xpect Change. For each theme, there are a number of questions to be answered to guide the development of blended learning.

Carman (2002), while considering a blend of learning theories of Gagné; Keller; Bloom; Merrill; Clark and Grey, suggests five key ingredients of a blended learning process. These are: 1) Live Events based on John Keller's ARCS[3] Model of Motivation; 2) Self-Paced Learning based on Gagné Nine Events of Instruction, Merrill's Component Display Theory, and Clark's Three Principles[4] on the use of multimedia to promote

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[3] Attention, Relevance, Confidence, and Satisfaction (Carman, 2002).
[4] See the following section.

knowledge transfer; 3) Collaboration; 4) Assessment[5]; and 5) Performance Support Materials[6] (Carman, 2002).

Derntl & Motschnig-Pitrik (2004-b) propose a model for blended learning called 'Blended Learning Systems Structure – BLESS', which consists of five layers; Blended Learning Courses; Course Scenarios; Blended Learning Patterns; Web Templates; and learning Platform .

Those frameworks and models of e-learning and blended learning are summarized in Table 2.5 below.

Table 2.5: Summary of Frameworks and Models of E-learning and Blended Learning

Framework/ Model Name	**Author**	**Main Concept**	**Features**	**Some Limitations**
	Burger & Rotherm *et al* (2001)	Focuses on special form of content in distributed systems and computer networks. Specifically it focuses on student's requirements for learning material and animation applets, and on teacher's requirements.	Extensible and consists of simulation and animated visualization	Focus on applets, more concepts are needed for integration into learning materials in multimedia
SimulNet	Anido-Rifón *et al* (2001)	For developing interactive and collaborative web-based applications. It is a layered architecture, consisting of commercial off-the-shelf services and standard Internet protocols, then services layer, components layer, and application layer.	Many services and components. Tested with good evaluation.	Suffers from performance problems when overloaded because it is 100% Java. Server's multitasking model is based on Java threads where the OS considers that there is one large server process running one thread for each component.
	Carman (2002)	Five key ingredients of blended learning process	Live events, self-paced learning, collaboration, assessment, and performance	There are many other ingredients, factors and elements not included. It looks at blended learning through those five ingredients only, which makes it questionable when considering a complete blended learning model that takes most, if not all, ingredients; elements; factors and dimensions into account.

[5] Based on Bloom's six levels framework of cognitive learning: Knowledge, Comprehension, Application, Analysis, and Synthesis

[6] Based on Gagné's and Gery's work

Table 2.5, Continue

Framework/ Model Name	Author	Main Concept	Features	Some Limitations
Virtual Mentor	Zhang *et al* (2004)	Based on constructivist learning theory	Consists of six principles: Multimedia-integration, Just-in-Time knowledge acquisition, Interactivity, Self-directivity, Flexibility, and Intelligence	Leaving all other dimensions/ factors aside, the model only takes one theory into consideration. Therefore, from pedagogical perspective, it does not take other theories into account like behavioral, and objectivist. This makes the model non-blended one from this perspective.
	Koohang & Plessis (2004)	Framework for e-learning usability properties	Five-category based on usability properties based on "looks great and works well" paradigm. It is based on usability attributes of usable product.	This framework is for e-learning not blended learning as dealt with in the context of this research. It focuses on usability properties when constructing e-learning
VASE	Dewar & Whittington (2004)	For the development of blended learning. drawn on the work of others, especially Hocutt (2001).	It is composed of Build a Vision, Check Assumptions, take a System View, and Expect Change. A number of questions for each theme to guide development of blended learning	It is not a blended learning model as such, rather it is a model to develop blended learning. Though it is a good attempt in this direction, it cannot be considered as blended learning model.
BLESS	Derntl & Motschnig-Pitrik (2004)-b	For blended learning, layered approach	Five layers: blended learning courses, course scenarios, blended learning patterns, web templates, and learning platform.	
	Kawamura, Nakatani, & Sugahara (2005)	Novel framework for asynchronous web-based training	Claims that it solved the problems of scalability and robustness that the existing WBT systems have	Focuses only on one aspect; that is asynchronous WBT. It does not even take synchronous into account. Not much of a blend is there.
	Keil-Slawik, Hampel & Eßmann (2005)	Framework for pervasive eLearning	In distributed knowledge space, using executable learning objects	This is a very specific / focused framework on one type of eLearning, in a given environment

2.6.1.2 Multimedia Element

Different definitions exist for multimedia. Each might look at multimedia from a different perspective. These differences could be related to the nature and origin of multimedia. Packer (1999) has questioned the origin of multimedia, and wonders when that was. Similar argument is presented by Gonzalez, Cranitch & Jo (2000), as to what discipline multimedia belongs, is a multidiscipline, or whether it is simply a new one. Heller *et al* (2001), says that multimedia is "a Polysemous term- a term with many definitions, and in this case, many roots." (Heller *et al*, 2001). Such roots might be education, human computer interaction, or computer graphics, and depending on the root, it takes different characteristics (Heller *et al*, 2001). Cox *et al* (1998) quote a dictionary definition of multimedia as: "including or involving the use of several media of communication, entertainment, or expression" (Cox *et al,* 1998). Gonzalez, Cranitch & Jo (2000), go one step beyond the technical aspect of multimedia by emphasizing that multimedia "is a vital, dynamic field offering new challenges, interesting problems, exciting results, and imaginative applications" (Gonzalez, Cranitch & Jo, 2000). [The authors take the perspective of multimedia education as a formal education programs at universities…]

Cox *et al* (1998) suggest a more technological definition applied to communications systems, stating that multimedia is: "integration of two or more of the following media for the purpose of transmission, storage, access, and content creation: text; images; graphs; speech; audio; video; animation; handwriting; data files" (Cox *et al,* 1998). Gonzalez, Cranitch & Jo (2000), conclude in their research that "Multimedia is about creating artificial environments that implement rich, interactive, multimodal information spaces, arising through a fusion of computer hardware, software and multimodal data" (Gonzalez, Cranitch & Jo, 2000).

"Multimedia is an utterly misunderstood term used to describe the variety of applications that integrate media types, from CD-ROM to live performance to the Internet" (Packer, 1999). To try and support his argument, Packer takes us on historical sojourn, starting from the immersive caves where paintings were found at the caves of Lascaux, France, to the performance "The Ring" opera of Richard Wagner, to the introduction of Memex (memory extender) by Vannevar Bush in 1945, then to the introduction of personal computers, moving to the creation of the CD-ROM "Puppet Motel" in 1995 by Laurie Anderson in collaboration with Hsin-Chien Huang, and finally wondering whether cave dwellers have ever imagined that these days some will create "immersive, ritualistic performance works for the Cave Automatic Virtual Environment (CAVE) systems" (Packer, 1999).

Steinacker, Ghavam & Steinmetz (2001) quoted (Steinmetz & Nahrstedt, 1999) in defining multimedia, from a technical point of view, as "A multimedia system is characterized by computer-controlled, integrated production, manipulation, presentation, storage, and communication of independent information, which is encoded at least through a continuous and a discrete medium" (Steinacker, Ghavam & Steinmetz, 2001). The authors argue that this is not enough for describing what is inside multimedia resources, how good it is, who should and can use it and why (Steinacker, Ghavam & Steinmetz, 2001).

From the above illustration, we could compose a more comprehensive definition of multimedia that could cover wider aspects and incorporate various elements. *This 'new' definition would read as "multimedia is about dealing with different types of data, presenting it using different types of media, using various technologies, mainly computer-based, in an attractive and useful artificial environment whether static or dynamic (interactive) to deliver a 'message' to the audience. In this context, this 'message' could be an idea, a lesson, an explanation, clarification, illustration, etc…*"

The above definition covers the various aspects that other researchers try to incorporate in their given definition of multimedia. However, as we can easily see from the above, those definitions lack something each, and 'concentrate' on one or some elements or dimensions. On the other hand, the new definition covers those elements and dimensions that are separately stated in the various definitions. It compiles and integrates these into one definition.

E-learning occurs in different forms and in different environments, and one of the characteristics of e-learning is that it does not need both learner and teacher to be always together at the same time. More emphasis has been directed towards *learner-centered* approach in e-learning where the learner plays a more active role. This trend and the nature of the e-learning setup, have called upon the use and utilization of multimedia in e-learning so that a more efficient and effective learning occurs. Here multimedia can very much assist the learner in building her/his own knowledge with minimum support from the teacher/instructor. Ruth Clark (2002), quoted in Carman (2002), provide three principles regarding the use of multimedia for knowledge transfer. The three principles are:

1) *The Multimedia Principles: Adding Graphics to Text Can Improve Learning;*
2) *The Contiguity Principle: Placing text Near Graphics Improves Learning; and*
3) *The Modality Principle: Explaining Graphics with Audio Improves Learning (Carman, 2002).*

Once those elements, dimensions, and principles are taken into account when developing and implementing multimedia for educational purposes, the benefits could be achieved and resources could be utilized.

In summary, multimedia has no single definition to refer to. Different scholars have different definitions, though not necessarily contradicting. On the contrary, they could be seen as complimenting each other. This could be attributed to the nature of multimedia and its roots in education and other disciplines. In general, multimedia has been associated with education [teaching and learning] since its main use is to 'inform' and/or help build/construct someone's understanding of something. This role becomes more evident and important in learner-centered approach, especially in e-learning.

In the following sections, we will see how it could, and in fact, should be carefully incorporated into the teaching/learning process through educational technology, especially when it comes to e-learning in general, and to blended learning in particular.

2.6.1.3 Educational Technology

"The term, educational technology, is used as a generic descriptor and is intended to include other terms such as instructional technology, educational media, learning technology and other such variants" (Reiser & Ely, 1997). The broadest terms of all are educational technology and instructional technology which sometimes are used interchangeably, therefore could be considered synonymous for practical purposes (Reiser & Ely, 1997). They say that according to Saetter (1990) the root of educational technology can be traced back to the early 1900. The most recent definition of educational technology is the one "published by AECT as *Instructional Technology: The Definition and Domains of the Field* (Seels & Richey, 1994). The new definition is brief: Instructional Technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning (p.1)" (Reiser & Ely, 1997).

"Instructional design is a systematic approach to the design, production, evaluation, and utilization of complete systems of instruction. Being a system, the design process is a set of interrelated parts, all working towards a common goal." (Ameritech, online).

Moore and Kearsley (1996) quoted in (Heydenrych, 2003) provide a production oriented definition saying

> *"Instructional Systems Design (ISD) consists of some recognized standard procedures that are used to develop well-structured instructional material… The fundamental principle of the ISD approach is that all aspects of learning and instruction should be defined behaviourally, so that what the student is expected to learn can be measured, and teaching can concentrate on the student's observable performance" (Heydenrych, 2003).*

Freeman (1994) states two definitions in his study/report of instructional design (ID). He quotes Coldeway (1982) defining ID as "instructional systems design is actually a hybrid made up of concepts in learning theory, systems engineering, instructional technology, and organizational development. It is a Systematic attempt to organize procedures and methods of demonstrated effectiveness in the educational context" (Freeman, 1994). The second definition is the one of Smith and Ragan (1993) quoted by (Freeman, 1994) stating that the term refers to "the systematic process of translating principles of learning and instruction into plans for instructional materials and activities" (Freeman, 1994). Gaede & Stoyan (2001) presented a pragmatic definition given by Lowyck & Elen (1993) saying that

> *"ID is a discipline that connects descriptive research findings with instructional practice by (1) identifying design parameters based on results of basic research from cognitive psychology; (2) instruments thee as rules, procedures and methods and (3) provides prescriptions for the development of instruction to optimize teaching and learning" (Gaede & Stoyan, 2001).*

A more recent definition is by Ragan & Smith, 1999, p.2) quoted in (Botturi, 2003) as "The systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources and evaluation" (Botturi, 2003). When looking at the two definitions by Ragan and Smith, we can easily see the "modification" and improvements in the definition by the same persons. The second definition has been expanded to include, in addition to instructional materials and activities, information resources and evaluation, which gives the term a wider coverage of resources and allows for evaluation of the whole process, so that better achievements are reached. Axmann & Greyling (2003) have quoted Piskurich (2000) as defining

> *"instructional design, stripped to its basics, is simply a process for helping you to create effective training in an efficient manner. It is a systems, perhaps more accurately a number of systems, that help you ask the right questions, make the right decisions, and produce a product that is as useful and useable as your situation requires and allows" (Axmann & Greyling, 2003).*

Yet a more recent definition of ID is the one provided by (IEEE 2001, p.1) quoted in (Botturi 2003): "Instructional design is the process through which an educator determines the best teaching methods for specific learners in a specific context, attempting to obtain a specific goal" (Botturi 2003).

2.6.1.4 Multimedia and Educational Technology

From the definition of educational technology found in (Reiser & Ely, 1997), it is clearly noticed that all resources and processes are dealt with and directed towards learning. According to Heller *et al* (2001), multimedia has different roots, and one of them is education. The three-dimensional matrix visualization of multimedia taxonomy, presented in Heller *et al* (2001); with CONTEXT; MEDIA TYPE; and MEDIA EXPRESSION as the axis, shows the diversification and various roots and disciplines that it takes. From what we see above, the two fields; multimedia and educational/ instructional technology, are used somehow to enhance teaching and learning process. Instructional technology uses "resources" and "processes" in a systematic method to improve learning. Multimedia on the other hand, (compiled from Steinacker, Ghavam & Steinmetz, 2001; Packer 1999; Gonzalez, Cranitch & Jo, 2000; Cox *et al* 1998; Heller *et al*, 2001) is about dealing with different types of data, presenting it using different types of media, using various technologies, mainly computer-based, in an attractive and useful artificial environment whether static or dynamic (interactive) to deliver a "message" to the audience. In this context, this "message" could be an idea, a lesson, an explanation, clarification, illustration, etc…

While educational/ instructional technology is meant for education (teaching and learning), it employs different types of data/media, combines them and present them to help teachers in delivering their lessons, so that better outcomes are evident in the final student performance.

The above discussion generally shows the integration and intersection between the two fields, though multimedia might take a wider perspective in terms of the purpose it serves and the audience it reaches.

2.6.1.5 Multimedia and Educational Technology in E-learning Context

Both multimedia and educational technology have been employed in one way or another in e-learning, due to the important contribution they make to the overall learning process and its success. The use of technologies in education may lead to highly effective results, when properly managed and integrated with parallel instructor-learner interaction modes (Tortora *et al,* 2002). Cantoni, Cellario & Porta (2004) assure that instructional design (ID) plays an important role in e-learning, and it is implicit in lecturer's experience in traditional learning environment, while it must be explicit in e-learning (Cantoni, Cellario & Porta, 2004). This requires more skills than the basic ones from the instructor; like "creative abilities and psychological sensitivity" (Cantoni, Cellario & Porta, 2004). Low, Low & Koo (2003) say that, "in the context of education, multimedia will provide flexible information, which is usually associated with instructional design and authoring skills" (Low, Low & Koo, 2003). In clarifying what advanced multimedia technology is, Cantoni, Cellario and Porta (2004) propose that; it is the one that increases skills; adapts to context and evolves while used. From effectiveness point of view, Tortora et al (2002) claims that it is the responsibility of the system designer to make the system attractive and interactive to students while using it. Cantoni, Cellario & Porta, (2004) paraphrase Wayne Hodgins, as saying

> *"for multimedia teaching to be really efficient and effective it is necessary to choose just the right content, just the right person, at just the right time, on just the right device, in just the right context, and just the right way." (Cantoni, Cellario & Porta, 2004)*

"So far, the available technology has forced the teacher not only to define the education contents but also to choose the presentation modalities, and hence acquire experience in fields like graphics and cognitive psychology far from his background" (Tortora *et al*, 2002). One of the major drawbacks of existing multimedia authoring tools is the difficulty teachers in their role as content manager, encounter in exploiting the potentiality of those tools (Tortora *et al*, 2002). Another drawback is "Visual technologies may place heavy demands on PC performance" (Cantoni, Cellario & Porta, 2004). Other drawbacks of current authoring environments is that developed multimedia components are static; not able to fit learner's needs; and not able to share their education contents with other components (Tortora *et al*, 2002).

Having these drawbacks and limitations in mind, some people have suggested ways and guidelines for better e-learning outcomes. "The most effective e-learning approaches are those exploiting streaming video, rich visualization and interactivity to deliver the training experiences to the user's machine" (Cantoni, Cellario & Porta, 2004). Yang & Liu (2007) proposed a web-based virtual online classroom (WVOC), which consists of two parts: "instructional communicating environment (ICE) and collaborative learning environment (CLE)" (Yang & Liu, 2007), and its design "depends on learning theories and information technologies" (Yang & Liu, 2007). It has several features such as encouraging self-pace learning and promoting interactions among parties involved, and provide live learning resources. However, it some limitations as it is built on windows streaming media which makes platform dependent, and it supports limited format for learning material (Yang & Liu, 2007). Low, Low & Koo (2003) propose a Multimedia learning system (MMLS), which is developed at a Malaysian university, and it is defined as "an interactive educational tool for course content", which "provides an interface for academicians and instructors to publish their course content on the web" (Low, Low & Koo, 2003). Zhang et al (2006) propose a system, Learning By Asking (LBA) which is a "multimedia based e-learning system", that "integrates multimedia instructional material including video lectures, PowerPoint slides, and lecture notes" (Zhang *et al*, 2005). This system is based on the "cognitive information processing theory", which is "an extension of the constructivist model, based on a model of memory" (Zhang *et al*, 2005). Despite these proposed systems, which are claimed to be adequate for e-learning, there are still some limitations and problems as indicated by the respected authors. Some quality problems forced the authors to use Windows Media Technologies (Yang & Liu, 2007). Zhang et al (2006) conclude that they cannot yet, claim that "interactive video-based e-learning is always superior to traditional classroom learning" (Zhang et al, 2006). However, they say that their study shows that, "under certain circumstances, interactive e-learning can produce better results than other methods" (Zhang et al, 2006).

2.6.2 Non-Technical Elements in Models of Blended Learninig

This dimension would cover various aspects and elements of the framework. Such elements and aspects include: psychological, philosophical, social, educational, pedagogical, political, managerial, and standards. Although some of these are interrelated, each one would be treated separately as much as possible, without ignoring the connection and dependences on others.

2.6.2.1 Psychological, Philosophical and Social Elements

Rovai (2002) claims that "E-learning environment presents great opportunities and risks" however, online learning can be a good "alternative for many students who do not have the opportunity to attend traditional face-to-face classes" (Rovai, 2002). Chassie (2002) suggests eight requirements for a successful e-learner: 1- Higher level of discipline. 2- Higher level of motivation. 3- Relatively stable work life. 4- Be a good planner. 5- Be organized. 6- Be able to set your priorities. 7- Need to be somewhat computer savvy. 8- Most of all, it must be capable of working independently (Chassie, 2002). These requirements are in line with some of the 7 reasons for high dropout rate in distance education as suggested by Rovai (2002). These contributing reasons are:

> *"limited support and services offered at distance by some schools, large financial commitments, competing work situations, dissatisfaction with teaching methods, low learner self-confidence and self-perception, unfamiliarity with the technology used by the distance education program, and student feelings of isolation (Besser & Donahue, 1996; Bullen, 1998; Cookson, 1990; Tinto, 1993)" (Rovai, 2002).*

Promoting "strong sense of community", which has several important elements like; "mutual interdependence among members, connectedness, trust, interactivity and, shared values and goals" (Rovai, 2002), is one solution to the high dropout rate issue. This may lead to stronger connections with others, and results in "larger base of academic support" (Rovai, 2002), which would have positive effects on commitment, cooperation, satisfaction, and motivation to learn. "Feelings of connectedness among community members and commonality of learning expectations and goals" are the two components of classroom community (Rovai, 2002). The study conducted by Rovai (2002), showed that sense of community in virtual classroom affect the level of cognitive learning of graduate students, where female ones were better off, while ethnicity and course content have no effect. This result cannot be generalized since the study was of limited scope and on limited bases as indicated by the author. Tham &

Werner (2005) emphasize that online environment require balanced effectiveness in the three factors that comprise it; namely, students, technology and institution, otherwise learning will be negatively affected.

From the teacher point of view, the use of Internet in teaching could be annoying task for them, according to Gill (2006). The author identifies five things that have vexed him and his colleagues. These are "(1) lack of models from our own experience …, (2) Constant disruptions precipitated by evolving technologies …, (3) Explaining our courses to others …, (4) Adjusting to a new rhythm of life …, and (5) Adjusting to our new role …" (Gill, 2006). According to Bonk (2000) quoted in Tham & Werner (2005), online educators wear many 'hats', including: The Technological Hat, The Pedagogical Hat, and The Social Hat.

2.6.2.2 Educational and Pedagogical Elements

Today, tremendous amount of data, information and knowledge is stored in various forms using various media all around us. Every day, or even hour, and may be every second, knowledge is being constructed, stored, exchanged between people and transformed from one form to another. The exchange of knowledge between different people/persons is done through the process of teaching and learning. With the wide spread of Internet, the process is even done faster and on wider scale than it used to. As the teaching/learning process is conducted mainly in the traditional way in a traditional classroom setting, this would put huge burden on both teacher and learner alike in conveying or acquiring knowledge in the new era. Teachers face difficulties "teaching" everything needed and learners find it hard 'learning' everything needed, within the traditional educational settings in higher education. "Education is undergoing a theoretical shift from programmed learning and information processing approaches to knowledge building and transfer" (Almala, 2005). Many educational institutions as well as other firms and organizations are utilizing a non-traditional way of teaching and learning, either through DE or through e-learning setting. It is anticipated that within 5 years [as of 2002] most delivery of materials in higher education will be in the middle of the spectrum that represent the transition from traditional to e-learning delivery (Forman, 2002).

2.6.2.2.1 Learning Styles and Learning Theories

According to Cantoni, Cellario & Porta (2004), people differ in how they assemble knowledge, "(e.g. bottom-up vs. top-down approaches, abstraction vs. exemplification, freedom vs. guidance)" (Cantoni, Cellario & Porta 2004). There are three categories of learning styles that learner may prefer to work under "visual… auditory…and kinesthetic" (Cantoni, Cellario & Porta 2004). Educators should recognize the existence of different learning styles and that learners would adopt different ones. According to Tham & Werner (2005), online educators should recognize the connection between culture and learning styles. Paul Butler, chief executive officer of KnowledgePool, quoted in Gunasekaran, McNeil, and Shaul (2002), says: "By suiting students' personalities and providing the motivation inherent to their learning styles, we believe that students are more likely to utilize, retain and seek additional learning…". 'Insights' defines four psychological styles, which are linked to learning styles each: "1- Cool blue … , 2- Fiery red … , 3- Earth green … , 4- Sunshine yellow … " (Gunasekaran, McNeil, and Shaul, 2002).

As to what approach or theory learners should adopt or follow, two main theories/schools of thoughts dominate the discussion on learning; constructivism and objectivist/behaviorism. Advocates of both argue in favor of the respective theory, claiming that it is more suitable for learning. People concerned and involved in e-learning generally try to adopt one of the two for e-learning systems and environments. Theoretical foundations about learning and cognition must be taken into consideration for an efficient online learning environment be appropriately designed, which helps to choose appropriate educational approach (Nunes & McPherson, 2003). According to the objectivist school of thought, “concepts are considered external to the learner and received through a process of communication, which focuses on behaviour and its modifications, rather than on cognitive or mental processes that facilitate learning” (Nunes & McPherson, 2003). On the other hand, Constructivism theory describes the development of knowledge through learning as “a process of active construction of meanings in relation to the context and environment in which the learning takes place” (Nunes & McPherson, 2003). The nature of reality is a main characteristic distinguishing constructivism from other learning theories (Almala, 2005). Both theories argue for different objectives/goals of instructions and learning. “The constructivist learning paradigm emphasizes that there is no single or objective reality ‘out there,’ which the instructor must transmit to the learner. Rather, reality is constructed by the learner during the course of the learning process” (Almala, 2005). Additionally, constructivism argues that “concept development and deep understanding” are the objectives, while behaviorist says that “behaviors and skills” are the goals (Nunes & McPherson, 2003). Driscoll (2000) quoted by Almala (2006), “summarizes the five major components of constructivism as being (1) a complex and relevant learning environment; (2) social negotiation; (3) multiple perspective and multiple modes of learning; (4) ownership in learning; and (5) self-awareness and knowledge construction” (Almala, 2006).

In their study; Tham & Werner (2005) quote Chickering and Gamson (1991) and Chickering and Ehrmann (1996) as saying that “positive online-learning environments incorporates seven principles of good teaching; a) encouraging student-faculty contact, b) encouraging cooperation among students, c) encouraging active learning, d) giving prompt feedback, e) emphasizing time on task, f) communicating high expectations, and g) respecting diverse talents and ways of learning” (Tham & Werner, 2005).

2.6.2.2.2 Asynchronous/Synchronous Learning

The main distinction between the two words is the time element. Synchronous means at the same time, while Asynchronous means at different times. In the learning context, it means that teaching/learning either can happen at the same time – synchronous, or at different times – Asynchronous. This includes traditional learning (synchronous) which takes place at the same time, same place. The same classification holds true for e-learning (online learning) as well, i.e. synchronous and asynchronous. Chen *et al* (2004) quote other researchers saying that most important advantages of synchronous learning are immediate feedback and more motivation and obligation to participate. Latchman, Salzmann, Gillet & Kim (2001) propose a hybrid synchronous and asynchronous learning environment called Lectures on Demand in Asynchronous Learning Networks. The concept behind this is to offer lectures online and/or playing it later from the archive. Several tools are used to bring lecture live online [and even later as asynchronous]. Cognitively, there are seven activities involved: Lecture, Live demos, Individual readings, Written exercises, Virtual experiments, Real experiments, and Practical projects (Latchman *et al*, 2001). Another model was developed by Martyn (2003) where it is basically a hybrid of face-to-face with asynchronous learning consisting of Chat; E-mail; Online Quizzes; and Online Threaded Discussion. In trying to overcome traditional learning disadvantages, based on their literature review, using Internet, Chen *et al* (2004) developed a synchronous learning model, consisting mainly of five components: role, participant, venue, delivery and interaction. However, they conclude by quoting other researchers as saying that students' learning styles and teachers' teaching styles are important factors that need consideration to improve student' learning environment (Chen *et al*, 2004). In their work, Miller & Neal (2005) highlight some disadvantages of synchronous learning [they call it WBT] over asynchronous (CBT) saying that student needs Internet access for WBT (synchronous) which can be costly, and prohibitive if a student is traveling or access is expensive.

2.6.2.3 Political Factors

"The main challenge facing traditional university is to rethink its higher education environment in light of new technologies, in order to meet the challenges of global context" (Cantoni, Cellario & Porta, 2004). Universities in general face various challenges, one of which of course is the technological challenge. With the continuous accelerated advancement in technology, universities have to keep up with this demanding challenge which needs more and more financial resources. In addition, such technologies, especially e-learning, will cause and introduce change into the university. Such change will affect various aspects of the education process, and the organization structure, in addition to power centers and authorities. The effect would be enormous that stakeholders in general might resist, or at least might not encourage. Each organization has its own politics, and as such, it is usually not an easy job to change the norms and traditions all of the sudden. Cautious must be practiced when dealing with such politics during the change process.

On the society and country level, politics might even be harder to alter. Rules, regulations, traditions, and practices are there, and it would be hard to amend and change.

In the Palestinian context, there are certain rules and conditions applied for the recognition and accreditation of HE diplomas (degrees), where the existing regulations do not recognize and accept distance learning degrees on all levels -first degree and postgraduate – Master and PhD. Despite the existence of an open university in Palestine - Al-Quds Open University 'QOU' which is a government university that still requires certain class attendance , the government, through its Ministry of Education and Higher Education (MOEHE), does not recognize any other degrees obtained through distance and open learning.

On a political level, the deteriorated situation in PA controlled areas due to the uprising (Intifada), and the Israeli actions, with the imposed closures and road checkpoints have led to a more difficult situation within the HE sector. With no window in the horizon for some kind of political solution, things might even get harder. This might be one of the reasons that led, or should lead to the move towards adopting some form of e-learning settings in HEIs. The efforts by some universities to introduce e-learning and incorporate it into their curriculum are signs of such move.

In addition, the general attitude and perception of the Palestinian people towards distance and open learning is a traditional one with lots of skepticisms about the quality and seriousness of such education system. However, recently, this has been slowly changing with more students joining the QOU, and due to the international trend towards open, distance and e-learning, and with the recent trends and efforts at Palestinian HEIs and MOEHE, such as PEI and RUFO.

2.6.2.4 Administrative, Financial and Organizational Elements

As any other issue, e-learning is affected by factors related to administration, finance and organization. On an administrative and strategic level, Cantoni, Cellario & Porta (2004) say "the main challenge facing traditional university is to rethink its higher education environment in light of new technologies, in order to meet the challenges of global context" (Cantoni, Cellario & Porta, 2004).

On a financial level, the issue is often critical and might be considered one of the top concerns for any organization. Chassie (2002) quoted Frank Mayadas, director of the Alfred P. Sloan Foundation's Asynchronous Learning Network, as saying "the cost of creating and teaching an online course will eventually be about 20% cheaper than a traditional course" (Chassie, 2002). Despite what Frank Maydas said, it might not waive the high cost involved in the development and initial delivery of e-learning. In his effort to find a 'solution' to the financial problem facing USA universities, especially traditional ones, Ruth (2006) suggested several options for traditional universities to consider. Among those are mergers and integration, limit bricks-and-mortar investment in favor of blended learning, support the deliberate proliferation of distance-learning adjunct faculty, and accepting that e-learning is costly but crucial (Ruth, 2006). He goes on explaining the rationale behind those options and especially the trade-off between bricks-and-mortar and blended learning. He claims that by having a course taught in a 'blended' mode i.e. almost half the lectures taught in traditional classroom and the other by using the technology, classroom utilization would increase, which leads to a decrease in the structure investment -constructing new buildings, which in turn lead to more investment in virtual classrooms (Ruth, 2006).

Suggestions for effective online-learning environment

Institution should:

a- Provide training to the faculty

b- Balance between motivation, behavioral changes and increased workload of the faculty

c- Provide proper support infrastructure for faculty members

d- Consider the amount of preparation time needed for each online faculty member and include this as part of the training and induction program

e- Be supportive of faculty conducting online courses, and give them assistance and time needed

f- Encourage the development of course syllabi that induce increasingly effective and efficient student participation

g- Consider what to do to minimize student fears in dealing with technology

h- Design their questionnaires according to course objectives

i- Follow up with graduates (Tham & Werner, 2005)

Box 2.2: Suggestion for Effective Online-Learning Environment, Source: Tham & Werner (2005)

When implementing e-learning, institutions must have a suitable structure which supports all parties involved. Tham & Werner (2005) have proposed a structure to support online learning that consists of five levels based on the work of Mintzberg

(1993). These are Committee/Advisory Board; Management Board; Network Administration Section; An Evaluation and Training Section; and Help Desk (Tham & Werner, 2005).

In their research Tham & Werner (2005) have come with various suggestions for an institution to consider for an effective online-learning environment (see box 2.2).

2.6.2.5 Standards and Quality

Despite the fact that e-learning is still an emerging field, tendency exists towards establishing acceptable common "Standards". Having complete and good e-learning standards will have several benefits for diverse stakeholders like users, learning content producers, tool vendors, and application and platform designers (Varlamis & Apostolakis, 2006). Two main reasons are behind the need of Standardization in learning technology for web-based education according to Anido-Rifón *et al* (2001). These are: "educational resources are defined, structured, and presented using various formats; and, functional modules embedded in a particular learning system cannot be reused by another system in a straightforward way" (Anido-Rifón *et al*, 2001). Many organizations/consortia have been working on building e-learning standards. Examples include: IEEE/LTSC (Learning Technology Standards Committee), CEN/ISSS/WS-LT (European Committee for Standardization/Information Society Standardization System/Learning Technologies Workshop), the aviation Industry's AICC, GESTALT project, and DCMI (Dublin Core Metadata Initiative) (Shon, 2002, and Anido-Rifón *et al*, 2001). These efforts came out of the concern for satisfying different communities' needs, including learners, developers, educators, education and training firms, and policy makers. As a result of such efforts, some standards have been emerging, though they did not reach a stable condition. Advanced Distributed Learning (ADL) has SCORM – Sharable Content Oriented Reference Model – as a standard. According to Shackelford (2002) as quoted in Shon (2002), ADL considers a set of requirements for e-learning standards which include "accessibility, interoperability, durability, reusability, adaptability, and affordability". There are several merits of standardized technologies, which protect an e-learning investment according to Varlamis & Apostolakis (2006). These are "interoperability, re-usability, manageability, accessibility, durability, and scalability". Anido and Llamas (2001) quoted by Shon (2002) list some areas of concern in the standardization process, which include, among others, "architectures and reference model, educational metadata, course structure, student assessment, content packaging and encapsulation" (Shon, 2002). "The SCORM's metadata model provides means for describing learning content from its most basic form … However it is not practical for SCORM to specifically model essential course materials such as bibliography, evaluation rules, or the course programme" (Simões, Luis & Horta, 2004). This is a proposed enhancement to SCORM metadata model, as the authors claim.

Having stable standards, would lead to better quality of available e-learning systems and products. As Cabezuelo & Beardo (2004) state, "quality is important in software industry because it has direct relation with competitiveness, cost reduction, and profit increase." They define quality as "degree in which the characteristics of a product or service can cover the felt or pre-felt needs of users in a period of time" (Cabezuelo & Beardo, 2004). Different e-learning quality approaches exist, some of them are generic approaches, some are designed specifically for Quality Assurance in education, and some cover specific parts of the educational process or domain specific aspect (Pawlowski, 2003). According to Almala (2005), Phipps and Merisotis (2000), define "Quality e-learning is a Web-based learning environment designed, developed, and delivered based on several dynamic principles, such as institutional support, course development, teaching/learning, course structure, student support, faculty support and evaluation, and assessment" (Almala 2005). A practice tendency is "creating learning resources from minimal, re-usable information units or learning objects" (Cabezuelo & Beardo, 2004). This is so because "emphasis could be put on maintaining systems and on independence of technology" (Cabezuelo & Beardo, 2004). The educational module is not the only thing to be considered for an quality issue when providing e-learning. "The quality of an educational module, when offered through a platform, suffers of quality of the tools provided by the platform itself" (Ardito *et al*, 2004). In addition, Almala (2006) has stated several issues for the quality e-learning:

> *"The availability of shared vision, technology, culture of the learning environment, instructional design, delivery options and strategies, maintaining quality and equity, cost factors, and the compatibility, aptitude, and self-discipline of participants are among the several issues that affect the success of a high-quality e-learning course and program" (Almala 2006).*

From another perspective, institutions must make sure that the online (e-learning) objectives are achieved while maintaining the standards and professionalism of the institution (Tham & Werner, 2005). When offering distance education, institutions can use the guidance published by the Institute for Higher Learning Policy, which consists of seven categories of quality measures for benchmarking (Tham & Werner, 2005). These categories are *institutional support; course development; teaching/learning; course structure; student support; faculty support; and evaluation and assessment.* In addition Global Alliance for Transnational Education (GATE) developed principles applicable to online courses to ensure credibility and professionalism, which include: goals and objectives; standards; legal and ethical matters; student enrollment and admissions, human resources, physical and financial resources; teaching and learning; student support; evaluation; and third parties (Tham & Werner, 2005). Ardito, *et al* (2004) identified four dimensions for usability evaluation of e-learning platform. These are: *Presentation, Hypermediality, Application Proactivity, and Users's Activity*. For each dimension, Ardito *et al* (2004) considered two general principles; effectiveness and efficiency. For effectiveness, they identified two criteria; *Supportiveness for Learning/Authoring, and Supportiveness for communication, personalization and access*, while for efficiency they identified *Structure adequacy, and Facilities and technology adequacy* as the two criteria. Guidelines are provided for each of the aforementioned criteria of each general principle, according to each of the four dimensions. In evaluating an e-learning module, they follow similar approach. The difference here is that general principles are not there, and guidelines are linked to criteria, which are in turn directly associated with each of the four dimensions. The two main criteria here are *Effectiveness of teaching/authoring*, and *Efficiency of supports and teaching modalities* (Ardito *et al*, 2004).

2.7 Barriers, Issues and Concerns of E-Learning

In promoting non-traditional teaching and learning, many, if not all, researchers highlights the drawbacks, limitations and problems associated with traditional teaching and learning. While not advocating traditional education totally, it would be also good practice to highlight problems and barriers to non-traditional education, and in particular those associated with e-learning. Among those who try to explore such barriers are Mallak (2001), Bonk (2001, 2002), Berge & Muilenburg (2001), Cho and Berge (2002), Berge, Muilenburg & Haneghan (2002), Mungania (2003), Hart & Friesner (2004), Kenny, Hermens & Clarke (2004), Anuwar (2004), Muilenburg & Berge (2005), Leem & Lim (2007), and Jakovljevic (2009).

Mallak (2001) identifies five barriers to effective e-learning in higher education. Those barriers are: Adoption rate, Changing technology, Lack of technological standards, Cost of converting courses or creating new ones, and Infrastructure. In their study, Berge & Muilenburg (2001) identified various barriers and linked them to the organizations of higher education. This linkage is associated with the stage in which each organization is at, with regard to distance learning. These stages start from no use of DL to the stage where “DL needed for mission critical goals” (Berge & Muilenburg, 2001). In all stages, the study states that *faculty compensation and time* is the highest barrier, and *administrative structure* is the lowest except in the first stage where legal factor is the lowest (Berge & Muilenburg, 2001). Barriers to teaching and learning at a distance, as Berge, Muilenburg & Haneghan (2002) shows based on others’ work, can be situational, epistemological, pedagogical, technical, psychological, philosophical, social and/or cultural (Berge, Muilenburg & Haneghan, 2002). Their work supports that of Berge & Muilenburg (2001). However, the ranking of the factors are different, though the first highest four and the last two remain the same. The differences might even look more significant if compared with that of Berge & Muilenburg (2001) based on stage of DL adoption in organization. One reason for such differences might be the scope and domain of each research, where Berge & Muilenburg (2001) concentrated on institutions of higher education, while Berge, Muilenburg & Haneghan (2002) included non-higher education institutions such as corporate or business organizations, government, non-profit organizations, schools etc… The other reason might be related to time difference between the two studies. In a study to learn about obstacles facing experienced instructors in using web as teaching and learning resource, Bonk (2001; 2002) concludes by saying that the main obstacle facing instructors was the preparation time required. Other obstacles include, but not limited to, lack of support for technical problems and course development, time to learn to use the web, and inability to display web in classroom, lack of training in how to use the Web, inadequate hardware in one’s office, and lack of software (Bonk, 2001; 2002). Mungania (2003) highlights 7 e-learning barriers which face employees. Some of those would also be applicable to higher education. Among those categorized barriers are personal, learning style, instructional, situational, content suitability and technological barriers (Mungania, 2003). The author goes further into decomposing those categories into their respected characteristics and factors.

In a more recent study, Muilenburg & Berge (2005) identify 8 barriers to online learning based on students' perceptions. These barriers are – ranked from most severe to least severe: social interactions, administrative/instructor issues, time and support for studies, learner motivation, technical problems, cost and access to the Internet, technical skills, and academic skills (Muilenburg & Berge, 2005). Jakovljevic (2009) identifies some barrier to e-learning implementation, especially those related to instructional strategies, including "inadequate access to technical advice, expertise and support".

The above barriers are tabulated to ease understanding and comparisons. They are shown in Table 2.6 below.

A study by UK Department for Education and Skills (2004) quoted in Kenney, Hermens & Clarke (2004), shows some barriers to e-learning concerning special needs individuals and groups. Those include: limited available teaching time to develop IT skill, the need for support and training for teaching staff, and the importance of including e-learning in continuous professional development for teaching staff (Kenney, Hermens & Clarke, 2004). In addition to those barriers and constrains, Hart and Friesner (2004) highlight plagiarism, and poor academic practice as a threat to e-learning in higher education and therefore they try to examine some solutions to this threat. In their study, Tham & Werner (2005) discuss some constraints that must be considered to ensure an effective e-learning. Those are: National Culture; Door to Information; Ethics; and Communication Skills. Kenney, Hermens & Clarke (2004) lists some challenges as recognized by The World Bank (2004), which include: "Access to appropriate technology remain uneven and unpredictable, Scalability, Shareability, Measurement, Changed governance structures, Standards to ensure quality and sustainability of e-learning are critical, and Bridging the knowledge divide" (Kenney, Hermens and Clarke, 2004). Talking about challenges facing e-learning implementation in Malaysia, Anuwar (2004) highlights several of them that need to be addressed. Such list includes: "Lack of awareness … Low adoption rate due to lack of e-content, inadequate infrastructure, together with the problem of digital divide … Bandwidth issue and connectivity … Computer literacy and digital divide (large number of the population is computer illiterate) … Lack of quality E-content … Difficulty in engaging learners online … and Language barrier" (Anuwar, 2004).

Table 2.6: Categories/types of barriers to e-learning according to users

	Individuals using Distance Learning / e-Learning				
	Employees in higher education	**Employees in all sectors**	**Employees in business**	**Instructors**	**Students**
Categories / Types of Barriers	Faculty compensation and time	Situational	Personal	Preparation time required	Social interactions
	Organizational Change	Epistemological	Learning Style	Lack of support for technical problems	Administrative / instructor issues
	Lack Technical Expertise and Support	Pedagogical	Instructional	Time to learn to use the web	Time and support for studies
	Evaluation	Technical	Situational	Inability to display web in classroom	Learner motivation
	Student Support Service	Psychological	Content suitability		Technical problems
	Social Interaction/ Quality Concerns	Philosophical	Technological		Cost and access to the Internet
	Legal Issues	Social			Technical skills
	Access	Cultural			Academic skills
	Threatened by Technology				
	Administrative Structure				
Source	(Berge & Muilenburg, 2001)	(Berge, Muilenburg & Haneghan, 2002)	(Mungania, 2003)	(Bonk, 2001, 2002)	(Muilenburg & Berge, 2005)

Those special barriers, constraints and challenges in addition to those identified by Mallak (2001) are summarized in Table 2.7 below.

Table 2.7 Special Barriers, Constraints and Challenges

Categories				
Barriers in higher education	**General barriers**	**Barriers concerning special needs individuals & Groups**	**Constraints**	**Challenges**
Adoption rate Changing technology Lack of technological standards Cost of converting courses or creating new ones Infrastructure	Plagiarism Poor academic practice	Limited available teaching time to develop IT skills The need for support and training for teaching staff The importance of including e-learning in continuous professional development for teaching staff	National Culture Door to Information Ethics Communication Skills	Access to appropriate technology remain uneven and unpredictable Bridging the knowledge divide Standards to ensure quality and sustainability of e-learning are critical Changed governance structures Measurement Shareability Scalability Lack of awareness Low adoption rate Bandwidth issue and connectivity Computer literacy and digital divide Lack of quality E-content Difficulty in engaging learners online Language barrier
(Mallak, 2001)	(Hart & Friesner, 2004)	(Kenney, Hermens & Clarke, 2004)	(Tham & Werner, 2005)	(Kenney, Hermens & Clarke, 2004), (Anuwar, 2004)

In their study, Derntl & Motschnig-Pitrik (2004) identify some problems related to e-learning constellations:

- E-learning platforms are introduced, but need extra efforts to exploit their full potential.
- Functionality of e-learning platforms is of low-level and need time, experience and technical skills.
- Problems with discovering good scenarios of blended learning, and lack of required skills on instructor side (lacks time, didactical know-how, flexibility, technical skills, ...)
- Focus is on content not on process and setting

In another study, Zhang *et al* (2004) identified several issues and concerns regarding e-learning. Among those are: high dropout rate; logistical concerns regarding preparation time; certain types of learning materials may be too difficult or costly to taught online; trust; authorization; confidentiality; individual responsibility; and high-bandwidth network for efficient content access.

The above approach and literature findings are similar to what Andersson & Grönlund (2009) has used and come up with. They surveyed the literature to identify the challenges for e-learning, where key terms were used for the inclusion of the related literature. They came up with a framework for the challenges of e-learning consisting of thirty challenges classified under four categories; namely: individual challenges; course challenges; contextual challenges and technological challenges (Andersson & Grönlund, 2009). Examples of the challenges under the four categories include: for student; motivation, conflicting priorities, economy, academic confidence, technological confidence, social support, gender, and age. For teacher: technological confidence, motivation and commitment, qualification and competence, and time. Under the course design: curriculum, pedagogical model, subject content, teaching and learning activities, localization, and flexibility, in addition to support for student from faculty and support for faculty. Under the contextual challenges come organizational such as knowledge management, economy and funding, and training of teachers and staff; and societal/cultural such as role of teacher and student, attitudes on e-learning and IT, and rules and regulations. Finally, under technological challenges come access, cost, software and interface design, and localization (Andersson & Grönlund, 2009). The study indicates that although similarities exist, there is a difference in focus on challenges between developed and developing countries.

However, the using of the term 'challenges' might seems vague, because they indicated that they used terms like challenges, enablers, disablers, obstacles, retention, attrition etc… . In addition, through their discussion of the literature and the proposed framework, they refer to factors, problems, issues, concerns etc …

In support of blended learning setting, Rovai & Jordan (2004) compare the outcome of three course settings i.e. face-to-face, pure online, and blended. They report that frustrations among some online students were eased in blended learning course. Additionally, the required technological ability and frequent usage by online student put some burdens on some students. Another problem is with face-to-face courses where some introvert students feel frustrated by the dominant vocal ones. These problems affect some students by making them feel uncomfortable and loose the sense of community. This problem of lost of sense of community, and other problems of both face-to-face and online learning are eliminated, or at least eased, by the blended learning as Rovai & Jordan (2004) explain. Blended learning has improved, particularly, the sense of community among students in blended learning courses (Rovai & Jordan, 2004). In a more recent study Leem & Lim (2007) discusses the problems emerged as a result of e-learning implementation. These problems are:

> *"The development and maintenance of infrastructure ... Stabilization, enhancement, and standardization of operational systems ... Management of academic records and policy issues ... Quality and management* of course *contents ... Increased faculty workload ... The general lack of support for learning ... Universities general lack of vision and innovation" (Leem & Lim, 2007).*

The main difference between this study and that of Anuwar (2004) is that it discusses problems arising as a result of implementing e-learning, while Anuwar (2004) discusses problems in implementing e-learning, which could be thought of as barriers/obstacles to e-learning implementation. This difference could be attributed to the differences in year of study of both, and the stage of e-learning implementation and adoption. Another study by Jakovljevic (2009) shows several barriers to e-learning implementation that include: "Inadequate access to technical advice; expertise; and support … barriers concerning computer infrastructure … and Expenses" (Jakovljevic, 2009).

A*s* we can see from the above, several barriers and constraints to non-traditional learning exist. These can be Nationally-related, institution-related, instructor-related and student-related. Challenges do exist also, and therefore need proper attention to deal with.

For successful non-traditional learning to materialize, such barriers and constraints must be overcome and resolved. In his work, Mallak (2001) recommends that for better e-learning, the following should be done: *Match technology to infrastructure, professor, and learning goals; Implement incentives to encourage use; Build toward the future; Go outside the bureaucracy; and Seek constant feedback*. Although this might look as a good prescription, other things should be done and taken into consideration. In designing blended learning systems, Graham (2004) identifies six major issues to be considered: 1) the role of live interaction; 2) the role of learner choice and self-regulation; 3) models for support and training; 4) finding balance between innovation and production; 5) cultural adaptation; and 6) dealing with the digital divide. However, these are general issues that may or may not apply to all situations. Therefore, it might be good practice to look at each situation within its own context to better take the right measures. Such measures would be to look carefully into barriers, constraints and challenges, and find a suitable solution for individual barrier and integrate it into the big picture of the solution for existing and foreseen barriers, constraints and challenges.

While the above discussion has been looking into the different dimension of e-learning, blended learning and traditional learning; taking the overall perspective worldwide, the following sections are dedicated particularly to looking into e-learning in higher education in developing countries and in Palestine.

2.8 E-learning in Developing Countries

As the main goal of this research is the development of a blended learning model for higher education in traditional universities in Palestine, it would be a good practice to look at the experience and/or status of such development in countries with some similar conditions. Although the concepts of e-learning and blended learning are the same all over the globe, their level of implementation and utilization might differ from country to country, and more generally from group of countries to another, particularly developed and developing countries. In this section, e-learning in some developing countries was explored briefly.

Andersson & Grönlund (2009) conducted an intensive literature review to identify challenges for e-learning in developing countries, and compared that with developed countries. In terms of papers addressing these challenges, it shows that not all categories of challenges [per authors' classifications] were addressed in the same way and frequency [number of papers] in both groups. Different categories were addressed differently, and the authors attributed that to the gap between developed and developing countries in terms of e-learning implementation and maturity (Andersson & Grönlund 2009). For example, challenges related to individual were more addressed in developed countries, while those related to technology were more addressed in developing countries (Andersson & Grönlund 2009). This would make sense due to the technological gap between the two groups; and to the more attention given to individual [student and teacher] in developed countries due to the fact that they already bypassed the issue of availability and adequacy of technology, while developing countries are still in need of addressing challenges related to context and course (Andersson & Grönlund, 2009). In a different study related to policy for ICT implementation in education, Blignaut, Hinostroza, Els & Brun (2010) compared two developing countries – Chile and South Africa – through "the second information technology in education study 2006" Blignaut *et al* (2010), with 20 developed countries. The study focused on ICT in education for schools and explored the policies and utilization of ICT in such countries. The results revealed considerable differences and big gap between the developed and developing countries, and even within the developing two countries. Gap was identified in areas such as availability of ICT infrastructure, technical support, pedagogical support, ICT-related courses, teacher self-confidence, and pedagogical practices (Blignaut *et al*, 2010). The gap is obvious due to the digital divide between developed and developing countries, in addition to circumstances, conditions and problems unique to each developing country. In reviewing the technology-enhanced learning in developing countries, Gulati (2008) discusses the challenges facing developing countries in implementation of technology-enhanced learning, especially the use of the Internet to reach less-advantageous people. Several challenges have been identified, including: "lack of educational and technological infrastructures, lack of trained teachers, negative attitudes towards distance learning, social and cultural restriction son girls and women, and inappropriate policy and funding decisions" (Gulati, 2008), which "resulted in furthering the gap between rich and poor, rural and urban, and between genders" (Gulati, 2008). The paper argues that, although e-learning and distance learning have been advocated as opportunistic and being easily accessible to poor and rural areas, and although it open economy to world market, it has done little for the these people and area, while at the same time it is the rich and urban area residents who benefited most from new infrastructure and investment (Gulati, 2008). It seems that this is a common practice in developing countries where all or most of investments and development go to major cities and towns and less if any goes to rural areas. This would call for a revision of government policies and practices regarding e-learning and distance learning infrastructures investments and decisions.

In their paper Kahiigi, Ekenber, Hanson, Danielson, & Tusubira (2008) explored the status of e-learning in Uganda. It was not until 1997 when new policy and initiatives have been adopted to integrate ICT in education; therefore, infrastructure was improved considerably since then; which was reflected in number of fixed lines, mobile phone subscribers and Internet service providers (Kahiigi *et al*, 2008). These efforts were directed to both school education and higher education. Example of e-learning implementation efforts is the Makerere University adoption of blended learning approach, however, this adoption did not explore the full functionalities provide by LMS (Kahiigi *et al*, 2008). In addition, the study indicates that e-learning development in Uganda is still at the very beginning stage. In their argument for developing an education evaluation framework for e-learning, Omwenga & Rodrigues (2006) introduced some challenges facing the adoption of ICT in education including political and socio-cultural factors such as resistance by authorities and teachers, linguistic and cultural inappropriateness of educational software, and conflict with traditional system (Omwenga & Rodrigues, 2006). They proposed a framework and evaluated it at University of Nairobi using two courses as case studies (Omwenga & Rodrigues, 2006), where it builds on a model developed by Omwenga (2004), which in turn builds on Hughes & Attwell (2003). The framework is two-dimensional consisting of *system perspective* in one dimension, and *technology mediation* as the other. The first consists of technical perspective, human perspective and education impact, while the second consists of structure, process, and outcome (Omwenga & Rodrigues, 2006). The results were encouraging in terms of asserting that e-learning and ICT implementation in education can be sustained. In their paper Seleka, Mgaya, & Sechaba (2006) hav compiled several factors affecting blended learning implementation in universities within developing countries, which include: flexibility and convenience, cost reduction, access to technology, computer skills, and platform or tool used. In further assessing the use of various collaborative tools in blended learning at the University of Botswana, they concluded that some of the issues in developed countries are applicable to developing countries; however, there are some issues specific to developing countries such as low bandwidth which affects access to some blended learning tools like WebCT

(Seleka, Mgaya & Sechaba 2006). On another aspect of e-learning and education, Moussa & Moussa (2009) highlighted the issue of quality assurance of e-learning in developing countries. They painted a representing picture of the situation of education in developing countries, attributing the poor situation to several factors including: dependence on memorization rather than critical thining, neglecting interactive teaching and teamwork, giving priority to quantity rather than , little effort to update curricula, quality of material taught, and poor usage of modern technology, among others (Moussa & Moussa 2009). In addition, they identified problems pertaining to the establishment of e-learning in developing countries, which include: *public universities are administered in a very conservative fashion, private universities are commercialized, curricula are rarely updated, lack of financial support from the governments, lack of qualified instructors to run e-learning systems, emigration of talented educated people to developed countries, lack of educational technological facilities, and poor integration in the new world system* (Moussa & Moussa 2009).

2.9 E-learning in Higher Education in Palestine

Statistics by the Ministry Of Education & Higher Education (MOEHE, 2008) show that in the year 2007/2008, there were 11 universities, one Open University, 12 university colleges, and 18 community colleges, three of which did not enroll new students. These Higher Education institutions (HEI) have a total of 180905 students registered in the academic year 2007-2008 (MOEHE, 2008). While in 2009/2010, statistics by the Ministry Of Education & Higher Education (MOEHE, 2010) show that there were 13 traditional universities, one Open University with 17 centers, 15 university colleges, and 20 community colleges, with a total of 196,625 registered students in the academic year 2009-2010 (MOEHE, 2010). These higher education institutions offer a variety of programs on the associate (diploma), Bachelor, Master, and Doctorate levels (one program only). The sector employed around 2880 full-time academic staff in 2007/2009 and 3685 in 2009/2010 (MOHE 2008, 2010). The overall student to lecturer ratio therefore is about 62.8 and 53.4 students for each full-time lecturer in the years 2007 and 2009 respectively. Table 2.8 shows some figures compiled from statistical yearbooks 2007/2008 and 2009/2010 (MOEHE 2008, 2010). The ratios have been calculated by the researcher by dividing number of registered students by number of fulltime academic staff.

Generally speaking, education in HE is a traditional one, though some efforts have been made to introduce technology and non-traditional method of teaching. Almost all universities in Palestine have a website, though the quality of these websites may vary from one to the other. These websites have acted like the first step towards publicizing the universities "electronically".

Table 2.8: Distribution of Academic Staff and Registered Students in Higher Education in Palestine in 2007 and 2009

Type of Institution	Number of Full-Time Academic Staff		Number of Registered Students		Student / Full-Time-Lecturer Ratio	
	2007	2009	2007	2009	2007	2009
Traditional universities	2062	2577	102125	107925	49.5	41.9
Open Education/University	0211	396	060631	062142	287.3	156.9
University Colleges	0354	429	005228	014944	14.7	34.8
Community Colleges	0253	283	012921	011614	51.0	41.0
	2880	3685	180905	196625	62.8	53.4

Some universities, like BirZeit University, have capitalized on its websites to move into some kind of e-learning efforts around the year 2002 (Khoury-Machool, 2007). However, the start was not by any means a true e-learning setting. Then the university kept enhancing its portal called "Ritaj". According to AL-Salqan (2005), 'Ritaj' is a learning utility, that "provides faculty and students with the means to communicate when meeting face to face is not possible", and once they can meet within campus, its role is back as a supporting learning utility one. Other universities are reviving their web presence and services (Al-Salqan, 2005). Recently, with the launching of the

Palestinian Education Initiative (PEI), and RUFO, Palestinian universities in general have become more aware of the importance and need for e-learning. Various universities have participated in RUFO project, namely; Al-Quds Open University, Birzeit University, An-Najah National University, Palestine Polytechnic University, and AL-Quds University RUFO (online). As a result of such participation, universities start establishing e-learning units and introducing e-learning to their students. For example Palestine Polytechnic University (PPU) starts introducing some courses electronically, but as a supplement to traditional classroom setting (PPU, online). More courses will be introduced in the e-learning context in the coming semesters. Similar initiative is evident at 'Al-Quds University' where some courses are offered online using Moodle platform (Al-Quds University, online). Islamic University of Gaza has participated in the Mediterranean Virtual University (MVU) project where a model has been developed and each partner university has adopted it, and modified it to suite its own needs (Anbar *et al*, 2005). The activities and some sub-activities of the course design were enhanced at Islamic University of Gaza with multimedia services such as SMIL (Synchronized Multimedia Integration language) and voice mail (Anbar *et al*, 2005). Birzeit University has also participated in MVU 2003-2005 (Tesdell & Mimi, 2009). The same study shows that several online courses have been developed and offered, though for professionals not university students. As of March 2009, there were two main running partnership projects from 2008-2010; one is *E-Learning Models in Higher Education* involving Bethlehem University and Al-Quds University and funded by Ford Foundation, the second is *Learning Innovation* Team involving UNRWA teaching Education College and Al-Quds University and funded by CISCO Systems (Tesdell & Mimi, 2009). The main aims of these projects are to identify effective e-enabled models at universities; and to train experienced teachers in online pedagogy (Tesdell & Mimi, 2009).

On the faculty side, a study by Shahin & Singh (2007) revealed some interesting points. Of the total respondents (faculty members), there were 43.4% who never attended formal e-learning classes while studying, and 57.9% never attended a short/special course through e-learning, yet 60.5% said they attended a training course on e-learning (Shahin & Singh 2007). In addition to that, 36.8% said they never used e-learning in their teaching career, while 31.6% used it sometimes.

Recently, a team at International Medical Education Trust-2000-Palestine conducted a research to assess the perception of healthcare professionals towards e-learning as a mode of educational delivery (Zaben, Abu Tayeh, Khdour, Shtiwi, Abu Salameh, Ajawi et al, 2010). The study shows that 61.3% of the respondents declare that e-learning is highly needed. As a result of this study, the team indicates that it started delivering an e-learning program for professionals in the healthcare, starting with medical and nursing education and planning to move to pharmacy and dental education (Zaben *et al,* 2010).

In a comparative study on cultural understanding of content and interface of e-learning systems between Belgian and Palestinian students, Mushtaha & De Troyer (2007) show that there are differences between the two groups. One difference is the sensitivity of Palestinian students towards contents, and their preference for their local language – Arabic – to be present beside English. The study also shows that careful consideration should be taken when using icons in the interface as many have been interpreted wrongly, or there was wrong expectation of what it is meant for (Mushtaha & De Troyer 2007).

As it could be seen above, there are initiatives by most traditional universities in Palestine to implement e-learning. However, when engaging in e-learning or blended learning, there are several factors that need to be taken into account. According to Shahin, Singh & Wah (2007b), some of the factors that could be distinct to Palestine are:

1- Institution's experience, which covers:
    a. Age i.e. how long it has been established,
    b. Use of e-learning and blended learning,
    c. Faculty and staff experience, and
    d. Student experience.
2- National experience, which covers the nation experience with education as an independent community, which is barely above 15 years.
3- Military occupation by Israeli forces of most of the Palestinian land.
4- Restrictions on people's movement between towns and areas by Israel military forces
5- Internal political situation that is unstable with power struggles between different factions
6- Rules and regulations
7- Language, in particular, English (Shahin, Singh & Wah, 2007b).

The above factors are mainly political and legal ones. They could be summarized as:

1. Political on the national level (internal among factions, and external by Israel)
2. Legislative and legal
3. Experience factors on national, institution, and individual levels
4. Language factor

2.9.1 Problems

As introduced in chapter 1, the education sector in Palestine suffers from many problems and barriers. In a study on educational reform in post-accord Palestine, Van Dyke & Randall (2002) explores some of the barriers facing Palestinian educational system – especially on school level – which include: 1- No philosophy of education; 2- Political obstacles; and 3-economic barriers. These barriers have several consequences and create several problems. Barrier '1' for example creates several problems like: traditional teaching styles, poor quality of teachers, and unclear answers to pressing educational questions in Palestine (Van Dyke & Randall, 2002). For the political obstacles, two main areas have been identified; "a lack of democracy and the lasting impact of the occupation" (Van Dyke & Randall, 2002). The economic barriers have direct impact on the educational system. Some of these are that most teachers have to work extra jobs, which affect training and classroom preparation; and second; class size remain on an average of 40 students per class (Van Dyke & Randall, 2002). Though this study is concerned with school education, mainly up to K-12, the problems and barriers identified, are most likely to affect the higher education sector, as they touch on the daily life of all Palestinians there. Itmazi & Tmeizeh (2008) highlights three critical problems facing traditional Palestinian universities namely "lack of funding, capacity limitation, and movement restrictions".

Other problems are of different dimension. The education system in Palestine is being systematically destroyed or barred from further development through the restriction on international faculty joining Palestinian universities. "Israel restricts the ability of Palestinian educational system to develop, by restricting the entrance of foreign lecturers and academics into the west bank and Gaza. Such visits and the study programs taught by foreigners are an integral part of higher education programs throughout the world, including Israel" (Gisha, 2006). Tesdell & Mimi (2009) has identified some challenges pertaining to e-learning at Palestinian universities including *financial*; with monopolistic control over Internet service by PalTel, high price of Internet tools and computers as a result of the Israeli imposed duties and taxes, and lack of funding at universities; *social*; as there is lack of awareness among the public; *leadership*; lack of political leadership, legislation, and recognition by MOEHE (Tesdell & Mimi, 2009).

In summary, the problems and barriers to e-learning in particular and to education in general, are shown in Table 2.9.

As it can be seen above, though there is not much literature on e-learning in Palestine, some serious problems, barriers and factors have been identified. Those will be used as a base for the new model development.

2.10 Model Building and Evaluation

This section discusses the process of model building and evaluation in general; and blended learning models development and evaluation with emphasis on student satisfaction as a measuring criterion.

Table 2.9: Problems and Barriers Facing Higher Education in Palestine

Problem/Barrier	**Identified by:**
1. relevance and quality of the supply; 2. efficiency in managing available resources 3. financial support	(World Bank, 2005), (Tesdell & Mimi 2009)
4. poor quality of teachers 5. unclear answers to pressing educational questions 6. lack of democracy 7. traditional education system/style 8. economic barriers	(Van Dyke & Randall, 2002), (Tesdell & Mimi, 2009)
9. impact of occupation (closures and restrictions on movement between towns and areas in the form of military/security checkpoints by Israeli forces)	(Van Dyke & Randall, 2002), (Al-Salqan, 2005), (Itmazi & Tmeizeh, 2008), (Tesdell & Mimi, 2009)
10. inexperienced Palestinian National Authority;	Established in 1994 after the Oslo Accord between Israel and PLO
11. Funding 12. Capacity limitation	(Itmazi & Ttmeizeh, 2008)
13. Israel restrict Palestinian educational system to develop, through restricting foreign faculty to join Palestinian universities	(Gisha, 2006)
14. deteriorating economic situation with high level of unemployment amounting to 26.0% in the year 2008	(PCBS, 2009a)
15. high student-to-lecturer ratio	Table 2.8 based on (MOEHE 2008)

2.10.1 Model Building

So far, we have touched upon the different aspects of e-learning. Backgrounds, definitions, elements, factors, theories, models, and the educational situation in Palestine have been tackled. However, what about model building, i.e. how models, especially in e-learning settings, are built? In this section, we will try to shed some light on this issue.

NASA Ames AI Research has identified five steps in implementing a model with SIGMA (The Scientist's Intelligent Graphical Modeling Assistant Project). The five steps are 1) Establish the modeling scope; 2) Specify a goal quantity; 3) Construct the model; and 5) Revise the model (SIGMA, 1996).

Schichl (2004), while talking mainly about mathematical models, shows what he called traditional description of modeling process which consists of the following iterative cycles: a) Real-World Problem; b) Construct Model; c) Collect Data; d) Compute Solution; and e) Interpret Results (Schichl, 2004). However, he says that various stages of the modeling cycle appear interconnected, and therefore need more interaction.

When building a System Dynamics (SD) model, progress comes through an iterative steps (Klabbers, 1975) quoted in (Klabbers, 2000). These steps are:

1- *Formulate the issue*
2- *Make a verbal description of the dynamics of the reference system*
3- *Define the time horizon*
4- *Choose system boundaries*
5- *Choose level of aggregation*
6- *Develop the conceptual map, that is, draw a (flow) diagram of causal relationships*
7- *Design the formal system of equations*
8- *Make an operational model by loading the formal system with empirically estimated parameters*
9- *Analyze the system via simulation runs – do sensitivity analysis*
10- *Verify or validate the model behavior – compare model behavior with available knowledge of behavior of reference system (calibration)*
11- *Draw consequences, wrap up lessons learned, and implement results.* (Klabbers, 2000*)*

In this modeling, Klabbers (2000) deals with it as models from a social systems perspective, for SD is a theory of that. In another effort, concerning mainly research, in chapter 1 of Blackwell Publishing book found online, a five-step model has been shown consisting of 1) research problem, 2) reference models, 3) Specification of hypotheses, 4) model formulation, and 5) Evaluation and testing, with feedback from the fifth step to all other four steps. Model boundaries can be determined by three types of variables: Endogenous (determined within the model), Exogenous (determined from outside but included in the model), and Excluded variables (not to be incorporated in the model-building process) (Grafton, Hill, Adamowicz, Dupont, Renzetti, & Nelson, 2004).

Looking at other people's work, we can easily notice that many models of learning – whether for e-learning or blended learning – have been introduced. However, few of the researchers have talked explicitly about model building. Valiathan (2002) has shown the categorization of blended learning by NIIT into three models: Skill-Driven, Attitude-Driven, and Competency-Driven models. While explaining the models, she only showed why and how a model can be used. For each model, a plan is highlighted for developers to use based on the nature of the content of a course. The plan includes things to be done and techniques – technology and non-technology-based – to be employed (Valiathan, 2002). Troha (2002) suggests a guiding model for blended learning design for training in corporations. His model consists of 12 design steps and provides an instructional design document to accompany this model. In advocating constructivism, Nunes & Morón-García (2002) propose educational system design model based on the constructivist philosophy. The model has similarities with information systems design and development methodologies, where it consists of the following main phases: establish core body of information crucial for the subject, identify type of experts that use, the design phase specifies comprehensive set of educational technology tools and their functions, in the development phase; different applications and tools are developed in parallel, then finally testing phase where all applications and tools are tested (both system testing and field testing) together (Nunes & Morón-García, 2002).

In reality, there are various models which have been built using various approaches and techniques. However, those are mostly centered on the problem solving approach, and the basic facts of models, as representation of something that help people understand reality.

This research is not be an exception. It was designed and completed in a similar approach, as it tries to 'solve' a problem, and achieve research objectives. The following section will shed some light on model evaluation

2.10.2 Model Evaluation

When models are built/developed, it is necessary to validate and evaluate them to prove that they are good enough to be used in reality. In the higher education e-learning and blended learning context, several researchers have tackled this issue. Evaluation is "the process by which people make value judgments" (Oliver 2000) quoted in Dyson, & Campello (2003). Within the learning context, the objectives of the evaluations would be either general or specific in terms of their intended outcomes (Dyson & Campello, 2003). In their effort to clarify how Virtual Learning environments can be evaluated, they build on Oliver (1997) framework and incorporate new distinctions. Following is a summary of the framework proposed by Dyson & Campello (2003):

Purpose of the evaluation: Roles, Experiments, Usability versus Learning

Methods: Interpreting Results, Process versus Outcome, Qualitative versus Quantitative, Subjective versus Objective, Expert versus User

Measures: Usability Heuristics, Frequency of Interactions, Quality of Interactions, Learner Perceptions, Learning Outcomes

In developing a new specification for "learning design" (Koper & Olivier, 2004) followed a common IMS practice which consists of Conceptual Model, an Information Model, Information Model Implementation, a Best Practices and Implementation Guide, and Set of Learning Requirement Scenarios (Koper & Olivier, 2004). To come up with the new representation of learning design, Koper & Olivier (2004) first define requirements; after conducting needs analysis; to meet specification, then, evaluate the learning design specification against each of these requirements.

Akkoyunlu & Yilmaz-Soylu (2008) develops an instrument- questionnaire – to evaluate learners' views on blended learning. To validate this instrument, statistical analysis; like item analysis, discrimination, Principal Component Analysis, and discriminant validity; was used. In addition, the instrument was field-tested, and also subject specialists gave their opinion on the instrument (Akkoyunlu & Yilmaz-Soylu, 2008). 'Experts' validation method is used in Henry (2008) to validate a scale used to measure degree of learner satisfaction. Seok (2009) uses a method consisting of five stages for item validation of an instrument to evaluate online learning. They are:

> *"identification and development of valid items of online instructional features by an extensive review of the literature, Validation of the items by SMEs, Sampling by a panel of experts(judges), Developing the multidimensional scaling and rating of the proximity (the similarity) of items, and Data collection and analysis" (Seok, 2009).*

2.10.3 Student Satisfaction

According to Sun *et al* (2008), user's satisfaction in e-learning environments is affected by several factors categorized into six dimensions; student, teacher, course, technology, system design, and environmental dimension, based on prior studies. Based on prior literature; and under each of the aforementioned dimensions; Sun et al (2008) identified thirteen factors affecting learner satisfaction. Those factors are: learner attitude toward computers, learner computer anxiety, learner Internet self-efficacy, instructor response timeliness, instructor attitude towards e-learning, course flexibility, course quality, technology quality, Internet quality, perceived usefulness, perceived ease of use, diversity in assessment, and learner perceived interaction with others (Sun *et al*, 2008). The authors use these factors as part of a model to assess perceived e-learner satisfaction. The result of their study shows that some of these factors are no longer valid [at least in the context of their study that was conducted in Taiwan]. Therefore, only seven factors are critically affecting perceived e-learner satisfaction, which include: learner's computer anxiety, instructor attitude towards e-learning, e-learning course flexibility, course quality, perceived usefulness, perceived ease of use, and diversity in assessment (Sun *et al,* 2008). However, some of the excluded factors in Sun *et al* (2008) study may still be valid for other countries or context, especially in developing countries where many students are practically exposed to computers and Internet only when admitted to higher education institutions. Besides, Sun *et al* (2008) study was conducted using e-learner volunteers who already enrolled in e-learning courses, where some of them already have prior experience with e-learning (56.3%), and almost half are between 20-30 years old, and the rest are above 30 years old. This indicates that all participants might already have been exposed to computers and Internet prior to participating in this study which in turn affected the outcome.

In reviewing the literature on student motivation and satisfaction, Bekele (2010) came up with a framework to identify sources of motivation and satisfaction as well as their indices for "Internet-Supported Learning Environment ISLE" (Bekele, 2010). He identified sources of motivation as: Engagement and interaction, content, technologies, and program format and flexibility (Bekele, 2010). The sources of satisfaction are: "software quality, screen layout, structure, flexibility, interaction, web experience, degree of technology use, support, and quality content" (Bekele, 2010). The motivation Indices that have been identified are: "task choice, effort, persistence, achievement, and skills" (Bekele, 2010). ISLE; from motivation and satisfaction perspective; are as effective as traditional setting if not more (Bekele, 2010). Factors such as "contents, methods, support services" and technology should be included in the "development, implementation and evaluation of ISLE" (Bekele, 2010).

The following section will highlight the research framework, and the overall picture of building the proposed model.

2.11 Concept Map (Gaps in the Literature)

In this section, a conceptual framework is presented in Figure 2.1 and a further explanation is presented in terms of summarizing the findings from the literature in the subsequent sections.

2.11.1 Summary of the Findings from Literature

In this section, a summary of the main dimensions of the literature review is provided, and has been divided into sub-titles.

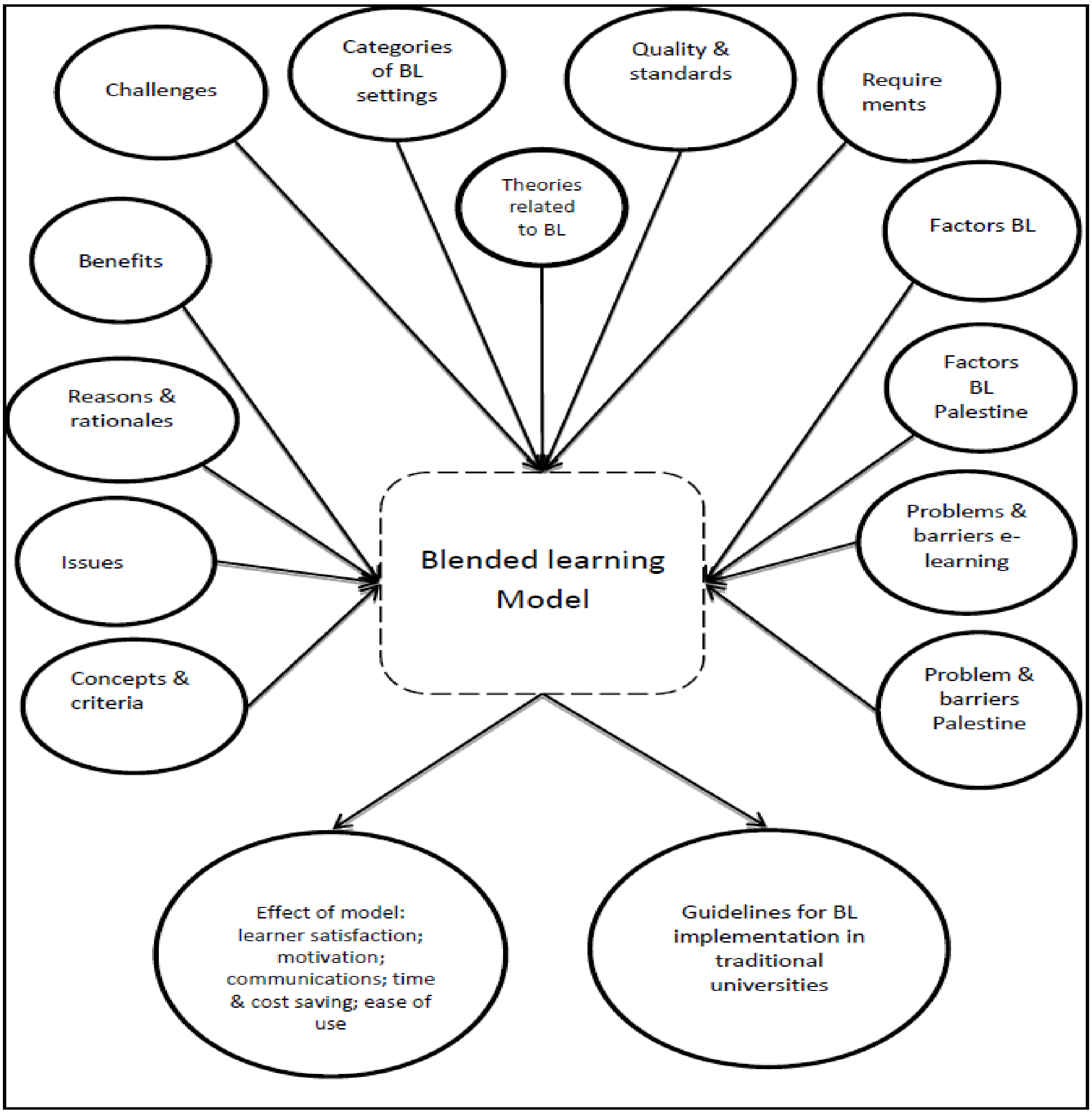

Figure 2.1: Conceptual Framework

2.11.1.1 Major Categories of Blended Learning Settings

Based on the literature above, we can conclude that blended learning is getting more and more attention by different researchers. However, these researchers have looked at it from a different perspective and/or dimension each. This might have resulted in many models, settings and interpretations of the meaning of blended learning. These variations can be categorized and grouped. Each group/category looks at blended learning from one or some dimensions/perspectives, but not from all perspectives. All those had been categorized and summarized in Table 2.4 earlier in the chapter.

Table 2.10: Comparison between Categories of Blended Learning Settings

Blend of	A	B	C	D	E	F	G
1. Web-based technologies	*						*
2. Pedagogical approaches	*		*	*			*
3. Inst. Tech. & Face-to-Face	*						
4. Inst. Tech. & Job tasks	*						
5. Self-paced & Instructor Support		*					
6. Event & Delivery media		*					
7. Perform. Support tools & Knowledge Management resources		*					
8. Traditional learning & web-base online			*				
9. Media and tools			*				
10. Online & offline(face-to-face) activities				*			
11. Self-paced & live collab. Learning				*			
12. Structured & unstructured learning				*			
13. Custom & off-the-shelf content				*			
14. Work & learning				*			
15. Synchronous & asynchronous comm. Methods				*	*		*
16. Online & face-to-face instructors and learners				*			
17. Formal live face-to-face & informal					*		
18. Self-paced & performance support					*		
19. Synchronous and Asynchronous Web Based collaboration & varieties of computer mediated communication.						*	
20. Varieties of technology-based delivery						*	
21. Instructional resources and activities & performance Support sys, info. search and retrieval tools and content repositories, and KM applications						*	
22. Instructional modalities (face-to-face, event-driven etc…)						*	
23. Multimedia technology-based delivery & conventional text-based material						*	
24. Instructional strategies						*	

Table 2.10, Continue

Blend of	A	B	C	D	E	F	G
25. Face-to-face & distance education							*
26. Practice-based &/OR classroom-based learning							*
27. Multi-disciplinary OR professional groups of learners and teachers							*
28. Instructor-directed OR learner-directed							*
A: Driscoll Concepts, B:Valiathan Drivers , C: Whitelock & Jelfs Definition , D:Dewar & Whittington Factors , E: Rosset, Douglis & Frazee , F: Shaw & Igneri Possibilities, G: Sharpe et al Dimensions							

To explore the difference between model and frameworks of e-learning and blended learning, and to highlight the shortages they may have, a comparison is tabulated in Table 2.11 below. The table shows each model or framework with its main features and short comes.

Table 2.11: Summary of Models of Blended learning and E-learning with Features and Shortcomings

Framework/ Model/ Tool Name/ Author	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS)	Type (F/ M/ T) (BL/EL)	Used for
1. Driscoll (2002)	Blended learning is based on four main concepts for such blend. Each concept is by itself a combination (blend) of various elements, as shown in the following four types of blends. 1- Combination of web-based technologies 2- Combination of pedagogical approaches 3- Instructional technology with face-to-face 4- Instructional technology with actual job task	Gives opportunity to have several types of blends.	Limiting blend to one category and consider that a blend. While this is true, it falls short of addressing all possible and needed blends.	Either one of the following: web-based technology, pedagogical approaches, instructional technology with face-to-face, and instructional technology with actual job task	M/BL	Training (job), while it could be adjusted to education
2. Valiathan (2002)	Classifies blended learning based on what drives it (driven by). These can be classified into three drivers: 1- Skill-driven: self-paced with instructor or facilitator support 2- Attitude-driven: event and delivery media 3- Competency-driven: performance support tools with knowledge management resources and mentoring	Addresses blended learning as one of three classifications, which helps in focusing on the reason and purpose for having blended learning	Deals with BL as either one of three types, and more focused towards training rather education	Self-paced + instructor support, event + delivery media, performance support tools + knowledge management resources and mentoring	M/BL	Training
3. Whitelock & Jelfs (2003)	It is derived from how blended learning is defined: 1- Traditional learning with web-based online approach 2- Media and tools employed in e-learning environment 3- Pedagogic approaches irrespective of learning technology used	It combines several 'blends' to formulate blended learning, which implies that all blends mentioned in the adjacent cell to the left should be present.	Falls short of addressing other types of blends	Consists of all three types which are present in the proposed blend	M/BL	Education

Table 2.11, Continue

Framework/ Model	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS)	Type (F/ M/ T) (BL/ EL)	Used for
4. VASE [Dewar & Whittington (2004)]	Compiles factors that have to be considered in blended learning definition based on the work of Singh (2001), Driscoll (2002), Selix (December, 2001), and Osguthorpe (2003). 1- Online and offline (face-to-face) activities 2- Self-paced and live collaborative learning 3- Structured and unstructured learning 4- Custom content with off-the-shelf content 5- Blending work and learning 6- Pedagogical models (constructivism, behaviorism, and cognitivism) 7- Synchronous and asynchronous communication methods 8- Online and face-to-face instructors and learners	Most comprehensive compared to other models/frameworks mentioned above. Cover a wide range of blends.	Although it is most comprehensive, it still lacks other blends and necessary components. It addresses the business/corporation in how to develop blended learning mainly for training, but not for education	Blending all types as shown in the cell to the left	M/BL	Training/ job
5. Burger & Rothermel (2001)	Focuses on special form of content in distributed systems and computer networks. Specifically it focuses on student's requirements for learning material and animation applets, and on teacher's requirements.	Extensible and consists of simulation and animated visualization	Focus on applets, more concepts are needed for integration into learning materials in multimedia		EL	
6. Rossett et al (2003)	Classifies blended learning based on what it is composed of. This is related to settings, collaboration/ communication and pace. 1- Live face-to-face: formal and informal 2- Virtual collaboration: synchronous or asynchronous 3- Self-paced and performance support	Combines both live face-to-face with virtual settings and self-paced. It looks at blended learning from a different perspective. As the type of blend indicate. It is directed towards training	While concentrating on what blended learning is composed of according to the three classifications, it mixes components, techniques etc… together such as mixing delivery methods/media and communications media. Lacks the explicit addressing of learning theories, instructional strategies, … and other blends	Live face-to-face (formal + informal), Virtual collaborations (synchronous + asynchronous), Self-pace + performance support	M/BL	Training

Table 2.11, Continue

Framework/ Model	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS)	Type (F/ M/ T) (BL/ EL)	Used for
7. Shaw & Igneri (2006)	Authors have explored several possibilities of blended learning, showing that any of these can be considered blended learning by itself, but no mentioning of combinations of these possibilities. 1- Synchronous and asynchronous web-based collaboration, and different varieties of computer-mediated communications 2- Different varieties of technology-based delivery (Internet, CD-ROM, video and audio podcast, etc) 3- A blend of instructional resources and activities with performance support systems, information search and retrieval tools and content repositories, and knowledge management applications 4- Different instructional modalities (face-to-face, event-driven instruction, etc) 5- Custom content and off-the-shelf content 6- Multimedia, technology-based delivery and conventional text-based materials 7- A variety of instructional strategies: discovery based approaches versus didactic strategies, case-based and scenario-based tactics, problem-based and project-based or design-based learning, independent versus collaborative approaches	Suggest several possibilities for blended learning. Covering a wide range of the blend learning dimensions/aspects, where each possibility covers one aspect/dimension of the blend. Suitable for education and training, through directed towards training.	Assumes that each possibility is a blend by itself, but no explicit indication of combining or integrating two or more of such possibilities in one blend. Though comprehensive in covering several dimensions/aspects of blended learning, it still fall of addressing some others	Synchronous + asynchronous web-based collaboration + computer-mediated communications, variety of technology-based delivery, different instructional modalities, instructional resources + performance support systems, custom + off-the-shelf contents, MM technology-based + conventional text-based materials, variety of instructional strategies	M/BL	

Table 2.11, Continue

Framework/ Model	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS)	Type (F/ M/ T) (BL/EL)	Used for
8. Koohang & Plessis (2004)	Framework for e-learning usability properties used in developing e-learning. Five categories using usability properties based on "looks great and works well" paradigm. It is based on usability attributes of usable product	Takes an important issue – usability- and employ it for e-learning development, focusing on both how the system works and how it looks.	It focuses on usability properties when constructing e-learning, not a model/framework for e-learning/ blended learning as such.	No blends	F/EL	Not specified
9. Sharpe et al (2006)	The researchers have identified 8 dimensions of blended learning, and they defined blended learning according to these. 1- Delivery – different modes (face-to-face and distance education) 2- Technology – mixture of web based technologies 3- Chronology – synchronous and asynchronous interventions 4- Locus – authentic work or practice-based vs. class-room based learning 5- Roles – multi-disciplinary or professional groupings of learners and teachers 6- Pedagogy – different pedagogical approaches 7- Focus – acknowledging different aims 8- Direction - instructor-directed vs. autonomous or learner-directed learning	Different from other models in the approach to classify BL based on dimensions. It covers a wide range of blends which makes it comprehensive.	The wide range of blends covered does not imply that these dimensions are taken into account in one blended learning model. Rather, it implies that BL can be classified or implemented in one of these dimensions. It also did not address other issues/elements that affect BL.	face-to-face + distance education, mixture of web technologies, synchronous + asynchronous interventions, authentic / practice-based + classroom based learning, multi-disciplinary/professional groupings of learners & teachers, different pedagogical approaches, instructor-directed + learner-directed learning	M/BL	Education
10. Keil-Slawik, Hampel & Eßmann (2005)	Framework for pervasive eLearning	In distributed knowledge space, using executable learning objects	This is a very specific / focused framework on one type of eLearning, in a given environment		F/EL	

Table 2.11, Continue

Framework/ Model	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS …)	Type (F/ M/ T) (BL/EL)	Used for
11. SimulNet /Anido-Rifón *et al* (2001)	For developing interactive and collaborative web-based applications. It is a layered architecture, consisting of commercial off-the-shelf services and standard Internet protocols, then services layer, components layer, and application layer.	Many services and components. Tested with good evaluation.	Suffers from performance problems when overloaded because it is 100% Java. Server's multitasking model is based on Java threads where the OS considers that there is one large server process running one thread for each component. Concentrates on interactivity in collaborative web-based applications. Overlooks other factors and elements.		EL	
12. Carman (2002)	Five key ingredients of blended learning process. Live events, self-paced learning, collaboration, assessment, and performance	It considers integrating learning theories (constructivism and cognitivism) with performance, where it takes the best of each based on the work of key scholars, which makes the learning process coherent and integral.	There are many other ingredients, factors and elements not included. While it addresses two main learning theories and performance dimension, it does not deal with other blends directly. It looks at blended learning through those five ingredients only, which makes it questionable when considering a complete blended learning model that takes most, if not all, ingredients; elements; factors and dimensions into account.	Live events, self-paced learning, collaboration, assessment, and performance.	M/BL	Education/training

Table 2.11, Continue

Framework/ Model	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS …)	Type (F/ M/ T) (BL/EL)	Used for
13. Virtual Mentor / Zhang et al (2004) and Zhang et al (2005)	A concept consists of six principles: Multimedia-integration, Just-in-Time knowledge acquisition, Interactivity, Self-directivity, Flexibility, and Intelligence, which is used to develop a system (LBA) Based on constructivist learning theory, to address problems of MM based e-learning systems.	integrates multimedia instructional material including video lectures, PowerPoint slides, and lecture notes	Leaving all other dimensions/ factors aside, the model only takes one theory into consideration. Therefore, from pedagogical perspective, it does not take other theories into account like behavioral, and objectivist. This makes the model non-blended one from this perspective. While addressing the problems with MM based e-learning system, it ignores all other issues and problems. No face-to-face contact.	Only use MM contents/delivery	EL	Education
14. VASE / Dewar & Whittington (2004)	For the development of blended learning. Drawn on the work of others, especially Hocutt (2001). It is composed of Build a Vision, Check Assumptions, take a System View, and Expect Change. A number of questions for each theme to guide development of blended learning	Provides a guide on how to develop/ implement BL in organizations taking system view (looking at organizations, and therefore BL as system)	It is not a blended learning model as such, rather it is a model to develop blended learning. Though it is a good attempt in this direction, it cannot be considered as blended learning model. It does not address what to blend and what affects BL development.	--	M/BL	Training/education
15. BLESS / Derntl & Motschnig-Pitrik (2004)-b	For blended learning, layered approach	Five layers: blended learning courses, course scenarios, blended learning patterns, web templates, and learning platform.				

Table 2.11, Continue

Framework/ Model	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS …)	Type (F/ M/ T) (BL/EL)	Used for
16. Kawamura, Nakatani, & Sugahara (2005)	Novel framework for asynchronous web-based training	Highly focused in terms of scope and purpose. Claims that it solves the problems of scalability and robustness that the existing WBT systems have	Focuses only on one aspect; that is asynchronous WBT. It does not even take synchronous into account. Not much of a blend is there.		F/EL	Training
17. WVOC/ Yang & Liu (2007)	It is a web-based virtual online classroom consisting of two parts; instructional communication and collaborative learning environments.	Pure online, combines instructional communications and collaborative learning, based on learning theories and IT. Self-paced learning and interaction are encouraged, and provides live learning resources	No face-to-face element (setting), built on windows streaming media technologies (platform dependent), limited format for learning material	Online only, learning theories, instructional communications, delivery media, contents	M/EL	Education
18. Latchman *et al* (2001)	Hybrid synchronous and asynchronous learning environment called Lectures on Demand in Asynchronous Learning Networks	Offers lectures online and /or playing later from archive. Seven activities involved: lecture, live demos, individual readings, Written exercises, Virtual experiments, Real experiments, and Practical projects	Mainly for asynchronous/synchronous online learning environment. No face-to-face, concentrates only on providing contents online.	Online only, synchronous & asynchronous, delivery media, no mentioning of other elements of the blend.	EL	Education

Table 2.11, Continue

Framework/ Model	Summary	Features	Short comes	Type of Blends (f2f, online, LT, IS …)	Type (F/ M/ T) (BL/EL)	Used for
19. Martyn (2003)	Hybrid online asynchronous learning with limited face-to-face interaction, consisting of chat, email, online quizzes, and online threaded discussion	Learner-centered, emphasizes dynamic nature of faculty-student and student-student interaction, utilizes seven principles of good practice in undergraduate education	Directed mainly towards distance education/learning. Focuses on asynchronous learning (communications). Only first and last class with face-to-face. does not consider other type of blends	Asynchronous communication methods,	EL	Education

2.11.1.2 Problems of e-learning

As the literature shows, there are several problems related to e-learning. These problems are summarized and shown in Table 2.12.

Table 2.12: Problems of E-learning

Problem	**Identified by**
1. No human teacher expression and explanation, 2. No synchronization and match between course materials and their explanations, 3. Lack of contextual understanding, just-in-time feedback and interactions, and lack of platform-independent standardized materials".	(Yang & Liu, 2007).
4. Cost more to develop, 5. Require new skills in content producers, 6. Has to clearly demonstrate a return on investment, 7. Related technology may be intimidating … lacking informal social interaction and face-to-face contact, 8. Enabling technology might be costly especially in case of advanced visually-rich content, 9. Requires more responsibility and self-discipline for the learner,	(Cantoni, Cellario & Porta, 2004).
10. Lack immediate feedback in asynchronous e-learning, 11. Increased preparation time for the instructor, 12. Not comfortable to some people	(Zhang *et al*, 2004).
13. It is not for students especially undergraduates, and not for every course, 14. It is too private reducing human interaction, which may lead to losing interest; therefore resulting in high drop-out rate.	(Chassie, 2002).
15. E-learning platforms are introduced, but need extra efforts to exploit their full potential. 16. Functionality of e-learning platforms is of low-level and need time, experience and technical skills. 17. Problems with discovering good scenarios of blended learning, and lack of required skills on instructor side (lacks time, didactical know-how, flexibility, technical skills, ...) 18. Focus is on content not on process and setting	(Derntl and Motschnig-Pitrik, 2004).
19. Lack of models from our own- lecturers- experience …, 20. Constant disruptions precipitated by evolving technologies …, 21. Explaining our – lecturers- courses to others …, 22. Adjusting to a new rhythm of life …, and 23. Adjusting to our – lecturers - new role …"	(Gill, 2006).

2.11.1.3 Barriers to E-learning

A summary of the barriers identified by several researchers can be found in Table 2.13 below. As shown in the table, there are 20 different barriers that exist and face e-learning. However, this does not necessarily mean that all such barriers would face every single e-learning implementation effort. On the other hand, many such barriers are likely to exist and face those efforts, though at different level of severity.

Table 2.13: Barriers to E-learning

Barrier	Identified by
Technological and technical	(Mallak, 2001), (Berge & Muilenburg 2001), (Muilenburg & Berge 2005), and (Bonk, 2001, 2002)
Infrastructure	(Mallak, 2001), (Bonk, 2001, 2002)
Skills – technical, academic and communication	(Muilenburg, and Berge, 2005), (Tham & Werner 2005)
Social / cultural	(Berge & Muilenburg 2001) , (Muilenburg & Berge 2005), (Tham & Werner 2005)
Time and support – to prepare, to learn, support for studies; technical problems and course development	(Bonk, 2001, 2002), (Berge & Muilenburg 2001), and (Muilenburg & Berge 2005)
Cost	(Mallak, 2001), (Berge & Muilenburg 2001), (Muilenburg & Berge 2005)
Adoption rate, Lack of technological standards	(Mallak, 2001).
Lack of training in how to use the Web	(Bonk, 2001, 2002).
Administrative/instructor issues,	(Berge & Muilenburg 2001), (Muilenburg & Berge 2005).
Learner motivation,	(Muilenburg & Berge 2005).
Door to Information; Ethics	(Tham & Werner 2005).
Organizational Change Lack Technical Expertise Evaluation Quality Concerns Legal Issues Threatened by Technology	(Berge & Muilenburg 2001)
Plagiarism Poor academic practice	Hart and Friesner, 2004)

2.11.1.4 Challenges to E-learning

1- "Access to appropriate technology remain uneven and unpredictable,
2- Scalability,
3- Shareability,
4- Measurement,
5- Changed governance structures,
6- Standards to ensure quality and sustainability of e-learning are critical, and
7- Bridging the knowledge divide" (Kenney, Hermens & Clarke, 2004).

2.11.1.5 Benefits and advantages of blended learning

The benefits and advantages of blended learning are related to the following:

1- "Accessibility,
2- Pedagogical effectiveness, and
3- Course interaction" (Dziuban, Moskal & Hartman, 2005)

2.11.1.6 Reasons/ rationales for blended learning

Various institutions, organizations and individuals have different reasons for implementing or adopting blended learning. Such reasons and rationales are summarized in Table 2.14 below.

Table 2.14: Reasons and Rationales for Blended Learning

Reason / rationale	**Identified by**
Social interaction, *Personal agency*, and *Ease of revision*.	(Osguthorpe, 2003) in (Dewar & Whittington, 2004)
Manage change; and *Accommodate different learning styles*	(Shaw & Igneri, 2006).
Pedagogical reasons - richness, improvement …, and *Access to knowledge*	(Dewar & Whittington, 2004), (Graham, Allen & Ure, 2003).
Increased flexibility	(Graham, Allen, & Ure, 2003) and (Shaw & Igneri, 2006).
Increased cost effectiveness	(Dewar & Whittington, 2004), (Graham, Allen, & Ure, 2003), (Shaw & Igneri, 2006).
At the course level, rationales for blended e-learning include:" *Design for large group teaching,* *Engaging students out of class, and* *Developing professional skills*"	(Sharpe *et al*, 2006).
While on the education level, it aims to *Improve learning*, and *Explain the relation between expected learning and educational theories*; mainly Associative learning, Constructivist learning, and Situative learning based on the framework from Mayes and de Freitas (2004)	(Sharpe *et al*, 2006).
The institutional rationale for blended e-learning are: " *Flexibility of provision;* *Supporting diversity;* *Enhancing the campus experience;* *Operating in global context; and* *Efficiency*"	(Sharpe *et al*, 2006).

2.11.1.7 Issues and Concerns for Blended Learning Adoption and Design

When opting for blended learning over e-learning/online learning, people or/and organizations usually consider such issues as those summarized in Table 2.15 below.

Table 2.15 issues and concerns for blended learning adoption and design

Issue / concern	Identified by
High dropout rate; Logistical concerns regarding preparation time; Certain types of learning materials may be too difficult or costly to taught online; Trust; Authorization; Confidentiality; Individual responsibility; and High-bandwidth network for efficient content access	(Zhang *et al*, 2004).
The role of live interaction; The role of learner choice and self-regulation; Models for support and training; Finding balance between innovation and production; Cultural adaptation; and Dealing with the digital divide	(Graham, 2004).

2.11.1.8 Concepts and Criteria for Blended Learning

Several concepts and criteria for blended learning exist as the literature shows earlier. However, such concepts and /or criteria are not found in one single literature among those that have been examined. Compiling those concepts and criteria in this research would help in understanding the big picture of blended learning. In addition, the compiled list would serve as a foundation block in the development of the new blended learning model. Table 2.16 illustrates these concepts and criteria.

Table 2.16: Concepts and Criteria for Blended Learning

Concept / Criteria	**Based on the work of**
"web-based learning should enable learners to engage in interactive, creative, and collaborative activities during knowledge construction."	(Zhang *et al*, 2005)
'blended learning' is ill-defined and inconsistently used"	(Oliver & Trigwell, 2005)
Ingredients of a blended learning process: 1) Live Events based on John Keller's ARCS Model of Motivation; 2) Self-Paced Learning based on Gagné Nine Events of Instruction, Merrill's Component Display Theory, and Clark's Three Principles on the use of multimedia to promote knowledge transfer; 3) Collaboration; 4) Assessment; and 5) Performance Support Materials	(Carman, 2002)
It is the responsibility of the system designer to make the system attractive and interactive to students while using it.	(Tortora *et al*, 2002)
Principles for the use of multimedia for knowledge transfer: 1) The Multimedia Principles: Adding Graphics to Text Can Improve Learning; 2) The Contiguity Principle: Placing text Near Graphics Improves Learning; and 3) The Modality Principle: Explaining Graphics with Audio Improves Learning.	(Carman, 2002)
Advanced multimedia technology increases our skills, adapting to the context and evolving while being used.	(Cantoni, Cellario & Porta, 2004)
Teachers as content manager face difficulty in exploiting potentiality of multimedia authoring tools.	(Tortora *et al*, 2002)
"Visual technologies may place heavy demands on PC performance".	(Cantoni, Cellario & Porta, 2004)
Developed multimedia components are static; not able to fit learner's needs; and not able to share their education contents with other components.	(Tortora *et al*, 2002)
"The most effective e-learning approaches are those exploiting streaming video, rich visualization and interactivity to deliver the training experiences to the user's machine".	(Cantoni, Cellario & Porta, 2004)
"distributed interactive learning environment (DIL) is superior to distributed passive learning environment (DPL)"	(Yang & Liu, 2007)
Usability attributes of a usable product as defined by several experts and organizations are, within e-learning context, "effectiveness, efficiency, flexibility, learnability, memorability, operability, understandability, attitude & satisfaction, and attractiveness".	(Koohang & Plessis, 2004)
Hocutt (2001) argues for a "strategic blend that, and ensures: a) that components are appropriately interrelated; b) the transitions among components are smooth; c) there is consistency among the components in terms of message, language, and style; d) there is sufficient and appropriate redundancy among the components".	(Shaw & Igneri, 2006)

2.11.1.9 Quality and Standards

Several quality issues have been discussed, covering several elements related to e-learning and blended learning. A summary of those is found in Table 2.17.

Table 2.17: Summary of Quality Issues in E-learning and Blended Learning

Quality issue	**Elements/ contents**	**Based on the work of**
Quality e-learning is a Web-based learning environment designed, developed, and delivered based on several dynamic principles, such as:	Institutional support, Course development, Teaching/learning, Course structure, Student support, Faculty support and evaluation, and Assessment (Phipps and Merisotis, 2000) in (Almala, 2005), and the Institute for Higher Learning Policy has published these as guidance for distance education	(Tham & Werner, 2005)
Principles to ensure *credibility* and *professionalism* in online courses:	Goals and objectives; Standards; Legal and ethical matters; Student enrollment and admissions, Human resources, Physical and financial resources; Teaching and learning; Student support; Evaluation; and Third parties,	Global Alliance for Transnational Education (GATE), (Tham & Werner, 2005).
Issues for the quality e-learning:	"The availability of shared vision, Technology, Culture of the learning environment, Instructional design, Delivery options and strategies, Maintaining quality and equity, Cost factors, and The compatibility, aptitude, and self-discipline of participants"	(Almala, 2006).
Issues for standardization process:	"Architectures and reference model, Educational metadata, Course structure, Student assessment, content packaging and encapsulation"	(Shon, 2002).
Requirements for e-learning standards:	"Accessibility, Interoperability, Durability, Reusability, Adaptability, and Affordability"	(Shon, 2002).

Table 2.17, Continue

Quality issue	Elements/ contents	Based on the work of
Merits of standardized technologies:	“Interoperability, Re-usability, Manageability, Accessibility, Durability, and Scalability”	(Varlamis & Apostolakis, 2006).
Dimensions for usability evaluation of e-learning platform:	Presentation, Hypermediality, Application Proactivity, and Users’ Activity. For each dimension, two general principles; effectiveness and efficiency. For effectiveness: two criteria; *Supportiveness for Learning/Authoring, and Supportiveness for communication, personalization and access*. For efficiency: *Structure adequacy, and Facilities and technology adequacy* as the two criteria	(Ardito, *et al*, 2004).

2.11.1.10 Requirements for Blended Learning Model Development

The requirements for development of a model of blended learning, which have been discussed earlier in this chapter, are presented and summarized in the following sections.

2.11.1.10.1 Multimedia Requirements

The use of multimedia and instructional technology in e-learning and blended learning is controlled by certain principles, rules, concepts, practices and requirements as shown earlier in the chapter. A summary of those is provided in Table 2.18.

Table 2.18: Multimedia Requirements for Blended Learning Model

Requirement	**Identified by**
• Three principles regarding the use of multimedia for knowledge transfer: *1) The Multimedia Principles: Adding Graphics to Text Can Improve Learning;* *2) The Contiguity Principle: Placing text Near Graphics Improves Learning; and* *3) The Modality Principle: Explaining Graphics with Audio Improves Learning (Carman, 2002).*	(Carman, 2002)
• Instructional Technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning. Therefore, there is a need to implement these principles when engaging in the development of blended learning, especially as multimedia and instructional technology are employed and utilized.	(Reiser & Ely, 1997)
• In developing a system, a selected approach should be adopted. Same principle applies to the development of a complete system of instruction	(Ameritech, online)
• Aspects of learning and instruction should be defined behaviorally in instructional system design	(Heydenrych, 2003)
• Concepts in learning theory, systems engineering, instructional technology and organizational development must come together to organize effectiveness procedures and methods in educational context.	(Freeman, 1994)
• ID is a process to create effective training in an efficient manner, to assist in asking the right question, make right decision, and produce useful and useable product.	(Piskurich, 2000) in Axmann & Greyling (2003)
• "Instructional design is the process through which an educator determines the best teaching methods for specific learners in a specific context, attempting to obtain a specific goal".	(Botturi, 2003)
• In educational context, multimedia will provide flexible information associated with instructional design and authoring skills.	(Low, Low & Koo, 2003)

2.11.1.10.2 Technology Requirement

- Advanced multimedia technology is, the one that increases skills, adapts to context and evolves while used (Cantoni, Cellario & Porta, 2004).

- "Visual technologies may place heavy demands on PC performance" (Cantoni, Cellario & Porta, 2004).

2.11.1.10.3 Pedagogy Requirements

Pedagogy is one of the major players in any learning setting or model. As shown earlier in the chapter, several issues, principles, concerns, and theories have been discussed. A summary of those is provided here.

- There are three categories of learning styles that learner may prefer to work under "visual… auditory…and kinesthetic" (Cantoni, Cellario & Porta, 2004). A blended learning model should take into account the different learning styles; at least the three generic styles – visual, auditory, and kinesthetic.

- Major components of constructivism are "

    1. a complex and relevant learning environment;
    2. social negotiation;
    3. multiple perspective and multiple modes of learning;
    4. ownership in learning; and
    5. self-awareness and knowledge construction" Driscoll (2000) in (Almala 2006).

The above shows that when applying constructivism, blended learning setting/model should provide learner with social interaction, offer various learning modes, and allow for knowledge construction.

2.11.1.10.4 Characteristics and Skills of Learner and Instructor

The learner in blended learning should posses several characteristics to be successful, especially in the e-learning part. Those characteristics/requirements are shown in the Table 2.19.

Table 2.19: Requirements for a Successful E-learner

Requirements for a successful e-learner	Identified by
Higher level of discipline. Higher level of motivation. Relatively stable work life. Be a good planner. Be organized. Be able to set your priorities. Need to be somewhat computer savvy. Most of all, it must be capable of working independently.	(Chassie, 2002)
Financially stable, *High self-confidence and self-perception.*	(Rovai, 2002)

On the other hand, the instructor in blended learning setting, and especially in the e-learning part of it, should be capable of doing and applying several tactics tasks like the ones mentioned in Table 2.20.

Table 2.20: Principles of Good Teaching

Principles of good teaching	Identified by
Encouraging student-faculty contact, Encouraging cooperation among students, Encouraging active learning, Giving prompt feedback, Emphasizing time on task, Communicating high expectations, and Respecting diverse talents and ways of learning.).	(Tham & Werner, 2005
Instructional design (ID) must be explicit in lecturer's experience in e-learning; requiring more skills like "*creative abilities* and *psychological sensitivity*".	(Cantoni, Cellario & Porta, 2004)
online educators wear many 'hats', including: The *Technological* Hat, The *Pedagogical* Hat, and The *Social* Hat.	(Tham & Werner, 2005).

2.11.1.11 Factors of Blended Learning

Looking deeply into the work of other researchers as discussed earlier in the chapter, we could come with a thorough list of factors that affect blended learning in higher education and therefore, should be taken into account when implementing blended learning. A summary is shown in Table 2.21.

Table 2.21: Factors in Blended Learning

Factor related to	Covers:	Identified by:
1- Faculty	Perception Characteristics Teaching style Experience	(Chen *et al*, 2004), (Dziuban, Moskal & Hartman, 2005), (Tham & Werner, 2005), (Berge & Muilenburg, 2001), (Bonk, 2001; 2002), (Cantoni, Cellario & Porta, 2004), (Gill, 2006), (Zhang *et al* 2004), (Derntl & Motschnig-Pitrik, 2004),
2- Student	Student-2-student relation (peer pressure, motivation) Characteristics Learning style Communication/ interaction method/ approach (student-2-student, student-2-instructor) Self discipline Role	(Berge & Muilenburg, 2001) , (Chassie, 2002), (Rovai, 2002), (Gunasekaran, McNeil & Shaul, 2002), (Shon 2002), (Rovai & Jordan, 2004), (Cantoni, Cellario & Porta, 2004), (Chen *et al*, 2004), (Graham, 2004), (Tham & Werner, 2005), (Muilenburg & Berge, 2005), (Oliver & Trigwell, 2005), (Dziuban, Moskal & Hartman, 2005)
3- Technical skills	Student Lecturer	(Muilenburg & Berge, 2005), (Cantoni, Cellario & Porta, 2004), (Kenney, Hermens & Clarke, 2004), Derntl & Motschnig-Pitrik, 2004), (Low, Low & Koo, 2003)
4- Content and resources	Availability Standards Delivery Online resources	(Tsai & Machado 2002), (Cantoni, Cellario & Porta, 2004), (Shaw & Igneri, 2006), (Tortora *et al*, 2002), (Low, Low & Koo, 2003), (Zhang *et al* 2004), (Dziuban, Moskal & Hartman, 2005)
5- Pedagogy	Model Approach Educational theories Richness Knowledge Effectiveness	(Sharpe *et al* 2006), (Dewar & Whittington, 2004), (Whitelock & Jelfs 2003), (Oliver & Trigwell 2005), (Dziuban, Moskal & Hartman 2005), (Graham, Allen & Ure 2003),
6- Instructional technology	Use of instructional technology and multimedia Instructional strategies Course instructional goals	(Reiser & Ely 1997), (Oliver & Trigwell 2005), (Shaw & Igneri 2006), (Dziuban, Moskal & Hartman 2005), (Zhang et al 2006)
7- Cost (financial)	Student Institution	Mallak 2001), (Chassie 2002), (Graham, Allen, and Ure, 2003), (Zhang *et al*, 2004), (Cantoni, Cellario & Porta 2004), (Dewar and Wittington, 2004), Bacsich, 2005), (Dziuban, Moskal & Hartman 2005), (Muilenburg & Berge 2005), (Miller and Neal, 2005), (Zhang *et al*, 2005), (Almala 2006), (Ruth, 2006), (Shaw & Igneri, 2006)

Table 2.21, Continue

Factor related to	Covers:	Identified by:
8- Time	Flexibility Convenience Availability	(King *et al* , 2001), (Graham, Allen, and Ure, 2003), (Derntl, Motschnig-Pitrik, 2004), (Zhang *et al*, 2004), Zhang *et al*, 2005), (Dziuban, Moskal & Hartman 2005)
9- Administrative (national, institute, program)	Reason Strategic directions Developmental level Reach	
10- Infrastructure	Technology including telecommunications, Internet, networks, and pace of change Human resources (lecturers, pedagogical experts, technological staff, support staff)	(Kenney, Hermens & Clarke, 2004), Derntl & Motschnig-Pitrik, 2004), (Low, Low & Koo, 2003)
11- Level of support	Technical support Content development support	(Tsai & Machado 2002), (Cantoni, Cellario & Porta, 2004), (Shaw & Igneri, 2006), (Tortora *et al*, 2002), (Low, Low & Koo, 2003), (Zhang *et al* 2004), (Dziuban, Moskal & Hartman, 2005)
12- Political (national, institution, group)	Politics and power centers Constitutional Legal Regulatory	
13- Delivery mode	Synchronous Asynchronous	(Valiathan, 2002), (Heinze and Procter, 2004), (Almala 2006), (Holden and Westfall, 2006), (Instructional Technology Council, 2006), (Sharpe *et al*, 2006), (Shaw & Igneri, 2006)

2.11.2 Summary of Findings on Palestine

Though the Palestinian Higher Education Institutions exposure to e-learning is in its infancy, and not much research have been carried out in this field, several factors, problems and barriers have been identified. These are used as one of the main inputs to the new model development and implementation. A summary of factors, problems and barriers follows.

2.11.2.1 Factors of Blended Learning

The factors are mainly political and legal. They could be summarized as:

1. Political on the national level (internal among factions, and external by Israel)
2. Legislative and legal
3. Experience factors on national, institution, and individual levels
4. Language factor based on the work of Shahin, Singh, and Wah (2007b)

2.11.2.2 Problems and barriers:

These problems and barriers are summarized in Table 2.22

Table 2.22: Problems and Barriers to Education in Palestine

Problem/Barrier	Identified by
1. relevance and quality of the supply; 2. efficiency in managing available resources 3. financial support	(World Bank, 2005)
4. poor quality of teachers 5. unclear answers to pressing educational questions 6. lack of democracy 7. traditional education system/style 8. economic barriers	(Van Dyke, and Randall, 2002)
9. impact of occupation (closures and restrictions on movement between towns and areas in the form of military/security checkpoints by Israeli forces)	(Van Dyke, and Randall, 2002), (Al-Salqan, 2005)
10. inexperienced Palestinian National Authority	Established in 1994 after the Oslo Accord between Israel and PLO
11. deteriorating economic situation with high level of unemployment amounting to 26.0% in the year 2008	(PCBS, 2009-a)
12. high student-to-lecturer ratio	Table 2.8 based on (MOEHE, 2008)

2.11.3 Effect of the System on Quality of Education

The proposed model and its implementation through the computerized system is hoped to have a good effect on the quality of education in the higher education sector. It is anticipated that by adopting this model, all three parties involved in the higher education process, namely; student, lecturer and institution, will benefit out of it. On student level, the availability of various learning methods, teaching styles, communication media, modalities, study materials, and resources would enhance the his/her ability to acquire and construct knowledge, and save time and money. On lecturer level, though it might require more time and efforts at the very beginning, it would enhance his/her teaching methods, styles, ability to handle class time, communication with students, sharing of teaching materials and resources, meeting individual students needs and styles, which would result in enhanced teaching/mentoring/facilitating methods and saving of time. On the institution level, it would help in enhancing the institution's ability to meet its goals and objectives through producing quality graduates. This is achieved through the utilization of resources and facilities, like classroom occupancy time, sustainable study materials and resources …

2.11.4 Guidelines for E-Learning Implementation in Traditional Universities

As it could be noticed from the literature above, several issues and considerations have to be thought of carefully, when implementing blended learning or e-learning. In the case of Palestine, the situation might be more in need of better planning. The literature reveals that there is little if any of generic, yet detailed guidelines for implementing e-learning or blended learning in traditional universities. The literature also reveals that it is not long since universities have started adopting forms of e-learning. This finding sparks the initiative to propose such generic guidelines. However, this is achieved through the development of the model of blended learning and implementing it. The outcome of such implementation together with findings from the literature; and data gathered and analyzed during the course of this research have all contributed in the compilation of these guidelines.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlights the research methodology that was adopted in conducting this research. Research framework, activities, and major phases/steps are explained. The chapter goes on explaining the research methodology in a step-by-step approach as the research progresses. It starts with identifying the problem statement and the scope, followed by identifying the research objectives and questions, and ending with the conclusions and recommendations. Various approaches, methods, and techniques have been used due to the nature of the research topic and domain, and also the various stages and activities. Details of these are presented in later sections of this chapter. Preliminary literature review has been conducted to formulate the problem statement, objectives and research questions. Then, an intensive literature review was conducted by covering as much as possible of such literature. Major international journals and conferences proceedings were searched, mainly electronically, through the university of Malaya library website. Educational, social, political, economic, and other elements of the Palestinian society, related to the e-learning issue were also searched and examined. Factors have been identified through the literature and through data collected from Palestine. The model was first designed and validated, then the software was developed based on the model, evaluated by experts based on Nielsen's 10 usability principles, and after that the whole model was tested in Palestine. Data from questionnaire distributed at the end of the testing period was collected and analyzed. Results are reported and conclusions are drawn. Figure 3.1 shows the flow of the steps in completing this research. Further explanation of each step is shown in the later sections.

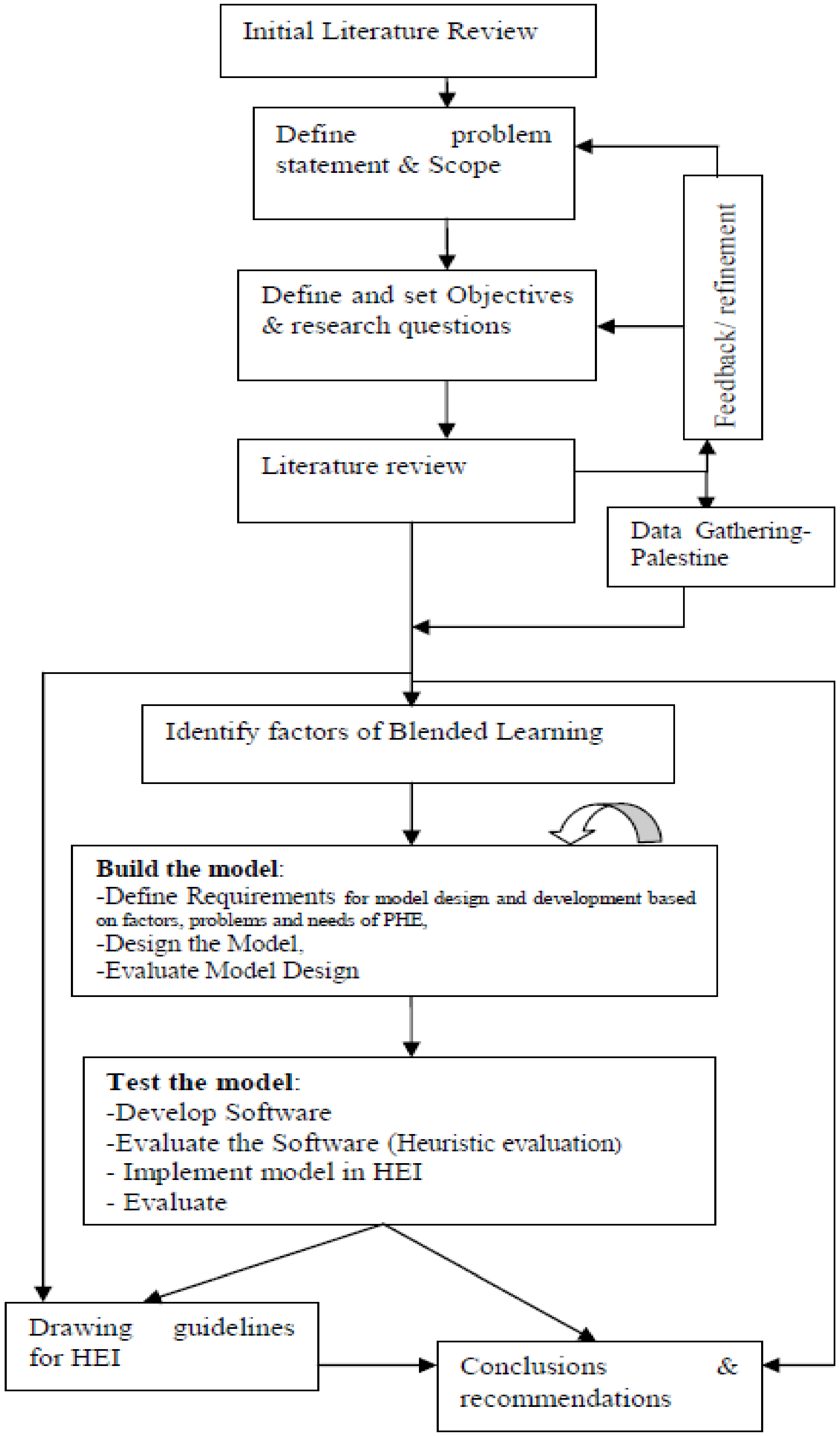

Figure 3.1: Research Workflow

3.2 Research methodology

For any research that is to be carried out, a methodology has to be employed. In this context, a research methodology is said to "consists of the combination of the process, methods, and tools which are used in conducting research in a research domain" (Nunamaker & Chen, 1990), while "methodology is the philosophy of the research process" (Nunamaker & Chen, 1990).

Sometimes, researchers need to combine more than one method in a single research. "Triangulation is the term used to describe the combining of several qualitative methods or combining qualitative with quantitative methods." (Cooper & Schindler, 2006; p. 219). This is usually adopted to "increase the perceived quality of the research" (Cooper & Schindler 2006; p. 219). Another term used to describe a similar situation is the mixed-methods research, which "involves the use of both quantitative and qualitative methods in a single study" (Fraenkel & Wallen, 2010; p. 557). The main feature in this context is, as interpreted by some people, that "mixed-methods research combines methods of data collection and analysis from both quantitative and qualitative traditions" (Fraenkel & Wallen, 2010; p. 557). However, "the type of instrument used to collect data is not a major difference between quantitative and qualitative methodologies… it is the manner, context, and sometimes intent that are different" (Fraenkel & Wallen, 2010; p. 557). This approach has several strengths when compared to the single-method researches. These strengths are: "1- can help to clarify and explain relationships found to exist between variables 2- allows us to explore relationships between variables in depth 3- can help to confirm or cross-validate relationships discovered between variables" (Fraenkel & Wallen, 2010; p. 557). To conduct a research using the mixed-methods approach, researchers can adopt one of the three types of mixed-methods designs: exploratory design; qualitative followed by quantitative, explanatory design: quantitative followed by qualitative, or triangulation design: simultaneously (Fraenkel & Wallen, 2010; p. 560).

In a research done by Figl, Derntl & Motschnig-Pitrik (2005), they argued that one particular method is found to be insufficient to evaluate their Person-Centered e-Learning approach. Therefore, they used a mix of methods for the evaluation. Such methods include: methodological triangulation, pre-test/post-test design, Quasi-experimental design, comparison with other courses, iterative cycles - extended action research- and triangulation of qualitative and quantitative parts (Figl, Derntl & Motschnig-Pitrik, 2005). In methodological triangulation, the questionnaires contain both open and scale questions to combine qualitative and quantitative methods, in addition to the reaction sheets gathered during the semester were used. In the pre-test/post-test design, some factors, like e-learning platform, and specific learning scenarios, were only possible to include them at the post-test. In quasi-experiment design, a comparison between different lab courses instructors was carried out, where students were not randomly assigned to the courses, with no control groups. Actual comparisons with other courses were not feasible in their study due to other instructors being not interested or did not use the same technology. The authors used the iterative cycle method to improve the e-learning platform as well as the questionnaires, through responding to suggestions by the students, by analyzing results and revising the questionnaires. For the triangulation of qualitative and quantitative parts, they have used the reaction sheets through the semester and at the end of the semester, in addition to questionnaires at the beginning and the end of semester. This approach is "proved to be reasonable and meaningful" (Figl, Derntl & Motschnig-Pitrik, 2005). As it could be noticed from the study by Figl, Derntl & Motschnig-Pitrik (2005), although they have used a mix of methods, some of the methods have not been used in its original setting. This was justified by the authors as the nature of the research, and to some uncontrollable conditions. However, the mix has overcome such limitations, and the result "increases cognition and contributes to a more complete picture of the whole scene" (Figl, Derntl & Motschnig-Pitrik, 2005). In another study by Figl, Motschnig-Pitrik & Derntl (2006), had similar approach, i.e. a mix of methods was employed to investigate the key factors affecting students' work in teams. In collecting data, the authors use the reaction sheets, enquiries and questionnaires – with open and closed answers questions and face-to-face discussion (Figl, Motschnig-Pitrik & Derntl, 2006).

Table 3.1 below portrates the relations and links between research objectives, research questions, methods, and instruments used in the research. Additional discussion on the methods an dinstruments is provided in the subsequent sections.

3.2.1 Methods used in the study

In this research, a mix of methods and techniques has been used. Qualitative data were collected by using a questionnaire with open-ended questions, in addition to the other closed or scale-type questions that were used to collect quantitative data. Another questionnaire was used to evaluate the proposed model by lecturers at the traditional universities in Palestine. This questionnaire collects quantitative data, with a room for comments and suggestions. To evaluate the system design – interface, another method was employed, known as heuristic evaluation method. Experts were asked to evaluate the interface using a form developed by Xerox, based on Nielsen's 10 usability principles. This form consisted of questions that resemble the criteria to be evaluated within each of the 10 principles, with a yes, no and N/A answers, and a room for comments on each. Once the model has been tested, a questionnaire comprising both closed and open-ended questions was given to the participating students at the end of the test period. This questionnaire collect~~s~~ both quantitative and qualitative data. An evaluation form as a request for feedback was given to the participating lecturers to evaluate the experience and the model. This form collects mainly qualitative data.

Table 3.1: Linking research objectives, research questions, methods and instruments

Objectives	Research Questions	Method	Instrument	Note
To identify factors affecting blended learning in traditional universities in general, and in Palestine in particular.	**What** factors need to be taken into account in developing a model of blended learning for traditional universities in Palestine?	**Literature** review, data collection through **survey** (quantitative & qualitative data)	**Questionnaire one** To collect data on lecturers' perception on e-learning, and to identify problems related to e-learning. Pilot tested, distributed to lecturers in Palestine. (quantitative & qualitative data)	Pilot tested and expert judgment based on content-related evidence method
To develop a model of blended learning for traditional universities in Palestine.	**What** are the requirements for developing blended learning model? **How** can factors and requirements above be used to develop a model of blended learning for traditional universities in Palestine?	**Literature** review, data collection through **survey**, **iterative** design (for both instrument and the model design) **System development** method	Developed **questionnaire two** to collect data on model design. Given to lecturers for pilot test and final evaluation of model design (quantitative & qualitative data).	Pilot tested and expert judgment based on content-related evidence method. Cronbach's Alpha 0.963
To implement the model at an activity level based on objective 2 above.	**What** are the dimensions for evaluating model implementation and its applicability?	**System development** method. **Heuristic** evaluation of the system & interface **Iterative** design of the system **Field testing** in Palestine Evaluation	Prototyping approach used. **Heuristic evaluation form** by Xerox based on Nielsen's 10 **usability principles** was used. Model **field-tested** at PPU using **four** courses, **questionnaire three** was given to students at the end, and **evaluation/feedback form** was given to participating lecturers (quantitative & qualitative data collected). **Exploratory** factor analysis using **Principle component analysis** was adopted to extract factors (components).	Originally around 300 criteria, reduced to 102 Expert judgment based on content-related evidence method. Cronbach's Alpha 0.984
Propose guidelines document for blended learning implementation in traditional universities in Palestine	**Based** on the model and its implementation, **what** guidelines can Palestinian Higher Education Institutions, particularly traditional universities, follow in implementing blended learning?	Based on findings of the research, and from literature.		

As highlighted in the previous section, it has been found out that it would be more suitable to employ a mix of methods to complete this research. Single type data, i.e. quantitative or qualitative, was found to be insufficient to answer the research questions and achieve the research objectives. Because the research consists of several stages, and due to the nature of the research topic, which is on blended learning, and also because each stage could be considered as a smaller semi-research part of the whole research, thus it would require different methods. For example, to evaluate the model design, a questionnaire was found to be the most feasible technique.

3.2.2 Study design

In this study, a mix of methods has been employed due to the nature of the research topic on developing a blended learning model for traditional universities in Palestine. It consists of many dimensions: development, blended learning, model, traditional universities and Palestine. This implies that these dimensions have to be harmonized together so that the research objectives can be achieved. As explained earlier in this chapter, several strengths are evident when employing a mix of methods (Fraenkel & Wallen, 2010; p. 557), especially when combining quantitative and qualitative data and methods. In this research, questionnaires were used as a mean for collecting data initially to try and identify problems facing the implementation of e-learning in Palestine, for evaluating the proposed model by the lecturers in Palestine, and for testing the implementation of the model by the students at Palestine Polytechnic University. With data and information gathered from the literature and Palestine, factors for blended learning, and requirements for the development of the new blended learning model have been identified, which make the foundation of the model. After that, the software was developed in order to implement the model and evaluate it through a test in Palestine. When the evaluation was conducted, comments and suggestions in addition to the results were used to enhance the model; representing an iterative approach in the overall design and implementation of the model. The data collected through the questionnaires were both quantitative and qualitative. Other evaluation forms were used to evaluate the software by using the heuristic evaluation method based on Nielsen usability principles, and to evaluate the implementation of the model by the lecturers.

Blended learning models, settings, factors, dimensions, requirements, advantages, disadvantages, choices, problems and barriers, and experiences have all been studied. This yielded to identifying the gap in the previous work. Then, based on this and on the objectives of the research, critical analysis of the available literature is conducted. Data collected through a questionnaire, previously distributed and used in reporting faculty perception towards e-learning in Palestine (Shahin & Singh 2007) was further analyzed in order to extract problems and needs for implementing e-learning in traditional universities in Palestine. Following that, the process of building a new blended learning model is completed. The new model is based on previous blended learning models (includes the consideration of various factors/elements, problems, etc…) and findings from the data gathered from Palestine. Then, it is evaluated by the academicians in two steps. First, a pilot test was conducted. Second, the model and the questionnaire were sent out to all lecturers at the traditional universities in Palestine through email. Lecturers were given a description of the model – graphical and textual – together with a questionnaire. They were asked to study the model, and then complete the questionnaire and return it back to the researcher.

An implementation of the model, as a computerized system, is developed by using Open Source Software. The system is then evaluated heuristically (the interface design) by the experts [those are either PhD holders in the field of computer science/software engineering/information systems, working at faculty of computer science & information technology, university of malaya, or professionals with masters degree with years of professional experience in system development] based on Nielsen 10 usability principles. Then, it was tested in PPU, on the activity level of four courses. At the end of the test, students were asked to fill in a questionnaire to evaluate the model. Lecturers involved in the test process were also asked to give their feedback and comments. The feedbacks from students and lecturers are analyzed, and conclusions are reached. Thus, amendments and improvements to the software are introduced.

Guidelines on e-learning, and particularly on blended learning in higher education, are compiled for higher education institutions; particularly the traditional universities.

3.3 Research Framework

The research framework is shown in Figure 3.2 above. It is built on three main sources for a successful development of the model therefore the completion of the research: literature, intuition and experience, and data. It shows what needs to be done, main activities and their relationships, instruments and methods, and the logical flow for the progress of the research. As shown in the Figure 3.2, the factor of blended learning are identified based on literature review, data collected through questionnaire one (Q.1) and based on the intuition and experience of the researcher. Requirements for developing blended learning model are derived based on the factors of blended learning. Then, model design, development and evaluation process is carried out based on the factors and requirements identified earlier. Questionnaire two (Q.2) is used for model design evaluation as well as intuition and experience of the researcher. Software implementation and evaluation is carried out based on the evaluated model design. Heuristic evaluation (checklist) based on Nielson’s 10 usability principles is used to evaluate the system. Model testing an devaluation is carried out based on system evaluation. Questionnaire three (Q.3) is used to evaluate the model, and finally, the guidelines document is compiled.

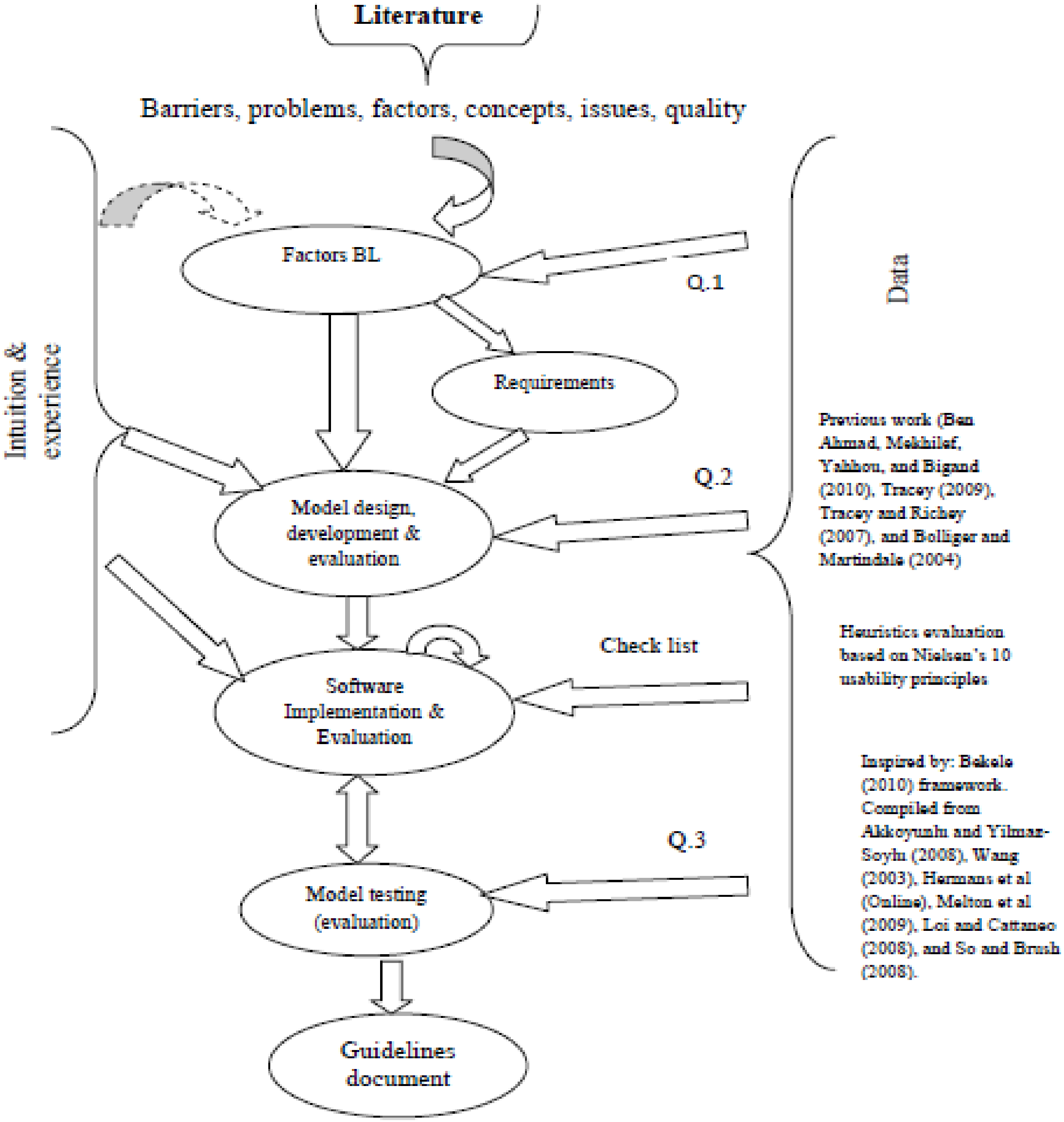

Figure 3.2: Research Framework

As shown in Figure 3.1 above, the research was carried out through various phases. Some of these phases depend on others, while many were overlapped and were conducted in parallel. This approach provides flexibility in refining and amending any particular work in any phase whenever it is necessary. The research could not be carried out in rigid, sequential phases due to the nature of the research itself and the nature of research in general. The following sections explore each of the phases.

3.3.1 Define Problem Statement and Scope of the Research

The problem statement and scope of the research were defined at the beginning as shown in chapter one earlier.

3.3.2 Define and Set Objectives and Research Questions

Objectives and research questions associated with them have been formulated based on the problem statement. They are listed below for convenience.

Research Objectives

1. To identify factors affecting the blended learning in traditional universities in general and Palestine in particular.
2. To develop a model of blended learning for traditional universities in Palestine.
3. To implement the model at an activity level based on objective 2 above.
4. Propose general guidelines document for blended learning implementation in traditional universities in Palestine.

Research Questions

The research tries to answer the following questions:

1) What factors need to be taken into account when developing a model of blended learning for traditional universities in Palestine?
2) What are the requirements for developing a blended learning model?
3) How can factors and requirements above be used to develop a model of blended learning for traditional universities in Palestine?
4) What are the dimensions for evaluating model implementation and its applicability?
5) Based on the model and its implementation, what guidelines can the Palestinian Higher Education Institutions, particularly traditional universities, follow in adopting and implementing blended learning?

3.3.3 Literature Review

Intensive literature review was conducted, and a conceptual framework at the end was identified. It formulates the foundation for the research framework.

3.3.4 Data Gathering – Palestine

A questionnaire was distributed among faculty members at the Palestinian traditional universities. The aim of this questionnaire was to explore the perception of the Palestinian faculty members on e-learning and blended learning, and to identify possible problems and obstacles facing the implementation of e-learning in universities as seen by the faculty members. In addition, it aims to explore the needs for e-learning implementation in universities, again from a faculty perspective. The data analysis was then carried out by using SPSS software for the quantitative data, and SPSS Text Analysis for Survey software to handle the qualitative part of the questionnaire. A second questionnaire was distributed to faculty members at the traditional universities in Palestine to evaluate the model in order to get feedback and comments before implementing it. This questionnaire was first pilot tested by sending it to 30 lecturers. Comments and suggestions were incorporated in the amended version of the questionnaire. The questionnaire was then distributed by e-mail to the academic staff at traditional universities in Palestine. It was then analyzed and tested for reliability. Results and comments were used to further enhance the model design. A software was developed based on the model, and before it was implemented, heuristic evaluation of the software was conducted by professionals. A third questionnaire was developed to gather data from students who participated in testing the model at the Palestine Polytechnic University. Participating students were given the questionnaire after the testing period was over, and participating lecturers were also given an evaluation form to provide feedback and comments on the model and the testing process.

3.3.5 Identification of Factors of Blended Learning

Identifying the factors and elements in blended learning was mainly based on the literature review, the related work and models created by various researchers. This is in line with what Seok (2009) uses when identifying items for online instructional features based on intensive literature review. A similar approach was adopted by Andersson and Grönlund (2009), in presenting a review of the e-learning challenges in developing countries. Bekele (2010) used the intensive literature review in proposing a framework for identifying sources of motivation and satisfaction in “Internet-Supported Learning Environment ISLE” (Bekele, 2010). Fresen (2007) relied mainly on the literature to extract the success factors. According to Miles & Huberman (1994) quoted in Fresen (2007), the first step in analyzing data is to reduce it. As the original list was descriptive to clarify exact meanings, the resulting final list was refined by focusing on single words/phrases to identify the factors concisely (Fresen, 2007). The work of Chassie (2002), Forman (2002), Rossett, Douglis & Frazee (2003), Heinze & Procter (2004), Dewar & Whittington (2004) based on the work of Singh(2001); Driscoll (2002); Selix (December, 2001) and Osguthorpe (2003), Cantoni, Cellario & Porta (2004), Driscoll’s four concepts; Valiathan (2002); and Whitelock and Jelfs (2003); all quoted in Oliver & Trigwell (2005), Osguthorpe and Graham (2003) as quoted in Dziuban, Moskal & Hartman (2005), Almala (2005), Zhang *et al* (2005), Yang & Liu (2007), Almala (2006), Holden & Westfall (2006), Fresen (2007), Stacey & Gerbic (2008), Goi & Ng (2009) and others, have been used.

The research built on such work, in addition to factors that are related and specific to Palestine. Literature, though rare, on Palestine has been used, in addition to data and information gathered and extracted from the first questionnaire on faculty perception.

3.3.6 Build the Model.

This phase consists of two main sub-phases as shown below.

A) Define requirements.

To identify and define requirements, literature review and results from the data analysis of the first questionnaire were used. The researcher also used his own intuition and more than 17 years of work experience – prior to commencing this research - in the academia and industry; for more input to the definition and identification of the requirements. “Literature reviews, data, and intuition form the basis of most theory development methods” (Lewis 1998). This is because none of the three alone would be sufficient to come up with a quality theory or model; however, the combination of the three would result in a more validated, reliable and testable theory or model (Lewis 1998). This approach has been used by Lewis (1998) through an illustrative study where “an advanced manufacturing technology [ATM] design constructs and theory of ATM design process” (Lewis 1998) have been achieved. The same principle has been adopted and used by Zainol (2009) when developing a decision support system. The approach adopted by the researcher in this research is also in line with the approach used by Seok (2009), where items have been identified for online instructional features by an extensive literature review. Factors, concepts, and needs of e-learning in the higher education in Palestine have been used to compile the list of requirements for the new model design and development. These were mapped to possible ‘individual’ solution for each. However, one factor was found to have one or more contributing ‘solutions’. The same holds true for individual solutions, as each could be mapped to more than one factor or problem. In general, the relationship between factors and solutions and between problems and solutions can be known as a many-to-many relationship.

B) Model design

Tracey & Richey (2007) structure the design of their model around Gustafson and Branch’s stages in instructional design; analyze, design, develop and evaluate. In following these four stages, Tracey & Richey (2007) determined the components of the model based on their analysis; then constructed the model. While the requirements were being identified as shown in ‘A’ above, they have been used as the base for the model design. The two activities i.e. requirements identification and model design, were running in parallel, with iterative cycles. Main components of the model were determined based on the factors, requirements and needs. Several trials have been attempted for arranging these components together based on the relationships among themselves. The requirements have been reflected through the architecture of the model. The architecture has been shown to colleagues and professionals, informally for comments while it was being developed. Once an acceptable layout was reached (see Figure 5.1), the design was ready to be officially evaluated.

3.3.7 Evaluation of the Model Design

Once the model was initially designed, there was a need to validate it. There are two types of model validation; internal validation, to test the components and processes of the model, while the external validation is to test the impact of the product model (Tracey & Richey, 2007; Tracey, 2009). After constructing the model, it was evaluated through internally validating it by focusing on verifying components and processes (Tracey & Richey, 2007)

Bolliger & Martindale (2004) used an established survey that is validated and used in several studies to evaluate their model. However, they modified it by adding questions derived from the literature concerning the topic. Ben Ahmed, Mekhilef, Yannou & Bigand (2010) developed an instrument to evaluate the model itself, not the effect or the outcome of it.

3.3.7.1 Questionnaire Development and Pilot Testing

To first evaluate the proposed model itself, the researcher developed a questionnaire based on ideas from Ben Ahmed, Mekhilef, Yannou, & Bigand (2010), Tracey (2009), Tracey & Richey (2007), and Bolliger & Martindale (2004), in addition to others. The questionnaire consists originally of 55 questions using the 5-point Likert-type questions, ranging from 5 strongly agree –SA - to 1 strongly disagree -SD. When constructing the questionnaire, consideration was given to the overall model, to the graphical representation of the model, the textual explanation accompanying the model design, the components, their relationships, individual components graphical representation, and to each component individually. Under each of the above, questions were compiled to address each dimension of the model evaluation. The piloted questionnaire can be found in Appendix A.

It was then tested for validity by using expert judgment based on the content-related evidence method (Fraenkel & Wallen, 2010; p149). In this method, experts [those are academicians holding doctorate degrees; working at universities in Malaysia, Jordan and Palestine] are asked to check the questionnaire for suitable language, terms, items and their relations with each other, and appropriateness of the items, and whether they cover all aspects and dimensions of the subject. After that, it was sent out through email to a total of 30 lecturers in Palestine, Malaysia and Jordan to test pilot it. Responses were keyed into SPSS 16 and the questionnaire was checked for reliability using internal consistency method (Fraenkel & Wallen, 2010; p157) yielding a Cronbach's Alpha of 0.972 based on the standardized items. Descriptive statistics was used to extract the mean of all items and for individual items. Comments and suggestions were incorporated in both the model design and the questionnaire. Details are shown in chapter 5.

3.3.7.2 Model Evaluation

The final questionnaire consists of a total of 53 '5-point Likert-type' questions, distributed among different categories. The questionnaire was divided into several sections as shown in Table 3.2 below. The complete questionnaire can be found in Appendix A.

Table 3.2: Main Sections of the Questionnaire

Section	Section title	No. Questions
A	The model (in general)	5
B	Graphical representation of the model	5
C	The textual explanation of the model	4
D	The components	4
E	The relationship between components	3
F	The graphical representation of the components	3
G - S	Individual components	2 each
T	Output of the model	3
	Comments/suggestions	

All the lecturers at traditional universities in Palestine were targeted, so that a wider range of responses and feedback would be achieved. The questionnaire, together with a description of the model, was distributed to all the lecturers in traditional universities in Palestine through email. The email was sent either directly to the lecturer's emails address that was accessible through the respected university website, or through a third party within the respected university such as the head of departments, deans, public relations units, or in some cases the vice presidents for academic affairs. Lecturers were asked to fill in the questionnaire and return it back through email. Again, the questionnaire was tested for reliability by using the internal consistency method, with the actual data collected, yielding a Cronbach's Alpha of 0.962. A similar test was carried out for all items individually to test their reliability.

3.3.8 Testing of the Model

To test the new model, two main sub-phases had to be completed. These are:

3.3.8.1 System Development Based on the Model Built

This is a major step in testing for the validity and suitability of the model. Developing a computerized version of the model is actually testing it. This is so, because the system itself was tested by the lecturers and students in actual settings. Feedback from both students and lecturers was then analyzed to prove the suitability of the model. In developing of the system, the Open Source Software – PHP, MySQL, NetMeeting were used. The approach used in the development was the prototype approach, which allows gradually building of the system, and in conjunction/parallel with the model building phase. At the end of the system development, a heuristic evaluation of the software was conducted. Heuristic evaluation is one of the usability inspection methods that was used to evaluate the interface specifications and design (Nielsen, 1994a), and studies show that it is capable of discovering usability problems better than user testing sometimes; although it is similarly true vice versa (Nielsen, 1994a). The evaluation of the system is based on Nielsen's 10 usability principles: visibility of system status, match between system and the real world, user control and freedom, consistence and standards, error prevention, recognition rather than recall, flexibility and efficiency of use, aesthetic and minimalist design, help users recognize; diagnose; and recover from errors, and help and documentation (Nielsen, 1994b). Those principles are expanded into detailed criteria in the form of questions with answers as 'yes', 'no' or 'n/a' by Xerox corporation. The heuristic evaluation form by Xerox (http://www.stcsig.org/usability/resources/toolkit/toolkit.html) was used to evaluate the system. However, it is too long as there are around 300 questions/criteria to be checked. After the discussion with the supervisor and with the software engineering professionals, it has been suggested to reduce the total number of questions/criteria, to make the evaluator's task manageable without affecting the overall theme. The original form was given to the supervisor for feedback and comments. The simplification was carried out by the researcher and a software engineering professional- who has knowledge about the system developed by the researcher. The task was carried out individually by both the researcher and the software engineer. Each simplified forms have been exchanged from either party to compare their work with one another. Then a joint session/meeting was arranged to reach an agreement on what to be taken out. The agreed upon simplified list was then given to the supervisor for the final approval. The final form consists of ten (10) sections, as shown in Table 3.3. The complete list that has been used in the evaluation can be found in Appendix A.

Table 3.3: Usability Principles

Principle	**Description**	**# of questions**
1) Visibility of System Status	The system should always keep user informed about what is going on, through appropriate feedback within reasonable time.	11
2) Match Between System and the Real World	The system should speak the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.	7
3) User Control and Freedom	Users should be free to select and sequence tasks (when appropriate), rather than having the system does this for them. Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Users should make their own decisions (with clear information) regarding the costs of exiting current work. The system should support undo and redo.	6
4) Consistency and Standards	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.	20
5) Help Users Recognize, Diagnose, and Recover From Errors	Error messages should be expressed in plain language (NO CODES).	10
6) Error Prevention	Even better than good error messages, it is a careful design which prevents a problem from occurring in the first place.	6
7) Recognition Rather Than Recall	Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.	18
8) Flexibility and Minimalist Design	Accelerators-unseen by the novice user-may often speed up the interactions for the expert users such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions. Provide alternative means of access and operation for users who differ from the "average" user (e.g., physical or cognitive ability, culture, language, etc.)	6

Source: Nielsen (1994b), ten usability heuristics. Retrieved from http://www.useit.com/papers/heuristic/heuristic_list.html

Table 3.3, Continue

Principle	Description	# of questions
9) Aesthetic and Minimalist Design	Dialogues should not contain information, which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.	8
10) Help and Documentation	Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.	10

Nielsen (1994c) suggests using between three and five evaluators. Having more evaluators would be good, but depends on the cost-benefit analysis; and recommended only if usability is an important issue (Nielsen, 1994c). The evaluation request was originally sent to fourteen (14) experts. Nine of the fourteen experts responded and completed the evaluation. The evaluators were given the evaluation form and the link to the system. They were asked to visit the system website, create their own accounts as lecturers and students, and browse the system as well as try it out by themselves. This is based on Nielsen (1994c) recommendation that when the evaluators are domain experts; it is possible to let them do it themselves. However, a very brief description was given to them, and one of them asked for a demonstration of the system by the researcher before engaging in the evaluation. The evaluators were asked to fill in the evaluation form after they have finish browsing and using the system, and then email it back to the researcher. The individual evaluation results were combined to identify usability problems. This is in line with what Nielson (1994a) suggests for heuristic evaluation as it is to be carried out individually; then reports are combined to find out the usability problems.

The result of the evaluation revealed that the system usability is high, with 78% of the criteria being met i.e. 77% answers were 'yes', 16% 'no', and 7% of the answers were 'not applicable'. If the 'not applicable' answers are not considered, then we will get 83% 'yes' and 17% 'no' answers. Details of the analysis are presented later in chapter five (5). Once this task is completed, the new system was uploaded to the website. By completing the upload and setup of the system, it was finally ready to be used/ tested by lecturers and students. This takes us to the next sub-phase.

3.3.8.2 Implementation and evaluation of the Model

This was carried out through the testing of the system in a real situation. Software development was carried out by using Open Source Software as the development tool. Once completed, it has been put into action for testing and evaluation. Volunteer Lecturers were asked to run the model for 2 weeks – an estimation time that a topic in an undergraduate course would take to be completed. Lecturers were briefed on the model and its functionality, and given 2-3 days to acquaint themselves with the system and the model at large. The final testing of the model, including the software, was carried out at the end of the trial period. Descriptive studies, usually in a classroom, and collecting data, mainly through questionnaire, were the typical methodology adopted by the computer supported collaborative learning research (Jeong & Hmelo-Silver 2010). In their review of the methodologies used in CSCL research (Jeong & Hmelo-Silver, 2010) found that methodologies used "do not fit the traditional quantitative and qualitative divide and/or experimental and descriptive divide" (Jeong & Hmelo-Silver, 2010). They attributed that to the nature of CSCL and to learning as a complex phenomenon "requires multiple approaches and perspectives" (Jeong & Hmelo-Silver, 2010). Liaw, Huang & Chen (2007b), in their study to investigate the factors towards e-learning systems implementation by learners, developed an e-learning system and then implemented it in two courses at a university in Taiwan, with total of 171 students. After six weeks of usage of the system, the students were asked to complete a questionnaire designed to assess the attitudes towards the system. The questionnaire consists of three parts, on demographic information, on computer and internet experience, and on attitude toward the e-learning system. All questions in the last two parts were 7-point Likert scales. Then, the questionnaire was analyzed, and factors were extracted by using the exploratory factor analysis method (Liaw, Huang & Chen, 2007b).

To test the model, a questionnaire was developed and was inspired by the framework of Bekele (2010). However, because it is concerned mainly with "Internet-Supported Learning Environment" (Bekele, 2010), it could not be used by its entirety, as this model blends both Internet-based setting and face-to-face setting. The items of the questionnaire were compiled from Akkoyunlu & Yilmaz-Soylu (2008), Wang (2003), Hermans *et al* (Online), Melton *et al* (2009), Loi & Cattaneo (2008), and So & Brush (2008). This approach which is called "funneling approach" was suggested by Nachmias & Nachmias (1993), Oppenstien (2000), and Cohen *et al* (2000), where it was cited and used by Saad (2008) in developing a questionnaire in his PhD thesis. In addition, Zaharias (2006) identifies items to be included in his questionnaire through an extensive literature review of related work. Additional items were added by the researcher to cover all dimensions for evaluating the model. The questionnaire was given to seven (7) experts [those are academicians holding doctorate degrees; working at University of Malaya, in faculty of education and faculty of computer science & information technology] for validation. Three of them did not respond. Comments and suggestions were taken into considerations and incorporated in the questionnaire. The final version of the questionnaire was then approved by the supervisor. It consists of three sections: section A on demographic characteristics consisting of eight (8) questions, section B consists of sixty eight (68) Likert-scale (7 points) questions, and section C consisting of six (6) open-end questions and a room for comments/suggestions.

The questionnaire was uploaded to the model website and made accessible to students participating in the testing of the model. This was done at the end of the test period, and students were given a week to fill-in the questionnaire online. Out of the 64 registered students in the courses used for testing of the model, only 57 responded and filled the questionnaire. The data was then exported to PASW Statistics 18 for analysis.

The questionnaire was then tested for reliability on all items, and found to have a Cronbach's Alpha of 0.982, and 0.981 based on the standardized items. There were 48 valid cases out of the 57, which represents an 84.2% based on the reliability test. However, when the questionnaire was tested for reliability of the Likert-Scale items, excluding the demographic items, a Cronbach's Alpha was found to be 0.984, and 0.985 based on the standardized items. The mean is 4.768, and the minimum and maximum values were 4.25, and 5.396 respectively.

3.3.8.3 Data Analysis

As indicated earlier, the data collected through the questionnaire was keyed into PASW Statistics 18. Then, it was analyzed by using the aforementioned software. Descriptive statistics was applied in addition to dimension reduction technique – factor analysis - where the principle component analysis was used. The aim is for data reduction, as explained in the following section.

3.3.8.3.1 Factor Analysis

"Exploratory factor analysis is the most widely used statistical methods in the psychological research" (De Winter, Dodou, & Wieringa, 2009). This method was used in this study to extract factors out from the variables of the questionnaire to simplify the analysis and grouping of related variables. The major intention of the researcher was data reduction, therefore the principal component analysis was used as a suitable extraction method (Preacher & MacCallum, 2002) quoted by (Treiblmaier & Filzmoser, 2010), in addition to the fact that normal distribution is not prerequisite (Reimann, Filzmoser & Garrett, 2002) quoted by the same source.

The sample size has influence on the analysis, where the larger samples will have less probability of errors, more accurate estimates and generalizability (Treiblmaier & Filzmoser, 2010). Several recommendations for sample size are there in the literature, ranging from absolute sample size to ratio between subjects and variables (Treiblmaier & Filzmoser, 2010). However, according to MacCallum *et al* (2001) quoted in Treiblmaier & Filzmoser (2010) this could be oversimplifying of the issue as the "population factors in data can be adequately recovered if communalities are high" (Treiblmaier & Filzmoser, 2010). They go further in saying that researchers usually recommend larger sample size than usual, when the communalities are low (Treiblmaier & Filzmoser, 2010).

The sample size for this questionnaire; as shown above is 57 with 48 valid cases. TThis is considered a small sample size as established in the literature, where the minimum accepted size of 50 is considered poor (De Winter, Dodou, & Wieringa, 2009). Small sample size is treated cautiously by researchers when using factor analysis. However, small sample size should not be of high concern to researchers and reviewers as indicated by Preacher & MacCallum (2002), if the communalities are high, number of factors is relatively small and model error is low. In this study, the communalities of all items were above 0.6 as shown in Table 7.4, and the number of factors extracted was six as shown in Table 7.2

Hogarty, Hines, Kromrey, Ferron, & Mumford (2005) and (Treiblmaier & Filzmoser, 2010) asserted that the sample size depends on both communality of the variables and overdetermination of the factors based, on MacCallum, Widaman, Zhang & Hong (1999) and MacCallum, Widaman, Preacher, & Hong (2001) studies. Overdetermination "refers to the degree to which the factor is clearly represented by a sufficient number of variables" (Hogarty *et al* 2005) where it is considered so if it has "high loadings on at least three to four variables and exhibit good simple structure"

(Hogarty *et al* 2005). Similar recommendation can be found in De Winter, Dodou & Wieringa (2009), where they suggested that the "lower sample sizes were needed when the level of loadings (λ; therefore the communalities) was high, the number of factors (f) small, and the number of variables (p) high" (De Winter, Dodou & Wieringa, 2009), which is in line with MacCallum *et al* (1999) theoretical framework as indicated by the same source. In addition to the above, several researchers have used small sample sizes in their studies regardless whether they employed factor analysis or not. Examples can be seen in the work of Rovai (2001), Ifinedo (2006), Henson & Roberts (2006), Van Raaij & Schepers (2008), Bangert & Easterby (2008), Yu (2009), Abedin, Daneshgar & D'Ambra (2010a), and Abedin, Daneshgar & D'Ambra (2010b), where the sample sizes were 20, 72, 60, 45, 53, 49, 47 and 40 respectively.

De Winter, Dodou, & Wieringa (2009) reported that in certain conditions, sample size was less than number of variables, although some studies and factor analysis guidelines argue that this should not be the case. On the other hand, they reported that Marsh and Hau (1999) proved that surpassing the equality barrier has no negative effect on the simulation results. In their own study, De Winter, Dodou, & Wieringa (2009) reported a similar outcome, while even going further in suggesting that increasing the number of variables was beneficial, even when it exceeds the sample size. They supported their argument and results with the proof by Robertson and Symons (2007), that this case is valid for maximum likelihood factor analysis, despite that such method considers such case as "impossible because the covariance matrix turns nonpositive definite" (De Winter, Dodou, & Wieringa, 2009). They recommended going as far as possible in increasing number of variables provided that it does not challenge the overall quality of the set. In regards to the number of factors to be decided on, they recommend to go for most appropriate number of factors rather than the correct number (De Winter, Dodou, & Wieringa 2009). In addition to this, Preacher & MacCallum (2002) suggested that decreasing the number of factors has a negative impact on the communalities, while increasing it, will compromises interpretability. In conclusion of the use of factor analysis, it has been asserted that “considering that models are useful unless they are grossly wrong (MacCallum, 2003) and a small sample size factor analytic model is not per definition grossly wrong, applying factor analysis in an exploratory phase is better than rejecting EFA a priori.” (De Winter, Dodou, & Wieringa, 2009)

3.3.8.3.2 Lecturer Evaluation

To support and supplement the evaluation results of the model by the students; another evaluation, as a feedback from the participating lecturers, was used. It consists of open-ended questions to guide lecturers in the evaluation process. The form can be found in the appendix. The use of both quantitative and qualitative data – triangulation - would improve the validity and reliability of the results. In addition, conducting the evaluation by all the parties involved i.e. students and lecturers, will improve~~s~~ the credibility and validity of the evaluation, as it shows two different perspectives.

3.3.9 Draw Guidelines for Higher Education

Based on the above phases, the researcher compiled a guidelines document for the implementation of e-learning, and particularly, blended learning, in the HEI in Palestine. This document shall act as a roadmap for traditional universities in Palestine, for their efforts to implement blended learning as a mean to migrate from the traditional settings of teaching and learning into a state where technology is used, incorporated and utilized within the teaching/learning process.

3.3.10 Summary

This chapter highlights the research framework, research flow, the research methodology, research methods and techniques used in the study. It explains the steps undertaken in conducting this study, starting from the initial steps in formulating the problem statement and research objectives, through the review of the literature, into the major phases of developing the model and implementing it, up to the analysis and discussions of the results and finding. The following chapters explain the major phases of the study, starting from the foundation of the new model in chapter four, to model development and evaluation in chapter five, to model implementation in chapter six, and model testing in chapter seven, into discussions and conclusions in chapters eight and nine.

CHAPTER 4

FOUNDATIONS OF THE NEW MODEL

4.1 Introduction

In this chapter, the preparation process to develop the new model is explained. As shown earlier, one of the objectives in this research is to develop a blended learning model while taking into account the factors that affect the blended learning. Some of these factors were identified earlier in Chapter two (2) and tabulated in Table 2.21. More factors, related to the Palestine, are to be explored and identified in this chapter through further analysis of data gathered from a questionnaire that was distributed among faculty members at the Palestinian universities. Furthermore, the use of these factors and other elements like problems, barriers, concepts, and learner characteristics, in developing the model through extracting their effects in the form of an input to model the development and implementation, are highlighted. A model, in the form of a proposed solution to problems facing the implementation of e-learning in the traditional universities in Palestine, has been proposed at the end of this chapter, which paves the ground for the new model to be designed and developed.

4.2 Input to the Model Design and Development Based on the Literature

In this section, an input to the model in the form of requirements is discussed based on what have been identified in the literature which are related to problems, barriers, factors, concepts, learner characteristics, and teaching principles.

4.2.1 Problems and Barriers of E-learning

As explained in chapter two, there are several problems and barriers to e-learning. They are listed below, and are used as one input to the design of the new model. It is used as a supporting evidence for the blended learning model under a consideration. The model takes these problems into consideration and either to eliminate or minimize their negative effects.

As we can see, these negative aspects of e-learning can be used as the driving factors in the design, development and implementation of a blended learning model.

4.2.1.1 The problems of e-learning:

As it has been indicated, those problems are related to the implementation of e-learning (in this context; pure e-learning) which has been summarized in Table 2.12, and needs to be resolved. Blended learning would be the solution. However, not just any blend, but to resolve those problems, the new model is designed and developed to eliminate or to minimize them. They have been used as an input to the design and development of the model. For example, to resolve problems number 1 and 3, the model blends face-to-face with e-learning (Internet based). In this way, there will be a direct interaction in the face-to-face setting, and through synchronous communications on the Internet. Here, the problems act as an input to the model, where they impose certain types of blend like face-to-face with e-learning (Internet) and synchronous/asynchronous communication. Summary of the inputs and imposed requirements on the model development, by the above mentioned problems, are shown in Table 4.1 below.

Table 4.1 Summary of Requirements and Inputs to Model Development and Implementation

Derived from:	Input
Problems of e-learning (Table 2.12)	Provide direct interaction between instructor and learner Provide JIT feedback and interaction in synchronous and asynchronous learning Offer platform-independent materials Decrease cost Provide face-to-face contact and social interaction Keep technology requirement to the minimum Keep extra preparation time demand to a minimum Make learning comfortable to learner and instructor Should be applicable to all students and courses Simplify the exploration of all functions with minimum effort Simplify and make easy to use with minimum technical skills Improve instructor's skills Balance focus on content, process and setting
Barriers to E-learning (Table 2.13)	Require minimum skills from instructor and learner Provide social interaction, Encourage blended learning culture Decrease time needed for preparation & for course development, Provide support for studies and technical problems Decrease cost for students and institutions Provide simple and friendly environment Provide for smooth change in the organization Minimize the need for technical expertise Adopt and adapt to quality standards and issues Comply with the existing legal issues Provide for measures against plagiarism Improve academic practice
Factors in blended learning (Table 2.21)	Accommodate characteristics and teaching style Offer student-2-Student social relation Accommodate characteristics and learning style Offer variety of communication/ interaction methods/approaches Allow for self-paced learning and self-discipline Engage student in more active role in learning Simplify to decrease need for technical skills by both student and lecturer Make content available in variety of formats 24/7 Utilize online resources Offer mix of learning theories Enrich content and learning process Provide for knowledge construction and transfer Utilize instructional technology and multimedia Provide for variety of instructional strategies Decrease cost for student and institution Allow for flexible time to learn Allow for learner to learn at convenient time Allow learner and instructor to interact / communicate in a flexible and convenient way 24/7 Be flexible in regards to development level (activity, course, …) Make good use of available infrastructure Minimize the need for simple technical support, Minimize the need for simple content development support Offer variety of delivery options of contents and lectures

Table 4.1, Continue

Derived from:	Input
Concepts and criteria for blended learning (Table 2.16)	Provide for interactive, creative and collaborative activities for learners Provide for live events based on ARCS model of motivation (Attention, Relevance, Confidence, and Satisfaction) Assist learner in self-paced learning by offering learning based on Gagné nine events of instruction Implement Clark's three principles on the use of multimedia Offer assessment based on Bloom's taxonomy Develop small dynamic multimedia components Utilize streaming video, rich visualization and interactivity Provide interactive learning environment Comply with the usability attributes Provide for consistency and smooth transition among interrelated components, and allow for redundancy among components
Pedagogy (Section 2.11.1.10.3)	The model must accommodate the different learning styles of learners. The model should be able to motivate learners. The model should offer a mix of learning theories like behaviorism, constructivism, cognitive. Lecturer should be able to adopt any of the theories as deemed suitable. Student should be able to follow the selected theory, as well as adopt his/her own, especially in learner-centered learning
Learner characteristics (Table 2.19)	Motivate learner Assist in learning plan Minimize needed technical and computer skills by learner Allow for independent study while maintaining control and provide directions
Good teaching principles (Table 2.20)	Allow for learner-lecturer interaction Provide a cooperation environment among students Accommodate different learning styles Make lecturer's tasks as easy as possible, bearing in mind the different roles of the lecturer

4.2.1.2 Barriers to E-learning

Several barriers to e-learning exist as summarized in Table 2.13. They should be eased if not eliminated. The adoption of blended learning model would help in this direction. The new blended model intends to overcome or ease such barriers. The above barriers impose several requirements/ input on the blended learning model development. Those requirements/ input are shown in Table 4.1.

4.2.2 Factors

As shown earlier in Table 2.21, Chapter two (2), several factors exist that affect the blended learning in higher education. Those factors impose several requirements/ input to the model development. They are shown in Table 4.1.

4.2.3 Concepts and Criteria for Blended Learning

The concepts and criteria shown in Table 2.16, Chapter two (2), are extracted from the literature, and are used as a foundation for the development of the new model. The model is built around, and based on those concepts and criteria in the form of an input to the model development as shown in Table 4.1.

4.2.4 Learner Characteristics

The inputs derived from the learner's characteristics are shown in Table 4.1. They serve as an indication of what is needed from the model to address those characteristics

4.2.5 Teaching Principles

As shown earlier in chapter 2, there are some good teaching principles that teachers should follow. These principles used here are to show how the model addresses them. This is expressed as inputs to the model development, which is shown in Table 4.1.

4.2.6 Summary of Requirements and Inputs to Model Development

Table 4.1 summarizes the requirements and inputs to the model development based on the literature review. These requirements and inputs have been derived from the respective elements, which are directly related to the blended learning model development, i.e. problems, barriers, factors, pedagogy, and learner. In addition, some other elements are also considered as guidance purposes, even though they are not directly considered as part of the proposed model, namely good teaching principles, and concepts and criteria for blended learning. These, in addition to what is found later on

Palestine, are used as a base and guidance to develop the model, and then to implement the software – Internet-based – as part of it.

The above are the requirements derived mainly from the literature, which comprises one part of the overall requirements. The second part is covered in the following section on the higher education in Palestine.

4.3 Higher Education in Palestine

Based on the literature review in chapter 2, there are several barriers and problems facing the Palestinian educational system as summarized in Table 2.9. However, there are some other problems/barriers that are faced by e-learning in the higher education in particular. These are revealed by further analysis of a survey that has been distributed among faculty members at the Palestinian universities in the West Bank, Palestine (Shahin & Singh, 2007).

4.3.1 Analysis of the Questionnaire

Prior to carry out the data analysis of the questionnaire, it is worth mentioning that the initial analysis and results of the questionnaire were reported in Shahin & Singh (2007). Therefore, such analysis is not repeated here. However, a summary of which is given below to act as an introduction to further the analysis of the questionnaire, especially the part that concerns with the problems and 'needs' of e-learning.

4.3.1.1 Summary of Questionnaire Analysis

The main concern of the previous reporting and analysis was to highlight the faculty perception towards e-learning. The analysis revealed some interesting findings.

The familiarity of the respondents with e-learning differs. About a quarter (23.7%) of the respondents were unfamiliar with e-learning, while 36.8% said it is good[7], and 31.6% said it is very good. In terms of attending formal e-learning classes, about 43.4% of the respondents never attended such training during their studies, while 60.5% of them had attended a training course/workshop on e-learning. On the usage of e-learning during their teaching career, 36.8% said they never used it, while only 9.2% said they used it often. On the other hand, about 15.8% said they have been using it for one year, while only 10.4% said they have been using it for two or more years.

The faculty members' opinion on using e-learning in the Palestinian universities revealed that, 51.3% of the respondents said it should be used for some courses/programs, while 32.9% said it should be for most courses/programs, and only 7.9% said it should be used for all course/programs. When asked if he/she has the opportunity to teach a course through e-learning, 25% of the respondents said they prefer the course to be offered mainly in class with online assistance, while 61.8% prefer the course to be offered as a mixture of online and in-class, and with only 2.6% prefer the course to be offered completely online.

Gender has some influence on the familiarity with e-learning (as rated by the faculty members themselves), where 70.3% of the male said their familiarity is good or very good , and 60% of female said it is good or very good. The academic qualification has no significant influence on the faculty member's familiarity with e-learning. Noticeably, years of teaching experience has a nonlinear relation with the familiarity on e-learning. The 11-15 years of experience category has the highest percentage (85.5%), when rating familiarity as good/very good, followed by 6-10 years category (80%), then 1-5 years category with 69.2%, and finally those with more than 15 years of experience 57.7%. Strangely, training has no significant effect on those who rated their familiarity with e-

[7] On a scale of not familiar at all, poor, good, very good, and excellent

learning as ‘poor’, and to a less extend on those who rated it as ‘good’. Attending a course through e-learning has more significant effect on the familiarity rating. About 83.3% of those who rated their familiarity as poor have not taken such course, while 57.1% of those rated it as ‘good’ have not taken such course either. Familiarity with e-learning has some influence on using e-learning in teaching, as 48.9% of those with poor or good familiarity never used e-learning before, while 60.7% of those with very good or excellent familiarity have used e-learning in teaching.

As a conclusion, faculty members’ exposure to e-learning is relatively new. Training has been provided to some, but it seems that such training should be more carefully designed and executed. The majority of faculty members are with-adopting the blended learning setting.

However, after further analysing the questionnaire, more findings in relation to problems and needs have been revealed. Those problems and needs are cross-tabulated with some demographic elements.

4.3.1.2 Problems

The response to the question:”*If **e-learning is to be implemented in <u>your</u> university;** the top three **problems** you think might face the university in this implementation are:*” is tabulated in Table 4.2. The categories were generated by the “SPSS Text Analysis for Surveys 2.1” software. The software allows for grouping of key terms that it extracts from the qualitative data. It groups relevant terms and key words, while allowing the user to manipulate and alter terms and grouping as necessary. The detailed and original list created by the ‘SPSS Text Analysis for Survey’ software can be found in Appendix B. Then, results obtained from the analysis were exported to SPSS version 16 for further analysis. Descriptive statistics was used to calculate frequencies, and to cross tabulating the identified problems with some demographic characteristics o fthe respondents to further explore the relationships between those problems and the demographic characteristics. This gives more insights into the problems and there relevance to the model development at a later stage.

The following is the explanation of the problems.

1. *Lecturer-related*: This category contains all problems that related to the lecturer, such as time needed, lack of knowledge/know how, skills, among others. The term 'lecturer' means the same thing as teacher, faculty member, and instructor, as expressed by the respondents. Not surprising, this category has the highest number of responses, indicating a positive thinking by the faculty members on pinpointing to the most crucial element in the teaching/learning process, realising the shortage and needs for appropriate lecturers. This category intersects with problem number 4 in Table 2.22.

Table 4.2: Categories of E-learning Problems in Palestinian Universities as Identified by Faculty Members

Problem category	**Number of responses**	**Percentage**	**Rank**
1. Lecturer-related problems	26	34.21	1
2. Student-related problems	22	28.95	2
3. Computers-related problems	18	23.68	3
4. Infrastructure problems	17	22.37	4
5. Administrative problems	15	19.74	5
6. Facilities and equipments problems	12	15.79	6
7. Cost problems	8	10.53	7
8. Training problems	7	09.21	8
9. Expertise/experience-related problems	7	09.21	8
10. Psychological problems	7	09.21	8
11. Pedagogical/educational problems	6	07.89	11
12. Technical problems	5	06.58	12
13. Software problems	4	05.26	13
14. Legislative and political problems	3	03.95	14
15. Content problems	2	02.63	15

2. *Student-related*: The second highest category in terms of responses covering a wide range of specific problems related to students. Examples of such problems include lack of skills, unfamiliarity with e-learning, motivation, affordability to have own

computer, accessibility to the Internet. This category intersects with problems number 1, 8, 9, 11 and 12 of Table 2.22.

3. *Computers-related*: This category covers the problems that are related to computers (desktop, laptop ...) in terms of availability, numbers, access. This category intersects with problems number 2, 3, and 7 of Table 2.22.
4. *Infrastructure problems*: This category covers problems on the infrastructure within the university/country, servers, bandwidth, Internet, connections; access. This category intersects with problems number 2, 3 and 7 of Table 2.22.
5. *Administrative problems*: These are related to change management/introduction, management culture, popularity of e-learning, the need of e-learning, incentives, organization. This category intersects with problems 2, and 3 of Table 2.22
6. *Facilities and equipments problems*: This category covers problems that are related to the availability of rooms, equipments like LCD (projectors) and other presentation devices, insufficient hardware and facilities in terms of numbers and suitability. This category intersects with problems number 2, 3 and 8 of Table 2.22.
7. *Cost problems*: This category covers funds, budget, affordability; implementation cost. This category intersects with problems number 3, 8, and 11 of Table 2.22.
8. *Training problems*: This is mainly regarding the training programs for lecturers, expressing a lack of such training for both lecturers and students, in addition to lack of qualified trainers. This category intersects with problem number 4, and 7 of Table 2.22.
9. *Expertise/experience-related problems*: This category covers the lack of experts, and also lack of experience in e-learning among staff. This category intersects with problem number 4 and 10 of Table 2.22
10. *Psychological problems*: This category covers perception, adaptation, seriousness, hesitancy, objections and confidence among staff and students.

11. *Pedagogical/educational problems*: This category covers evaluation problem, applicability to all courses/fields, traditional teaching methods, and other pedagogical problems. This category intersects with problems number 1, 7, and 12 of Table 2.22.
12. *Technical problems*: This covers technical issues, technical support and assistance, and installation problems.
13. *Software problems*: This category covers availability and confidence in software.
14. *Legislative and political problems*: This category covers road blocks and closure, copyright, support by ministry of higher education. This category intersects with problems number 5, 9, and 10 of Table 2.22.
15. *Content problems*: This category covers instructional material development and availability

Table 4.3: Cross-tabulation of Gender with Problems

Problem	Gender	
	Male	Female
1. Lecturer-related	21	5
2. Student-related	20	2
3. Computers-related	14	4
4. Infrastructure problems	15	2
5. Administrative problems	11	3
6. Facilities and equipments problems	10	2
7. Cost problems	6	2
8. Training problems	5	2
9. Expertise/experience-related problems	5	2
10. Psychological problems	5	1
Percentage	83.5	16.5

The above problems were cross-tabulated with some of the demographic characteristics of the respondents. For this purpose, only the top 10 categories of problems are considered, as the others are of lower frequency. An exploration of the gender of the respondents with the problems is shown in Table 4.3. It is noticed that from Table 4.3, female respondents have higher percentages of their male counter parts, when identifying the problems compared to their overall percentage in the sample and in the population. Exceptions can be seen in problem number 4, where they scored less than their relative percentage.

Interpreting the effect of the academic qualification of the respondent – as shown in Table 4.4 - shows that those with bachelor degree are less likely to identify the problems they may face. However, for those with Masters or Doctorate degrees, have no particular trend in pinpointing the problems. More doctorate degree holders have identified problems number 1, 5, 7 compared to Master's Degree holders; while the later have identified problems number 2, 3, 4, 8 more.

Table 4.4: Cross-tabulation of Qualification with Problems

Problem	Qualification			
	Bachelor	Masters	Doctorate	Other
1. Lecturer-related	1	11	14	0
2. Student-related	1	12	9	0
3. Computers-related	2	9	7	0
4. Infrastructure problems	2	9	5	1
5. Administrative problems	0	5	9	1
6. Facilities and equipments problems	2	5	4	0
7. Cost problems	0	3	5	0
8. Training problems	0	6	1	0
9. Expertise/experience-related problems	1	3	3	0
10. Psychological problems	0	3	4	0
Percentage	8.7	45.3	44.2	1.7

The largest three groups of respondents (computing, engineering and natural sciences) scored similar percentages in identifying the various problems as shown in Table 4.5. However, in the infrastructure problem, computing major respondents scored five times more than the natural sciences major, while the later scored five times more than the first in the administrative problems. Computing major respondents are more concerned about the first 7 problems except problem which is related to administration. The same thing holds true for natural sciences, except that they are less concerned about problems related to infrastructure. Engineering ones on the other hand, are mainly concerned about the first 4 problems, and problems number 6 and 9. Social science major respondents are more concerned about problems related to lecturer, student, infrastructure and expertise. On the other hand, arts/humanities major respondents are concerned about problems related to lecturer and administration. Administrative sciences major respondents are concerned about problems related to students, infrastructure, administration and training. It is evident that the respondent's major has an effect on the type of problems, when facing the e-learning implementation as he/she perceives it.

Table 4.5: Cross-tabulation of Field/Major with Problems

Problem	Field/Major							
	Computing	Admin Sc.	Engineering	Education	Arts/Hum	Social Sc.	Natural Sc.	Others
1. Lecturer-related	6	1	3	1	3	2	6	3
2. Student-related	5	3	3	1	1	3	4	1
3. Computers-related	5	1	2	1	0	0	6	2
4. Infrastructure problems	5	2	3	1	1	2	1	2
5. Administrative problems	1	2	1	1	4	0	5	0
6. Facilities and equipments problems	4	1	3	1	0	0	3	0
7. Cost problems	3	1	1	0	0	1	2	0
8. Training problems	1	2	0	1	0	1	1	1
9. Expertise/experience-related problems	1	0	2	0	0	2	1	1
10. Psychological problems	1	1	1	1	1	1	1	0
Percentage	23.4	10.2	15.0	6.0	7.2	8.4	23.4	6.6

As Table 4.6 shows, respondents with more than 15 years of experience are mainly concerned about problems related to lecturer, student, computers, infrastructure, and administration, while those with less than 6 years of experience are mainly concerned about the first 4 problems, and problems related to facilities, cost, and expertise. Those with 6-10 years' experience are mainly concerned about problems related to lecturer, administration, psychology, and to a less extend about computers and infrastructure problems. The final category is concerned about problems related to lecturer, infrastructure, administration, cost and psychology.

Table 4.6: Cross-tabulation of Year of Experience with Problems

Problem	Years of experience			
	1-5	6-10	11-15	>15
1. Lecturer-related	7	6	4	9
2. Student-related	11	2	1	8
3. Computers-related	9	3	0	6
4. Infrastructure problems	6	3	3	5
5. Administrative problems	3	4	3	5
6. Facilities and equipments problems	9	1	1	1
7. Cost problems	4	0	2	2
8. Training problems	2	2	1	2
9. Expertise/experience-related problems	4	2	1	0
10. Psychological problems	1	4	2	0
Percentage	36.6	19.8	12.8	30.8

As shown in Table 4.7, lecturers whose level of familiarity is poor are more concerned about problems related to lecturer, student, computers and infrastructure. Similar interest is evident in the 'Good' level of familiarity category, with administrative problem replacing the infrastructure. Those with very good level of familiarity are more concerned about student, computers, infrastructure, and facilities. On the other hand, those with excellent familiarity level are mainly concerned about lecturer and student problems.

Table 4.7: Cross-tabulation of Familiarity with E-learning with Problems

Problem	Familiarity with E-learning			
	Poor	Good	Very good	Excellent
1. Lecturer-related	10	9	4	3
2. Student-related	7	5	7	3
3. Computers-related	6	7	5	0
4. Infrastructure problems	5	3	8	1
5. Administrative problems	2	9	4	0
6. Facilities and equipments problems	2	3	6	1
7. Cost problems	4	0	3	1
8. Training problems	2	0	4	0
9. Expertise/experience-related problems	1	4	1	1
10. Psychological problems	1	3	3	0
Percentage	25.3	34.1	32.4	8.2

For those who did not attend a training course/workshop on e-learning, they only manage to identify 38.9% of the overall problems as shown in Table 4.8. Similar relative trend in identifying problems is evident in both categories – attended/ not attended training.

Table 4.8: Cross-Tabulation of Attended Training on E-Learning with Problems

Problem	Attended Training	
	No	Yes
1. Lecturer-related	9	17
2. Student-related	9	12
3. Computers-related	8	9
4. Infrastructure problems	7	10
5. Administrative problems	3	12
6. Facilities and equipments problems	6	5
7. Cost problems	4	4
8. Training problems	3	4
9. Expertise/experience-related problems	4	3
10. Psychological problems	3	4
Percentage	38.9	61.1

Table 4.9 shows similar trend in identifying problems among those who have never used e-learning during their teaching career and those who just used it once or twice. Lecturer related problems score the highest in both categories, while student related problems scores the highest in the 'used it sometimes' category. Highest percentage of problems has been identified by those who never used e-learning before (38.1%), followed by those who used it sometimes (31.0%).

Table 4.9: Cross-tabulation of Use of E-learning During Teaching Career with Problems

Problem	Use of e-learning during teaching			
	Never	Once/Twice	Sometimes	Often
1. Lecturer-related	10	6	6	4
2. Student-related	6	4	10	2
3. Computers-related	8	4	2	4
4. Infrastructure problems	5	4	6	1
5. Administrative problems	7	2	5	1
6. Facilities and equipments problems	4	3	4	1
7. Cost problems	4	1	2	1
8. Training problems	3	1	2	0
9. Expertise/experience-related problems	3	0	3	1
10. Psychological problems	4	1	2	0
Percentage	38.1	19.6	31.0	11.3

Those who said that e-learning should be used in the Palestinian universities for some courses/programs, have identified most of the problems (56.2%), followed by those who said ‘for most courses/programs’ (34.3%) as shown in Table 4.10. In both categories, lecturer related problem scores the highest.

Table 4.10: Cross-Tabulation of E-Learning Should be used in Palestine with Problems

Problem	E-Learning Should be Used In Pal Univ.				
	No	Not Sure	For Some Courses	For Most Courses	For All Courses
1. Lecturer-related	0	1	14	9	1
2. Student-related	0	1	14	6	1
3. Computers-related	0	0	8	8	1
4. Infrastructure problems	0	0	12	5	0
5. Administrative problems	0	2	9	4	0
6. Facilities and equipments problems	0	0	7	5	0
7. Cost problems	0	0	6	2	0
8. Training problems	0	0	3	3	1
9. Expertise/experience-related problems	1	1	3	2	0
10. Psychological problems	1	0	3	3	0
Percentage	1.2	3.6	56.2	34.3	4.7

As it could be noticed from the above discussion, problems identified by the faculty members intersect with those that are identified in the literature and emphasise on them. However, problems number 10, 12, 13, and 14 –see Table 4.2 above- do not intersect with the problems/barriers in the literature. It must be noticed however, that those problems/barriers identified in the literature covers and emphasize mainly on the broader aspect of the education sector. This however, does not mean that those problems do not address the higher education in general and e-learning in particular, though there is no direct reference to such issue. While, on the other hand, the problems and barriers identified by the researcher through survey do address e-learning in the higher education. Therefore, they are more precise in revealing the e-learning status in the higher education in Palestine. The research takes mainly these problems into consideration in the development of the blended learning model. At the same time, not to ignore those that derived from review of the literature.

4.3.1.3 Needs for E-learning

The response to the question "**If you are to use some form of e-learning in courses <u>you</u> teach; t**he top three **things** you most likely need – as a lecturer- are:" is tabulated in Table 4.11. The same steps and method as in identifying problems in the previous section, were used to identify the 'needs' by lecturers when using e-learning in teaching courses.

In addition to the categories shown in the table, there are 20 respondents who did not answer the question. All these 'needs' intersect either directly or indirectly with the cost category of problems. This is either a direct influence of the cost involved in meeting these needs, or the consequences of not allocating the needed budget. 'Need' number 11 'Web features' does not match/intersect with any of the problems listed in Table 4.2. On the other hand, problem categories 10, 11, and 14, do not intersect/match with any of the needs listed in Table 4.11.

Table 4.11: Categories of e-learning NEEDS in Palestinian Universities as Identified by Faculty Members

Need category	**Number of responses**	**%**	**Rank**	**Intersects with Problem:#**
1. Internet and Networks	17	22.37	1	4
2. Training	14	18.42	2	1, 8
3. Facilities And Equipments	14	18.42	2	6
4. Computers	14	18.42	2	3
5. Software and Systems	12	15.79	5	13
6. Materials and Online Resources	11	14.47	6	15
7. Support and Assistance	9	11.84	7	4, 12, 15
8. Student's Side Needs	8	10.53	8	2
9. Time And Load	8	10.53	8	1, 5
10. Expert/ Lecturer	7	09.21	10	1, 9
11. Web features	6	07.90	11	
12. Others	4	05.26	12	5

#: see Table 4.2 for details

The following is an explanation of the needs.

- *Internet and Networks*: Is the highest category of needs, covering needs that is related to the Internet and its access and use, networks at the institution, availability of Internet connection at office and home.

- *Training*: Lecturers identified training as the second category of needs, which covers training on the e-learning systems, platforms, courses, workshops, technology, pedagogy.
- *Facilities and Equipments*: Covers the needs that are related to various equipments and facilities to support teaching and learning.
- *Computers*: Another critical category covering the needs that is related to personal computers, laptops, and computer labs.
- *Software and Systems*: Covers the needs for software and systems that are related to e-learning in particular, in addition to teaching and learning in general.
- *Materials and Online Resources*: Covers the needs for online/digital resources to support the teaching/learning process.
- *Support and Assistance*: Covers the technical and administrative support.
- *Student's Side Needs*: Covers the student accessibility, encouragement, ability, skills, and acceptability.
- *Time and Load*: Covers the needs on preparation time and load reduction.
- *Expert/ Lecturer*: Covers the needs for experts, lecturer's knowledge of e-learning, capability and skills.
- *Web features*: Covers the needs for various web features like email, and forums.
- *Others*: Covers some other needs like effectiveness, incentives, organization, and adaptability.

The above needs clearly show that e-learning in the Palestinian universities suffers a dramatic shortage in terms of the basic "needs" that must be fulfilled for a proper implementation and the use of e-learning. A strong indication is the fact that almost 26.3% of the respondents did not answer this question. This could be attributed to faculty members not knowing what is needed to use in e-learning. Another indication is the top five ‘needs’ categories; *Internet and Networks, Training, Facilities and Equipments, Computers, and Software and Systems.*

4.3.2 Factors for Blended Learning

In addition to the factors that were identified in the literature above by Shahin, Singh & Wah (2007b), other factors can be drawn from the discussion on the survey results. *Cost and Financial support* is one of the main factors to consider when implementing e-learning in the Palestinian universities. *Infrastructure* is another factor, where basic requirements are still not satisfactorily met. In addition, *lecturer* (faculty) – perception, characteristics, skill, experience - is yet another important factor to consider, as lecturer is a corner stone in the whole process. Another important factor to consider is the *learner* (student), as he/she is most affected by and determinant element of a successful e-learning implementation. *Pedagogy and Time* are two other factors. *Political and Legislative* factors in addition to the *language* factor - many lecturers did not participate in the survey because of the language, as the survey was conducted in English (Shahin & Singh 2007) - also concluded from the discussion and they support similar factors that were identified in the literature above.

In summary, within the Palestinian context, several factors have been identified and are used in the model development and implementation. They are:

1. Political factor on the national level (internal among factions, and external by Israel).
2. Legislative and legal factor
3. Experience factor on national, institution, and individual levels
4. Language factor
5. Cost and financial support factor
6. Infrastructure factor

7. Lecturer factor
8. Learner factor
9. Pedagogy factor
10. Time factor

When comparing this list of factors with the list of factors that were identified in the literature, it can be easily noticed that many of them are common in both lists. However, the legislative and legal factor is somehow unique to the Palestine, as current rules and regulations do not recognize/ accredit degrees gained through distance learning or complete e-learning (DFT 2006). The political factor is another unique one to the Palestine, especially when it comes to occupation by Israel and the many Israeli military checkpoints between cities and towns, which restrict the movement of the people. In addition, language factor is again, somehow unique to the Palestinian case, especially to many lecturers (Shahin & Singh, 2007) and students. This factor puts on some restrictions and barriers to the implementation of e-learning and blended learning. Infrastructure factor, though common in both lists, differs in scope and dimension. While it is concerned about detailed and very technical issues in the international aspect – as it has been revealed through the literature – it talks about general issues like the availability of Internet connections, speed and bandwidth, and concerned about the availability of computers and other devices in the Palestinian case. Looking at the two lists in light of the problems and barriers to e-learning in Palestine, and at the 'needs' to implement e-learning in higher education while considering the overall problems/ barriers, issues, concepts, criteria and quality standards within the e-learning and blended learning fields, we can compile a new list out of the two. The new list of factors is to be used for the development of the new blended model. It consists of the following factors:

1. Instructor factor
2. Learner factor
3. Infrastructure factor
4. Cost factor
5. Pedagogy factor
6. Time factor
7. Political factor
8. Legal factor
9. Language factor
10. Delivery mode factor
11. Instructional technology factor

4.3.3 Problems to be Resolved

On the other hand, among the many problems facing e-learning in Palestine, those that are directly related to the above factors and are feasible to deal with within this research scope and limits are considered in the development of the model. However, there are other problems that would be affected indirectly. These problems are:

1. Traditional education system.
2. Impact of Occupation.
3. Economic situation.
4. High student-to-lecturer ratio.
5. Instructor-related problems.
6. Learner-related problems.
7. Infrastructure.

To complete the picture, the ‘needs’ that have been identified earlier should be looked at as an integral part of this picture. It could be easily noticed that the top four ‘needs’ are beyond the capability or aim of this research. As such, the new model does not deal directly with the Internet and networking needs nor the training, facilities and computers ‘needs’. However, they are considered when building and implementing the model to be indirectly satisfied or compensated. The other ‘needs’ would be fully or partially fulfilled.

These factors, problems and needs lead to a number of inputs for the new model development. These inputs are summarized in the following section.

4.3.4 Input to Model Development

In this section, the input to model development, which has been derived from various dimensions and aspects as shown earlier, like factors, problems, barriers etc… is highlighted and explained.

4.3.4.1 Input Derived from Factors

As indicated above, the factors lead to a number of requirements/inputs to model development. These are:

- Decrease the need to attend face-to-face classes.
- Decrease daily cost for learner to be physically present in campus.
- Decrease cost for institution.
- Comply with the current rules and regulations.
- Utilize the available infrastructure.
- Improve instructor skills.
- Accommodate learner and instructor characteristics.
- Help improve the educational system.
- Improve teaching and learning methods.
- Save learner’s time.

4.3.4.2 Input Derived from Problems & Barriers

As the problems and barriers that have been identified from the survey, do intersect and relate to one or more problems and barriers in the literature, thus they will be considered for the development of the model as such. This is because, as explained earlier, these are more relevant to e-learning than those that were identified in the literature. They have direct influence on the development of the new blended model. These effects are shown in Table 4.12 below in the form of imposed inputs/requirements, which are taken into consideration when developing the model.

4.3.4.3 Inputs Derived from the Needs

Several requirements/inputs can be derived from the above-identified 'Needs' for e-learning. These include the following:

- Keep technology requirements to a minimum.
- Make use of the available bandwidth and connections without overwhelming it with high-demand applications and contents.
- Use small size and simple contents.
- Keep demand for high skills as low as possible.
- Offer mixture of face-to-face and Internet-based settings.
- Offer blended environment of the various components of the model.
- Make use of available contents/resources on the Internet.
- Utilize free open source tools and software.
- Motivate learners and instructor.
- Encourage self-paced learning.
- Keep the need for extra preparation time to a minimum.
- Easy to use.
- Simple.

4.3.4.4 Summary of Inputs Derived from Palestine

Table 4.12 summarizes the inputs to the model development, which have been derived from Palestine through data collected.

Table 4.12: Summary of Inputs from Information from Palestine

Problem/ Barrier	Input
Lecturer-related problems	Minimize requirement for new skills Keep technology requirement to the minimum Simplify and make easy to use with minimum technical skills Improve instructor’s skills Require minimum skills from instructor Minimize time needed for preparation & for course development,
Student-related problems	Provide direct interaction between instructor and learner Make learning comfortable to learner Improve human interaction and interest Keep technology requirement to the minimum Simplify the exploration of all functions with minimum effort Simplify and make easy to use with minimum technical skills Provide support for studies and technical problems
Computers-related problems	Keep technology requirement to the minimum Offer a mixture of face-to-face setting and Internet-based setting
Infrastructure problems	Keep technology requirement to the minimum Offer a mixture of face-to-face setting and Internet-based setting
Administrative problems	Provide simple and friendly environment Provide for smooth change in the organization, Offer a mixture of face-to-face setting and Internet-based setting
Facilities and equipments problems	Keep technology requirement to the minimum Balance focus on content, process and setting Offer a mixture of face-to-face setting and Internet-based setting
Cost problems	Keep technology requirement to the minimum Minimize cost for students and institutions Minimize the need for technical expertise Offer a mixture of face-to-face setting and Internet-based setting
Training problems	Minimize requirement for new skills Simplify and make easy to use with minimum technical skills Improve instructor’s skills Require minimum skills from instructor and learner Provide simple and friendly environment Minimize the need for technical expertise
Expertise/ experience-related problems	Simplify the exploration of all functions with minimum effort Simplify and make easy to use with minimum technical skills Improve instructor’s skills Require minimum skills from instructor and learner Provide support for studies and technical problems Minimize the need for technical expertise

Table 4.12, Continue

Problem/ Barrier	**Input**
Psychological problems	Provide direct interaction between instructor and learner Provide JIT feedback and interaction Minimize requirement for new skills Provide face-to-face contact and social interaction Learner should be self-discipline and responsible person Make learning comfortable to learner and instructor Simplify the exploration of all functions with minimum effort Simplify and make easy to use with minimum technical skills Require minimum skills from instructor and learner Provide support for studies and technical problems Provide simple and friendly environment Motivate learner
Pedagogical/ educational problems	Provide face-to-face contact and social interaction Learner should be self-discipline and responsible person Make learning comfortable to learner and instructor Should be applicable to all students and courses Balance focus on content, process and setting Provide for measures against plagiarism, Improve academic practice Offer a mixture of face-to-face setting and Internet-based setting
Technical problems	Keep technology requirement to the minimum Require minimum skills from instructor and learner Provide support for studies and technical problems Minimize the need for technical expertise
Software problems	Simplify the exploration of all functions with minimum effort Simplify and make easy to use with minimum technical skills Require minimum skills from instructor and learner Provide simple and friendly environment
Legislative and political problems	Make learning comfortable to learner and instructor Minimize cost for students and institutions Adopt and adapt to quality standards and issues Comply with the existing legal issues Offer a mixture of face-to-face setting and Internet-based setting
Content problems	Balance focus on content, process and setting Minimize time needed for preparation & for course development Make contents available 24/7 Make use of available relevant resources from the Web

Table 4.12, Continue

Problem/ Barrier	Input
Needs	Keep technology requirements to a minimum Make use of the available bandwidth and connections without overwhelming it with high-demand applications and contents Use small size and simple contents Keep demand for high skills as low as possible Offer mixture of face-to-face and Internet-based settings Offer blended environment of the various components of the model Make use of available contents/resources on the Internet Utilize free open source tools and software Motivate learners and instructor Encourage self-paced learning Keep the need for extra preparation time to a minimum Easy to use Simple
Factors	Decrease the need to attend face-to-face classes Decrease daily cost for learner to be physically present in campus. Decrease cost for institution Comply with the current rules and regulations Utilize the available infrastructure Improve instructor skills Accommodate learner and instructor characteristics Help improve the educational system Improve teaching and learning methods Save learner time

4.4 Summary of Inputs to Model Development

The full requirements, from both literature and Palestine, are combined together and shown in Table B.1 of appendix B.

4.5 Solving the Problems

After identifying which problems to consider, a solution should be proposed to resolve them. Looking at each problem in light of the factors identified earlier, and within the scope and limits of this research, a solution for each is proposed.

1. *Traditional education system problem*: As noted earlier in the literature, it is not advised to 'jump' to the other extreme. Moving gradually and smoothly will be a better choice than going completely online – 'pure' e-learning. As such, the

elements that contribute to resolving this problem are: 1) blending face-to-face setting with Internet based on e-learning; 2) blending several delivery modes i.e. synchronous and asynchronous such as face-to-face, email, forums, downloaded contents; 3) blending learning theories: constructivism and behavioral 4) employing and blending instructional strategies such as *discovery-based/ didactic-based, case-based, scenario-based, problem-based* … . Through this, the education system will gradually shift to a more learner-centered learning, while not alienating both the learner and instructor from what they have been accustomed to. Learners will be exposed to a more modern ways to learn, where they will take some controls over the learning process. Instructors will be migrating from the traditional teaching methods in a pace that suites their individual characteristics and skills. This is in line with the principles of good teaching, according to Tham & Werner (2005).

2. *Impact of occupation*: The proposed solution will definitely not end the occupation. However, what it can do is to ease some of its negative impacts. This can be done through 1) blending face-to-face with Internet based setting, 2) offering flexible and convenient time, in addition to having electronic contents available 24/7. In this way, the need to be physically present in campus every class/day is decreased, at the same time if for any reason related to occupation, a student cannot come to class, he/she can use the Internet-based settings to communicate and interact with lecturers and students, and to access contents and other related materials online.
3. *Economic situation and cost:* This model is not an economic solution to the problem. However, it contributes in decreasing the relative cost to attend classes – commuting and other daily expenses - and drops relative cost through saving room occupancy time and related expenses like electricity cost. This can be accomplished through 1) blending face-to-face with Internet based settings, 2) not demanding high cost/sophisticated equipments. In this way, students do not have to come to campus

all the time, which in turn reduces the relative cost of computing and other expenses. In addition, when the model is implemented in the simplest possible way, with options and alternatives for communications methods, and for contents types and delivery methods, students can mostly use whatever computers and equipments they have without the need to buy extra and/or sophisticated ones.

4. *High student-to-lecturer ratio:* It can decrease the negative effect of this ratio through 1) blending face-to-face with Internet based settings, 2) offering variety of delivery modes, 3) variety of communication methods, and 4) blending variety of instructional strategies. This is achieved, as a result of the above, as it becomes easier to contact and communicate with larger number of learners through electronic methods. Contents can be easily distributed/ delivered to learners in forms other than the traditional text-based content delivery. The blend of instructional strategies allows for a better control over large classes and for a better transfer and/or construction of knowledge to and at the learner's mind.
5. *Infrastructure:* As the current infrastructure does not support pure e-learning, or at least the more dependency on technology in learning, the model considers this fact and utilizes the available infrastructure through blending face-to-face and Internet based settings which does not need any sophisticated infrastructure, leaving it up to the implementer to make the best use of the available technology.
6. *Instructor-related problems:* A solution to these problems – or at least easing them- is 1) blending face-to-face with Internet based settings, 2) blend of learning theories like constructivism and behavioral theories, 3) blending various delivery modes, and 4) blending communications methods. In this way, by depending on the instructor's characteristics, experience and teaching styles, he/she can choose what suites him/her best when doing the job. At the same time, the model, through its blends, encourages, and in fact requires the instructor to improve his/her skills and teaching

methods through the gradual implementation of the model. For example, through one and three above, the instructor is encouraged and 'forced' to use and utilize some technology.

7. *Learner-related problems:* Similar to the instructor-related problems, the solution is the same but from the learner's perspective. In addition to that, the blend of various instructional strategies also contributes to the solution. Depending on the learner's characteristics and learning style, the instructor can offer what suites the learner best, be it communication method, content delivery, learning theory or instructional strategy. At the same time, the learner has the choice for communication method, delivery mode, and instructional strategy, whichever that suite him/her best.

The problems and proposed solutions are summarized and shown in Table 4.13

Table 4.13: Problems and proposed Solutions based on Literature and Information from the Questionnaire

Solution \ Problem	1	2	3	4	5	6	7
1. blending face-to-face setting with Internet based e-learning	√	√	√	√	√	√	√
2. blending several delivery modes	√	-	-	√	-	√	√
3. blending learning theories	√	-	-	-	-	√	√
4. blending instructional strategies	√	-	-	√	-	-	√
5. Time	-	√	-	-	-	-	-
6. blend of communications methods	-	-	-	√	-	√	√
7. Not demanding high cost/ sophisticated equipments.	-	-	√	-	-	-	-

As noticed above, a solution is proposed for each problem individually. Although this is a good start, it is the intention of this research to tackle and solve these problems collectively within the umbrella of the identified factors earlier. As it could be easily noticed, these problems are interrelated and the proposed solutions are overlapping in many instances. However, solution one contributes to solving of all problems, but does not mean it solves them all by itself. At the same time, several solutions contribute to solving a particular problem, such as problem seven (7). On the other hand, the factors that have been identified earlier play a major role in determining the proposed solution.

Similar to Table 4.13, factors and solutions can be tabulated too, as shown in Table 4.14.

Table 4.14: Factors and Proposed Solutions

Solution \ Factor	1	2	3	4	5	6	7	8	9	10	11
1. blending face-to-face setting with Internet based e-learning	√	√	√	√	√	√	√	√	√	√	√
2. blending several delivery modes	√	-	√	-	-	√	√	-	√	-	-
3. blending learning theories	√	-	√	-	√	-	-	-	-	√	√
4. blending instructional strategies	√	-	√	-	√	-	-	-	-	-	√
5. Time	√	√	-	√	-	√	√	-	-	√	-
6. blend of communications methods	√	-	√	-	√	√	√	-	√	√	-
7. Not demanding high cost/ sophisticated equipments.	-	-	-	√	-	-	-	-	-	-	-

In addition to the factors and problems above, the identified needs for e-learning in the Palestinian higher education institutions are taken into account, though not directly, for the final 'solution' in the form of the proposed model. Table 4.15 is a portrait of the factors, problems, needs and proposed solutions that craft the foundation of the new model.

Table 4.15: Portrait of Factors, Problems, Needs and Proposed Solutions

Factors	**Problems**	Needs	**Solutions**
1. Instructor 2. Learner 3. Infrastructure 4. Cost 5. Pedagogy 6. Time 7. Political 8. Legal 9. Language 10. Delivery mode 11. Instructional technology	1. Traditional education system 2. Impact of Occupation 3. Economic situation 4. High student-to-lecturer ratio 5. Instructor-related problems 6. Learner-related problems 7. Infrastructure	1. Internet and Networks 2. Training 3. Facilities And Equipments 4. Computers 5. Software and Systems 6. Materials and Online Resources 7. Support and Assistance 8. Student's Side Needs 9. Time And Load 10. Expert/ Lecturer 11. Web features 12. Others	1. blending face-to-face setting with Internet based e-learning 2. blending several delivery modes 3. blending learning theories 4. blending instructional strategies 5. Time flexibility 6. blend of communications methods 7. Not demanding high cost/ sophisticated equipments.

Combining the individual solutions as shown above, will result in an integrated solution for the above factors, problems and needs. This solution is actually the new blended learning model as described in the following chapter.

CHAPTER 5

THE NEW MODEL

5.1 Introduction

The new model is developed to address the factors in blended learning that have been identified earlier. It is a solution to the identified problems that are related to e-learning implementation in the higher education in Palestine. The general objectives of the model are to ease the problems, help to improve the education system by transforming it from traditional to blended learning, while improving learner satisfaction and motivation; improving communications among learners and instructors, and reducing relative cost for both learner and institution.

This chapter presents the new model. It shows the first version of the model, which was pilot tested – see Figure 5.1 – and an explanation of the model, then shows the results of the pilot test. It goes on explaining the revision process for improving the model and the questionnaire used for evaluating it – which was used in the pilot test – to come up with the revised version of the model as shown in Figure 5.2. This is then followed by reporting the evaluation results of the revised model, and finally a discussion of the findings.

5.2 Model Design

The first version of the model design which was pilot tested, as shown later in the next section, has gone under several attempts to evolve in this status. The design of the new model was carried out based on the previous works by other researchers. Mainly, the categories of possible blended learning settings as described in chapter two earlier and presented in Table 2.4, were used as the foundation base for the design and development of the new model. In addition, previously developed blended learning models were used for ideas and components to be included in the new model. An attempt was made to integrate the categories from Table 2.4 together in such a way that, features of each would complement other features from the remaining categories. Features or blends that are out of the scope of the research have been excluded, particularly those that are dealing with work/job-related blending learning. Once the initial design draft has been materialized, the factors for blended learning, barriers and problems of e-learning and blended learning, quality, concepts and issues – as described in the earlier chapters – have been used to design and develop the new blended learning model. The idea of the Venn diagram shape of the Set theory in mathematics and statistics has been used to visualize the relationship between the various components of the model. However, instead of using the 'oval' shape; a quadrant shape has been used. This is because it was found difficult to reflect the design idea and overall graphical representation of the components by using the oval shape. This approach is meant to show the interaction between the components and the containment of one component of another, while allowing inner components to interact with the outer ones directly without 'going through' the parent component as shown in Figure 5.1. For example, 'instructional strategies' component is contained in the 'learning theories' component, and at the same time, it has direct interaction with the 'synchronous/asynchronous communication methods' component. The same thing is true for the 'content delivery & media' component, where it is contained in the 'instructional strategies' component, and has direct interaction with the 'learning theories' and 'synchronous/asynchronous communication methods' components. The interaction is represented as that the side of a component touches the border of the outer component. The graphical representation of the model is shown in Figure 5.1. This is the first version of the model which was pilot tested by the lecturers from Palestine.

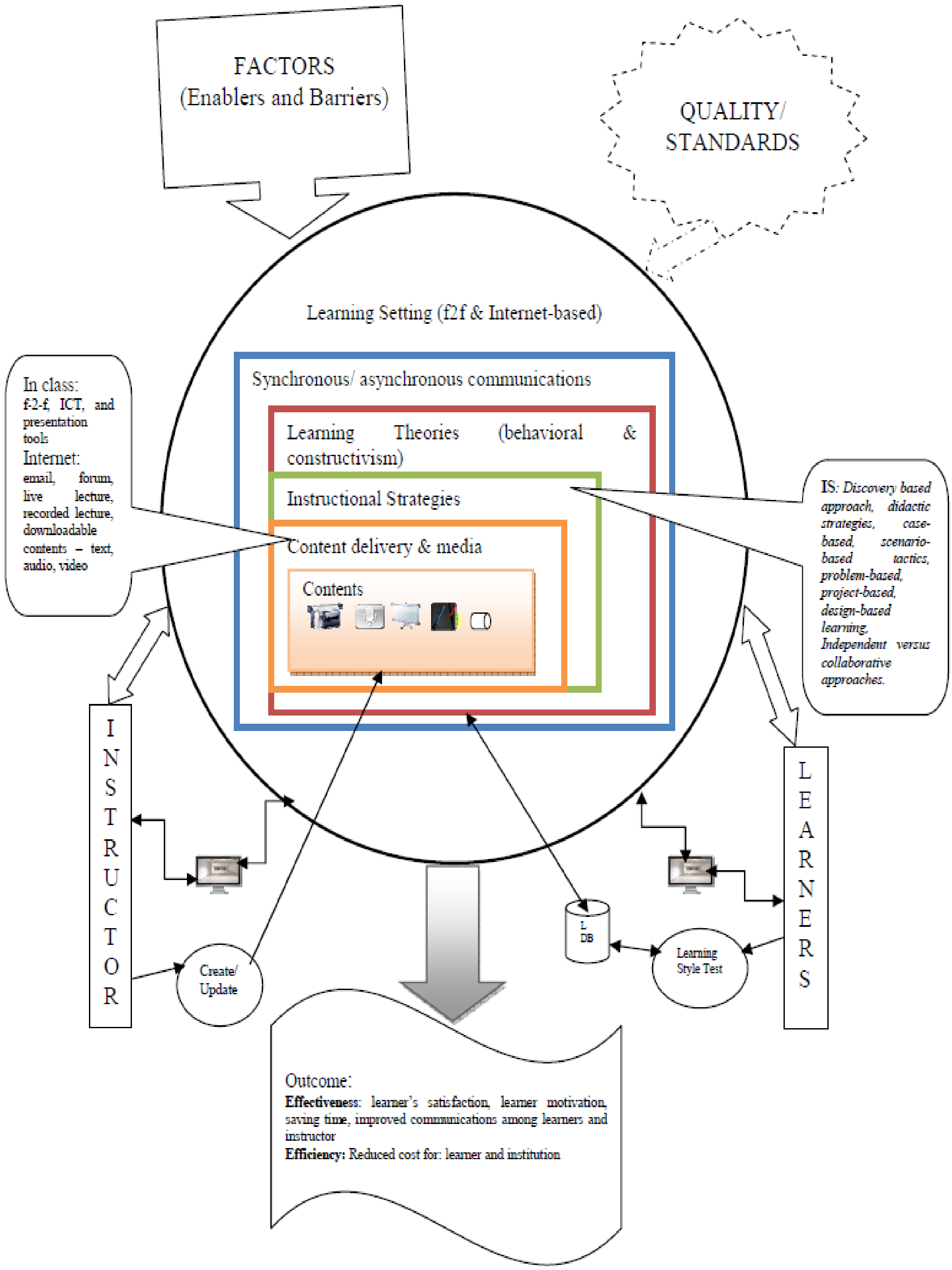

Figure 5.1: Version one of the New Model – Used for Pilot Testing

5.3 Description of the Model

Of the seven proposed ‘solutions’ shown earlier in chapter 4, “Time” and “Demand for high cost/sophisticated equipments” are not ‘physical’ components of the proposed model. Therefore, the main components of the proposed model are:

1. Blending face-to-face setting with Internet based e-learning.
2. Blending several delivery modes.
3. Blending pedagogical approaches/learning theories.
4. Blending instructional strategies.
5. Blend of communications methods.

As no learning/teaching process would take place without the presence of ‘contents’ where the explicit knowledge is found, thus the ‘contents’ must be a component of the model. To make good use of the model, the “Learning Style Test” must be added to the model. This is necessary to identify the learner’s learning style before engaging with the learning process. The instructor and learners are considered as the main participants/ users of the model. As their characteristics influence the way the model is developed and to be used, they are considered part of the blended model.

5.3.1 Graphical Representation of the Model

The graphical representation of the model is shown in Figure 5.1. The main components are placed in the center of the model. The circle represents the blend of face-to-face and Internet-based settings. The first square inside the circle represents the blend of synchronous and asynchronous communications methods. The second square represents the blend of learning theories, while the third square represents the blend of instructional strategies. The fifth square represents the blend of content delivery and media methods/options, followed by the sixth square, which represents the blend of contents types. The idea of this graphical representation comes from the Venn diagram illustration. It is to show that the components are interrelated in a given manner, and not only they may intersect with each other or be a sub-component for another, but also to show that certain components may interact not only with their parent but also with the upper-level components i.e. grand-components. It may be possible for a component to directly interact with a grand-grand component. The borders of a component are the interaction point(s) with other components.

As the diagram shows, all activities of the model are conducted within the outer circle, which is representing the blend of face-to-face with Internet-based settings. Within that, all communications and interactions between the learners and instructors for any purpose or for completion of any task jointly or individually, are carried out and pass through the blend of synchronous and asynchronous communications component of the model. The points where the border lines of components are touching each other are meant to show a *door* for interaction with the outer component(s) that is (are) two levels up. For example, the content delivery & media component' borderline has interaction points with the instructional strategies component and learning theories component. This means that this component can interact directly with the learning theories component, and with synchronous and asynchronous communications component. This is done despite that the content delivery & media component is graphically represented as a component within the instructional strategies component, and the later as a component within the learning theories component. On the other hand, it can be seen that the contents component has no interaction with any of the outer level component, and the only interaction is with the content delivery & media component, meaning that the contents can only be reached through the content delivery & media component during the running of the model and interaction between the learner and instructor. The only exception is for the content creation/update process by the instructor as the arrow in the figure shows.

The instructor component interacts with the blend of face-to-face and Internet-based settings. It is done so, by either interacting during a face-to-face session or by using a computer during/through Internet-based settings. The other indirect interaction is done though the create/update component for the contents' creation and/or update. Learner interacts in a similar manner during face-to-face sessions and by using a computer during Internet-based settings, in addition to indirect interaction through the learning style test component. Factors and quality/standards components are there to show the influence of these on the model development and implementation. They are not directly considered part of the main model components as such, though they are always present in developing and implementing the model. The outcome component represents the expected outcome/benefits of implementing the model in the form of model output. The two callout shown on the right and left sides of the diagram, are meant to provide more explanation on the two respected components that they point to.

5.3.2 Description of the Components

In this section, an explanation of the components is provided. The model consists of the following components:

1. **Contents**: Contents within this model comprise of several types and formats such as:
    a) Traditional text-based contents, be it textbooks, notes, handouts, or any other form of printed content.
    b) E-content consists of any form of study material in electronic format (digital), which has been created/updated/uploaded by the instructor. These contents are also available for use and demonstration in the classroom setting.
    c) Web-based resources, which are relevant to the program/ course/ activity, can be found and accessed on the Internet.

d) Live lecture; be it in audio or in video form. The lecture would then be stored in the repository for later use and reference.

e) Stored version of edited 'IM' or online chat between the instructor and students.

f) Approved contribution from students to be added to the repository or to the course/ activity material, either for immediate use, or perhaps for future use by the next offering of the course/ activity.

2. **Content delivery**: Two main categories exist: in class delivery and internet-based delivery. In-class delivery can be a traditional lecture, with or without the help of information technology. ICT can be used to deliver contents in class, as a supplement to the lecture. In addition, the Internet can be utilized to access relevant contents on the WWW in the class. Other forms of delivery options include email, forum, live lecture, recorded lecture, text.

3. **Instructional strategies**. Different strategies would be blended. Instructor will have to match the learning and teaching styles. This is possible through the use of the results from the learning style test that each learner must take at the beginning of the activity / course. Another factor that will affect the adoption of a strategy is the nature of the activity / course, and the prior experience of the instructor and learner in e-learning, in addition to the availability of other resources and technology.

4. **Learning theories**. In this blended model, the setup allows for a blend of two approaches; behaviorism and constructivism. Combining/ blending both would be of two fold benefits to the learning and teaching process. First fold, gradually moving from behaviorism to constructivism would not alienate both learner and instructor from the approach that they have been acquainted with for so long. The second fold is that blending the approaches would benefit learner and instructor alike in better learning, and better teaching.

5. **Synchronous/Asynchronous Communication**: Variety of communication methods and types are employed. In the broad categorization, they are classified as synchronous and asynchronous communications. Synchronous communication can be practiced in class (face-to-face) setting and in live interaction over the Internet. By using the Internet, students can interact with each other or/and with the instructor in using variety of methods. Live lecture is one way, live chatting, and IM are another two. Asynchronous communication can be practiced over the Internet. Different choices and methods are available such as forum, email, Q & A.
6. **Learning setting**: Classroom/Internet. The model offers the two main learning settings. It combines the traditional classroom setting and Internet-based setting. This combination utilizes the benefits of both settings, and minimizes their disadvantages. Based on the credit hour system, the ratio between classroom contact and Internet-based should be at least 2:1, preferably 1:1. However, the ratio can be amended to suite the respective case/situation.
7. **Learner**. Learners have the alternatives to choose their learning method, communication method, setting, and learning contents and delivery. Different cases should be monitored by the instructors to decide and/or assist learner on how to proceed.
8. **Instructor**. This model builds on the role of the instructor, both in the traditional learning setting and in the Internet-based part of the setting. It is the instructor who delivers the lecture in traditional classroom, and it is also him/her who delivers lecture 'remotely' on the internet. The instructor has a major role –if not full responsibility- to set the objectives of the activity/course to be achieved. The instructor is also responsible for creating a cooperative environment among the students through teamwork, group assignments/ projects and other means. While

allowing the instructor to control over the activity/course teaching and learning, the learner is kept in mind to allow for the learner-centered learning to take place.

9. **Learning style test**. This component is used by learners to assess their learning styles. The test is taken at the beginning, when the learner is about to be engaged in the learning process. The result of the test is saved in the learner database, where it can be used later by the instructor and learner alike, to find the best suitable way to teach/learn so that it matches the learner's learning style. The learning style test can be adapted from any standard test, and it is up to the implementer of the model to decide on the suitable test for the case. The learning style test component through the learner database; has a direct contact with the pedagogical approaches component of the model.
10. **Create/ update process**. This component/process is used to create various types of contents in various forms. In addition, it is the responsibility of the instructor to keep these contents up-to-date and amended as needed.
11. **External entities**. These external elements will affect the overall structure, setup, and process of the model. It consists of factors and quality standards components.
12. **Outcome of the model.** The outcome of the model is of two folds. One is improved efficiency, and the other is for better effectiveness. Efficiency is measured in terms of reduced relative cost for both learner and institution. This can be achieved through decreasing the relative cost to learn, i.e. commuting cost, daily expenses, etc and through decreasing the relative cost to teach, i.e. classroom utilization, cutting utility expenses, etc. as a consequence of the decrease in number of traditional classroom hours per activity/course. In addition, the efficiency would be improved through saving relative time for learner in terms of commuting time and in campus time.

5.4 Model Evaluation

The model must be evaluated after it has been developed. The evaluation of the model design should be carried out, to show that the model is acceptable and contains all the necessary components as proposed in chapter four (4) earlier. It is also meant to prove that the proposed model is a feasible and acceptable solution to the identified problems and needs of the traditional universities in Palestine, based on the identified factors of blended learning as explained in chapter four earlier. The evaluation process is carried out in two phases, the pilot test phase and the actual evaluation phase. These two phases are explained below.

5.4.1 Pilot Test

After the preliminary design of the model has been completed, it must be validated. To validate the model, a questionnaire has been designed containing several questions, based on 5-point Likert scale, such as 'SA' strongly agree, 'A' agree, 'N' neutral, 'D' disagree, and 'SD' strongly disagree. This was compiled based on the work by Ben Ahmed, Mekhilef, Yannou, and Bigand (2010), Tracey (2009), Tracey and Richey (2007), and Bolliger and Martindale (2004) as described in chapter 3 earlier. The questionnaire consists of several main parts to check the model in general, the graphical representation (layout) of the model, the textual explanation of the model, the components of the model in general, the relationships between components, the graphical representation of the components, the individual part for each component independently, and finally the output component. In total, there were 55 questions distributed among the different parts. The questionnaire was pilot tested by the faculty members who are mainly working at the traditional universities in Palestine, and few other Palestinian faculty members working abroad, for example in Malaysia and Jordan. Few non-Palestinian faculty members were also asked to complete in the pilot test. The questionnaire was sent by email to the lecturers together with a description of the model. The lecturers were asked to look at the model and read the textual explanation, and then fill in the questionnaire. They were also asked to give their comments and suggestions on both the model itself and the questionnaire. In total, the questionnaire was distributed to 30 lecturers. 14 responses were received (by email) out of 30, making a response rate of 46.67%. The responses were keyed-in to the SPSS version 16.0 software.

5.4.1.1 Validity of the Questionnaire

Any questionnaire should be validated before it can be used. Validity of the questionnaire in general, and of each of the items, should be carried out. Face validity of the questionnaire was conducted to check for the appropriateness of the language, words and terms used, and for the consistency of the items and their intended meanings. According to (Fraenkel & Wallen, 2010; p. 157), an acceptable reliability test result (Cronbach's Alpha) is above 0.7. By using SPSS, the validity test to check the reliability of the questionnaire was conducted, yielding a Cronbach's Alpha of 0.972 based on the standardized items, which is greater than 0.7 as shown in Table 5.1. The group item reliability test results are shown in Table 5.1.

Table 5.1: Group item Reliability - Pilot

Group	Items	Cronbach's Alpha	Cronbach's Alpha based on standardized items	Mean
1	All items	0.969	0.972	4.074
2	The Model, graphical representation and textual (1-17)	0.852	0.863	4.004
3	Components, relationship and graphical representation (18-28)	0.934	0.938	3.922
4	All components (29-55)	0.961	0.966	4.180

Details of item means and reliability are shown in Table 5.2. Based on Cronbach's Alpha values, the questionnaire is valid and reliable according to Fraenkel & Wallen (2010; p. 157).

Table 5.2: Details of Item Means and Reliability - Pilot

Item	Mean	Cronbach's Alpha if Item Deleted
Model Is Understandable	4.21	.969
Model Is Clear	4.00	.969
Model Is Simple	3.43	.969
Model Is Complete	3.43	.971
Model Is Comprehensive	3.86	.970
Model Is Self Explained	3.71	.969
Graphical Representation Is Clear	4.21	.968
Graphical Representation Is Simple	3.79	.969
Graphical Representation Is Understandable	4.00	.968
Graphical Representation Is Complete	3.93	.969
Graphical Representation Is Comprehensive	4.00	.969
Graphical Representation Is Match Textual Explanation	4.43	.968
Textual Explanation Of The Model Is Simple	4.21	.969
Textual Explanation Of The Model Is Clear	4.57	.969
Textual Explanation Of The Model Is Complete	3.93	.969
Textual Explanation Of The Model Is Comprehensive	3.86	.969
Textual Explanation Of The Model Is Understandable	4.50	.968
Components Are Understandable	4.21	.968
Components Are Necessary	4.07	.968
Components Are Relevant	4.36	.968
Components Are Sufficient	3.36	.969
Relationship Between Components Is Understandable	3.86	.969
Relationship Between Components Is Clear	3.71	.969
Relationship Between Components Is Meaningful	4.07	.968
Graphical Representation Of Components Is Suitable	4.00	.968
Graphical Representation Of Components Is Clear	3.93	.968
Graphical Representation Of Components Is Simple	3.71	.968
Graphical Representation Of Components Is Understandable	3.86	.967
Learning Setting Component Is Necessary	4.50	.969
Learning Setting Component Is In Right Place	4.07	.968
Synchronous/Asynchronous Component Is necessary	4.43	.968
Synchronous/Asynchronous Component Is In Right Place	4.21	.968
Learning Theories Component Is Necessary	3.86	.969
Learning Theories Component Is In Right Place	3.86	.968

Table 5.2, Continue

Item	Mean	Cronbach's Alpha if Item Deleted
Instructional Strategies Component Is Necessary	4.21	.969
Instructional Strategies Component Is In Right Place	4.00	.968
Content Delivery Component Is Necessary	4.36	.968
Content Delivery Component Is In Right Place	4.21	.968
Content Component Is necessary	4.29	.969
Content Component Is In Right Place	4.00	.968
Instructor Component Is Necessary	4.43	.968
Instructor Component Is In Right Place	4.21	.968
Learner Component Is Necessary	4.57	.969
Learner Component Is In Right Place	4.14	.968
Factors Component Is Necessary	4.07	.969
Factors Component Is In Right Place	3.93	.968
Quality Component Is Necessary	4.21	.969
Quality Component Is In Right Place	3.71	.968
Learning Style Test Is Necessary	4.43	.968
Learning Style Test Is In Right Place	4.14	.968
Create/Update Component Is Necessary	4.21	.968
Create/Update Component Is In Right Place	3.86	.968
Outcome Component Is Understandable	4.57	.968
Outcome Component Is Clear	4.50	.968
Outcome Component Is Reasonable	3.86	.969

As a pilot test of the questionnaire and the model, results obtained were used to enhance both of them. The mean for all items indicates that the model is acceptable and has been overall positively evaluated. However, there is still room for improvements. Looking at the mean of the sub-groups of the items such as group 3 in Table 5.1, reveals that this group's mean is slightly below 4.0, and group 2's is slightly above 4.0 indicating that something can be done. By examining the individual items within this group shows that items '*Components are sufficient*', '*Relationship between components is clear*', and '*Graphical representation of components is simple*'; have scored relatively low means; 3.36, 3.71, and 3.71 respectively. Furthermore, examining items' means of group 1 shows that items '*Model is simple*', '*Model is complete*', '*Model is Self explained*', and '*Graphical representation of the model is simple*' also revealed relatively low scores; 3.34, 3.34, 3.71, and 3.79 respectively. In addition, item '*Quality component is in the right place*' scored a mean of 3.71 indicating some kind of relative dissatisfaction of the location. Having these means as indicators, the associated components and issues are dealt with for more improvements. This is done in light of the evaluators' comments and suggestions as shown below.

All the comments and suggestions received are in line with what has been discussed earlier on the relatively low means of some items and groups of items. Quality component in the model has received some comments and suggestions. Evaluators 1, 4, and 8 questioned the shape and the location of this component, suggesting in reshaping it and providing more explanation about it to clarify its relation with the other components in the model. These comments and suggestions are in line with what has been noticed earlier regarding item '*Quality component is in the right place*' with a scored mean of 3.71. Other comments and suggestions, by evaluators 1 and 5, are directed towards an 'assessment' component that has to be added to the model, which agrees with item '*Components are sufficient'* that scored a mean of 3.36. Content component was perceived as not clear by evaluators 2 and 3, suggesting it should be clarified in terms of shape and explanation. This is in line with item *Relationship between components is clear*, that scored a mean of 3.71. The learner component was seen as not clear and specific by evaluator 2, while evaluator 4 suggests that it should be the center of the model, i.e. the model should be learner-centered. The learning theories component was seen as containing ambiguity and being not clear, by evaluator 2 and 8, while evaluator 3 expresses concerns about the difficulty to cope with the situation, when the constructivism theory is adopted. Evaluator 4 suggests that components like infrastructure, computers, etc need to be included within the learning settings. Both evaluators 4 and 6 expressed concerns on the graphical representation of the model and its components. They suggest in reshaping the model. These comments support the relatively low identified means as indicated above, such as item '*Graphical representation of components is simple*' which scored relatively low mean of 3.71, and items '*Model is simple*', '*Model is complete*', '*Model is Self explained*', and item '*Graphical representation of the model is simple*', which scored 3.34, 3.34, 3.71, and 3.79 respectively. Evaluator 8 expresses that the factors and learning style test components are not clear and need explanation, especially the rationale for the learning style test. Details of the comments and suggestions can be found in Table 5.3.

Table 5.3: Comments and Suggestions - Pilot

Evaluator	Comment/ suggestion
E1	The "Quality/Standards" component role in this model is not clear, is it part of it (no description for it) or not (that is why it is drawn as dashed line cloud?). Even if the model assumes using "agreed-upon" standards, I think they should be linked with the model. The model concentrates on Teaching/Learning what about Assessment measures?
E2	Overall, the model(Framework) is good while there are some ambiguity in some parts such as content, role of the learner, constructivism theory
E3	Contents are not clear in the model. It is very difficult to handle with the constructivism theory especially in education. Difficulty to measure the outcome.
E4	Learners should be in the center, not the graph center, but it should be student centered model. The model concentrates on the delivery, so the development is not well feasible. The learning settings should include all the components; the infrastructure, the computers, etc. the quality should cover all the components of the model
E5	I did not see evaluation and assessment part since at the end it is important to evaluate the achievements of the learners
E6	The Instructor/learner interaction should be clearer in the model. They are as important as the model itself! The graphical representation of the components is Suitable: (not so official!!! especially the Balloons). Also the PCs should be more clear)
E7	It is great work and well done. But I am asking about the role of technology in the model. Does technology have an impact on the model? I mean with technology blogs, wikis, forums …
E8	Factors component needs explanation Quality component needs explanation in the text Learning theories component not clear Learning style test component: is it necessary, and what is it exactly?

These comments and suggestions are taken into account, in enhancing the model as reflected in the revised version of the model. The *quality* component has been redesigned and repositioned, and its relation with the other components in the model has been clarified. The same thing is done to the *factors* component. The *Assessment* component has been added to the model. The *content* component has been altered and the icons were replaced with textual expression to remove any misunderstanding or interpretation of the icons and what they represent. The overall graphical representation of the model has been enhanced to reflect the comments and suggestions as much as possible.

5.4.1.2 The Revised Model

After the model and the questionnaire were pilot tested, both have been revised. Useful comments and suggestions were incorporated into the model whenever feasible. The new revised model is shown in Figure 5.2, followed by a model description.

The overall design of the model has been maintained in the revised version. Major components of the model remain in their original place and shape. However, a new component, *Assessment*, has been added to the model based on the pilot test and comments by evaluators. It is placed within the learning setting – face-to-face and Internet-based – component. The arrows indicate the relationship between this component and other components of the model. The instructor and learner are the participants in this component, while learning theories, instructional strategies, and contents components provide the base and input to this component. Both learner and instructor components and their associated ones have been changed in shape, and their locations in the diagram have been slightly altered to show better overall shape and look of the model. The callouts have maintained their overall location, but have changed in shape.

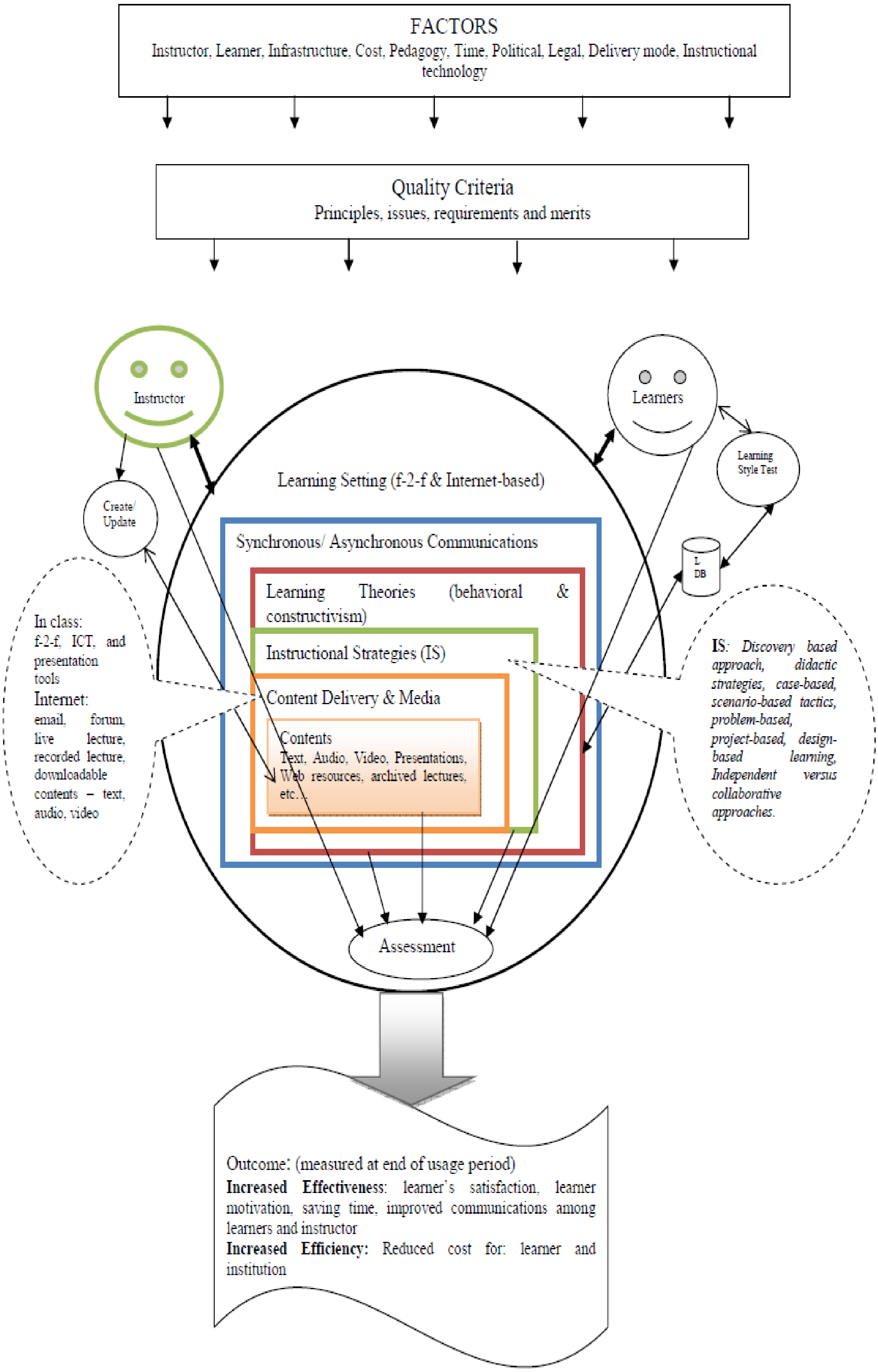

Figure 5.2: The Revised Model

Both factors and quality components have been modified in terms of shape and location. Factors component is now presented on the top side of the diagram with arrows going out of the component towards the model, indicating influence by the factors on the model design and implementation. Below that, the quality component is represented in the same manner, but with a smaller box indicating that it is, too, somehow being influenced by the factors component. The arrows going out of the quality component towards the model show the influence it has on the model, i.e. the model should be designed and implemented according to quality standards.

5.4.1.3 The Revised Questionnaire

As a result of the pilot test and the comments provided by the evaluators, the original questionnaire was altered and modified to reflect them. The 'Simple' criterion/question used in the questionnaire is sometimes wrongly interpreted like naïve or dummy, and therefore, gave the wrong intended meaning. Consequently, this criterion/question has been taken out. As new component has been added, additional questions/criteria had to be added to the questionnaire as well. This has resulted in the modified questionnaire with 53 questions. The revised questionnaire is shown in appendix A.

5.4.2 Evaluating the Revised Model

To actually validate the model and test its suitability for an implementation, a questionnaire was distributed among faculty members at the traditional universities in Palestine. The questionnaire was distributed together with the model and its description through email to all lecturers. The process was done either by sending emails directly to lecturers whenever the email is known to the researcher, or by sending an email to individual departments or faculties at the universities when emails of the respected lecturers are not known or available to the researcher, asking them to distribute the email to the lecturers at the respected department/ faculty.

5.4.2.1 Population and Sampling

The population of the study consists of all lecturers at the traditional universities in Palestine, which amounts up to 2062 lecturers according to MOEHE (2008). The whole population was considered and targeted through email. This is due to the expectation of a low response rate because of the nature of the evaluation process that involves studying the model both textually and graphically, and then completing the questionnaire. As anticipated, the number of responses was low, amounting up to only 60 responses.

5.4.2.2 Reliability Test

A reliability test was run on the whole data set and it yields a Cronbach's Alpha of 0.962; and 0.963 based on standardized items, with 54 valid cases (90%). To test the reliability more, a reliability test for the individual groups of questions was conducted. The highest Cronbach's Alpha was for questions 51-53, and the lowest was for questions 15-18. The highest mean was for questions 25-50 and the lowest for questions 22-24. The highest variance was for questions 15-18 and the lowest was for questions 22-24. For the inter-item correlations; the highest mean was for question 51-53, the lowest for questions 25-50, while the highest variance was for questions 6-10 and lowest for questions 22-24. As shown, the Cronbach's Alpha never falls below 0.7 for any individual group of questions. The reliability test for all questions and the individual groups of questions, shows that the instrument is valid and reliable (Fraenkel & Wallen, 2010; p. 157). Summary of the result is shown in the Table 5.4 below.

Table 5.4: Group Reliability of Items – Revised Model

Questions	Cronbach's Alpha	Cronbach's Alpha based on standardized items	Mean
The Model (1-5)	.865	.867	3.933
Graphical representation (6-10)	.850	.850	3.897
Textual explanation (11-14)	.916	.923	4.167
Components (15-18)	.785	.808	4.045
Components relationship (19-21)	.877	.878	4.092
Graphical representation of components (22-24)	.900	.900	3.819
G to S (25-50)	.932	.935	4.315
Output (51-53)	.939	.939	4.183

5.4.3 Analysis of the Results

By looking at the descriptive statistics of all items, it could be noticed that question 37 has the highest mean of 4.6, with a standard deviation of 0.527, while question 18 has the lowest mean of 3.67, with a standard deviation 1.052. Questions 2 through 9, 14, 18, 22 through 24, 30 and 44 scored means of less than 4.0 (see Table C.1), while the rest of the questions all scored means greater than 4.0. Details of the individual item statistics are shown in Table C.1 in Appendix C.

Looking at the standard deviation (*SD*) of each question, it could be easily noticed that the *SD* is noticeably high with the lowest *SD* amounting to 0.527 of question 37. This indicates that it is not normally distributed and the answers are dispersed from the mean. It reflects varying opinions of the evaluators towards each criterion/question, which is most probably in line with the background of each evaluator (qualification, academic field, experience).

Results in Table 5.5 show that the *model in general* is perceived by the evaluators as needing more enhancement, as most questions that are related to this group have scored means less than 4.0, though it is not considered as a low score (lowest score of 3.73 represents a 74.6% score in terms of percentages which is acceptable). The high standard deviation of these questions shows that the answers were dispersed around the mean. The *graphical representation of the model* group scored low means for four (4) questions with high standard deviation. The low score in both groups are consistent from a visual (graphical) perspective as the graphical representation reflects the model in general, and at the same time, evaluating the model in general depends largely on the graphical representation, especially if one does not read the textual explanation of the model carefully. The results for the *graphical representation of the components* group support and are in line with the other the two groups' results. In group 'D' only one criterion has scored low means, and in fact it is the lowest among all of them. For individual component's criteria, only groups 'I' and 'P' scored low means for criterion *in the right place*. Again, this is in line with the results of the other low-scored means criteria as shown above.

Table 5.5: Low Means questions

Item	Mean	SD
Group A. The model is:		
2 - Clear	3.98	.748
3 – Complete	3.83	.867
4 - Comprehensive	3.87	.833
5 - Self-explained	3.73	.821
Group B. The graphical representation (layout) of the model is:		
6-Understandable	3.98	.833
7 – Clear	3.97	.802
8-Complete	3.75	.795
9-Comprehensive	3.78	.783
Group C. The textual explanation of the model is:		
14- Comprehensive	3.97	.802
Group D. The components are all:		
18- Sufficient	***3.67***	***1.052***
Group F. The graphical representation of the components is:		
22- Understandable	3.90	.817
23- Clear	3.82	.770
24- Suitable	3.78	.721
Group I. Learning theories component is		
30- In the right place	3.95	.818
Group P. Quality criteria component is		
44- In the right place	3.98	.748

In general, the reported means indicate that the model has received acceptance and was evaluated considerably good. Even the lowest mean of 3.67 out of 5, amounts to around 73.4% rating by the respondents.

5.4.3.1 Consistency of the Results

By looking into the relation between the various groups of questions, this gives a clear idea on the consistency of the responses. To achieve this, a cross tabulations for all groups have been conducted. The groups and their corresponding items of the questionnaire are shown in Table 5.6.

Table 5.6: Item Groups of the Questionnaire

Group	Description	Questions
A	The Model in general	1-5
B	Graphical Representation of the model	6-10
C	Textual Explanation of the model	11-14
D	The Components	15-18
E	Components' Relationships	19-21
F	Graphical Representation of Components	22-24
G-S	All Components	25-50
T	Outcomes	51-53

Cross tabulating group A with group B shows consistency in the responses. Those who responded 'Agree – A' in both groups, was 27.9% of all the answers, which is the highest percentage. Total percentages of A's and SA's in both groups are close to each other. There is no 'SD – strongly disagree' answers in both groups, and only about 5% or less for 'D – disagree'. See Table 5.7 for details. Similar results are evident when cross tabulating group A with group C, D, and T as shown below.

Cross tabulating group A with group C, again, shows consistency in the responses. Those who responded 'Agree – A' in both groups, was 30.9% of all the answers, which is the highest percentage.

Table 5.7: Cross Tabulating Model (general) with Graphical Representation

			Graphical Representation (Group B - Q6-10)				
			D	N	A	SA	Total
Model (Group A - Q1-5)	D	% of Total	2.0%	1.1%	1.7%	.2%	5.0%
	N	% of Total	.7%	7.1%	11.4%	1.5%	20.7%
	A	% of Total	1.5%	15.1%	27.9%	5.8%	50.3%
	SA	% of Total	.1%	.9%	7.7%	15.2%	24.0%
	Total	% of Total	4.3%	24.3%	48.7%	22.7%	100.0%
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree							

Total percentages of A's and SA's in both groups are close to each other – 50.3% for group A as agree, and 53.3% for group C as agree, while group C scores a 32.5% for 'strongly agree' and group A scores only 24.0%. There is no 'SD – strongly disagree' answers in both groups, and only about 5% or less for 'D – disagree'. Table 5.8 provides more details on this.

Table 5.8: Cross Tabulating Model with Its textual Explanation

			Textual explanation (Group C- Q11-14)				
			D	N	A	SA	Total
Model (Group A-Q1-5)	D	% of Total	1.2%	1.5%	2.1%	.2%	5.0%
	N	% of Total	.0%	4.7%	12.7%	3.3%	20.7%
	A	% of Total	.3%	5.8%	30.9%	13.3%	50.3%
	SA	% of Total	.1%	.6%	7.7%	15.7%	24.0%
	Total	% of Total	1.7%	12.5%	53.3%	32.5%	100.0%
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree							

Cross tabulating group A with group D, again, shows consistency in the responses. Those who responded 'Agree – A' in both groups was 28.5% of all the answers, which is the highest percentage. Total percentages of A's and SA's in both groups are close to each other – 50.3% for group A as agree, and 46.7% for group D as agree, while group D scores a 32.5% for 'strongly agree' and group A scores only 24.0%. There is no 'SD

– strongly disagree' answers in group A, and only about 6.2% or less for 'D – disagree'. Table 5.9 provides more details on this.

Table 5.9: Cross Tabulating Model (general) with Components

			Components (Group D- Q15-18)					
			SD	D	N	A	SA	Total
Model (Group A- Q1-5)	D	% of Total	.0%	1.3%	1.2%	1.6%	.8%	5.0%
	N	% of Total	.0%	2.8%	4.7%	9.4%	3.8%	20.7%
	A	% of Total	.3%	1.8%	7.3%	28.5%	12.4%	50.3%
	SA	% of Total	.1%	.3%	.9%	7.2%	15.5%	24.0%
	Total	% of Total	.4%	6.2%	14.2%	46.7%	32.5%	100.0%
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree								

Cross tabulating group A with group T, again, shows consistency in the responses. Those who responded 'Agree – A' in both groups was 28.8% of all the answers, which is the highest percentage. Total percentages of A's and SA's in both groups are close to each other – 50.3% for group A as agree, and 47.8% for group T as agree, while group T scores a 38.3% for 'strongly agree' and group A scores only 24.0%. There is no 'SD – strongly disagree' answers in both groups, and only about 6.1% or less for 'D – disagree'. Table 5.10 provides more details on this.

Table 5.10: Cross Tabulating Model (general) with Outcome

			Outcome (group T- Q51-53)				
			D	N	A	SA	Total
Model (group A- Q1-5)	D	% of Total	1.7%	.8%	2.0%	.6%	5.0%
	N	% of Total	1.7%	2.4%	11.9%	4.7%	20.7%
	A	% of Total	2.6%	3.8%	28.8%	15.2%	50.3%
	SA	% of Total	.2%	.8%	5.1%	17.9%	24.0%
	Total	% of Total	6.1%	7.8%	47.8%	38.3%	100.0%
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree							

Table 5.11 shows a summary of the cross-tabulation of the Model component (group A) with all the other groups. Clearly it shows that most responses are within the 'agree' and 'strongly agree' categories.

The same thing has been done with cross tabulating group B with group C, D, and F. Group D has been cross tabulated with group E, F, T and G through S as one group. Same thing has been done for group E with groups G through S as one group, and group F with groups G through S as one group. All cross tabulations show similar results as explained earlier above. See Tables 5.12 through 5.14 and Tables C.2 through C.7 for more details and explanations.

Table 5.11: Summary of Cross Tabulating Group A with All Others

All Groups	Group A (Q1-5)				
	SD	D	N	A	SA
Graphical	0%	4.3%	24.3%	48.7%	22.7%
Textual	0%	1.7%	12.5%	53.3%	32.5%
Components	.4%	6.2%	14.2%	46.7%	32.5%
Outcome	0%	6.1%	7.8%	47.8%	38.3%
Outcome	0%	6.1%	7.8%	47.8%	38.3%
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree					

These results actually show a high level of consistency among responses of all groups of questions, indicating that the responses are consistent with each other. This in turn, indicates that the questionnaire is acceptable, consistent, and reliable.

Cross tabulating group B with group C, shows consistency in the responses. Those who responded 'Agree – A' in both groups was 31.3% of all the answers, which is the highest percentage. Total percentages of A's and SA's in both groups are close to each other – 48.7% for group B as agree, and 53.38% for group C as agree, while group C scores a 32.5% for 'strongly agree' and group B scores only 22.7%. However, group B scores 24.3 for 'neutral' which is higher than the 'strongly agree' answer. There is no 'SD – strongly disagree' answers in both groups, and only about 4.3% or less for 'D – disagree'. Table 5.12 provides more details on this.

Table 5.12: Cross Tabulating Model Graphical Representation with Textual Explanation

Cross-tabulation of Model Graphical Representation with Textual Explanation							
		Textual explanation (group C- Q11-14)					
		D	N	A	SA	Total	
Graphical representation (group B- Q6-10)	D	1.3%	.9%	1.1%	1.0%	4.3%	
	N	.1%	4.5%	15.2%	4.6%	24.3%	
	A	.2%	5.5%	31.3%	11.6%	48.7%	
	SA	.0%	1.6%	5.8%	15.3%	22.7%	
	Total	1.7%	12.5%	53.3%	32.5%	100.0%	
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree							

Cross-tabulating group B with group D, again, shows consistency in the responses. Those who responded 'Agree – A' in both groups was 26.7% of all the answers, which is the highest percentage. Total percentages of A's and SA's in both groups are close to each other – 48.7% for group B as agree, and 46.7% for group D as agree, while group D scores a 32.5% for 'strongly agree' and group B scores only 22.7%. However, group B scores 24.3 for 'neutral' which is higher than the 'strongly agree' answer. There is very low percentage of 'SD – strongly disagree' answers in group D, and only about 6.2% or less for 'D – disagree'. Table 5.13 provides more details on this.

Table 5.13: Cross Tabulating Model Graphical Representation with Components

		Components (group D- Q15-18)					
		SD	D	N	A	SA	Total
Model Graphical representation (group B- Q6-10)	D	.1%	1.1%	.9%	1.6%	.7%	4.3%
	N	.1%	1.3%	4.4%	12.8%	5.8%	24.3%
	A	.2%	3.3%	7.2%	26.7%	11.2%	48.7%
	SA	.0%	.5%	1.6%	5.7%	14.9%	22.7%
	Total	.4%	6.2%	14.2%	46.7%	32.5%	100.0%
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree							

Cross-tabulating group B with group F, also, shows similar trend. Those who responded 'Agree – A' in both groups was 29.3% of all the answers, which is the highest percentage. Total percentages of A's and SA's in both groups are close to each other – 48.9% for group B as agree, and 50.3% for group F as agree, while group F scores a 18.4% for 'strongly agree' and group B scores only 22.2%. However, group B scores 24.5% for 'neutral' and group F scores 27.4% which is higher than the 'strongly agree' answer. The 'D – disagree' scores a 4.4 or less. Table 5.14 provides more details on this.

Table 5.14: Cross tabulating Model Graphical Representation with Components Graphical Representation (Q22-24)

		Components Graphical Representation (group F- Q22-24)				
		Disagree	Neutral	Agree	Strongly Agree	Total
Model Graphical Representation (group B- Q6 -10)	D	.3%	2.9%	1.1%	.0%	4.4%
	N	1.7%	11.5%	9.8%	1.5%	24.5%
	A	1.8%	11.8%	29.3%	6.0%	48.9%
	SA	.1%	1.1%	10.1%	10.9%	22.2%
	Total	3.9%	27.4%	50.3%	18.4%	100.0%
SD Strongly Disagree, D Disagree, N Neutral, A Agree, SA Strongly Agree						

The other cross tabulations of the groups shows similar trends as the above tables do. Tables C.1 through C.6, show more details which can be read and interpreted in a similar way as shown above.

5.4.3.2 Further analysis

Some of the respondents provide useful comments and suggestions at the end of the questionnaire. See Table 5.15 for details.

Some of the comments in Table 5.15 are general and praising the work and the model, such as those by lecturers L1, L2, L3, L4 and L5. Other more specific comments are related to the clarity and layout of the graphical representation for the model in general and for some components in particular. This is evident in the comments and suggestions by lecturers L10, L14, L20, L21 and L23. Others suggest reorganizing and/or adding other components, by lecturers L13, L16, L17, L20, and L24. Some lecturers – L6, L10, L11, L12, L15, and L19 - expressed concerns over the learner's satisfaction, the combination of face-to-face and asynchronous, transition period of the adoption of the model and special needs learners. One lecturer; L7 raised the language issue by suggesting that the model and the instructions should have been supplemented with the Arabic translation as some lecturers "do not have the needed proficiency to understand the questionnaire and the model" (Lecturer L7).

Table 5.15: Comments and Suggestions – Revised Model

Lecturer	Comment/suggestion
L1	I think this research results and outcomes will enhance our e-learning activities within and among Palestinian's Universities and academic communities, I am really happy as an educators and a researcher who has an interest in e-Learning activities to see PhD dissertation in the area of e-Learning/ Teaching
L2	It is a great idea that someone is going to work on the blended learning model for higher education in Palestine. I think the model is good, need some arrangement of the items.
L3	Very good work in general
L4	GO ON. I THINK YOU HAVE AN INNOVATIVE WORK
L5	First of all, I would like to congratulate you for this excellent and wonderful work. After studying your model, it is not a compliment to say that this comes as a result of a long-time work and great efforts.
L6	I think that considering the "learner's satisfaction" as one of the metrics of the effectiveness, needs some more description. Because the students in Palestine could be satisfied by a very weak course with high obtained grades! You know … it is a cultural issue.
L7	I think you need to provide the model and the instructions for answering the questionnaire with Arabic Translation. I am sure that some of our colleagues do not have the needed proficiency to understand the questionnaire and the model. Moreover, some terms used in the questionnaire and the model needs explanations.
L8 **L9**	_The model should be evaluated by experts in the field (I don't consider myself an expert). Instead of having the questionnaire completed as you are asking, it was much better to have a Web form where people can sign on and complete anonymously.
L10	It takes time to understand the model. The model gives the possibility of f-2f & asynchronous, which is impossible. In addition there are many flow arrows to Assessment which makes it not clear. V. good work in general
L11	Did you put in your account the blind students?
L12	(Translated). Abbreviations not clear, crossing lines; which you may simplify it. Time frame is not discussed, i.e. the transition period from traditional to e-learning, as this period might give different results from the next period of e-learning generations who will get used to e-learning and may prefer it compared to the existing generation who might prefer the traditional method.
L13	need to interact between instructor and learner DB, Learning Theories are not just behavioral & constructivism, you need to add content design and content authoring tools, you need to add content design standards like SCORM.
L14	I think that the graphical representation of the model should be more flowchart-based. This is very important to exactly describe the sequence of e-learning procedure and illustrate the relationship among the different components

Table 5.15, Continue

Lecturer	Comment/suggestion
L15	Outcome: Learner's Satisfaction: How will you measure? Level of learner's satisfaction differs among learners (depends on what the learner is willing to achieve).
L16	I think there must be other components other than the Instructor and Learners i.e. there must be a component that is responsible for the administration taking into account that instructor are not responsible for the administration tasks, in addition for the Synchronous/Asynchronous Communication and Learning Theories , Instructional Strategies and Content Delivery & Media in my opinion must be in separated blocks in side Learning Setting
L17	I would like to mention for something which I have noticed it when I was using the e-learning at PPU. Not all students are tracing the moves that instructor do in the course web that for they didn't used to be at course web. Therefore we have to connect any moves or changes in the course web to student's mobiles numbers not only emails. To inform them that we add, announce and change something.
L18	I mean in course web "the site of the course in the internet". I don't know might this not necessary for you to mention it but this will be in the "content delivery".
L19	In the Learning Process we have find the Special needs People ,and Other People that have special condition, So they affect in the model in some ways
L20	External components are not clear? Why quality is external component?
L21	I think that the graphical model should be cleaner as it takes a little too long time to figure out the flow ideas. Also, I think that the outcome in terms of effectiveness should include other factors than learner satisfaction such as delivering the intended learning outcome
L22	The managing module and model components of the suggested research are in the right track according to the scientific records. I wish you thoughtful and full successes in your thesis work to be finalized and to graduate
L23	The arrows from the Factors Box to quality Box should be extended to the quality Box. The whole model should be placed in a square box (light) and then arrows from the quality box be extended to the new whole model box. (However if the factors and the quality boxes should affect the whole model then the arrows should reach the new model box by putting the factors and the quality boxes next to each other in the same level !!!!) The arrows from learners and the instructors to the assessment block are crossing the figure in a bit annoying manner….. You may put the model on landscape orientation and expand the model so as the arrows are not crossing the text…. (Not so important…. Just an idea)
L24	there is no need for factors component since you engaging them inside the system boundary, also I think that also you can combined the quality criteria in the learning theory and IS

5.5 Discussion and Conclusion

In addition to the reliability of the questionnaire, the results show that the faculty members at the traditional universities in Palestine accept the model. The high mean

(4.139) of all the questions and the individual questions Mean – see Table C.1 - indicate high acceptance and very good perceived value of the model by the faculty members. However, some items as shown in Table 5.5 scored a mean that is less than 4.0/5.0 (80%). To enhance the model, these items are analyzed to determine which part/aspect of the model should be considered for further improvement.

By examining the Means of individual items, it could be noticed that the lowest is of item 18 *'The components are all sufficient'*. This indicates that lecturers think that more components should be included in the model. While this by itself does not show what components are missing, linking this relatively low mean to the comments and suggestions provided by lecturers provides indications of the perceived missing components. As shown earlier, some lecturers suggest adding in some components to the model. In addition, this result is in line with category 'A' criteria 3 and 4, category 'B' criteria 8 and 9, and category 'C' criterion 14, which all scored similar Means, indicating consistency in the results. While it is possible to add as many other components as perceived by individual person/professional based on his/her view of blended learning, and also based on the needs and respective situation, such addition in the context of this research should comply with the scope and objectives of the research. At this point, there will be no additional components that would be added. Criteria *clear, self-explained, understandable,* and *in the right place* are concerned generally with the layout of the model, i.e. the overall graphical representation of the model and the individual component. This indicates that improvement to the overall design should be carried out. These results of such criteria come from the different perceptions of the evaluators, and their own understanding and visualization of the model and its components. However, this perception of the model by the evaluator could in part, be attributed to the fact that the model has been designed in a different way compared to what has been the norm, usually in the form of flowchart, flow diagram, or layered like representation of the models, as some evaluators have indicated in their comments, and also been heard from some people who have seen the model in one way or another. The philosophy behind the adoption of using this way to represent the model graphically has been explained earlier in this chapter. Despite that, an attempt has been carried out to further enhance the layout of the model.

Based on these results and comments provided by the respondents; the model has been slightly altered to reflect the comments and suggestions. The callouts have been removed to make it more readable and less congested as suggested by the evaluators. The model has been placed in a light box containing all the components. Arrows from the factor and quality components have been extended in order to reach the outer box of the model. Figure 5.3 shows the final version of the model in this research.

At this point, research objective two (2) has been achieved through the development of the new blended learning model based on the factors and requirements that were identified in chapter four. This is in fact, achieved through answering the research question three (3), '*How can factors and requirements above be used to develop a model of blended learning for traditional universities in the Palestine?'* Throughout this chapter, the process of using the factors and requirements, which were identified in chapter four, has been explained. It explains how the model was designed and developed, and how a questionnaire was compiled to evaluate the new model, firstly by pilot testing both the model and the questionnaire, amending both, and then evaluating the model. Results have been used in order to enhance the model until it reaches its final status, as shown in Figure 5.3.

The next step for developing and implementing the model was then carried out. This is explained in the next chapters.

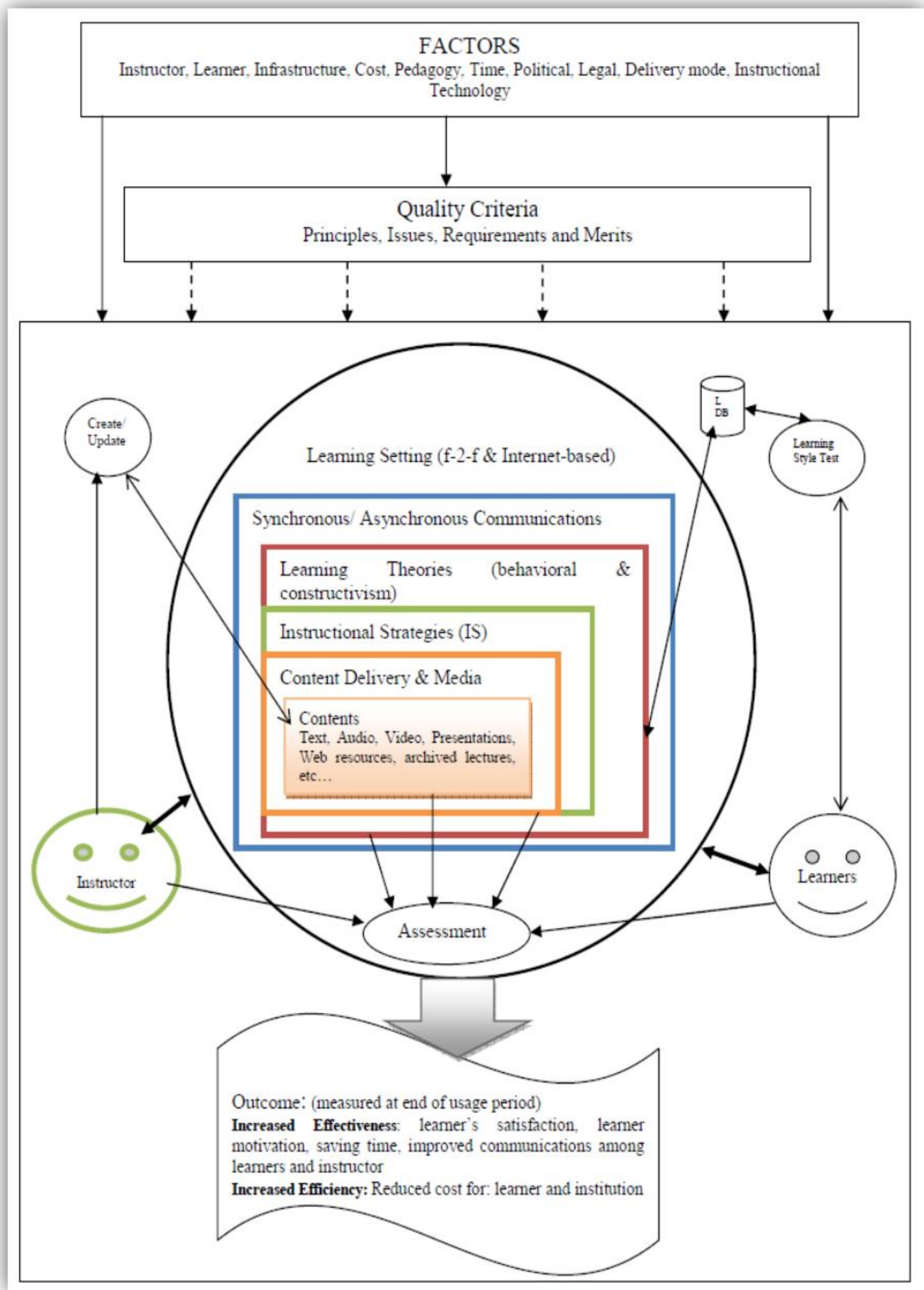

Figure 5.3: Final version of the new blended learning model

CHAPTER 6

MODEL IMPLEMENTATION

6.1 Introduction

This chapter explains the implementation of the new model. To implement the model, software based on the new model was developed. The main input to the software development came from the components of the model and the relations between them. While, the other major input came from the requirements, which were extracted from the various elements to the model development, i.e. factors, problems, etc… as shown in chapter 4 earlier. In the following sections, development environment, user interface design and system features are explained.

6.2 Background for Model Implementation

The model can be implemented on course or activity levels as Graham (2004). The implementation depends on several factors like the institution's policy and strategy, experience with e-learning and blended learning by all the parties involved; instructor, learner and institution, and legal factors/issues. However, a typical implementation would be to start at the activity level, then, move on to the course level.

On the activity level, the model can be implemented by instructors and learners to serve one activity in a course; for example. In this regard, an activity would comprise a chapter, or a topic to be covered within a taught course. In this way, the course can be divided into a number of chapters to be covered, or into a number of topics. Whichever the case, the course is said to have 'many' activities, i.e. chapters or topics. Implementing the model on the activity level paves the ground for further adoption of the model in other activities, and later on the course level. This represents a gradual implementation and adoption of the model from the activity level to the course level, which will ease several of the issues, problems and barriers that are related to e-learning and blended learning as explained earlier in chapter 2. Implementing the model in this way helps in:

- acquainting instructor who has little to no experience with e-learning and technology.

- acquainting learners who has little to no experience with e-learning and technology.

- minimizing the launching cost of the blended learning adoption.

- gradually; introducing changes to learners, instructors and institution, to shift from traditional learning to e-learning through this blended model.

- minimizing the risk of blended learning implementation and adoption.

- building expertise gradually.

To implement the model on the activity level, it should work as follows:

- The administrator sets up the system.
- Taking into account of the several issues and circumstances at the time of implementation, and the instructor should be able to tentatively assess the situation in order to make the right decision on the implementation of the model. Then;
- The instructor decides on what activity of the course he/she teaches, and then the model will be implemented.
- In general, for the model to work best, it is recommended that all the various components/elements of the teaching/learning process should be blended, i.e. every component should be blended itself. For example, 'synchronous/asynchronous communications' component should be able to blend with itself, using and adopting methods from both types, like face-to-face, email, chat, IM, forums, etc… the same suggestion is applicable to other components as well.
- The instructor decides on the ratio of face-to-face contact with online (internet-based) learning, however, a 1:1 ratio is recommended.

- Initially, the instructor decides on what to blend in each of the main components in the model. This includes the synchronous/asynchronous communication methods, learning theories to use, instructional strategies, technologies, delivery methods and media, and contents.
- The instructor sets up the model for execution on the activity level.
- Once ready, the students are required to sign in the system by creating their own accounts.
- Learners are required to take the learning style test. This test is needed as explained earlier, to identify each learner's learning style so that the instructor can offer better help to the learners in their learning through the adoption of the suitable communication method, learning theory, strategy, technology, delivery method, and content. At the same time, it also helps the learners to capitalize on their learning skills and styles, and helps them in following and using the suitable communication methods, contents, and content delivery and media. However, the result of the test will not be used to 'force' the learners in following certain methods, approaches, etc… rather it just acts as a guidance in providing suggestions and recommendations.
- Instructor uses the learning style test results to match learners with the suitable setup, i.e. communication method, content, delivery, learning theory, instructional technology and strategy. In addition, the instructor also tries to accommodate each learner's needs based on the test result. On the learner's side, he/she is provided with the test result together with suggestions and recommendations as to what suites him/her best. Learners may use these as guidance in their learning process to utilize his/her potential.
- Learners have the choice to either follow the recommendations of the model based on the test results, or to follow their instincts in selecting the most suitable

contents, delivery media, communications and interactions with the instructor and other learners, use of available resources, etc. However, the learner should be cautious as this would require self-discipline and good time management. This choice pushes for the learner-centered learning where learners enjoy more 'freedom' in the way they learn; coming closer to the constructivism theory.

- The instructor will start utilizing the model and supply it with relevant contents, and initiates all other features/functions of the system.
- The learners start using the model and utilize it to its fullest functionality.
- When implemented on the course level, the model should work as follows:
- As in the activity level implementation, instructor will do all the assessments needed before engaging in the implementation. Unlike the activity level, the instructor has to look at the course as a whole, not at one activity.
- The instructor will do the same steps as in the activity level, however, replacing 'activity' with 'course'.
- The instructor divides the course into several activities - either as chapters, or as topics.

6.3 Development Environment

The system was developed in PHP with MySQL backend. The system uses two open source projects, to accomplish its task, the 'PCPIN' chat system and the 'OpenMeetings' conference system. A user of the systems can play one of three roles; student, instructor or administrator according to account type and privileges.

➢ PHP is used to implement the system for many reasons as shown in the following:

- The system is an interactive website, so it needs a server-side scripting language that can interact with a database server. PHP is a powerful scripting language for creating dynamic and interactive websites.

- PHP is an open source, and it is free to download and use.
- PHP is platform independent, i.e. it can be run under Windows, Linux, Unix etc.
- PHP is easy and fast to learn, and runs on the server side.

➢ MySQL database server was selected for many reasons as shown in the following:

- MySQL is an open source, and it is free to download and use.
- MySQL is platform independent. It runs on more than 20 platforms such as Windows, Linux, Unix etc ...
- Easy to use.
- High performance.
- High reliability.

The system was implemented to serve mainly two types of users; students and instructors. For technical and monitoring purposes, a third type, administrator account was created. A brief description of the role for each account as follows.

➢ A user with Student account type and privileges, can do the following tasks:

- Register for an offered course.
- Withdraw from a registered course.
- View the available contents.
- Suggest new contents.
- View, download the assessments and upload its solutions.
- View, print the frequently asked questions.
- Communicate with colleagues and instructors by using different communication methods like e-mail, forums, instant messages, chat and conference.
- And other tasks required for using the system efficiently and easily.

➢ A user with Instructor account type and privileges, can do the following tasks:

- Offer new course.

- Manage the activities, contents, assessments and solutions, frequently asked questions and student lists of the courses.
- Show statistical information about the registered students in the courses like learning style.
- Use conference feature to conduct online lectures (virtual class rooms). This feature enables the lecturer to arrange and implement online lecture with full functionality to enable any student to participate and act as if they are in a class room, where the student can participate in different ways like post something on the virtual white board, audio, video and text chat.
- Communicate with colleagues and students by using different communication methods like e-mail, forums, instant messages, chat and conference.
- And other tasks required for using the system efficiently and easily.

➢ A user with Administrator account type and privileges, can do the following tasks:

- Manage the available accounts.
- Manage the ‘PCPIN’ chat module.
- Manage the ‘OpenMeetings’ conference module.
- And more due to system administration.

6.4 Interface Design

The underlying principle of the interface design is to keep it simple. Figure 6.1 shows the general design of the interface.

The interface design is explained below.

1. Title bar: Here the title of the current open page is displayed, showing the user where he/she is and which ‘page’ is being explored.

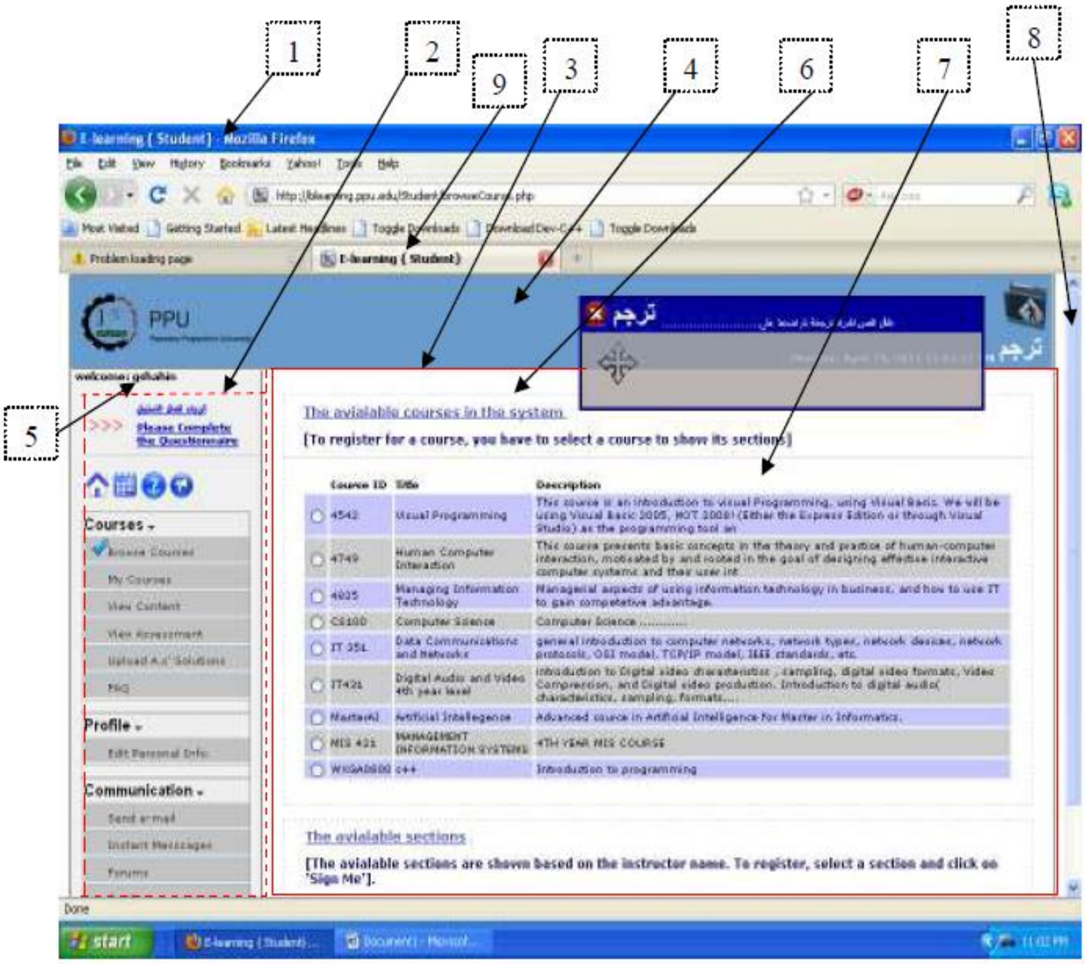

Figure 6.1: System Interface

2. Navigation panel: Located on the left side of the screen and it is always present while navigating the system. The top part of it is usually left blank and it could be used for an important function/link to be accessed for a limited period – as in the case of the questionnaire that has to be completed by students. The second top part is for icons used to access certain features or going directly to the specific page. Examples are that of the home icon to take the user to the home page, the calendar icon to display a calendar, the help icon is to access/display help on using the system, and finally the announcement icon which is used to access the announcement feature of the system by both instructor and students, however, it is differently. The main part of the navigation panel consists of three main categories for the ~~of~~ options/menu items: courses, profile, and communication. The courses and communication parts, each contains several sub-

menu items/options. These items/options can be collapsed or expanded to hide/show all the items. Any item (option) is directly selectable by the user and immediately executes the intended feature of the system. Once selected, the item will be marked with "√" to indicate that it is now selected and active.

3. Display area: This area is for displaying all the information and data, related to selecting an option from the navigation panel on the left side. It consists of two main sections: section 6 and section 7. Section 6 is to display the title and some details of the selected option of the navigation panel. This is done in addition to the highlighted selected option with a **"√"** in front of it, to further inform the user of what function/feature of the system that is being used at this moment. Section 7 is for detailed information and data on the selected option. It further allows the user to do further selection of options that are available within this display and the interaction area. It also serves as a data entry area for certain input provided by the lecturer.

4. Top part of the screen – logo, date, translator button, and logout icon.

5. Display the current user with a 'Welcome' on top of the navigation panel.

8. Vertical scroll bar to scroll up and down the display area. However, this is kept to a minimum.

9. The browser tab will show which main module of the system is being used. The two main modules are the instructor module, and student module. There is also a third module, which is the administrator module. It should be noted here that the general layout of the interface, is the same for all modules, particularly the student and instructor modules. As explained in section '6.5 system feature', there are similarities in both instructor and student modules, except where certain functions are specific to either of the two.

6.5 System Features

The system has two main users; lecturer and student. There is also a third user, which is the administrator of the system. The role of each user will be explained below. The system has several features reflecting the main components of the model and the requirements. These features are discussed below.

6.5.1 Contents Related Features

These features come mainly under the *Courses* header of the navigation menu on the interface window. These features accessibility depends on the type of user, i.e. lecturer or student.

6.5.1.1 Contents' Features Related to Lecturer

Lecturer can:

A) *Browse Courses*: Once selected, a bold **√** will be shown in front of the option in the navigation menu. The lecturer can browse all the courses that are available in the system, and signing in to the corresponding one by selecting it, and then clicking on the *sign me* button. He/she can add a course to the system if it is not already there. The lecturer can sign in to more than one course.

B) *My Courses*: By selecting this option, a list of all the courses that the lecturer has signed in is displayed. The lecturer can unsign from a selected course.

C) *Manage Activity:* This feature is for managing activities of a particular course. When the lecturer selects a course, all the associated activities are displayed. If no activities exist, a message indicating so will be displayed. On top of the displayed activities, an option is offered to the lecturer as a recommendation based on the learning style test results of students who are registered in the selected course. Lecturer can add new activity, providing a title and description, at the same time he/she can delete or edit a selected activity.

D) *Manage Contents*: This feature is to add, delete and edit contents that are related to a particular activity of a particular course. Once selected, a list of courses of the lecturer is displayed. The activity of a selected course has to be selected for the associated contents to be displayed. The lecturer can delete or edit an existing content. He/she can also add new content to the selected activity. To add a content; the lecturer has to provide a title, description, and type for the content, and then upload it.

E) *Suggested Contents*. This feature allows the lecturer to approve/disapprove contents that are suggested by students for a particular activity of the course. By selecting this feature, the lecturer will be prompted to select a course, and then, selects an activity. When an activity is selected, suggested contents by the students, if any, will be displayed with an option for the lecturer to approve/disapprove. Once he/she approves a suggested content, it will become part of the contents that are associated with the said activity, and will be accessible to all the students who have registered for the course.

6.5.1.2 Contents' Features Related to Student

A student who is registered in the system and his/her account has already been activated by the respected lecturer of the course, can access the following features, which are related to content.

A) *Browse Courses*: In this feature, student can browse for available courses in the system and selects the one he/she is enrolled in to register. By selecting a course, the student is prompted to *sign in* to one of the sections of the course, if there is more than one section. This *status* of the student registration in the course is set to *pending*, which needs the approval of the respected lecturer to change it to *active*.

B) *My Courses:* Student can browse all courses he/she is registered in. By selecting a course, the student can *unsign* him/herself from the course.

C) *View Content*: Student can browse contents that are related to an activity of a course. Once this feature is selected, a list of all registered courses is displayed with a prompt for the student to select a course to display its activities. Student is opted to select an activity where all related contents can be viewed. Within this, student can view the contents added by the instructor, contents added by a colleague, his/her own suggested contents, and can *suggest* content for the activity. The contents are displayed under two headings. The first is the contents suggested to student according to his/her learning style. The second is for the additional contents, i.e. student can view all the contents that are associated with the selected activity. When selecting the option *suggest content*, a data entry screen is displayed, where student is prompted to provide data on the category of the content (a file or a web address), content title, type and description, and a browsing field to select the intended file, and then click on the upload button. Suggested content will be uploaded to the system carrying the pending status, until it is approved by the instructor.

Clicking on *content* causes the system to display the content on the screen, with an option to save it.

6.5.2 Communication and Interaction Features

These features comprise synchronous and asynchronous communications options. These are:

A) *Email.* Students can send emails to the lecturer and colleagues by using the internal feature. The student's email address which was provided to the system at registration – account creation – is used automatically in the *From* field, and student can write the email address of the recipient(s) or select from a contact list that was created and managed by the student. This feature is used to save the student's time by allowing him/her to send email messages directly through the system without the need to launch an external email client. Student can *manage* the contact list by adding new contact, editing or deleting it. The same options are available to the lecturer.

B) *Instant messages (IM):* This feature allows lecturer and student to send and receive instant messages to and from registered users of the system by typing in their names or selecting from a list. Similar in concept to the email feature, users can send and read instant messages directly through this feature. They can create a list of friends/colleagues from the registered users. It offers a search for existing users by typing their first or last name, and by selecting the student or instructor category. Once the search has been completed, the user can add it to the list.

C) *Manage Forums:* This feature is accessible to lecturers only, and concerned with managing the forums of a course and related topics. The lecturer can add a new forum to a course, as well as edit the forum data or delete it. In addition, lecturer can also edit the topics of a particular forum by clicking on *Manage Topics*, where he/she can edit or delete a topic, as well as adding in a new one by providing a topic title and description, and then click the *Add* button.

D) *Forums:* This feature provides a space to discuss and exchange information and ideas on a particular topic of interest within a course. Each course can have more than one forum, and each forum may contain more than one topic. Each topic may have many posts which are organized in a reversed chronological order – most recent post will be displayed first. The student has to select the *Forum* feature to access it; then a list of all the courses that the student has registered in will be shown. After selecting a course, the forum will be displayed. Selecting a forum will cause the system to show all the topics that are related to it. At this point, the student can add new topic by providing a title and a description of the new topic, and then click on the *Add* button. He/she can access any of the topics by clicking on it, to read the posts and/or post his/her contribution to the discussion. The topic window allows users to read the posts and provide a space for writing in the contribution within the same window.

E) *Conference:* This feature uses free open source software. The software is called OpenMeetings. It has been used 'as is' through integrating it with the system. It can also run as a ‘standalone’ tool. It allows registered users, in this case the lecturer and students, to meet online through a synchronous communications. The options are for audio conference, video conference, and video/audio whiteboard conference including text chat. Conference rooms can be designated as public or private, all registered users can join the first one, while the second room, is only for restricted users. There is a moderator for each room, who controls the room activities, and can grant moderation rights to the other users/members. There are several features including sharing files and uploading/downloading. More detailed description of this software can be found in the appendix.

F) *Chat:* This feature uses free open source software. It is used for textual chat between users. All registered users in the systems, and in the Chat module, can chat with each other. The rooms are available for public and private/restricted chat.

G) *Announcement:* This feature can be used by the lecturer to post any announcement that is related to the course he/she teaches. This feature is accessible through the icon on the top left corner of the window. Lecturer can add new announcement stamped with the date and time, edit or delete an existing one. All existing announcements are displayed in the lower left side of the screen beneath the list of courses, and the right side is dedicated to adding new announcement. Students can view the announcement by clicking on the icon and then select a course. Only active student of the respected course can view announcements that are related to it.

6.5.3 Assessment Feature

This feature is accessible to both lecturer and student, however with different scope. The lecturer can upload an assessment for an activity of a course through the *manage Assessment* option. Once this feature is selected, a list of courses taught by the respected lecturer is displayed, where he/she can select a course then an activity. Once an activity is selected, a list of all the assessments that are associated with this activity will be shown on the left half of the display area including the title, description, start and end date, and the assessment's filename. Assessment can be deleted or edited by the lecturer. On the right side of the display area, the lecturer is prompted to add an assessment by giving it a title, description, start date and end date, and can browse for a file to upload. The individual assessment is activity-based with an option for coverage of more than one activity. An associated option with *Manage Assessment* option is the *View Assessment Solution*. It works like the manage assessment; however, the lecturer will be able to see all uploaded solution to a particular assessment. He/she can view the list by selecting the assessment of an activity of a course. All uploaded solutions are downloadable by the lecturer by clicking on the file name. The lecturer can delete a solution from the database once it is no longer necessary to be there.

On the other hand, student can access the assessments via the *View Assessment* option, where he/she selects a course then an activity, where all the assessments of that activity will be displayed. Student then can download the assessment file and save it. In addition, student can later submit a solution to an assessment through the *upload Assessment's Solution*. The process is similar to accessing the assessment, however, now the student will upload the solution file of the said assessment for the lecturer to view and download.

6.5.4 View Student List Feature.

This feature provides some information and basic statistical data on enrolled students in course(s) taught by the lecturer. Once this option is clicked, it will display a list of all courses taught by the lecturer, with options like *view pending students, view active students, learning style for each student, and view statistics* displayed beneath the list of courses. The lecture can select a course then can click on any of the options. As the name indicates, pending students are those who had registered/enrolled with the course – through the system – and waiting for the approval by the lecturer, whereas active students are those who have been already approved by the lecturer. The *learning style for each student* shows a list of all students containing their names, ID number, status, and learning style. This is useful to the lecturer as he/she can be informed of what the learning style of each student, which helps him/her in planning the course. The *view statistics* provides a basic data on each of the three learning styles; auditory, visual, and kinesthetic, showing the number of students and the percentage in each of the learning style. By clicking on a particular learning style, the lecturer can have more information in the form of suggestion, on what is suitable for this style. These suggestions are divided into classroom and Internet settings. For each, suggestions are related to the suitable content type, delivery method/media, and communication method. In this way, the lecturer is advised on what to consider when planning the course/activity.

6.5.5 Frequently Asked Questions (FAQ) Feature

This feature provides space for the lecturer to post the most frequently asked questions and their answers that are related to each course he/she teaches. It allows the lecturer to add in a FAQ and its answer, edit or delete a FAQ. To do so, the lecturer has to click on the FAQ option, and then select a course from the displayed list. All FAQs – if any - will be displayed on the lower left side of the screen, and the right side is dedicated to adding in new FAQ. On the other hand, students can view these FAQ by clicking on FAQ, and then selects a course. All FAQ with answers will be displayed beneath the list of courses.

6.5.6 Profile Feature.

This feature is for users to edit their profile which was created, when the user register/create an account in the system for the first time, including the name, the password, main email and alternate email. User name and ID cannot be edited here.

6.5.7 Learning Style Test.

This feature is used to identify the student's learning style. Once registered with the system, the student has to take a test to identify his/her learning style. In this test, the learning style of a student is classified under one of the three generic learning styles, i.e. auditory, visual and kinesthetic, based on Cantoni, Cellario & Porta (2004) classification of learning styles. A Learning Style Test questions were used from (V. Chislett & A. Chapman 2005, of BusinessBalls.com which is offered as free resource, downloaded from http://www.businessballs.com/ freematerialsinword/vaklearningstylesquestionnaireselftest.doc. The researcher has provided Arabic explanation for each question, and used the test in the model implementation. The test is available in Appendix E. When a student login to the system for the first time after he/she created his/her account, he/she will be prompted to take the test by answering a series of 30 questions with three choices – A, B or C. The student can choose only one answer from the three, and then clicks the *next* button, which takes him/her to the next question. If for any reason the student is unable to finish the test in one go, i.e. all thirty (30) questions, he/she will be given the option to save the test and continue later, provided that he/she have answers at least one question. At the end of the test, the student is informed of his/her learning style and shown a recommendation on the suitable content, delivery method and communication methods appropriate for classroom and online/Internet settings. If the student did not complete the test, the learning style will be categorized as *undefined* and remains so until the test is completed. In such cases no recommendation is provided. Later on, the student can resume the test or retake it at any time by clicking on the *redo/resume* the test option.

6.5.8 Online Help Feature

This feature provides some basic help to the users about the system and its functionality. The amount of help provided should be sufficient to assist users in using the system.

6.5.9 Account Creation Feature.

This feature is a one-time use, where new users – lecturer and student – create their profile and account with the system. The lecturer can choose the instructor account, while the student can choose student account creation. Basic data is required from either types of users such as name – first and last, ID (Lecture ID or Student ID), login name, primary and alternate email, two telephone numbers. Once done, the data will be saved in the database, where users can edit it later on as explained in the *profile feature.* A third type of users is the Admin. The responsibility of the Admin is to oversee the functionality and administrative issues that are related to the system. It is the Admin who approves the lecturer's account and status as a lecturer, in addition to approving the student's account.

6.5.10 Translation Feature

This is an add-on feature, which is automatically activated when browsing any page within the system. It allows the user to highlight a text inside the 'window', then click on this feature and the translated text in Arabic will be displayed in the designated location (see section 6.3 interface design and Figure 6.1)

6.6 Software Testing

After the system has been developed as shown above, it went under a process of evaluation mainly for the interface design, by using heuristic evaluation techniques. The technique uses Nielsen's 10 usability principles with criteria for each compiled from XEROX Inc. heuristic evaluation document (Xerox, ND). The process and method have been explained in chapter 3 earlier. However, in the following sections the results of the evaluation are discussed.

6.6.1 System Evaluation

When the software was completed, an evaluation of the interface design was carried out. It is worth mentioning that the development was gradually carried out and evolved over time, where at some stage it ran in parallel with the other phases like model building and evaluation. As explained in chapter three (3), the heuristic evaluation method was adopted. Professionals and lecturers of computer science, software engineering and information systems, were asked to evaluate the software. Some of them were in Malaysia, and others were in Palestine. About fourteen (14) were asked to evaluate the system, and nine (9) of them responded to the request and provided their evaluation.

6.6.2 Evaluation Results and System Amendments

Table D.1 shows the details of the evaluation of the system interface by experts. It shows each criteria (item) with number of 'Yes' responses and its percentage, number of 'No' responses and its percentage, and number of 'N/A' responses and its percentage.

Most criteria have scored high 'Yes' answer, therefore having high percentage of the overall responses. Most criteria have scored 'Yes' answer for more than 67% of all responses and a few of them have scored between 50% and 67%, while a few criteria (12 criteria out of 102) scored less than 50% of responses as a 'Yes' answer. Those are marked in yellow in Table D.1, and shown in Table 6.1, namely criteria 3.4, 3.5, 4.19, 5.1, 5.3, 5.6, 5.10, 6.5, 6.6, 7.9, 7.18, and 10.2. The worst case was with criterion 6.5, where it scored only one 'Yes' answer, followed by criterion 6.6 with two answers, then criteria 7.18, 3.4, and 5.10 with three 'Yes' answers each.

Table 6.1: Criteria with Low 'Yes' Answers

Criteria	Description	YES		NO		N/A	
		#	%	#	%	#	%
3.4	If menu lists are long (more than seven items), can users select an item either by moving the cursor or by typing a mnemonic code?	3	33	3	33	3	33
3.5	If the system uses a pointing device, do users have the option of either clicking on menu items or using a keyboard shortcut?	4	44	2	22	3	33
4.19	If the system has multipage data entry screens, do all pages have the same title?	4	44	3	33	2	22
5.1	Is sound used to signal an error?	4	44	5	56	0	0
5.3	Are error messages grammatically correct?	4	44	3	33	2	22
5.6	If an error is detected in a data entry field, does the system place the cursor in that field or highlight the error?	4	44	2	22	3	33
5.10	If the system supports both novice and expert users, are multiple levels of error-message detail available?	3	33	3	33	3	33
6.5	Do data entry screens and dialog boxes indicate the number of character spaces available in a field?	1	11	6	67	2	22
6.6	Do fields in data entry screens and dialog boxes contain default values when appropriate?	2	22	6	67	1	11
7.9	Are optional data entry fields clearly marked?	4	44	3	33	2	22
7.18	Do data entry screens and dialog boxes indicate when fields are optional?	3	33	4	44	2	22
10.2	If menu choices are ambiguous, does the system provide additional explanatory information when an item is selected?	4	44	2	22	3	33

Table 6.2 shows the individual usability principles with the percentages of 'Yes', 'No' and 'N/A' answers. The criteria of each principle were grouped together to find the average percentage of each group for each answer.

Table 6.2: Individual Usability Principles with the Percentages of 'Yes', 'No' and 'N/A' Answers

Usability Principle	Criteria	Yes%	No%	N/A%
1) Visibility of system Status	1.1 - 1.11	86	11	03
2) Match Between System and the Real World	2.1 - 2.7	90	10	00
3) User Control and Freedom	3.1 - 3.6	61	24	15
4) Consistency and Standards	4.1 - 4.20	83	13	04
5) Help Users Recognize, Diagnose, and Recover From Errors	5.1 - 5.10	61	24	14
6) Error Prevention	6.1 - 6.6	59	31	09
7) Recognition Rather Than Recall	7.1 - 7.18	80	14	06
8) Flexibility and Minimalist Design	8.1 - 8.6	74	20	06
9) Aesthetic and Minimalist Design	9.1 - 9.8	88	08	04
10) Help and Documentation	10.1 - 10.10	80	11	09

When examining the individual usability principles results, it is noticed that principle two '*Match Between System and the Real World' had* scored 90%, which is the highest percentage for the 'Yes' answer among all the principles, followed by principle nine '*Aesthetic and Minimalist Design*' and principle one '*Visibility of system Status*' with 88% and 86% respectively. On the other hand the lowest was principle six '*Error Prevention*' with only 59% for the 'Yes' answer. The same principle scored the highest score (31%) for the 'No' answer, followed by principles three '*User Control and Freedom*', and five '*Help Users Recognize, Diagnose, and Recover From Errors*' with 24% each. The low score of principle six is attributed to criteria 6.5 and 6.6, where they both scored a very low 'Yes' answer percentage of 11% and 22% respectively, while the 'No' answer percentages of both is 67%.

On the other hand, by looking at the individual evaluators' evaluation – see Table 6.3, it could be noticed that the highest 'Yes' evaluation is 95 out of 102 criteria questions, while the lowest is 51 out of 102 questions. Four of the evaluators answered with more than 80 'Yes' answer, while 3 are within the range of 70 to 80. It can also be noticed that those with a 'Yes' answer of between 70 and 80 range, their other answers are mainly 'No' , while evaluator 2 with 67 'Yes' answer gave more 'N/A' answers than 'No' answers (27 'N/A' compared to 8 'No'). The highest 'No' answers is by evaluator 7, who also has the lowest 'Yes' answer. Evaluator 4 has the lowest 'No' answer, while evaluator 6 has zero (0) answers for the 'N/A' category.

Table 6.3: Results of Individual Evaluators

Evaluator	# Yes	% Yes	# NO	% NO	# N/A	% N/A
1	95	93	3	3	4	4
4	93	91	2	2	7	7
6	93	91	9	9	0	0
3	87	85	14	14	1	1
5	78	76	13	13	11	11
8	76	75	23	23	3	3
9	75	74	24	24	3	3
2	67	66	8	8	27	26
7	51	50	46	45	5	5

Percentages have been rounded off

As the above results show, it is clear that the evaluation was a positive one, although some criteria were not fully met. The evaluation results were used to improve the system. Amendments and alterations to the interface design were made whenever feasible. However, it is worth mentioning that improvements and amendments to the system were done almost on a continuous base i.e. an ongoing process.

Based on the evaluation results and after the amendments were made, it was concluded that the system was acceptable and therefore, it could be put to test at the Palestine Polytechnic University in Palestine. This testing was the final stage in the evaluation of the model. This is discussed in Chapter 7 below.

CHAPTER 7

MODEL TESTING

7.1 Introduction

This chapter highlights the process and outcome of the model testing. In this context – as explained earlier in chapter 3 – the testing of the model went into two main phases. The first phase was evaluating the system itself, particularly the interface, after it had been developed; as explained in chapter 6. The second phase was to implement the model – testing it – at Palestine Polytechnic University; one of the traditional universities in Palestine. The testing of the model was followed by an evaluation by students who participated in the test, as well as lecturers who volunteered to test the model using courses they were teaching at the time. The process and results are explained in sections 7.2 and 7.3 below. Finally, some discussion and conclusion of the model testing followed.

7.2 System Usage and Evaluation

To test the model at Palestine Polytechnic University, a request was sent to the management of the university asking for their permission. The management has welcomed the request and directed their Computer Center staff to provide all assistance needed.

7.2.1 Preparation

To prepare for the testing, the Computer Center staff at Palestine Polytechnic University was asked to provide dedicated 'location' on the university's servers. Technical preparation was carried out by the staff, then, the system was uploaded. The system was tested online for few days before the actual usage began. Prior to that, a request was sent to all lecturers at Palestine Polytechnic University asking for volunteers to test the model. Four lecturers responded and expressed their willingness to help in testing the model. Those lecturers were contacted directly through email and over the phone for clarifying issues related to the testing process. They were provided with a brief explanation of the system and the procedures to be followed in testing the model. No formal training was given to those lecturers on how to use the system, with the exception of brief instructions sent to them via email. They managed to use the system with no major problems or difficulties, and whenever they had any questions or inquiries; it was directly explained to them. They in turn, explained the operation of the system to their respected students. The testing was originally planned to start mid November 2010, but due to some technical issues it was delayed towards the end of November. However, by that time, the volunteer lecturers at Palestine Polytechnic University suggest to postpone the testing until after their students are done with some semester assessments. Therefore, the testing started on December, 11th, 2010. This delay was one of the constraints/limitations on the implementation and testing of the model.

7.2.2 The Evaluation Process

At the time when the system was installed and tried by lecturers at Palestine Polytechnic University, the lecturers were ready to start the test. They informed their respected students that they will try a model of blended learning, and therefore, students will start to use the software (system) associated with this model. Students have been briefed and shown how to use the system by their lecturers. The model was under testing for two weeks. At the end of the two weeks, an online questionnaire was made accessible to students through the system (website). Students were instructed by their lecturers to access the questionnaire and fill it in. As indicated earlier, the questionnaire was available to student for ten (10) days to give them the time to fill it as it is relatively lengthy one. Student had the choice of filling in the questionnaire at one shot, or can fill it at different times per his/her convenience. At the end, data from the questionnaire was exported to PASW Statistics to be analyzed. On the other hand, participating lecturers were asked to provide their feedback on the model through an evaluation form sent to them via email. The following sections provide more details on reporting both students' and lectures' evaluations.

7.2.3 Evaluation by Students

The participating students are the major evaluators of the effectiveness of the model. They have used it for two weeks, towards the end of the first semester of 2010/2011 academic year. However, the system remained accessible to students until the end of the semester. The students were originally enrolled in four different courses at Palestine Polytechnic University, taught by the volunteer lecturers. Three of the courses are undergraduate ones with a total of 54 students. These courses are: Human Computer Interaction, Digital Audio and Video, and Managing Information Technology. The fourth is Artificial Intelligence for postgraduate students with 10 (ten) registered students.

7.2.4 Evaluation by Lecturers

Lecturers who have volunteered to try the model were asked to give their feedback on their experience and on the model itself. A form has been designed to help lecturers on what to comment on, with a room for more comments and suggestions.

7.2.5 Questionnaire Used in the Evaluation

As indicated in the research methodology; chapter three earlier, a questionnaire was compiled based on previous work by Akkoyunlu and Yilmaz-Soylu (2008), Wang (2003), Hermans *et al* (Online), Melton *et al* (2009), Loi & Cattaneo (2008), and So &

Brush (2008). In addition, more items were added to cover all dimensions of the model evaluation. This questionnaire was given to students to complete after they have used the model for two weeks. The full questionnaire can be found in the appendix.

Population and sampling: the population for this questionnaire is all students who are registered in the four courses which are used to test the model. The total number of registered students is 64. As participants in the testing of the model, all students were considered and asked to complete the questionnaire online. However, 57 of them completed it, yielding an 89.06% response rate.

Validity and reliability of the questionnaire: Any questionnaire should be validated before it can be used. Validity of the questionnaire in general and of each of the items should be carried out. Face validity of the questionnaire was conducted to check for appropriateness of the language, words and terms used, and for consistency of the items and their intended meaning. In addition, experts were asked to validate the questionnaire in terms of suitability and appropriateness of the questions. Seven (7) experts/lecturers at university of Malaya were asked to do the validity, and four (4) of them responded with their comments and suggestions. These were taken into considerations and incorporated in the questionnaire, leading to removal of some items and modifying some others.

According to Fraenkel & Wallen (2010; p. 157), an acceptable reliability test result (Cronbach's Alpha) is above 0.7. The questionnaire was tested for reliability of all items. It scored a Cronbach's Alpha of 0.982 and 0.981; based on standardized items. There were 48 valid cases out of the 57 original cases, which represents an 84.2% based on the reliability test. However, when the questionnaire was tested for reliability of the Likert-Scale items, excluding the demographic items, a Cronbach's Alpha was found to be 0.984, and 0.985 based on standardized items. The Mean is 4.768, and minimum and maximum values were 4.25 and 5.396 respectively. Results of individual item reliability test are shown in Table F.1. This means that the questionnaire is valid and reliable according to Fraenkel & Wallen (2010; p. 157).

On the other hand, another evaluation form was compiled for lecturers to provide comments and feedback on the testing of the model. It consists mainly of open ended questions to allow room for lecturers to express their opinion. The form can be found in appendix A.

7.3 Results and Analysis

This section reports on and analyzes the results of the evaluations of the model by students and lecturers.

7.3.1 Students' Evaluation

As explained earlier, participating students were asked to complete the questionnaire online. A description, of the responses to each item, is shown in Table F.2. It shows that the highest mean is 5.37 of item B62, and lowest is 4.21 of item B5. The highest standard deviation is 1.937 of item B1, and the lowest is 1.159 of item B57. However, it shows that ten (10) items scored a mean of 5.0 and above; namely items B62; B66; B51; B52; B65; B64; B68; B17; B47; and B63, while the rest of the items scored a mean between 4.21 and 5.0. On the other hand the ten (10) items, which scored the lowest means, are – in ascending order: B5, B3, B39, B4, B14, B20, B60, B40, B38, and B42.

7.3.1.1 Demographic Characteristics of the Students

Of the 57 students participating in the test, there were 35 (61.4%) female and 22 (38.6%) male students, while the age distribution of the students was concentrated in the 20-25 interval (50 students representing 87.7%), with 6 (10.5%) above 25 years, and only one (1.8%) under 20 years old. The majority of the students 35 (61.4%) are fourth year students, 5 (8.8%) are third year, 6 (10.5%) are fifth year students, and 2 (3.5%) second year undergraduate students. Postgraduate students were distributed as 6 (10.5%) first year, and 3 (5.3%) as second year Masters Students. As for the program students are enrolled in, 48 (84.2%) are undergraduate (Bachelor degree) and 9 (15.8%) postgraduate (Master degree) students. Students are mainly enrolled in the field of computer science/ information technology 41 (71.9%), 12 (21.1%) in the Art/Humanities filed, 2 (3.5%) in business administration, and 1 (1.8%) in the science and engineering fields respectively.

When it comes to owning a computer, 30 (52.6%) of students own laptop, while 11 (19.3%) own a personal computer, 3 (5.3%) have family PC, and 12 (21.1%) own both a laptop and personal computer, while only one (1.8%) has no computer. Connected to the Internet from home, students' responses show that 6 (10.5%) has no connection to Internet at home, 1 (1.8%) use dialup connection, 16 (28.1%) use wireless connection, and 30 (52.6%) use DSL connection, while 2 (3.5%) use satellite and other type of connections respectively.

7.3.1.2 Analysis of the Responses

As shown above, there are ten (10) items, which scored mean of 5.0 or above. These items and the other ten (10) items with the lowest means are shown in detail below. Table F.2 presents details of all items; with responses distributed among the categories of the scale i.e. CD, D, SHD, N, SHA, A, CA. in the figure below, the CD is represented by 1, D with 2, SHD with 3, N with 4, SHA with 5, A with 6 and CA with 7. Analysis of the highest and lowest ten means of all items is presented below.

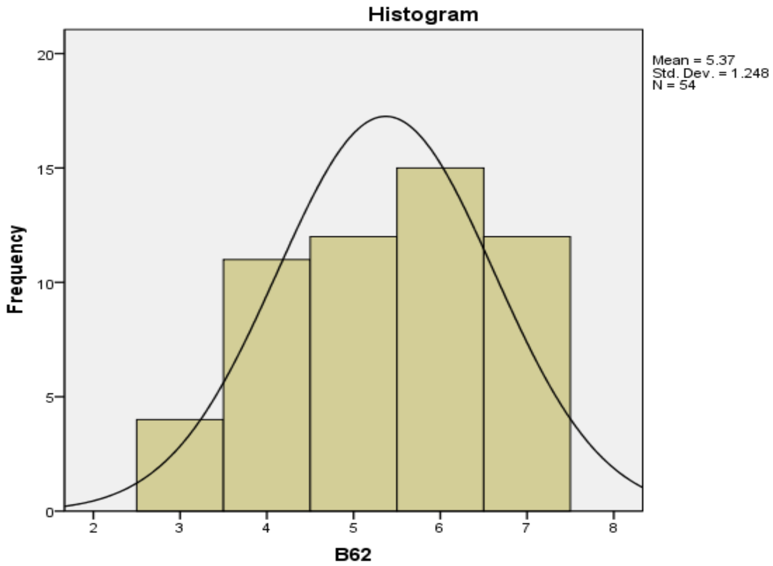

Figure 7.1: Frequencies of Answers of Item B62

Item B62 '*I would be more satisfied if there is a bilingual feature (Arabic/English) in the system*' scored the highest mean of 5.37. Looking further into the responses to this item it could be noticed that only less than 10% of the respondents do not agree with this statement, while almost 70% agree/completely agree with it, and about 20% are neutral.

Item B66 *'I do not need to buy additional hardware to use the system'* scored the second highest mean of 5.36. Of the respondents, only less than 13% do not agree with this statement, while about 9% are neutral, and the majority (>78%) agree with it.

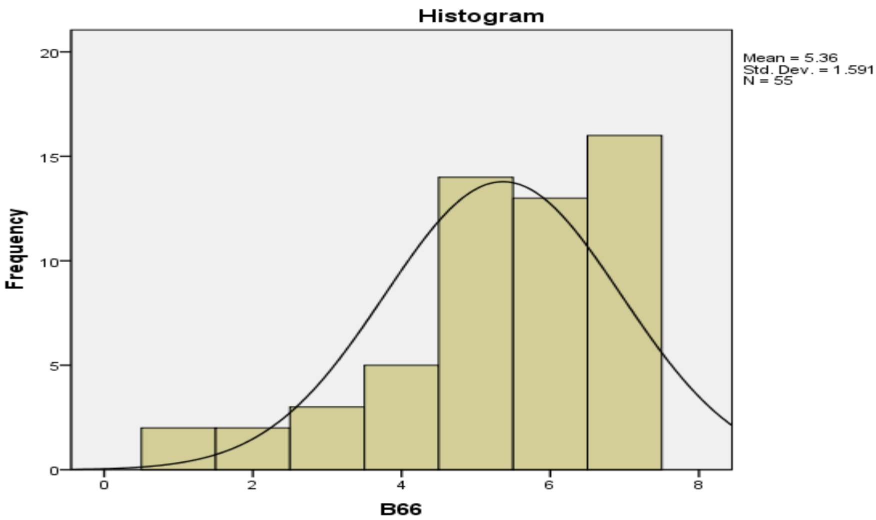

Figure 7.2: Frequencies of Answers of Item B66

Item B51 *'If this model is applied for all courses, I think it will decrease my transportation cost'* scored the third highest Mean of 5.35. Only less than 13% of the respondents do not agree with it, while the majority (65%) does agree; with about 18% indifference to it.

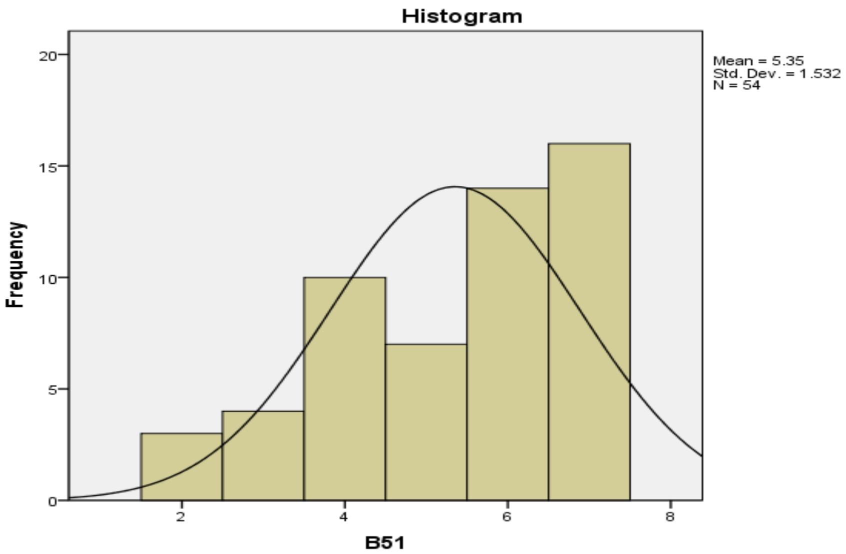

Figure 7.3: Frequencies of Answers of Item B51

Item B52 *'If this model is applied for all courses, I think it will decrease my daily expenses'* is next with a mean equals 5.24. Less than 13% do not agree, while about 16% are neutral, and 66.8% agree with this statement.

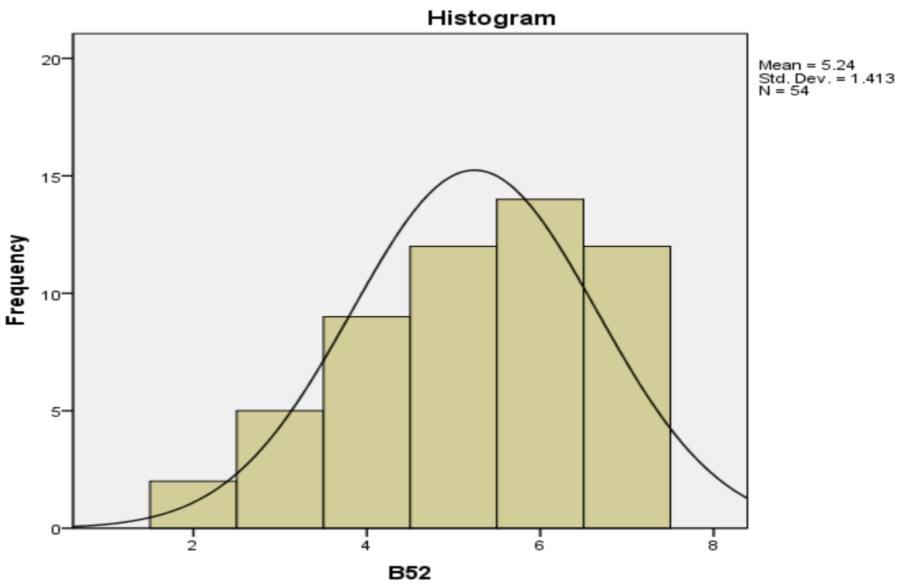

Figure 7.4: Frequencies of Answers of Item B52

Item B65 *'I do not need to change my connection speed to use the system'* has a Mean of 5.13. Less than 18% disagree with this statement, while more than 70% agree with it, and about 9% are neutral.

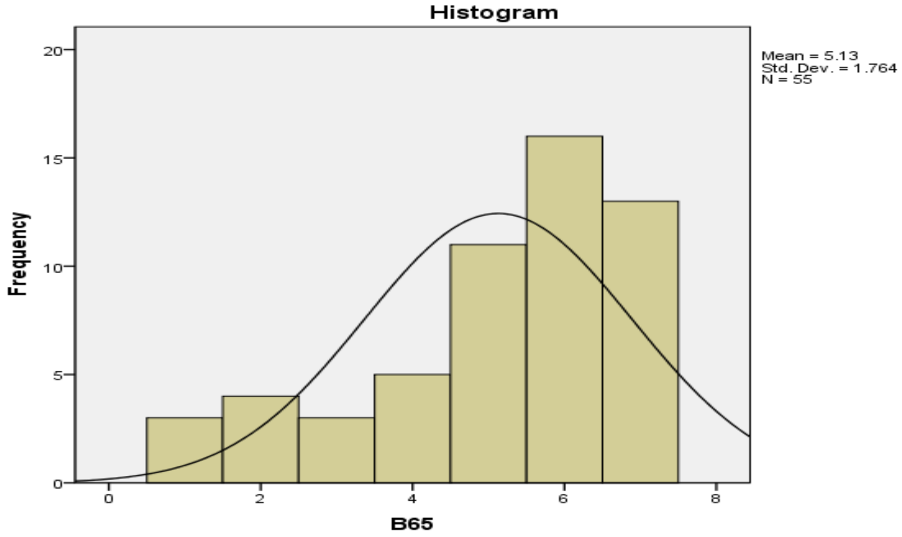

Figure 7.5: Frequencies of Answers of Item B65

Item B64 *'Using this model, I feel I can retain information and knowledge better than using traditional system'* has a Mean of 5.09. There is no extreme disagreement with this statement, i.e. there is no 'completely disagree' or 'disagree answers'.

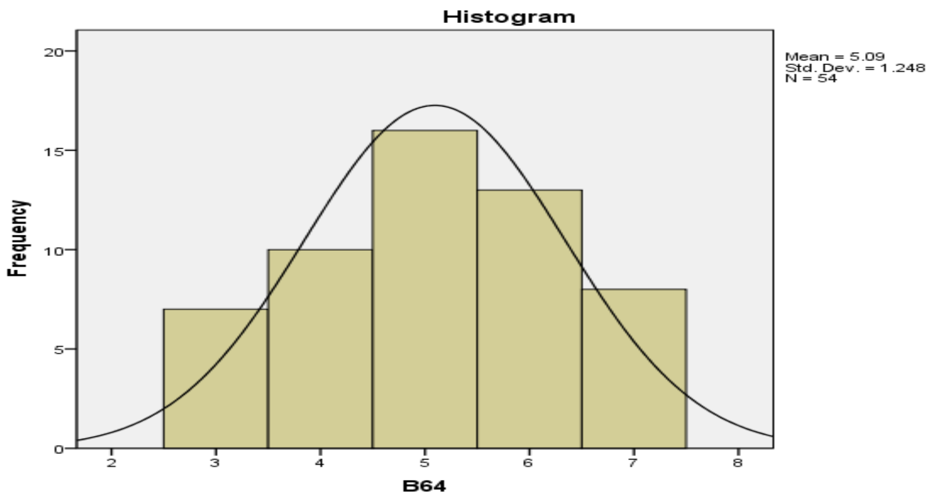

Figure 7.6: Frequencies of Answers of Item B64

However, 12.3% say they 'somehow disagree', while 17.5 are neutral, and the remaining 64.9% agree with the statement.

Item B68 *'If this model is to be applied/ used in the future (next semester onward), I would like to use it'* scored a Mean of 5.05. Of the respondents, 63.3% agree that they would use the model if applied in the future, and 17.5% are neutral to the use of it. On the other hand, only 15.9% would not like to use the model if applied in the future.

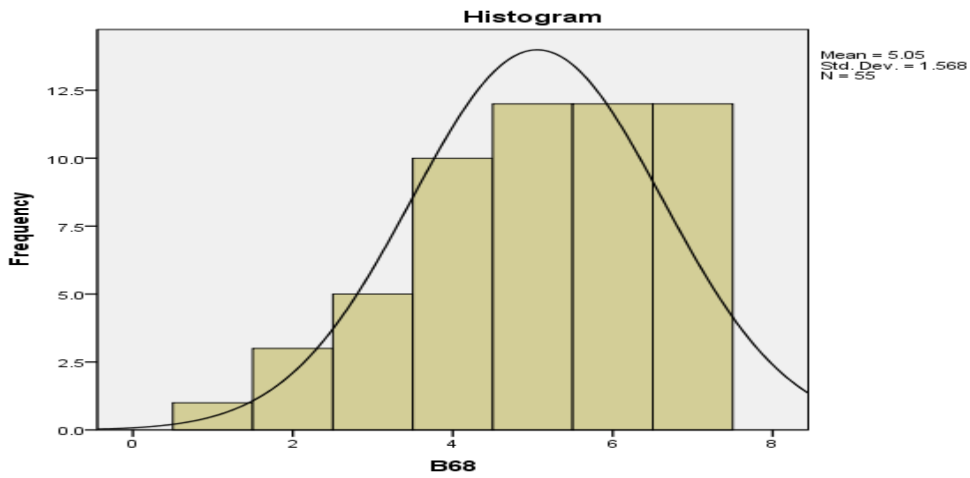

Figure 7.7: Frequencies of Answers of Item B68

Item B17 *'The communications methods available are supportive and help me reinforce what I have learned'* scored a Mean of 5.02. The highest percentage of responses goes to 'somehow agree' with 29.8%, while those who agree or completely agree represent 33.3%. Less than 15% do not agree, and 19.3% are neutral.

Item B47 *'This model gives me flexibility for study time'* has a Mean of 5.02. In this item the highest percentage goes to 'neutral' answer (28.1%). Those who agree represent 54.3%, while 12.3% goes to disagree.

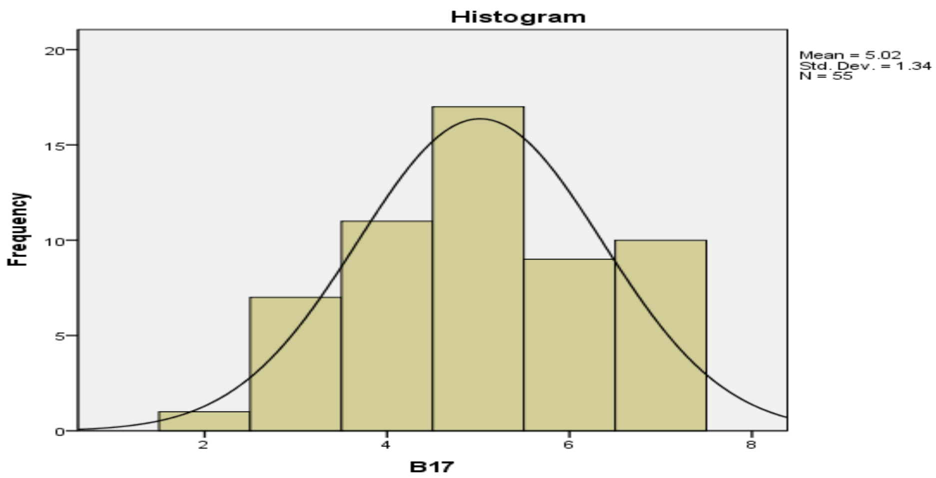

Figure 7.8: Frequencies of Answers of Item B17

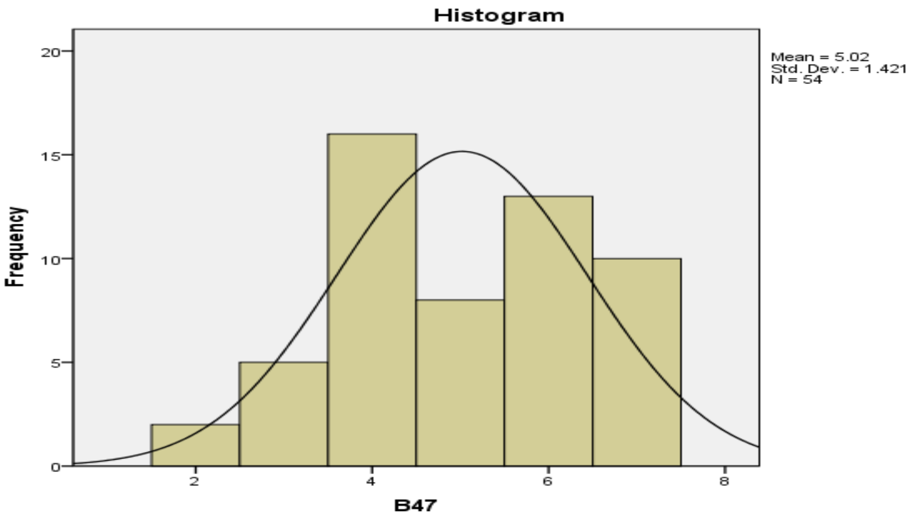

Figure 7.9: Frequencies of Answers of Item B47

Item B63 *'There are advantages to learn through this model'* scored a Mean of 5.0. No extreme disagreement is reported, though 10.5% say they somehow disagree. However, 59.4% do agree with the statement, and 24.6% are neutral.

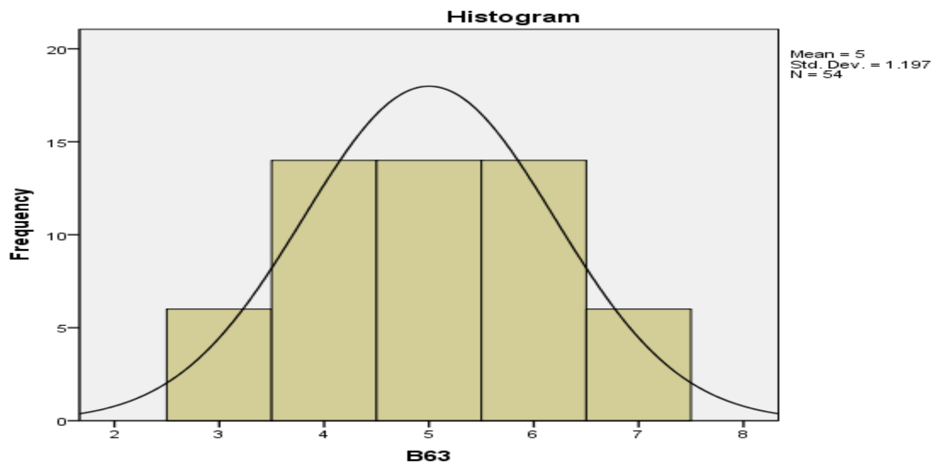

Figure 7.10 Frequencies of Answers of Item B63

The other items with the lowest means are presented below.

Item B5 *'I can use the Conference easily'* scored the lowest mean of 4.21. Respondents who do not agree with this statement represent 26.3%, while 28.1% are neutral, and 43.9% do agree with this statement.

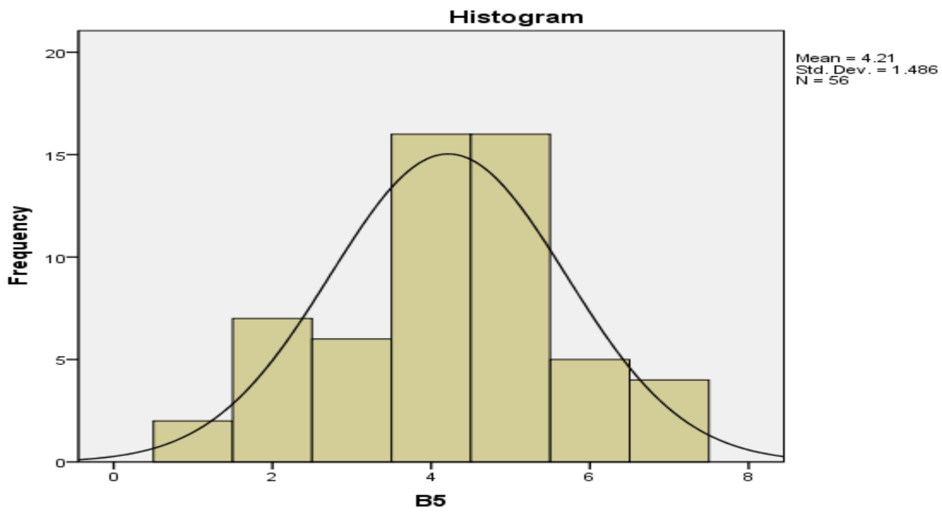

Figure 7.11 Frequencies of Answers of Item B5

The second lowest is item B3 *'I can use the forum easily'* with a mean equals 4.28. For this item, 29.8% of the respondents do not agree with the statement, while 19.3% are neutral, and 50.9% say they agree.

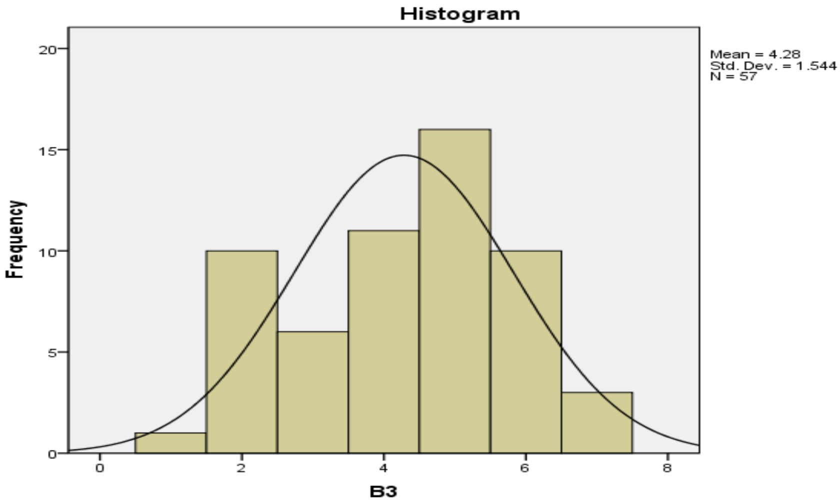

Figure 7.12 Frequencies of Answers of Item B3

Item B39 *'I felt more comfortable communicating with the lecturer through this model than traditional system'* scored a mean of 4.28 as item B3. It also scored a 29.8% for those who do not agree, while there are 24.6% neutral and 40.3% agree.

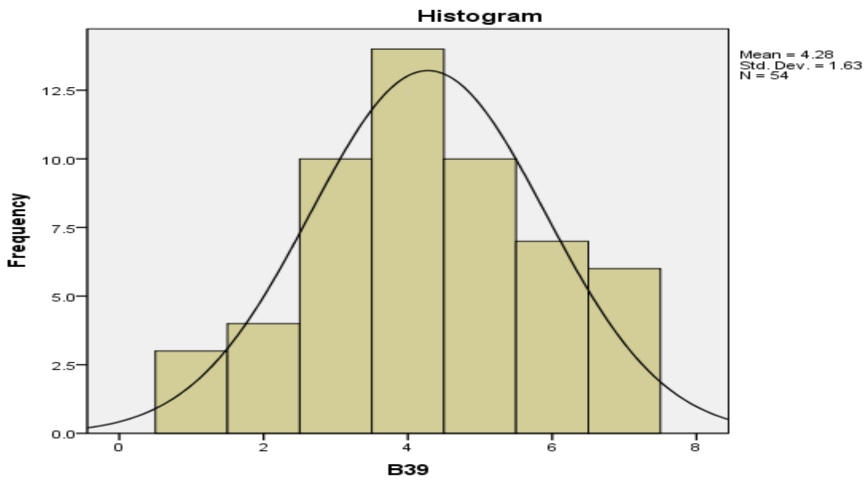

Figure 7.13 Frequencies of Answers of Item B39

Item B4 *'I can use the Chat easily'* has a mean of 4.32. Of all respondents, 24.6% say they do not agree with the statement, while 28.1% say they are neutral, and 47.3% do agree that they can use the 'Chat' easily.

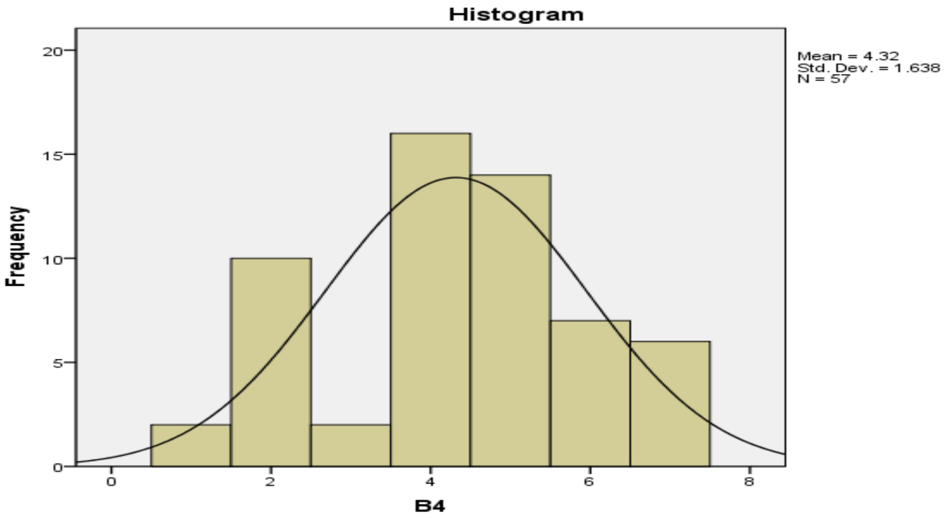

Figure 7.14 Frequencies of Answers of Item B40

Item B14 *'The communications and interactions in the web environment is enough for me'* scored a Mean of 4.32. There is no complete disagreement with this statement, though 26.3% do not agree and consider it not enough. On the other hand, those with a neutral stand scored 29.8%, while those who agree scored 42.1%.

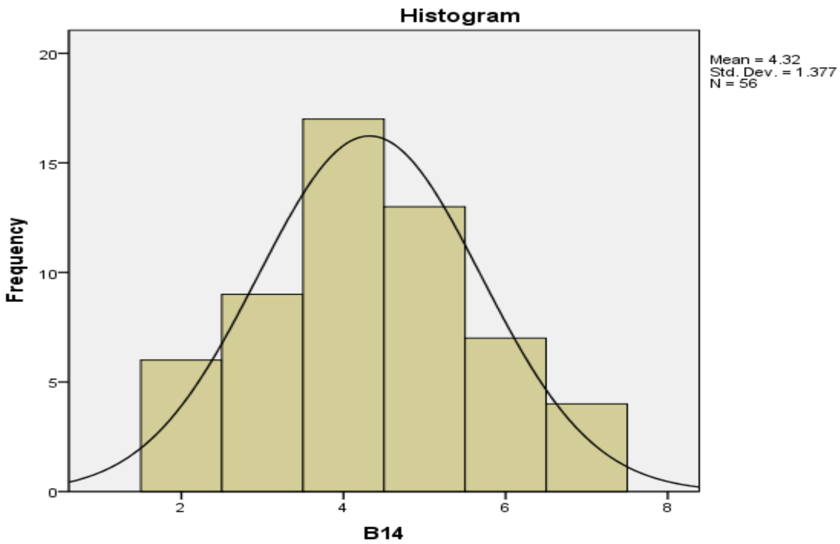

Figure 7.15 Frequencies of Answers of Item B14

Item B20 *'I can flexibly communicate/ interact with my lecturer in a convenient manner 24/7'* scored a Mean of 4.36. Most responses concentrated around the somehow disagree; neutral and somehow agree with 17.5%, 21.1% and 22.8% respectively. In general 29.8% do not agree with the statement, and 45.6% do agree.

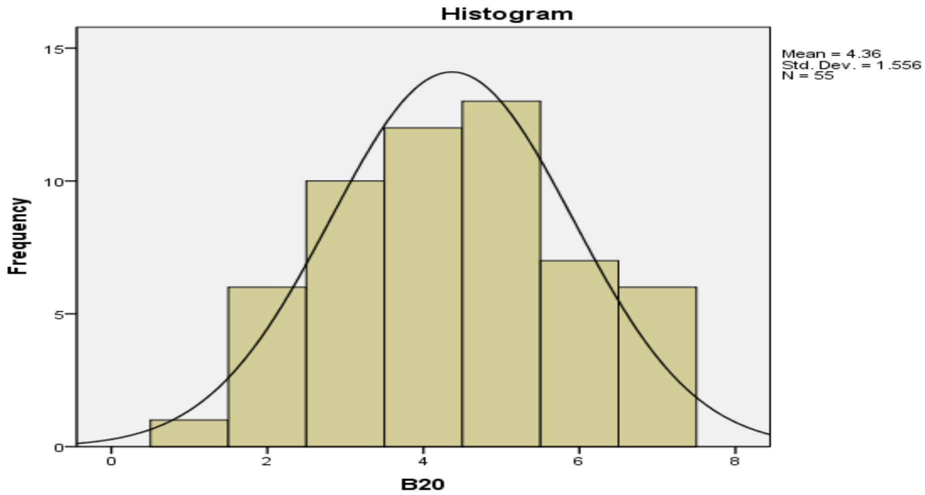

Figure 7.16 Frequencies of Answers of Item B20

Item B60 *'Teaching approaches used in this model are suitable to my LS'* scored a Mean of 4.41. There is 29.9% of respondents who do not agree with this statement while there is 17.5% neutral, and 47.4% agree.

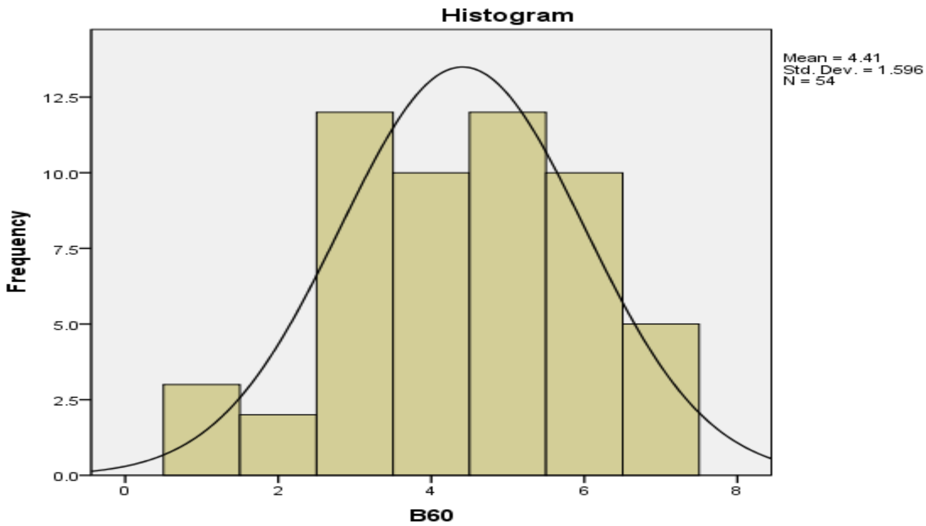

Figure 7.17 Frequencies of Answers of Item B60

Item B40 *'I felt more comfortable communicating with peer students through this model than traditional system'* has scored a Mean of 4.43. However, 29.9% do not agree with this. On the other hand, 40.4% do agree, while 24.6% are neutral.

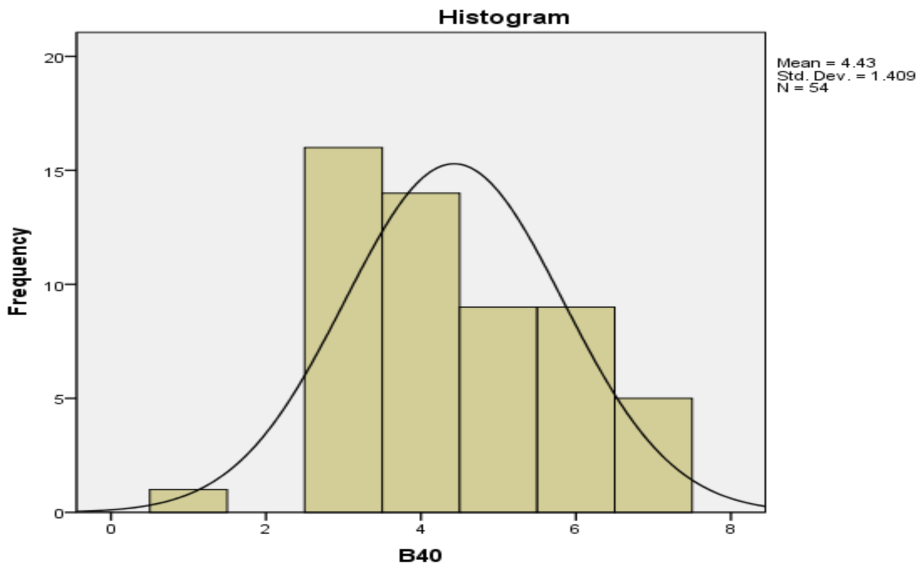

Figure 7.18Frequencies of Answers of Item B40

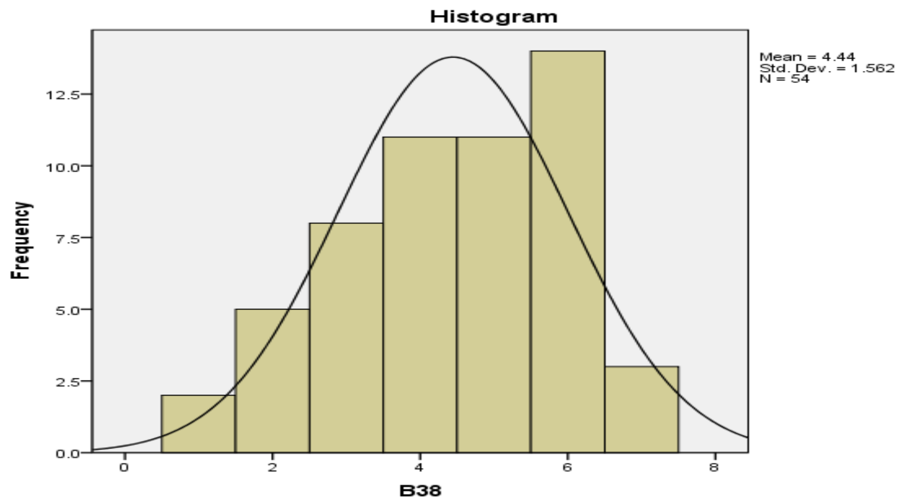

Figure 7.19: Frequencies of Answers of Item B38

Item B38 *'I enjoyed learning through this model'* scored a Mean of 4.44, with 26.3% not agreeing with this statement. However, 49.2% do agree with it and 19.3% are neutral.

Lastly, item B42 *'This model is more satisfying than most other methods'* scored a Mean of 4.44, with 26.3% not agreeing with this statement. However, 45.6% do agree, and 22.8% neutral.

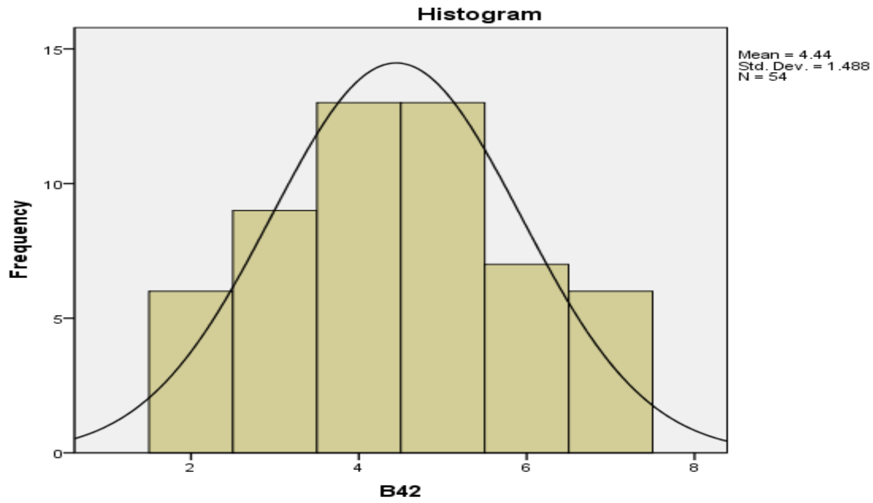

Figure 7.20: Frequencies of Answers of Item B42

7.3.1.3 Factor Analysis

The questionnaire consists of a large number of questions - 68 Likert scale questions - which makes it difficult and rather lengthy process to analyze every question alone. Yet, it would be hard to identify related questions that identify certain factor/ criterion that describe one of the dimensions of the evaluation of the model. A common practice is the use of the factor analysis method to identify such factors and to group the questions under each of the factors. The aim of the evaluation is not to proof/disproof or accept/reject certain theory, rather, it aims at assessing how students at Palestinian traditional universities evaluate and perceive the new developed model.

As such, an exploratory factor analysis method is used to extract these factors and group the questions. PASW Statistics 18 was used to analyze the data and extract the factors. The first attempt was done using principal component analysis extraction method, with Eigen value greater than 1. Iteration was set to 40, using VARIMAX rotation. The acceptable minimum loading on a factor of an item was set to be 0.5, which is considered high. This resulted in thirteen (13) factors satisfying the criteria with a cumulative percentage of 86.162%, which is shown in Table 7.1.

Table 7.1: Total Variance Explained –Initial Attempt

Compo-net	Initial Eigen values			Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings	
	Total	% of Variance	Cumulative %	Total	% of Variance	Total	% of Variance
1	34.288	50.424	50.424	34.288	50.424	9.061	13.324
2	3.885	5.714	56.137	3.885	5.714	8.907	13.098
3	3.378	4.968	61.105	3.378	4.968	7.380	10.854
4	2.764	4.064	65.169	2.764	4.064	5.164	7.594
5	2.512	3.694	68.863	2.512	3.694	5.029	7.396
6	1.981	2.913	71.776	1.981	2.913	4.703	6.916
7	1.815	2.669	74.446	1.815	2.669	4.368	6.423
8	1.763	2.593	77.039	1.763	2.593	3.308	4.865
9	1.479	2.175	79.214	1.479	2.175	3.264	4.800
10	1.396	2.053	81.267	1.396	2.053	2.330	3.427
11	1.207	1.775	83.041	1.207	1.775	1.941	2.855
12	1.112	1.636	84.677	1.112	1.636	1.745	2.567
13	1.010	1.485	86.162	1.010	1.485	1.390	2.044
14	.979	1.440	87.602				
15	.857	1.261	88.862				

As the number of factors is high (13), and some items failed to load above 0.5 on any factor, the test was repeated with same criteria, except that minimum Eigen value method was replaced by a pre-determined number of factors of 6, method. This is used because factor number 6 represents a cumulative percentage greater than 70%. The result showed better loading than the first attempt. However, some items (questions) failed to load on any factor. These items are: 18, 43, 57, 56, 65, 1, 17, and 67. The process was repeated again under the same criteria, but with the exclusion of the above items. The result shows improved initial Eigen value cumulative percentage of 73.976%. However, items 32 and 68 failed to load. Again, the process was repeated as before, but now excluding items 32 and 68. The final result, with total variances explained of the principal component analysis method is shown in Table 7.2. It shows an initial Eigen value cumulative percentage of 74.520%. This means that the results explain almost three fourth of what it is supposed to, which is considered quite acceptable.

Table 7.2: Total Variance Explained –Final Attempt

Compo-net	Initial Eigen values			Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings	
	Total	% of Variance	Cumulative %	Total	% of Variance	Total	% of Variance
1	29.622	51.072	51.072	29.622	51.072	10.581	18.243
2	3.794	6.541	57.613	3.794	6.541	9.584	16.524
3	3.252	5.607	63.220	3.252	5.607	8.904	15.352
4	2.584	4.455	67.674	2.584	4.455	6.094	10.507
5	2.345	4.043	71.717	2.345	4.043	4.389	7.568
6	1.626	2.803	74.520	1.626	2.803	3.669	6.326
7	1.597	2.754	77.274				

The result shows that all items load above 0.5 on one of the factors. Seventeen (17) items load on factor one, fourteen (14) on factor two, eleven (11) on factor three, eight (8) on factor four, five (5) on factor 5, and three (3) on factor six. The highest loading was that of item B12 '*The system makes it easy for me to discuss questions with other students*' (0.831) on factor three, and the lowest was item B60 '*Teaching approaches used in this model are suitable to my LS*' (0.500) on factor three. Please refer to Table 7.3 for details.

Table 7.3: Rotated Component Matrix with Item Loading on Factors

Items (questions)	Factors					
	1	_2_	_3_	_4_	_5_	_6_
B25: Sharing and discussion environment in face to face sessions (in this model) are good	.760					
B54: Content types (text, audio, video …) available are suitable for me.	.701					
B61: Knowing my LS increased my satisfaction with learning	.684					
B59: The LST helped me choose suitable communication method(s) for my LS.	.678					
B26: The teacher completes missing subjects during the face-to-face sessions of this model.	.665					

Table 7.3, Continue

Items (questions)	Factors

	_1_	_2_	_3_	_4_	_5_	_6_
B58: The LST helped me choose suitable contents for my Learning Style (LS).	.651					
B64: Using this model, I feel I can retain information and knowledge better than using traditional system.	.634					
B63: There are advantages to learn through this model.	.631					
B24: The quality of the face-to-face interaction (in this model) between learners themselves is good	.622					
B27: Generally, I can find the answers to my questions during the face-to-face sessions of this model.	.618					
B20: I can flexibly communicate/ interact with my lecturer in a convenient manner 24/7	.595					
B62: I would be more satisfied if there is a bilingual feature (Arabic/English) in the system	.587					
B19: The possibility to interact with the lecturer and with the other students is good.	.549					
B28: To learn through website makes me responsible for the course and motivates me to attend the course.	.547					
B53: Content types (text, audio, video …) available are sufficient for me.	.544					
B31: The model enables me to learn the content I need	.529					
B55: Content types (text, audio, video, …) available meet my needs	.519					
B37: This model allows me to play a more active role in learning		.733				
B41: This model provides a satisfying learning experience		.721				
B33: The Web environment helps us prepare for the course		.705				
B42: This model is more satisfying than most other methods		.680				
B40: I felt more comfortable communicating with peer students through this model than traditional system		.676				
B39: I felt more comfortable communicating with the lecturer through this model than traditional system		.656				
B23: The quality of the face-to-face interaction (in this model) between lecturer and learners is good		.653				
B38: I enjoyed learning through this model.		.643				
B34: I can study over and over again in the web environment (system).		.613				
B30: By following this model, I can study at my own pace		.610				
B35: My motivation is high while I am studying on the web (System)		.595				
B36: This model motivates me to study		.564				

Table 7.3, Continue

Items (questions)	Factors					
	_1_	_2_	_3_	_4_	_5_	_6_
B29: To learn the subject through this model is much more interesting than other methods		.546				
B22: I am satisfied with the cooperation and collaboration environment among learners which the model offers		.530				
B12: The system makes it easy for me to discuss questions with other students			.831			
B10: The system is user-friendly			.804			
B13: The system makes it easy for me to discuss questions with my lecturer			.800			
B15: I can share my thoughts and experiences with my colleagues through the communication methods (Forum, Chat, IM, Email, and Conference)			.761			
B14: The communications and interactions in the web environment is enough for me			.724			
B11: The system makes it easy for me to find the content I need			.704			
B16: My lecturer gives feedback through the web (Forum, Conference …) about my questions; inquiries etc			.651			
B9: The system is easy to use			.619			
B6: I can use the IM easily			.570		.	
B21: I can flexibly communicate/ interact with learners in a convenient manner 24/7			.565			
B60: Teaching approaches used in this model are suitable to my LS			.500			
B47: This model gives me flexibility for study time				.761		
B48: My schedule is more flexible because of this model				.742		
B46: The workload, in comparison to the traditional classroom mode, is lower				.739		
B50: This model is more convenient for my study time				.716		
B51: If this model is applied for all courses, I think it will decrease my transportation cost				.706		
B52: If this model is applied for all courses, I think it will decrease my daily expenses				.634		
B2: I find the web site clear				.563		
B49: This model decreases the need to attend f-2-f classes and saves some of my time				.545		
B5: I can use the Conference easily					.742	
B4: I can use the Chat easily					.730	
B7: I can use the "View Assessment" easily					.729	

Table 7.3, Continue

Items (questions)	Factors

	_1_	_2_	_3_	_4_	_5_	_6_
B8: I can use "Assessment Solution" easily					.666	
B3: I can use the forum easily					.563	
B45: While using the system, I do not need much technical support						.751
B44: To use the system, I do not need additional technical skills						.736
B66: I do not need to buy additional hardware to use the system						.697

Communalities are shown in Table 7.4. As shown in the table, there are no low communalities i.e. with extraction less than 0.600. Therefore, the items loading of factors and the extraction are high and acceptable.

The above factors that have been extracted should be named using the least possible words/terms. Looking at the items loading on each factor, we could name these as follows: Factor one: *motivation*, Factor two: *satisfaction*, Factor three: *communication and interaction*, Factor four: *time and cost saving*, Factor five: *ease of use*, and Factor six: *support & needs*

Table 7.4 Communalities

Item	Initial	Extraction		Item	Initial	Extraction
B2	1.000	.715		B34	1.000	.646
B3	1.000	.789		B35	1.000	.694
B4	1.000	.800		B36	1.000	.763
B5	1.000	.714		B37	1.000	.863
B6	1.000	.778		B38	1.000	.808
B7	1.000	.809		B39	1.000	.778
B8	1.000	.790		B40	1.000	.760
B9	1.000	.756		B41	1.000	.762
B10	1.000	.824		B42	1.000	.845
B11	1.000	.803		B44	1.000	.646
B12	1.000	.899		B45	1.000	.771
B13	1.000	.876		B46	1.000	.619
B14	1.000	.784		B47	1.000	.802
B15	1.000	.774		B48	1.000	.755

Table 7.4, Continue

Item	Initial	Extraction		Item	Initial	Extraction
B16	1.000	.665		B49	1.000	.650
B19	1.000	.732		B50	1.000	.755
B20	1.000	.634		B51	1.000	.698
B21	1.000	.745		B52	1.000	.722
B22	1.000	.802		B53	1.000	.696
B23	1.000	.809		B54	1.000	.816
B24	1.000	.857		B55	1.000	.748
B25	1.000	.715		B58	1.000	.749
B26	1.000	.687		B59	1.000	.653
B27	1.000	.740		B60	1.000	.744
B28	1.000	.772		B61	1.000	.690
B29	1.000	.707		B62	1.000	.610
B30	1.000	.728		B63	1.000	.667
B31	1.000	.670		B64	1.000	.674
B33	1.000	.719		B66	1.000	.755

Table 7.5 shows each factor with all items loaded on it, and a brief description of each factor.

Table 7.5 Factors and Their Descriptions with Items Loading on Each

Factor	Item (question)	Description
Factor one: *motivation*	B25: Sharing and discussion environment in face to face sessions (in this model) are good B54: Content types (text, audio, video …) available are suitable for me. B61: Knowing my LS increased my satisfaction with learning B59: The LST helped me choose suitable communication method(s) for my LS. B26: The teacher completes missing subjects during the face-to-face sessions of this model. B58: The LST helped me choose suitable contents for my Learning Style (LS). B64: Using this model, I feel I can retain information and knowledge better than using traditional system. B63: There are advantages to learn through this model. B24: The quality of the face-to-face interaction (in this model) between learners themselves is good B27: Generally, I can find the answers to my questions during the face-to-face sessions of this model. B20: I can flexibly communicate/ interact with my lecturer in a convenient manner 24/7 B62: I would be more satisfied if there is a bilingual feature (Arabic/English) in the system B19: The possibility to interact with the lecturer and with the other students is good. B28: To learn through website makes me responsible for the course and motivates me to attend the course. B53: Content types (text, audio, video …) available are sufficient for me. B31: The model enables me to learn the content I need B55: Content types (text, audio, video, …) available meet my needs	This factor explains 18.243% of total variances in the rotated sums of squared loadings (RSSL). Students scoring high in this factor are to be more motivated by the model, through proper available contents; communication availability and flexibility; interaction; and learning style.

Table 7.5, Continue

Factor	Item (question)	Description
Factor two: *satisfaction*	B37: This model allows me to play a more active role in learning B41: This model provides a satisfying learning experience B33: The Web environment helps us prepare for the course B42: This model is more satisfying than most other methods B40: I felt more comfortable communicating with peer students through this model than traditional system B39: I felt more comfortable communicating with the lecturer through this model than traditional system B23: The quality of the face-to-face interaction (in this model) between lecturer and learners is good B38: I enjoyed learning through this model. B34: I can study over and over again in the web environment (system). B30: By following this model, I can study at my own pace B35: My motivation is high while I am studying on the web (System) B36: This model motivates me to study B29: To learn the subject through this model is much more interesting than other methods B22: I am satisfied with the cooperation and collaboration environment among learners which the model offers	This factor accounted for 16.524% of total variances in RSSL. Students who score high on this factor are more satisfied with self-paced environment the model offers; interaction environment and enjoyment.

Table 7.5, Continue

Factor	Item (question)	Description
Factor three: *communication and interaction*	B12: The system makes it easy for me to discuss questions with other students B10: The system is user-friendly B13: The system makes it easy for me to discuss questions with my lecturer B15: I can share my thoughts and experiences with my colleagues through the communication methods (Forum, Chat, IM, Email, and Conference) B14: The communications and interactions in the web environment is enough for me B11: The system makes it easy for me to find the content I need B16: My lecturer gives feedback through the web (Forum, Conference …) about my questions; inquiries etc B9: The system is easy to use B6: I can use the IM easily B21: I can flexibly communicate/ interact with learners in a convenient manner 24/7 B60: Teaching approaches used in this model are suitable to my LS	This factor explains 15.352% of total variances in RSSL. Students scoring high on this factor are most probably enjoying and wanting easy to use; flexible; and varied communications and interactions with lecturers and fellow students.
Factor four: *time and cost saving*	B47: This model gives me flexibility for study time1 B48: My schedule is more flexible because of this model B46: The workload, in comparison to the traditional classroom mode, is lower B50: This model is more convenient for my study time B51: If this model is applied for all courses, I think it will decrease my transportation cost B52: If this model is applied for all courses, I think it will decrease my daily expenses B2: I find the web site clear B49: This model decreases the need to attend f-2-f classes and saves some of my time	This factor describes 10.507% of total variances of RSSL. Those who score high on this factor are and would enjoy schedule flexibility and saving on time and cost.
Factor five: *ease of use*	B5: I can use the Conference easily B4: I can use the Chat easily B7: I can use the "View Assessment" easily B8: I can use "Assessment Solution" easily B3: I can use the forum easily	This factor explains 7.568% of total variances in RSSL. Those scoring high on this factor want to easily using the system.

Table 7.5, Continue

Factor six: *Support & Needs*	B45: While using the system, I do not need much technical support B44: To use the system, I do not need additional technical skills B66: I do not need to buy additional hardware to use the system	This factor accounts for 6.326% of the total variances in RSSL. Those scoring high on this factor do not want much technical support and skills; and additional hardware to use the model.

7.3.1.4 Further Analysis

After extracting the above factors, using principle component analysis method, a descriptive statistics of the six factors was compiled. As it could be noticed from Table 7.6, the highest mean for a factor is that of ‘time & cost saving’ (4.968) followed by ‘Support & Needs’ factor (4.903). The lowest is that of ‘ease of use’ factor (4.402). The difference between the highest and the lowest is 0.566. The highest standard deviation is that of ‘ease of use’ (1.563) and the lowest is that of ‘motivation’ (1.377). The least difference between any two ordered means is the one between ‘communications & interaction’ and ‘satisfaction’ (0.031), while the largest difference is between ‘satisfaction’ and ‘ease of use’ (0.199).

Table 7.6: Means with Differences between each Consecutive Ones, and Standard Deviation

Factor	**Mean**	**Diff.**	**St deviation**
Time & cost saving	4.968	0.000	1.461
Support & Needs	4.903	0.065	1.480
Motivation	4.774	0.129	1.377
Communications & interaction	4.632	0.142	1.495
Satisfaction	4.601	0.031	1.493
Ease of use	4.402	0.199	1.563

For more analysis, these factors should be examined in relation to demographic characteristics of the respondents. Factors have been cross-tabulated with the demographic elements as shown below.

7.3.1.4.1 Factor One; Motivation.

Cross tabulating factor one ‘Motivation’ with learning style shows that those with audio (1) learning style scored highest percentage for ‘agree’ (6.0%) followed by ‘neutral’ (5.7%), while those with Visual (2) learning style scored highest for ‘somehow agree’ (7.9%) followed by ‘neutral (5.0%). The kinesthetic (3) learning style students scored highest for ‘somehow agree’ (10.2%) followed by ‘agree’ (8.7%). Details are shown in Table 7.7.

Table 7.7: Cross Tabulation of Learning Styles (LS) with Factor 1 (Motivation)

			Factor 1 - Responses							Total
			1	2	3	4	5	6	7	
LS	0	% of Total	.0%	2.2%	4.3%	3.8%	2.6%	1.8%	.9%	15.6%
	1	% of Total	.0%	1.0%	3.9%	5.7%	5.2%	6.0%	2.1%	23.9%
	2	% of Total	.0%	.5%	2.2%	5.0%	7.9%	3.2%	1.4%	20.2%
	3	% of Total	.3%	1.3%	3.8%	8.1%	10.2%	8.7%	8.0%	40.4%
Total		% of Total	.3%	5.0%	14.1%	22.6%	25.8%	19.9%	12.3%	100%

Cross tabulating ‘Motivation’ factor with program of study shows that the highest percentage of the undergraduate students respond with ‘somehow agree’ (22.6%) to items of this factors, followed by ‘neutral’ (19.8%), and ‘agree’ (15.6%). On the other hand, graduate students respond highest (4.3%) to ‘agree’ followed by ‘disagree’ (3.3%) and ‘somehow agree’ (3.2%), as illustrated in Table 7.8. In general, those who evaluate the motivation factor items in both categories as positive i.e. ‘somehow agree’ to ‘completely agree’ score similar percentages of respondents within the same category. To illustrate, if we add all percentages of undergraduate students for the ‘somehow agree’, ‘agree’ and ‘completely agree’ 22.6+15.6+10.9= 49.1, then divide it by the total percentage 49.1/84.4=0.582 (58.2%). If we do the same thing for the graduate students, we get 3.2+4.3+1.4=8.9 then divide by total percentage 8.9/15.6=0.571 (57.1%). Graduate students responded neutrally to motivation factor items less than undergraduate ones, while they responded more negatively than the undergraduate students.

Table 7.8: Cross Tabulation of Program of Study with Factor 1 (Motivation)

			Factor 1 – Responses							Total
			1	2	3	4	5	6	7	
Program	BA	% of Total	.3%	4.5%	10.8%	19.8%	22.6%	15.6%	10.9%	84.4%
	MA	% of Total	.0%	.4%	3.3%	2.8%	3.2%	4.3%	1.4%	15.6%
		% of Total	.3%	5.0%	14.1%	22.6%	25.8%	19.9%	12.3%	100%

Cross tabulating 'motivation' with 'field of study' shows that there are two main fields; computer science/it and art/humanities fields. In the computer science/it field the highest percentage is 19.4% for 'somehow agree' followed by 'neutral' (17.9%) and 'agree' (14.4%). While in the art/humanities field the highest is 4.6% for 'somehow agree' followed by 'agree' (4.1%) and 'completely agree' (3.7%). Details are provided in Table 7.9.

Table 7.9: Cross Tabulation of Field of Study with Factor 1 (Motivation)

			Factor 1 – Responses							Total
			1	2	3	4	5	6	7	
Field	SCIENCE	% of Total	.0%	.0%	.0%	.1%	.4%	.3%	1.0%	1.8%
	BUS ADMIN	% of Total	.1%	.1%	.9%	1.0%	1.1%	.4%	.1%	3.7%
	ENG	% of Total	.0%	.0%	.0%	.0%	.2%	.6%	1.0%	1.8%
	COMP SC/IT	% of Total	.1%	3.6%	10.5%	17.9%	19.4%	14.4%	6.6%	72.5%
	ART/HUM	% of Total	.1%	1.3%	2.8%	3.6%	4.6%	4.1%	3.7%	20.2%
		% of Total	.3%	5.0%	14.1%	22.6%	25.8%	19.9%	12.3%	100.0%

When cross tabulating ‘motivation’ factor with ‘owning a computer’ – see Table 7.10, the highest percentage of those who own a laptop is for ‘somehow agree’ (14.1%), followed by ‘agree’ (12.3%) and ’neutral’ (12.0%), while the highest for those who own a PC is for ‘neutral’ (5.0%) followed by ‘somehow agree’ (4.9%) and ‘somehow disagree’ (3.7%). On the other hand, the highest for those who own both a laptop and a PC is for ‘somehow agree’ (5.1%) followed by ‘agree’ (4.6%) and ‘neutral’ (4.3%).

In cross tabulating ‘motivation’ factor with ‘Internet connection at home’ results show that the highest percentages of those who have DSL connection is for ‘agree’ (13.1%) followed by ‘somehow agree’ (12.5%) and ‘neutral’ (10.8%), while those with wireless connection score the highest percentage for ‘somehow agree’ (6.9%) followed by ‘neutral’ (6.3%) and ‘agree’ (6.0%). See Table 7.11 for details.

Table 7.10: Cross Tabulation of ‘Owning a Computer’ with Factor 1 (Motivation)

			Factor 1 – Responses							Total
			1	2	3	4	5	6	7	
Own Comp	OWN LAPTOP	% of Total	.1%	1.5%	6.9%	12.0%	14.1%	12.3%	5.3%	52.3%
	OWN PC	% of Total	.1%	2.4%	3.7%	5.0%	4.9%	1.3%	1.1%	18.4%
	FAMILY PC	% of Total	.0%	.1%	.2%	1.0%	1.4%	1.4%	1.4%	5.5%
	LAP&PC	% of Total	.1%	.6%	3.0%	4.3%	5.1%	4.6%	4.2%	22.0%
	NO COMP	% of Total	.0%	.3%	.3%	.3%	.3%	.2%	.3%	1.8%
		% of Total	.3%	5.0%	14.1%	22.6%	25.8%	19.9%	12.3%	100.0%

Table 7.11: Cross Tabulation of Internet Connection at Home with Factor 1 (Motivation)

			Factor 1 - Resposes							Total
			1	2	3	4	5	6	7	
Connect	NO CONN	% of Total	.1%	.5%	2.5%	3.5%	4.1%	.2%	.1%	11.0%
	DIALUP	% of Total	.0%	.1%	.2%	.8%	.5%	.1%	.1%	1.8%
	DSL	% of Total	.1%	1.7%	6.4%	10.8%	12.5%	13.1%	7.7%	52.3%
	SATELLITE	% of Total	.0%	.0%	.2%	1.3%	1.7%	.4%	.0%	3.7%
	WIRELESS	% of Total	.1%	2.6%	4.9%	6.3%	6.9%	6.0%	.8%	27.5%
	OTHERS	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	3.7%	3.7%
		% of Total	.3%	5.0%	14.1%	22.6%	25.8%	19.9%	12.3%	100.0%

7.3.1.4.2 Factor Two; Satisfaction.

The second factor; satisfaction is cross tabulated with the same demographic characteristics as in the case of motivation factor.

Table 7.12: Cross Tabulation of Learning Style with Factor 2 (Satisfaction)

			Factor 2 – Responses							Total
			1	2	3	4	5	6	7	
LS	0	% of Total	1.2%	1.1%	4.3%	3.4%	3.9%	.8%	.5%	15.3%
	1	% of Total	.0%	1.1%	4.1%	8.0%	3.2%	4.5%	3.2%	23.9%
	2	% of Total	.7%	1.1%	3.4%	4.5%	7.2%	2.0%	1.4%	20.3%
	3	% of Total	.8%	2.2%	2.8%	9.2%	8.4%	10.5%	6.6%	40.5%
		% of Total	2.6%	5.4%	14.6%	25.1%	22.8%	17.8%	11.7%	100.0%

Cross tabulating ‘satisfaction’ with learning style shows that the highest percentage for auditory learning style is for ‘neutral’ (8.0%), and visual learning style scored highest for ‘somehow agree’ (7.2%), while kinesthetic learning style students scored highest for ‘agree’ (10.5%), as shown in Table 7.12.

In the case of the program of study, undergraduate students scored highest for ‘neutral’ (21.6%) followed by ‘somehow agree’ (20.3%), while graduate students scored highest for ‘agree’ (5.5%) followed by ‘neutral’ (3.6%), as shown in Table 7.13.

Table 7.13: Cross Tabulation of Program of Study with Factor 2 (Satisfaction)

			Factor 2 - Responses							Total
			1	2	3	4	5	6	7	
Program	BA	% of Total	2.1%	4.9%	12.8%	21.6%	20.3%	12.2%	10.9%	84.7%
	MA	% of Total	.5%	.5%	1.8%	3.6%	2.5%	5.5%	.8%	15.3%
		% of Total	2.6%	5.4%	14.6%	25.1%	22.8%	17.8%	11.7%	100.0%

Table 7.14: Cross Tabulation of Field of Study with Factor 2 (Satisfaction)

			Factor 2 – Responses							Total
			1	2	3	4	5	6	7	
Field	SCIENCE	% of Total	.0%	.0%	.1%	.3%	.3%	.8%	.4%	1.8%
	BUS ADMIN	% of Total	.0%	.3%	.9%	.8%	.8%	.9%	.0%	3.7%
	ENGINEERING	% of Total	.0%	.0%	.0%	.0%	.3%	.9%	.7%	1.8%
	COMP SC/IT	% of Total	1.6%	2.8%	9.9%	20.4%	18.2%	11.1%	8.6%	72.4%
	ART/HUM	% of Total	1.1%	2.4%	3.7%	3.7%	3.3%	4.1%	2.1%	20.3%
		% of Total	2.6%	5.4%	14.6%	25.1%	22.8%	17.8%	11.7%	100.0%

Cross tabulating ‘field of study’ with ‘satisfaction’ factor – see Table 7.14 - shows that students in the computer science/it field scored highest for ‘neutral’ (20.4%) followed by ‘somehow agree’ (18.2%), while students in the art/humanities field scored highest for ‘agree’ (4.1%) followed by ‘neutral’ and ‘somehow disagree’ with 3.7% each.

When cross tabulating ‘own a computer’ with ‘satisfaction’ factor results show that those who own a laptop scored highest for ‘somehow agree’ (15.4%) followed by ‘neutral’ (13.8%), while those who have their own PC scored highest for ‘neutral’ (4.9%) followed by ‘somehow agree’ (4.1%). Those who have both a laptop and a PC scored highest for ‘neutral (4.6%) followed by ‘completely agree’ (4.5%). Details are shown in Table 7.15.

Cross tabulating ‘Internet connection at home’ with ‘satisfaction’ factor shows that those with a DSL connection scored highest for ‘agree’ (14.2%) followed by ‘somehow agree’ (12.5%), while those with a wireless connection scored highest for ‘neutral’ (6.7%) followed by ‘somehow agree’ (6.4%). Those with no connection scored highest for ‘neutral’ (3.8%) followed by ‘somehow disagree’ (2.9%). See Table 7.16 for details.

Table 7.15: Cross Tabulation of Own a Computer with Factor 2 (Satisfaction)

			Factor 2 - Responses							Total
			1	2	3	4	5	6	7	
OwnComp	OWN LAPTOP	% of Total	.7%	1.6%	6.3%	13.8%	15.4%	9.6%	4.7%	52.1%
	OWN PC	% of Total	1.1%	1.7%	3.7%	4.9%	4.1%	2.1%	.9%	18.4%
	FAMILY PC	% of Total	.0%	.3%	.4%	1.2%	.3%	2.0%	1.4%	5.5%
	LAP& PC	% of Total	.8%	1.8%	3.9%	4.6%	2.8%	3.7%	4.5%	22.1%
	NO COMP	% of Total	.1%	.0%	.3%	.7%	.3%	.4%	.1%	1.8%
		% of Total	2.6%	5.4%	14.6%	25.1%	22.8%	17.8%	11.7%	100.0%

Table 7.16: Cross tabulation of Internet Connection at Home with Factor 2 (Satisfaction)

			Factor 2 - Responses							Total
			1	2	3	4	5	6	7	
Connect	NO CONN	% of Total	.4%	1.7 %	2.9%	3.8%	2.2%	.0%	.0%	11.1%
	DIALUP	% of Total	.7%	.5%	.5%	.1%	.0%	.0%	.0%	1.8%
	DSL	% of Total	.3%	1.4 %	5.9%	12.4 %	12.5 %	14.2 %	5.4%	52.1%
	SATELLITE	% of Total	.0%	.0%	.0%	2.1%	1.6%	.0%	.0%	3.7%
	WIRELESS	% of Total	1.3 %	1.7 %	5.3%	6.7%	6.4%	3.6%	2.6%	27.6%
	OTHERS	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	3.7%	3.7%
		% of Total	2.6 %	5.4 %	14.6 %	25.1 %	22.8 %	17.8 %	11.7 %	100.0 %

7.3.1.4.3 Factor Three; Communications & Interactions

The third factor; "communications & interactions" is cross tabulated with the same demographic characteristics as in the case of the other two factors.

Cross tabulating this factor with learning style of student shows that the highest score for 'audio' learning style is for 'agree' (8.0%) followed by 'neutral' (5.2%), while the highest for 'visual' learning style is 'somehow agree' (8.0%) followed by 'neutral' (5.5%). The highest score for 'kinesthetic' learning style is 'somehow agree' (9.8%) followed by 'completely agree' (8.8%).

Results for cross tabulating program of study with 'communications & interactions' show that the highest for undergraduate students is 'somehow agree' (23.0%) followed by 'neutral' (20.5%), while for graduate students the highest is 'agree' (4.7%) followed by 'somehow disagree' (3.1%).

When cross tabulating field of study, results show that the highest for computer science/it students is ‘somehow agree’ (18.7%) followed by ‘neutral’ (16.4%), while for art/humanities field the highest is ‘neutral’ (4.7%) followed by ‘agree’ (4.4%).

The results of cross tabulating ‘own a computer’ show that those who have a laptop scored highest in “somehow agree’ (14.5%), followed by both ‘agree’ and ‘neutral’ (10.9%) each, and those who have a PC scored highest in ‘somehow agree’ (5.5%) followed by ‘neutral’ (5.0%), while those who have both a laptop and a PC scored highest in ‘neutral’ (4.7%) followed by ‘agree’ (4.4%).

Lastly, cross tabulating the ‘Internet connection’ at home, shows that those with DSL connection scored highest in ‘somehow agree’ (15.6%) followed by ‘neutral’ (11.6%). Those with wireless connection scored highest in ‘agree’ (7.7%), followed by ‘neutral’ (5.2%), while those with no connection are mostly ‘neutral’ (3.4%).

7.3.1.4.4 Factor Four; Time & Cost Saving

The fourth factor; “time & cost saving” is cross tabulated with the same demographic characteristics as in the case of the other factors.

When cross tabulating learning style with ‘time & cost saving’ factor results reveal that ‘audio’ learning style students scored highest in ‘neutral’ (6.0%), and ‘visual’ learning style students scored highest in ‘somehow agree’ (7.8%), while ‘kinesthetic’ learning style students scored highest in ‘completely agree’ (11.3%).

As for program of study, undergraduate students scored highest in ‘somehow agree’ (20.5%) followed by both ‘agree’ and ‘neutral’ with17.9% each, while graduate students scored highest in ‘agree’ (22.3%) followed by both ‘somehow agree’ and ‘neutral’ with 21.8% each.

As for program of study, computer science/it students scored highest in ‘neutral’ (17.7%) followed by ‘agree’ (17.5%), while art/humanities students scored highest in both ‘somehow agree’ and ‘somehow disagree’ (4.1% each) followed by ‘agree’ (3.7%).

When it come to owning a computer, cross tabulation results show that student who have their own laptop scored highest in ‘agree’ (13.8%) followed by ‘somehow agree’ (12.0%), and those who have their own PC scored highest in ‘neutral’ (5.5%) followed by ‘agree’ (4.4%), while those who have both a laptop and a PC scored highest in ‘completely agree’ (4.8%) followed by ‘neutral’ (4.4%).

In ‘Internet connection at home’ cross tabulation shows that those with DSL and wireless connections scored highest in ‘agree’ (13.3% and 6.9% respectively), followed by ‘somehow agree’ (13.1% and 6.2% respectively).

7.3.1.4.5 Factor Five; Ease Of Use

Again, the fifth factor; “ease of use” is cross tabulated with the same demographic characteristics as in the case of the other factors.

The cross tabulation of learning style shows that both audio and visual learning styles students scored highest in ‘somehow agree’ (9.9% and 8.2%) respectively, while kinesthetic learning style students scored highest in ‘neutral’ (8.9%) followed by ‘somehow agree’ and ‘agree’ (8.2% each).

In the program of study cross tabulation, the undergraduate students scored highest in ‘somehow agree’ (24.8%) followed by ‘neutral’ (18.8%), while graduate students scored highest in ‘agree’ (3.9%)

Computer science/it and art/humanities students both scored highest in ‘somehow agree’ (21.3% and 5.3%) respectively.

When cross tabulating ‘own a computer’ results show that those who have their own laptop scored highest in ‘somehow agree’ (16.0%) followed by ‘agree’ (11.0%), and those who have a PC scored highest in ‘neutral’ (5.7%), while those who have both a laptop and a PC scored highest in ‘somehow agree’ (5.7%).

The ‘Internet connection at home’ tabulation shows that those with DSL connection scored highest in ‘somehow agree’ (14.2%) followed by ‘agree’ (10.6%) and ‘wireless connection’ scored highest in ‘somehow agree’ (8.5%) followed by ‘neutral’ (5.7%).

7.3.1.4.6 Factor Six; Support & Needs

Lastly, the sixth factor; “Support & Needs” is cross tabulated with the same demographic characteristics as in the case of the other factors.

Cross tabulating learning style shows that all learning styles audio, visual and kinesthetic scored highest in the ‘somehow agree’ (7.4%, 7.4%, and 12.3% respectively). The same hold true for cross tabulating program of study, where undergraduate and graduate students scored highest in ‘somehow agree’ (27.0%, and 5.5%) respectively.

Same trend is evident in cross tabulating field of study, where both computer science/it and art/humanities scored 25.*% and 6.1% respectively. Similar results are reported when cross tabulating ‘own a computer’, where ‘own a laptop’, ‘own a PC’, and ‘own both laptop & PC’ scored highest in ‘agree’ (18.4%, 6.7%, and 6.7%) respectively. Same thing is true about ‘Internet connection at home’ where those with DSL and wireless connections scored highest in ‘agree’ (16.6% and 9.8%) respectively.

7.3.1.5 Analysis of Open Ended Questions

In addition to the Likert-scale questions, the questionnaire contains six (6) open ended questions to give students the opportunity to express their opinion on the model in free writing. Most students answered these questions in Arabic, therefore, an aggregate reporting of the findings on each questions is reported. However, some key answers and or comments are highlighted whenever deemed appropriate. It should be noted that most answers to these questions were provided in Arabic. Therefore, the meaning in English of such answers was expressed, but not as an exact translation. The questions and answers are presented in Table 7.17 through Table 7.19.

Table 7.17: Features Lliked/Disliked by Students

Q1. The things I like most about the model	**Q2. The things I dislike most about the model**
Communication methods through audio, video, chat The ability to ask questions any time. It is simple (design and use) Lecturer provides us with lots of additional materials, and because most courses at our faculty needs computers it makes using the web for study a preferred way most of the time. Time flexibility, Conference and chat rooms Comprehensive Easy to use and learn Does not need skills The idea of using the internet for learning using the most popular way for everyone to learn (audio, video) Learning through the web, especially the ability to concentrate and the time I want to learn (self-paced) Different method from the traditional one, which allows for learning directly through the Internet Translation feature, although some time the translation is not accurate. Interface Full coverage of the subject No need to come to university all times. Ability to communicate/interact with lecturer and students	Writing within the system (switching between Arabic / English) … Nothing I disliked … The need to login again when using the conference and chat features although already logged in the system. I don’t know exactly how to use it. Interaction/communication is more difficult than traditional way… View courses option Interface (especially small fonts … could not read)… Slow Not much details in some topics … Using conference is slow and takes time… Some icons like the logout icon… Not easy to use GUI is not friendly Not familiar with all functions and features…

Looking at answers to question one (1), it could be noticed that students like many things about the model. The responses indicate different perspectives of how students perceived the model. Some have expressed they like features and components of the model, while others like the method of teaching and learning – i.e. the blend. Some have seen the way to interact with the system and with lecturer as one of the main things they like most. Being a comprehensive model is one of the things students like about it. Time flexibility and the ‘no need to come to university all the time’ are two other main things student like. On the other hand, there are things that student do not like about the model, particularly the system. While students expressed ease of use as one of the things they like, others say that it is not easy to use and not knowing how to use it. Same thing regarding the interface and some icons is being expressed. Some others expressed that it is slow, especially when using the conference and chat, in addition to the extra step of login to the conference and chat.

However, as indicated in chapter six (6) earlier, these two modules – conference and chat – are open source software which was adopted and used as is with no modification. This could be one of the sources for dislike of the interface and interaction and the perceived ease of use. Slowness of the system, especially the conference could be attributed to the Internet connection under student’s disposal. However, the conference and chat modules require relatively good Internet connection to run in an acceptable speed and performance. This could be one of the disadvantages of these two modules. In general, the ‘like’ responses outnumber the ‘dislike’ ones. In addition, these variations in responses are in line with the findings from the other questions in part two of the questionnaire as indicated earlier in this chapter.

Table 7.18: Advantages and Disadvantages of the Model as Expressed by Students

Q3. Advantages of the model	**Q4. Disadvantages of the model**
Chat (with lecturer and students)	Not easy to use
Availability of variety of contents in advance which helps in preparation	Not comfortable
Suitable to theoretical courses (non-practical)	Forum and conference features need training on how to use
Ease to browse contents	Discussion and interaction with lecturer is more difficult
Clear and simple	Has small font
Ability to choose what to learn	Some icons are not clearly indicating what it is for
Lecture time (flexibility)	Some parts are hard to learn to use
Translation feature	Not suitable for all courses
Availability of contents online all times which enables me to come back to it any time.	Big problem if no Internet connection or PC failure (a common thing here)
Understood and not complicated	None
Easy to navigate	Student role is not highly evident (should be more learner-centered)
Generally good	Switching between Arabic and English (writing is reversed in Arabic) …
Features of conference, forums and chat	Too many choices …
I can study whenever I want, the way I want and as many times I want	
It helps in answering questions, notes anytime, which is not limited to normal lecture time	
Flexibility	

The advantages and disadvantages of the model as perceived by students are presented in Table 7.18. Communications and interaction methods such as conference, forums and chat, are perceived as main advantages of the model in addition to flexibility and ease of use. Additionally, availability of variety of contents is perceived as one of the advantages, which in fact lead to other advantages such as ability to study anytime, choose what to study/learn. The translation feature is considered as an advantage of the model – system- by students. On the other hand, several disadvantages have been highlighted by students. Many of such perceived disadvantages are a reflection of the things students do not like about the model as shown earlier above. Some of these are contradicting the advantages as expressed in answers to question three (3). This perception on the disadvantages might have come from the inability of some student to use some features/modules due to short of training, and/or Internet connection disruption as some have indicated.

Table 7.19: Reasons Student could not Use the Model, and Problems faced While using the Model

Q5. Reasons could not use the model	**Q6. Main problems while using the model (particularly the system)**
Unfamiliar with the system and its features and how it works… it needs training Too busy studying, not using the Internet a lot Lack of interactive media Cannot access Internet from home all time Need more time and practice to use it Internet connection was disconnected Busy studying for final exams, completing term projects… model used towards end of semester No Internet at home Internet connection interruption/disruption at home Not enough time to navigate and browse through the system I used all functions Technical reason related to availability of Internet None Need more free time to learn and use it	Writing (Arabic / English) Lack of Immediate feedback on messages Could not find what I need sometimes... Sometimes could not benefit enough from Conference or chat Viewing my assessment Could not find some icons at the beginning (logout icon) Chat and conference were not clear No problems encountered Problem related to slow connection Technical and technological problems Hard to learn some parts Fonts and color

For those who could not use the system fully during the test period, they indicated that there were some reasons behind it. The main reason for that is students were busy preparing for final exams and end of term projects, as the model was tested towards the end of the semester. The second reason was related to Internet availability and connectivity/disruption. Other reasons include the need for more time to familiarize oneself with the system, lack of training.

Responding to question six (6) regarding problems encountered while using the model – particularly the system- students generally reemphasized the disadvantages of the model as explained earlier. They, for example, were faced with problems related to conference and chat modules, some technical and technological issues, finding it hard to learn how to use parts of the system, slow connection, fonts and colors, and switching between Arabic and English while writing text. These problems are explained while discussing the disadvantages of the model above. However, these problems, the disadvantages and dislikes shown above are rooted to lack of proper and enough training on using the system, and to the conference and chat modules where students found them a little difficult to handle, especially the too many options and features within them. However, this problem can be again attributed to training issue, where it would have been resolved or eased had students had adequate training on how to use the various modules of the system. The other source for problems, disadvantages and dislikes could be directly attributed to Internet connection availability, speed, and disruption.

Some students have offered their Comments/suggestions on the model for improving it. Main comments and suggestions are:

- Provide more time for training to benefit from all features of the system.
- Enhance the user interface to be more attractive for students, such as changing colors, icons, and fonts
- Make it easier to use

- Enhance the IM
- Easier access to chat
- Suitable for facilities available to us, but could be enhanced more to better suites the existing conditions
- Has advantages and disadvantages, but the worst thing is that some students do not have Internet connection
- The model is very good
- Hope it will be applied soon

As it could be noticed from the discussions on the open-end questions, the responses by students are complementing each other and are not contradicting in general. The final comments/suggestions are also in line with the responses to other six open-end questions and build on them. The overall responses to these questions are generally in line with what have been found from the analysis of the questionnaire data and the results obtained.

7.3.2 Lecturers' Evaluation

After concluding the test process, participating lecturers were asked to give their evaluation and opinion regarding the model and the testing process. As explained earlier in the previous section, an evaluation – feedback - form was sent to the participating lecturers, via email, to fill and return it back. Three of the four lecturers who volunteered to test the model have responded to the evaluation request and sent their evaluation via email. The responses were extracted into Table 7.20.

The feedback from the lecturers indicates that, overall, the model is acceptable and in fact is rated quite well. In question one, the things that the lecturers like are: student registration in the system, suggested contents by students, variety of content types, managing the activities, simple, availability of synchronous and asynchronous learning, security of course registration – student registration in a course needs approval by the lecturer, and managing contents. These things that lecturers like about the model actually represent most of the main functions of the model. However, things they do not like about the model are mainly concerned with assessment and interface issues. They indicated that they need the model to provide online quizzes, test and more assessment that is sophisticated.

Table 7.20: Lecturers' Responses (Model Evaluation)

Question	**Lecturer 1**	**Lecturer 2**	**Lecturer 3**
Q1: The things I, as a lecturer, like most about the model are	**R**egistering students **S**uggested contents **V**ariety of content uploading **M**anaging activities	**S**imple **S**ynchronous and asynchronous learning availability **N**o one can join a course without activating his account, which is better way and more secure than enrollment key	**M**anaging of the content
Q2: The things that I disliked most about the model are	**A**ssessment systems **H**igh level of the system	**M**odel is lack of images (few images are there) **E**ven it is simple, but it is in somewhere unclear **N**o online quizzes can be created **N**o end hour for the assessments	**I**nterface
Q3: The main advantages of this model are	**T**he ability to manage the course in a way that suits students learning levels. **E**nables to keep in contact with students. **E**nables to present the course content in several ways	See question1	**E**asy **S**imple **F**ast response **T**he Main functional requirements are appeared in the right places in the model

Table 7.20, Continue

Question	Lecturer 1	Lecturer 2	Lecturer 3
Q4: The main disadvantages of this model are	**U**sing the systems effectively needs training. **D**oesn't enable customization	**N**othing particularly to this model. **D**isadvantages are same as any other similar models	**T**he color of the interface **L**og out icon is not good in shape and place **I**cons metaphor
Q5: If you could not apply (use) the model fully during the test period, the reasons behind that are		**T**he test was at the end of the course, the students were preparing themselves for the final exams which reduced the interactivity with the system	Time since we are in the final exams days
Q6: The main problems that I faced while using the model; and in particular the system; are	**I** have to train each student to use the system. **S**ometime the systems didn't add students, and not provide a clear reason for that. **U**ploading material from student is tedious	**C**onfusion. (may be because I used to use different model (Moodle))	**M**anaging activity at the first time is difficult and always need to remember some steps but in the second time it become less difficult
Q7: Please give us your overall opinion on the model and its applicability in traditional universities, its benefits, and its acceptance by lecturers and students	**T**he model is applicable, but need more attention to some features such as to be user friendly, assessment systems, help, tutorials	**I** believe that the model can be easily applied	**R**eally it's nice and the students like it and since I teach the HCI course I see that a model in this behavior may help us and help students in learning more than the traditional way we used in our universities
Comments/ Suggestions		**S**witching between different languages is needed **M**ore images and icons will be better, especially for the standard file format (like PDF, world…), **I**cons to differentiate between activities….. **A**dding calendar to the model will be better **R**eminder **S**tudents' announcement. ***P****lease see Question 2.*	I ask if there is a manual for using everything in the model or its only instructions. If not I suggest to upload a manual for every activity

In terms of advantages of the model as perceived by the lecturers; the model has several such advantages: the ability to manage the course in a way that suits students' learning level; enables lecturers to keep in contact with students; enables the presentation of the course content in several ways, simple; synchronous and asynchronous learning, security in joining the course by students, easy; fast response, and finally, main functional requirements appear in the right places. On the other hand, lecturers' answers revealed less disadvantages of the model than advantages. These disadvantages are: training is needed to use the system effectively, and lack of customization. The other disadvantages are related to the colors used in the interface, and the use of icons- more appropriate ones should be used.

In response to the question if lecturers could not use the model fully, the reason behind that would be; they indicated that the testing of the model was towards the end of the semester and students were preparing for the end of semester and the final exams, which affected the use of the model.

As for the problems they faced/ encountered while using the model, and particularly the system, lecturers highlight the following problems: training students to use the system, uploading material by students, confusion – as they used to use other model before (Moodle), and first time managing the activity.

The overall lecturers' opinion on the model related to its applicability, benefits, and acceptance, is a positive one. They indicate that the model is applicable and would help more than the traditional way in teaching and learning used at universities, although it needs some amendments such as more attention to be given to features like user friendly, assessment, help and tutorials.

When answering the further comments/ suggestions, lecturers suggest that it would be good if a bilingual feature is available, more images and icons for file type; activities and others. Reminder function, an online manual and full assessment function are other things they suggest to be included in the model.

7.4 Discussion

As it could be seen from the results above, the lecturers did not have hard time using and applying the model. However, as shown above, there were some problems and perceived disadvantages. The lecturers suggest few things to be added or modified in the system – software. One of the issues highlighted in the evaluation, whether as a problem, a dislike, or as a suggestion, is related to assessment. The lecturers are right in raising this issue. However, the assessment function is available in the system, though in a very simple manner. Its presence indicates that it has been thought of, however, the online assessment in its full functionality and circumstances are beyond the scope of the research and the initial findings related to factors and problems associated with e-learning and blended learning in traditional universities, particularly in Palestine. Besides, this issue is a full research field by itself. Despite that, the model allows for the inclusion of such function and it would be possible to amend its functionality to make room for online tests.

The other issue is the training and ease of use by lecturers and student. This is true to some extent; lecturer and students should be given a briefing session – training – before using the system. It seems that the training of students, which was assumed to be undertaken by lecturers, did not take place in a formal session for all students. This, seems to create a problem for some of the lecturers as they had to train or show students how the system works individually, which led to some problems and frustration to both lecturer and students and resulted in them facing some difficulties using some of the functions for the first time.

In regard to the interface, the researcher tries to keep it as simple as possible, with not much of images, animations and bright colors. This is actually in line with the Nielsen's

10 usability principles as explained earlier in the research methodology chapter, and as shown in the heuristic evaluation criteria developed at Xerox based on those principles. However, it would be easy to add few meaningful images and animations and to change the color of the interface to suite users' tastes. The addition of some few more images and may be animations would resolve the lecturers' complains about the interface.

As the student evaluation of the model is concerned, it reveals several points and issues. One of which is that though generally evaluated positively, the implementation of the model, namely the software part, could have been designed better, especially the interface. The execution of the model and its usage by students could have been done more appropriately to get higher scores when evaluated. This was evident in the responses to related questions of the questionnaire.

Looking at the '*Ease of use'* factor resulting from the factor analysis, it scored a mean of 4.402/7 and standard deviation of 1.563. This in fact shows how low the ease o fuse was perceived by students, although the score is still positive and above average. The standard deviation of 1.563 is considered high which indicates that the responses were not normally distributed and not even approximately normally distributed. This indicates that students had different perceptions based on their experiences with the model. The high scores of this 'factor' has been offset by some of the low scores i.e. the 'disagree' and 'somehow disagree' answers. Another notable observation is the relatively high score of the 'neutral answer' which represents 4/7 on the scale. When examining the items loaded on this factor, it could be easily seen that they are concerned with the conference, chat, and forum. These modules of in the system are the source of some of the problems and comments on the model which were provided by students. In addition, the conference and chat modules are open source software that have been used in the system as is, as has been explained earlier. The interface and the execution of these two modules were the main source of the perceived difficulty of use of the system. In addition these two modules require good Internet connection to be executed reasonably, which some students do not have. The other module in this group is the ‘assessment’ where it also contributed to the relatively low score of ‘ease of use’ factor.

Satisfaction factor also scored relatively low mean (4.601/7), compared to other factors, and high standard deviation (1.493). This could be attributed to more than one reason, including the student learning style, whether he/she own a computer, and the Internet connection at home. It is noticed that students who did not have undefined learning style or have audio learning style were less satisfied with the model than those with visual or kinesthetic learning style. It shows that those with audio learning style might have not been able to perceive the potential of the model and its communication features in addition to the self-paced and the more active role students would be able to play. While on the other hand, visual and kinesthetic learning styles students appreciate these features and potentials in the model. However, their positive responses were relatively offset by the others. The same applies to the ‘own a computer’ and Internet connection at home reasons. Those who have laptops or both laptop and PCs were more satisfied than those who only a family PC or no computer. For Internet connection, those who have DSL were more satisfied than those with no connection or other types. However, those with a wireless connection have scattered answers all over the scale, with concentration on the neutral. Although positive responses are there, they were relatively offset by negative ones.

Communications & interaction factor has the third lowest Mean of 4.632 and standard deviation of 1.495. The standard deviation reveals that the responses to items within this factor are not normally distributed, nor approximately normally distributed. Responses are scattered over the scale, however positive ones tend to be more than negative ones. This could have been affected by several reasons including the learning style, the field of study, own computer and Internet connection. Almost 2/3rd of those with undefined learning style perceived the 'communication & interaction' negatively followed by visual learning style students with almost 1/4th and audio learning style students with almost 1/5th. This in turn has contributed to the relatively low Mean and high standard deviation. The field of study has affected the mean of this factor also. The computer science/IT students comprise the largest percentage (71.8%) among other fields. Almost 1/4th of them evaluated the communication & interaction negatively, while almost half of them evaluated it positively and the rest were neutral. The negative evaluation has offset largely the positive one. 1/4th of Art/humanities students who comprise around 1/4th of the sample have evaluated this factor negatively. None of the other students has evaluated this factor negatively, though they comprise a small percentage of the sample.

Examining the 'own a computer' variable effects on this factor reveals that 30% of those who own a PC evaluated the communication & interaction factor negatively. 21% of those who own a laptop and 21% of those who own both laptop and PC also evaluated it negatively. For the type of Internet connection at home, none of those with dialup connection have evaluated this factor positively. While almost 1/3rd of those with wireless connection evaluated negatively. Strangely, 30% of those who has no connection evaluated it negatively, and 38% of them evaluated it positively. Less than 1/4th of those with DSL connection have evaluated this factor negatively.

Examining *time & cost saving* shows that it has the highest Mean (4.968) of all factors and standard deviation of 1.461. This shows that again, responses were scattered along the scale i.e. responses were not normally nor approximately normally distributed. It further reveals that less than 15% of those with visual and those with kinesthetic learning style evaluated this factor negatively, while 68% and 64% respectively, evaluated it positively. On the other hand, 54% of the audio learning style student evaluated it positively, while 60% of the undefined learning style evaluated positively. These results have contributed to the relatively high Mean score of this factor, however, the negative and neutral responses have affected the overall Mean score. Although the standard deviation is high, the percentages of positive responses among learning styles are close to each other and represent a positive perception of the potentials of the model to offer flexibility in time and relative cost saving.

When looking at the field of study variable, it reveals that 61% of the computer science/IT students have evaluated this factor positively, followed by Art/Humanities students with 53%. However, none of the other students have evaluated this factor negatively, although their overall percentage to the sample is small.

Looking at the *own a computer* variable, it could be noticed that 65% of those who have a laptop evaluated this factor positively, and 60% of those who own PC and 55% of those who own both have also evaluated it positively. Considerable percentage of those students have neutrally evaluated the *time & cost saving* factor. On the *Internet connection at home*, 66% of those who have DSL connection evaluated this factor positively, while 58% of those who have wireless connection evaluated it positively.

If we look at the items of the questionnaire that loaded on this factor, we could notice that three of these items namely B51, B52, and B47 scored among the top ten item Means of part two. At the same time, it is noticed that these three items scored relatively high percentages of responses 18%, 16% and 28% respectively, as 'neutral'. It seems that such percentages of students could not see the potential of the model in this area. This could be attributed to the fact that the model was only tested for two (2) weeks and for one course – for most students – which is only about 1/5th of the average semester load for normally registered students at PPU. Therefore it could have been difficult for some to realize the potential of the model in terms of flexibility and cost saving.

For *Support & Needs* factor, several variables have contributed to the relatively high Mean score, though it has a high standard deviation, meaning that the responses are not even approximately normally distributed. The items loaded on this factor are items B44, B45, and B66, where they scored a Mean of 4.7, 4.65 and 5.36 respectively. However, to get deeper insight on this factor, we examine the effect of some variables like learning style, field of study, own computer and Internet connection. Similar to what has been done with other factors, it could be noticed that more than 66% of responses are positive and 16.6% are negative, while more than 17% are neutral. The relatively high neutral percentage could be attributed to the time frame and test period of the model – two weeks – where some students might have not been able to experience enough with the model, especially the software, which might have lead to the perception that they need help and support, which is normal at the beginning of operating or using a software for the first time. However, to look at sources of positive evaluation as well as negative ones, we examine each variable mentioned earlier. The learning style variable has some effects on this factor. Almost $1/3^{rd}$ of those with undefined learning style and $1/3^{rd}$ of those with audio learning style have evaluated this factor negatively, while 7% of those with kinesthetic style have evaluated it negatively. None of those with visual style has evaluated it negatively. However, the positive evaluation has been relatively offset by the negative one, at the same time about 17% of all responses are neutral. This indicates that high majority of students with either visual or kinesthetic learning styles are more aware of and perceive the model as supportive and require minimum needs to use and operate, while only less than half students with audio style perceived it the same way.

In terms of *field of study*, about 14% of those in the computer science/IT field evaluated this factor negatively while 67% positively, compared to 24% of those in the Art/humanities field who evaluated it negatively and 63% positively. However, 18% of the first group is neutral and 13% of the later is neutral. It shows some differences between the two groups indicating that the computer science/IT students needed less support than Art/humanities students, which is both logical and normal as the first group is presumably more technology savvy than the second. However, more students of the first group are neutral in evaluating this factor than the second group.

Looking at *own a compute*r variable it could be noticed that about 10% of those who have laptop evaluated this factor negatively compared to about 25% of those who either have a PC or both laptop and PC. Again, neutral answers are evident in this variable, especially for those who have a family PC where it amounts to about 56%, however, the least neutral responses are within the own both laptop and PC category. The highest positive evaluation is that of those who own a laptop (75%), followed by those who own both laptop and PC (64%).

To *Internet connection at home,* 12% of those with DSL connection evaluated this factor negatively, while 24% of those with wireless connection evaluated it negatively. However, 72% and 58% of those with DSL or wireless connection respectively have evaluated it positively. None with satellite connection or dialup or others has evaluated it negatively.

7.5 Guidelines on Blended Learning for Higher Education

The literature and the findings on the data collection and analysis, in addition to the results of the model development and implementation – through testing it in Palestine – provide the bases for the compilation of guidelines that could be proposed for traditional universities in Palestine to implement blended learning.

The administration of universities can consider the following guidelines for implementation of blended learning at their respective universities.

i. Alter existing strategy and incorporate blended learning into strategic planning. Depending on each university case, the existing strategies would need to be revised and altered if blended learning is to be implemented. Facing the new and immerging challenges would need universities to think differently and to survive. However, this revision of strategy would need to be carried on all levels in the university. Self assessment of e-readiness in addition to assessing the strengths and weakness are two exercises for universities to conduct. In order to proceed with strategy revision and alteration. The effect of this exercise will be on institution level, program level and course level (Graham, 2004). However, this will lead to gradual implementation of blended learning.

ii. Create a blended learning culture. This could be accomplished through dissemination of information on e-learning and blended learning among all parties involved including management, administrative staff, academic staff, technical and support staff and students. This should promote the implementation of blended learning models within the university on the various levels according to Graham (2004), however, universities are advised to use a bottom-up approach where blended learning is first implemented at the activity level, then move on to course level and so on. Once the awareness for blended learning is created, universities can start the implementation on the activity level. This could be done on selected courses with selected lecturers who have enough knowledge on blended learning and are eager to implement it. In this way, chances of success would be increased, while risk of failure would be decreased.

iii. Capitalize on lecturers' perception on blended learning and attitude towards it. Lecturers are generally willing to adopt blended learning in courses they teach as was revealed by the first questionnaire used in this study (see section 4.3.1.1 of chapter four). This attitude provides a good base for such implementation of blended learning as it implies that there would be minimum resistance – if at all

– by lecturers against the change. This is great opportunity as it saves universities precious and scarce resources which otherwise would be spent on easing the resistance to change.

iv. Train lecturers on blended learning. Positive attitude or perception of lecturers toward blended learning would not be enough by itself to start the implementation of blended learning. Proper implementation would require trained and knowledgeable lecturers who possess at least minimum needed skills. It is not only technology that makes the difference, but also other elements such as instructional strategies, learning theories, and content creation:

a. Technology. Depending on the outcome of the assessment, lecturers who lack the needed technical skills have to be trained on related software tools and programs. This could vary from basic to advanced tools and levels of training, such as word processing, presentation software, Internet etc…

b. Pedagogy. This aspect of training would cover the basic pedagogic principles and the learning theories such as cognitive, behavioral and constructivism. This would be important for lecturers to realize the role of and ways to implement each and its implication on the teaching and learning process, in addition to appreciating the integration of such theories in the blended learning settings.

c. Instructional strategies and technologies. Lecturers should be exposed to the various strategies and technologies used in teaching and learning. This should be conducted within the scope of blended learning settings so that lecturers appreciate the integration of such strategies and technologies in the process, and how to tailor their teaching to suite the diversity of their students learning styles and characteristics.

d. Content creation. Lecturers should be trained on how to create basic teaching and learning contents for their respected courses, and how to make use of existing ones. This training aspect should be conducted based on the learning theories, instructional strategies and technologies used within the framework of the blended learning setting

v. Improve the existing infrastructure at individual universities. This includes the networking and communications infrastructure within campuses, covering bandwidth, servers, and access to Internet. In addition, facilities, equipments and peripherals should be improved both in quantity and quality. For example lecturers should have personal computers with high bandwidth connection to Internet, and open labs should be equipped with the appropriate number of computers with proper infrastructure and access to Internet and Intranet. However, this should be based on the results of the assessments of the e-readiness exercise.

vi. Universities should recognize that the implementation of blended learning at course or activity level demands some efforts from lecturers especially at the beginning. Therefore, measures should be taken to motivate lecturers to switch to blended learning, and to reward them particularly the pioneering ones. One such measure could be to decrease the teaching load proportional to how much blended learning has been implemented by such lecturers.

vii. Complementing lecturer training, universities should create support groups whose main objective is to provide support, help and assistance to lecturers in their efforts to create learning contents, and to provide technical assistance to them whenever needed. Such groups could include information technology specialist, multimedia specialists, subject matter experts, instructional technology and strategy experts, and pedagogical experts.

viii. Universities should start the implementation on activity or course levels, as explained above, and should begin this implementation with senior students.

This would give advantage as these students are more mature and possess better technical and technological skills than first year student because they are already exposed to technology through either official computer-related courses offered to them as part of the curriculum, or through their exposal to technology and computers over the years at their respected university and as part of their personal experience. Universities then can move towards junior students. At the same time, universities could opt to start with fresh students provided that they make sure that those students possess the necessary technical and technological skills. The advantage of this approach is that those students are not exposed to life at university campus, and not used to traditional teaching at universities, therefore they might be better recipients and better adaptable to the new setting i.e. blended learning. Whichever approach to opt for, would depend on the strategy and the self assessment of the individual university.

ix. Target students when creating the blended learning culture. It is them who will be subject to and participants in the implementation. The students' acceptance of the blended learning setting is an important issue for the successful implementation. Organize workshops and seminars, in addition to other methods to disseminate all necessary information on blended learning to students.

x. Prepare students to accept the new method of teaching and learning. Train students to become more active learners and exercise self-discipline in partially self-paced learning environment. This could be achieved through workshops on critical thinking skills, on appropriate learning methods for the new settings and on inter-personal communication skills.

xi. Universities should develop their own systems for the implementation of blended learning, either individually or collaboratively between two or more universities. However, this should take the individual university's case into consideration. In the event of opting to buy or use an existing system, universities should tailor it to meet their needs and serve the blended learning setting as described in this study.

xii. While developing their (universities) own systems, ensure that these systems comply with the usability principles (Nielsen, 1994b). This is particularly important to ensure usefulness, ease of use, and functionality of the systems among others.

xiii. Systems should be at least bilingual – English and Arabic-, if not Arabic alone – see Figure 7.1, where the question on bilingual feature scored the highest mean; indicating that students would like to see such feature in blended learning models. This is to suite the various students, especially those in programs taught in Arabic. Even many lecturers would prefer this as they might be having difficulties with English.

xiv. Emphasis balance between process, technology and content in the blended learning setting. This is important so that anyone of the three pillars does not get more attention than the other two, which might result in improper implementation and therefore not-as-expected outcomes.

xv. Capitalize on the use of learning style test. This will help in identifying each student's learning style which helps him/her in utilizing the best content, communication methods, learning strategy etc… that suites him/her most. In addition, this test helps lecturers to get to know their students learning styles, which in turn helps them to identify the best possible content for each style, the best communication method(s), the best teaching approach, learning theory, instructional strategy etc… and therefore adapt to the students' needs.

xvi. Make sure that the implementation of blended learning with its two main settings i.e. classroom and Internet-based, motivate learners to learn, and that learner are satisfied once they use blended learning.

xvii. Ensure that social interaction among students is evident and taken care of through the implementation of the blended learning model.

xviii. Lecturers should apply the principles of good teaching, multimedia principles, ARCS model, Gagne principles, and bloom's taxonomy while conducting their courses.

xix. Utilize the various communications methods –synchronous and asynchronous – to better communicate and interact with students, so that a social environment is created among students. Make sure that feeling of connectedness is there among all students. This is also important in providing immediate feedback to students' inquiries

7.6 Summary

This chapter presents the model testing, how it was conducted and the results of the test of the model implementation. The model was tested in Palestine Polytechnic University by four different lecturers in four courses. The results from students' evaluation indicated that the model was evaluated positively, despite some below average evaluation of some questions. The exploratory factor analysis of questionnaire items resulted in six *factors (Components)* as shown earlier in the chapter. Evaluation by lecturers who participated in the test also revealed that the model received a positive evaluation, although some comments and suggestions for improvement were expressed by lecturers. They expressed in their comments and responses to open end questions that the model is applicable and they would want to use it in the future.

Based on the results and discussions, guidelines for higher education to implement blended learning were compiled as shown in section 7.5. These guidelines are meant to be used in their generic form to provide directions for the efforts of introducing and implementing blended learning in traditional universities in Palestine.

In the following chapters, more discussions and recommendations on the overall results and findings of this study are provided.

CHAPTER 8

DISCUSSION OF FINDINGS AND RESULTS

8.1 Introduction

Although discussions on results and finding were given in the previous chapters, this chapter generalizes the discussions according to the main objectives of the research.

8.2 Discussion on Factors of Blended Learning

As shown earlier in Chapters 2 and 4, several factors do exist which affect the development and implementation of a blended learning model. The factors that have been identified in this research were partly found in the literature and extracted from previous work. Others came as a result of the findings of part of this research, especially those related to Palestine. As was argued earlier in this research, the factors from previous works could not be found in a single research/work. The list of factors was compiled from many previous sources. Some factors were found in more than one research, and some were only reported in one source. These factors though exist and reported in previous work, were not directly available to interested parties in one single document. In addition to this, the so many existing factors were not used in the previous efforts to develop and implement blended learning in higher education. As the literature revealed, those were partly used in such development and implementation. This could be attributed to the fact that the factors were not addressed fully in any single work. Again, this in turn could be attributed to the scope and intention of each research. Most, if not all, previous research works perhaps have focused on one specific issue and dealt with blended learning from one or limited perspectives.

On the other hand, as this research has revealed, most identified factors from the literature are applicable to Palestine. However, the study and analysis of data from Palestine showed that there exist some additional factors that might be uniquely applicable to Palestine, and perhaps to similar third world countries with similar or identical situations.

8.3 Discussion on Model Development

The review of previous work has revealed several factors on blended learning. These factors have been shown in the literature review – chapter 2 – and used in chapter 4 – foundation of the new model – in addition to factors extracted from information on Palestine to lay the foundations of the new blended learning model. Besides these factors, problems and barriers facing e-learning and blended learning, concepts and criteria, pedagogy, good teaching principles, learner characteristics and elements related to Palestine were also used to elicit and formulate the requirements for the new blended learning model. However, it should be noted that these requirements are for blended learning on all levels i.e. institutional, program, course and activity (Graham 2004). As indicated earlier, the new model is developed on the course level, and implemented on the activity level with provision and capability of handling multiple courses and multiple activities with a course as shown in Chapter 6. As a consequence, some of the derived requirements could not be handled and dealt with in this study and on this level of development and implementation. However, these requirements were used in the compilation of the guidelines for blended learning implementation in traditional universities.

In addition to the derived and elicited requirements, previous models and work have been used to lay the foundation of the new model. For example ideas from Driscoll 2002, Valiathan 2002, Dewar & Whittington (2004) – see Table 2.5 - have been used for inclusions of which components in the model. However, as shown in chapters four and five, all these ideas and requirements have been integrated and harmonized to come up with the initial model design. This design was only reached after several attempts and informal discussions with many people. This initial design was not meant to be the final, therefore it was pilot tested by several lecturers to enhance the design and the components of the model, then inputs from this pilot test was incorporated into the model. Once again, the model was evaluated on larger scale by lecturers in Palestine. The evaluation results were used to further enhance the model before being implemented. This process reflects a design based approach, where the steps of process undergo revision and enhancement in an iterative manner until an acceptable design is concluded. Out of this process, several outputs have been reached. The most important output was the new blended learning model. Compared to other models of blended learning and e-learning, the new model outperforms these. The comparison of these models with the new blended learning model is shown in Table 8.1 below. The comparison reveals that the new model has several features that none of the previously developed models has all features combined. This gives the model advantages over the other models as it has more features than any other model alone. These features came as a result of considering the factors of blended learning -which have been concluded based on both review of the literature and empirical evidences-, the requirements -explained earlier in chapter four-, and the iterative process of enhancing and evaluating the model. Another output of this process was the development of an instrument – questionnaire – to evaluate the model. In the course of searching for methods and criteria to evaluate the model design at first, it was difficult to find an established instrument that satisfy and could be used for evaluating the model. Therefore, the researcher compiled a questionnaire based on some ideas from previous works. As indicated earlier in chapter three and chapter five, this questionnaire has been pilot tested, enhanced then used to evaluate the model. It has been proofed that the reliability of the questionnaire items was very high – Cronbach's Alpha was 0.963. Therefore, this questionnaire could be used for the evaluation of similar model designs, although it might still need to be further proofed and/ or enhanced to be generalized.

Table 8.1: Comparison between Categories of Blended Learning Settings with the New Model

Blend of	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**New Model**
1. Web-based technologies	*						*	*
2. Pedagogical approaches	*		*	*			*	*
3. Inst. Tech. & Face-to-Face	*							*
4. Inst. Tech. & Job tasks	*							n/a
5. Self-paced & Instructor Support		*						*
6. Event & Delivery media		*						*
7. Perform. Support tools & Knowledge Management resources		*						n/a
8. Traditional learning & web-base online			*					*
9. Media and tools			*					*
10. Online & offline(face-to-face) activities				*				n/a
11. Self-paced & live collaborative Learning				*				*
12. Structured & unstructured learning				*				*
13. Custom & off-the-shelf content				*				*
14. Work & learning				*				n/a
15. Synchronous & asynchronous communication Methods				*	*		*	*
16. Online & face-to-face instructors and learners				*				*
17. Formal live face-to-face & informal					*			*
18. Self-paced & performance support					*			n/a
19. Synchronous and Asynchronous Web Based collaboration & varieties of computer mediated communication.						*		*
20. Varieties of technology-based delivery						*		*
21. Instructional resources and activities & performance Support sys, info. search and retrieval tools and content repositories, and Knowledge Management applications						*		n/a
22. Instructional modalities (face-to-face, event-driven etc …)						*		*
23. Multimedia technology-based delivery & conventional text-based material						*		*
24. Instructional strategies						*		*
25. Face-to-face & distance education							*	n/a
26. Practice-based &/OR classroom-based learning							*	n/a
27. Multi-disciplinary OR professional groups of learners and teachers							*	n/a
28. Instructor-directed OR learner-directed							*	*
A: Driscoll Concepts, B:Valiathan Drivers , C: Whitelock & Jelfs Definition , D:Dewar & Whittington Factors , E: Rosset, Douglis & Frazee , F: Shaw & Igneri Possibilities, G: Sharpe et al Dimensions								

8.4 Discussion on Model Implementation

As shown in the previous section and in chapters five, six and seven above, the model has been developed and evaluated successfully and then implemented, tested and evaluated positively. In the implementation stage and testing stage, the model shows that most stated requirements for the model development and implementation have been achieved. This is evident through the model design where several components have been included and integrated in the model. The relationships and interactions between these components proof that at the development stage several of the requirements are achieved. However, other requirements could not be proofed directly through the model development alone as such. Therefore the model has been implemented and put to test to proof the applicability of the model and that, requirements stated earlier in chapter 4 are achievable through this model. The development of a system based on the model, and then the test of the whole model in one university in Palestine proofed to be successful. This is reflected in the evaluation results of the system interface through Nelsen‘s 10 usability principles which were used in a heuristic evaluation method, details of which are presented in section Chapter six (6). The proof was also reflected in the results of model testing by students and lecturers. The details of the test results are presented in Chapter seven (7). However, it should be clearly stated that some of the requirements for successful blended learning model development and implementation were not achieved. This is due mainly to several reasons. The first is, as expressed in the scope of the research in chapter one, that the model is implemented at the activity level with provision for course level implementation, where the model proofs it can handle more than one course at a time and more than one activity of a course. This implementation imposed restrictions on some of the requirements because these are related to institutional and program level implementation. The other reason is that the achievement of some of the requirements is beyond the control and capability of the researcher, and even it would be beyond the control of individual institutions. A third reason could be attributed to the contents, instructional strategies adopted by the lecturers. The model does not enforce any particular content nor instructional strategy. In addition to this, the model has been tested in four different courses – this could be considered as strength– however, it does not interfere with the contents and instructional strategies that a lecturer may use. Therefore, some of the stated requirements addressing these components and elements could not be proofed or satisfied directly through the model development and implementation. A detailed list of these requirements which have not been met is provided in Table 8.2. The details of the requirements that have been met are shown in Table B.1 of Appendix B.

Table 8.2: Unsatisfied Requirements

Requirements/ Inputs	Reason not satisfied
1. Offer platform-independent materials	This is dependent on lecturers to offer the kind of material which is platform independent. The model does not impose any restriction on material
2. Enrich content and learning process	This is depending on both lecturers and students to enrich the content
3. Provide for knowledge construction and transfer	This is indirect, as it would be a result of the teaching and learning practice. However, the model provides for provision for it, but it all depends on lecturers and students
4. Provide for live events based on ARCS model of motivation (Attention, Relevance, Confidence, and Satisfaction)	Not directly, as it depends heavily on lecturer handling of the teaching, and the suitable contents to be used
5. Implement Clark's three principles on the use of multimedia	Not directly because this is content-specific and depends on the course and level of sophistication of MM used. However, lecturers are advised to do so.
6. Offer assessment based on Bloom's taxonomy	Provision for activity based assessment is available through the assessment module. However, it all depends on how lecturer implements this, and on quality criteria in use at the respected institution.
7. Develop small dynamic multimedia components	Not directly, provision for using variety of contents is there. It is the lecturer's responsibility to do so.
8. Utilize streaming video, rich visualization and interactivity	Not directly, however it is available through the content module. The lecturer is responsible for providing the material

Table 8.2, Continue

Requirements/ Inputs	Reason not satisfied
9. Utilize free open source tools and software	The model was developed and implemented using open sources software, but does not impose any on lecturers and students during implementation and use
10. Decrease the need to attend face-to-face classes	It does provide this, but when the model was tested it was only for two weeks, so the actual effect could not be measured accurately, however, relatively it does decrease it through the provision of offering the course/activity in a 1:1 or 2:1 ration between face-to-face and Internet-based settings.
11. Help improve the educational system	This is one of the long term would be effects of the model. However, it could not be measured during the test of the model which was only for two weeks.
12. Improve teaching and learning methods	The blend that this model offers provide for room to improve the teaching and learning methods. Again, ,this could not be accurately measured because of the short test period
13. Save learner time	This is relatively achieved, as it was not possible to measure the actual effect on saving learner's time due the short test period, and to the fact that this kind of measure would need more specific instruments and methods to be accurately and adequately measured.

As it could be noticed from the Table 8.2 and Table B.1, the study, through model development and implementation, has managed to achieve the stated requirements for such development and implementation of the new blended learning model, despite very limited number of requirements that have not been fully achieved. Those requirements that have not been fully achieved; are mainly beyond the control of the researcher and the research settings. However, such requirements could be realized on the long run.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

This chapter concludes and closes up the study by highlighting the conclusions drawn from the study, and the recommendations proposed to parties interested and concerned with it. The chapter ends up with a section on future and suggested work.
The aim of this study was to develop and implement a blended learning model for traditional universities, especially in Palestine. In particular, the study has four objectives to accomplish, as shown previously in chapter one. The study was guided by five research questions based on the objectives. A theoretical framework based on theories related to and on blended learning guided the study; in the review of the literature, the research methodology and methods used; the development of the model and its implementation.

9.2 Conclusions

To conclude the study, it might be good practice to look at the conclusions in light of the objectives.

9.2.1 Identification of Factors of Blended Learning

Objective one was ‘To identify factors affecting blended learning in traditional universities in general and in Palestine in particular.’ This objective was achieved through examining the literature and information from Palestine related to higher education and blended learning. The objective was guided by the following research question: ‘What factors need to be taken into account in developing a model of blended learning for traditional universities in Palestine?’

The study identified these factors of blended learning as shown in Chapter Two (2) and Chapter Four (4), particularly section 2.11.1.11, Table 2.21, section 2.11.2.1, section 4.3.2,

The second research question ‘What are the requirements for developing blended learning model?’ was also answered through the compilation and extraction of requirements and inputs to model development and implementation based on the factors of blended learning, concepts and issue of blended learning, barriers and problems with e-learning, and information from Palestine related to e-learning, blended learning and higher education. The full requirements are summarized in Table B.1. The same table shows those requirements that had been achieved through the model development and implementation

9.2.2 Development of Model

The second objective was ‘To develop a model of blended learning for traditional universities in Palestine.’ This objective was guided by research question three ‘How can factors and requirements above be used to develop a model of blended learning for traditional universities in Palestine?’ and has been achieved through the development of the new blended learning model as shown in Chapters four and five. The model was developed then evaluated by lecturers in Palestine. It received a positive evaluation as shown in chapter five, which pave the way to go to the third objective of implementing the model.

9.2.3 Implementation of Model

The third objective was ‘To implement the model at an activity level based on objective 2.’ It was guided by research question four ‘What are the dimensions for evaluating model implementation and its applicability?’ This objective has been achieved through the implementation of the model by developing a system and testing it in Palestine Polytechnic University with four courses. The evaluation was considered good as shown in Chapter seven (7). Exploratory Factor Analysis was applied to the questionnaire data, and six factors were extracted using the principle component analysis. These factors are *motivation*, *satisfaction*, *communication and interaction*, *time and cost saving*, *ease of use*, and s*upport & needs*.

9.2.4 Proposed Guidelines

The last objective was 'To propose guidelines document for blended learning implementation in traditional universities in Palestine.' It was guided by research question five 'Based on the model and its implementation, what guidelines can be put forward to Palestinian Higher Education Institutions, particularly traditional universities, to follow in implementing blended learning?' This objective has been achieved through the compilation of guidelines for traditional universities. These guidelines are shown in Chapter seven (7); section 7.5. They meant to act as generic guideline and blue prints for traditional universities to follow when engaging in the implementation of blended learning.

9.3 Recommendations

Based on the outcomes of this study, some recommendations are presented here.

9.3.1 Recommendations to Government

i. Government, through the Ministry of Education and Higher Education, should amend the existing rules and regulation governing the accreditation and recognition of programs and degree offered in open, distance or online learning. This amendment should at least affect the local universities, as a start, and should allow for blended learning to be implemented at the existing traditional universities in Palestine. It also should provide a room for online and e-learning to be offered by universities wishing to do so – whether new ones or existing ones. For such amendments to be official, it has to be passed to the Palestine Legislative Council for approval. However, the amendments of the existing rules and regulations, and the new ones that might be added should provide for measures to ensure the quality of such degrees, programs and courses offered through online, blended learning or e-learning. In addition to that, they should take measures against plagiarism and fraud.

ii. Government should work on improving the existing infrastructure through its Ministry of Communications and Information Technology in cooperation with the Palestine Telecommunications Company. It should ensure that telecommunication services are accessible to rural areas, with reasonable cost and bandwidth.

9.3.2 Recommendations to universities

i. Universities should form a collaborative task force and lobby to change existing rules and regulations that govern the higher education sector, especially those concerned with the accreditation of courses and programs, focusing on e-learning and blended learning issues. Rules and regulations should be amended, and new ones should be introduced to address the new trends in the use of technology in education, particularly those involving blended learning. The universities should take advantage of the perception and attitude of the faculty members towards e-learning and blended learning.

ii. Universities should form a lobby and task force to push for improved national telecommunication infrastructure, both in terms of quality and cost, in addition to reach and coverage. The effort could be directed towards the Ministry of Education and Higher Education – as the umbrella for all higher education institutions, to Ministry of Communication and Information Technology, to the

Education Committee at Palestine Legislative Council, and to Palestine Telecommunication Company.

iii. Universities are advised to follow the guidelines proposed in this study, as shown in section 7.5. These guidelines should act as blue prints for the implementation of blended learning in traditional universities.

9.4 Significance of the study

The research shows how multi-blended learning settings can be constructed and employed for a better quality of education and effectiveness of learning. This actually comes from the combination of learning theories, the combination of face-to-face with e-learning, synchronous with asynchronous communications, instructional strategies, contents delivery types, and variety of contents. This blend proves to be useful and applicable at traditional universities in Palestine as the results of the field test showed earlier. Perhaps, after further testing, it would be applicable to other similar situations.

The result of this multi-blend is a blended learning model that was developed and implemented based on a set of identified factors, then, evaluated and tested and proved applicable to Palestinian traditional universities. By applying the new model, traditional universities in Palestine could smoothly go into the transition phase to blended learning settings. Another significance of the findings is that students would be able to improve their learning, as they would be exposed to a blend of teaching and learning settings through the adoption of the new model. The new model allows for students to 'learn' independently and conveniently through the availability of the various types of contents 24/7, various communication methods, learning theories, and instructional strategies.

Another major significance of the findings is the integration of the learning style test within the model. This allows lecturers to meet the different student demands and abilities, and match learning style with the appropriate contents, communication methods, instructional strategies, learning theories, and content delivery. It also proofed that multiple theories (Transaction Distance Theory, Blended Learning Theory, Learning style theory …) can be integrated to guide the development of such model. Furthermore, the findings lay the foundation for further work to propose an integrated theory for blended learning that takes into accounts all elements and variables affecting blended learning. Another significance of the findings of this research is the identification of six factors (components) that are crucial and important in evaluating blended learning model implementation and usage by students at traditional universities. The guidelines, as a result of this study, would play an important role in implementing blended learning at traditional universities in Palestine. The importance of this finding comes also from the fact that similar guidelines are rare if at all found in Palestine, which makes them perhaps unique and the first to be compiled based on scientific research.

9.5 Future Work

Although this research has covered the development and implementation of blended learning in traditional universities, particularly in Palestine, based on a set of factors of blended learning in addition to other elements such as barriers and problems, concepts etc., there is stillroom for further research and enhancement to this study. Some of the future work may include:

- Conduct a more deep study involving government, lecturers, students and university administration to put-forth a strategy for e-learning and blended learning implementation in Palestine.
- Evaluate the model on wider scale, which includes more universities and variety of courses for longer period. This might be conducted to confirm/affirm the results reported in this study regarding the effectiveness of the new model, and

to confirm or improve on the factors extracted through the exploratory factor analysis. A confirmatory factor analysis may be conducted.

- Conduct a research on the role of learning style test in improving the learning effectiveness of students in higher education institution using blended learning.
- Conduct a more thorough and deep study, building on this one, to propose a theory for blended learning which build on existing theories, and taking into account the factors and elements of blended learning identified in this study as a base.

9.5 Final Words

This reporting of the research has covered the various stages of conducting the study, from the first step through to this point. The study managed to achieve the stated objectives, produced a blended learning model for traditional universities in Palestine, and developed questionnaires to evaluate and test this model, in addition to compiling guidelines for blended learning implementation in traditional universities. As mentioned in the previous section, a single work cannot cover everything therefore a room for improvements is there. However, it is expected that this study would be of significant to researchers in the field of e-learning, to traditional universities aiming at implementing blended learning, and other parties. It is hoped that some researchers, especially from Palestine, would carry on research studies in this direction; building, enhancing and expanding on this work. Finally, it should be made clear that all mistakes and errors committed and found in this report are the researcher's own errors and mistakes, and not anyone else.

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APPENDIX A

A.1 Questionnaire One

'PERCEPTION OF FACULTY MEMBERS AT PALESTINIAN UNIVERSITIES TOWARDS E-LEARNING'

This questionnaire aims at exploring how faculty members perceive and think about e-learning. Their perception is important in determining the right setting for higher education and the use of e-learning in universities. Your cooperation in answering this questionnaire is highly appreciated and will be only and strictly used for research purposes, and only summary results will be reported. By answering the questionnaire, you are contributing greatly to the general efforts of introducing the right e-learning setting in Palestinian universities. In particular, you are helping the researchers in their efforts to find this proper setting within a larger research context.
Please fill in this questionnaire by ticking (√) in the relevant box or by writing the required information.

1. **Name of university:** ____
2. **Faculty (college):** ____
3. **Gender:** ☐ Male ☐ Female
4. **Academic Qualifications:** ☐ Bachelor ☐ Masters ☐ Doctorate ☐ Other: ____________
5. **Major area of studies:** ☐ Computing (IS/IT/CS/SE/CE). ☐ Admin Sc., ☐ Engineering, ☐ Education, ☐ Arts/Humanities, ☐ Social Science, ☐ Natural Science ☐Others ________________
6. **Years of teaching experience:** ☐ **1-5,** ☐ **6-10,** ☐ **11-15,** ☐ **>15**
7. **Do you have an e-mail account?** ☐ **Yes** ☐ **No**
8. **If No, what is the main reason (tick only one)?** ☐ Not convinced of its usefulness, ☐ My University did not offer me an account, ☐ Do not have Internet connection at home, ☐ Others _______________
9. **If yes, do you use it to communicate with (tick all that apply)**
   ☐ listservers, forums and online resources to use it for educational purposes?
   ☐ friends and relatives? ☐ students ☐ Personal use other than educational purposes
10. **How do you rate your familiarity with e-learning?**
    ☐ Not familiar at all, ☐ Poor, ☐ Good, ☐ Very good, ☐ Excellent.
11. **In your opinion, which of the following could be used in e-learning (tick all that apply)**
    ☐ e-mail, ☐ forums, ☐ chat, ☐ live online lectures, ☐ recorded material, ☐ CDs, ☐ Web-based,
    ☐ text books, ☐ classroom, ☐ mixture of learning theories, ☐ course profile web page,
    ☐ online assessment, ☐ Internet
12. **Did you have any experience with e-learning during your formal studies (i.e. first, second, third degree)?**
    ☐ No, ☐ Very few activities within one course, ☐ One Course (subject), ☐ 2-3 courses, ☐ >3 courses.
13. **Have you received or attended any training course/workshop on e-learning?** ☐ Yes, ☐ No.

14. **Apart from your formal education, have you ever attended a short/special course through e-learning?**

☐ No, **(Please go to Question 15)** ☐ Yes, **and my opinion on this course is (please tick the appropriate answer for each criterion in the list below):** (**SD**=Strongly Disagree, **D**=Disagree, **N**=Neutral, **A**=Agree, **SA**=Strongly Agree)

Criteria	**SA**	**A**	**N**	**D**	**SD**
a. Hardware and peripherals used were satisfactory					
b. Software used were suitable and easy to use					
c. Instructional methods used were appropriate					
d. Contents were suitable and informative					
e. Time was flexible and suited me					
f. Cost was acceptable and reasonable					
g. Instructor was well prepared					
h. Instructor encouraged and motivated me					
i. Communication with instructor and other learners was easy and occurred in a friendly atmosphere					
j. Outcome/results of the course were up to my expectations					

15. **If you have the chance, will you ever attend a course through e-learning?**

☐ Never, ☐ not likely, ☐ likely, ☐ most likely, ☐ Sure

16. **Did you ever use any form of e-learning during your teaching career?**

☐ never, ☐ once or twice, ☐ sometimes, ☐ often, ☐ always

17. **How long have you been using e-learning in courses you teach?**

☐ Have not used, ☐ Have just started, ☐ One year, ☐ Two years, ☐ Three years,

☐ >3 years

18. **Do you think that e-learning should be used in Palestinian universities in general?**

☐ for all courses/programs, ☐ for most of courses/programs, ☐ for some courses/programs,

☐ not sure, ☐ not at all.

19. **Regardless of what other universities do, do you think that <u>your</u> university should use e-learning?**

☐ For all courses/programs, ☐ for most of courses/programs, ☐ for some courses/programs,

☐ not sure, ☐ not at all.

20. **Regardless of other disciplines (area of study), do you think that e-learning should be used in <u>your</u> area of study/teaching?**

☐ For all courses, ☐ for most of courses, ☐ for some courses, ☐ not sure, ☐ not at all.

21. **If you have the opportunity to 'teach' a course through e-learning, will <u>you</u> prefer to have the course offered**

☐ online, ☐ as a mixture of online and in class, ☐ mainly in class with online assistance,

☐ not sure, ☐ will not use e-learning.

22. **If e-learning is to be implemented in <u>your</u> university;**

The top three **problems** you think might face the university in this implementation are:

1. ____
2. ____
3. ____

The top three **things (strengths)** that will help the university in this implementation are:

1. ____

2. ______________________________

3. ______________________________

23. If you are to use some form of e-learning in courses <u>you</u> teach;

The top three **things** you most likely need – as a lecturer- are:

1. ______________________________
2. ______________________________
3. ______________________________

The top three **things (strengths)** that will help you – as a lecturer- are:

1. ______________________________
2. ______________________________
3. ______________________________

Your overall comments on e-learning in Palestine:

____

____

____

____

Please return the completed questionnaire to the person distributing it or as instructed by him/her.

Thank you for your response.

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A.2 Questionnaire Two

A.2.1 Pilot test Questionnaire

Model Design Evaluation Form

Please read the attached brief description and sketch of the model design. Based on that, please fill in this evaluation form. Your objective feedback is highly appreciated for the improvement of the design. Please feel free to comment on the model. Thank you for your time and invaluable feedback and comments.

*Please write (***X***) in the appropriate answer of each item of the evaluation form. ("SA" Strongly Agree, "A" Agree, "N" Neutral, "D" Disagree, and "SD" Strongly Disagree).*

Item	SA	A	N	D	SD
A. The model is					
1. Understandable					
2. Clear					
3. Simple					
4. Complete					
5. Comprehensive					
6. Self-explained					
B. The graphical representation (layout) of the model is					
7. Clear					
8. Simple					
9. Understandable					
10. Complete					
11. Comprehensive					
12. Matching the textual explanation					
C. The textual explanation of the model is					
13. Simple					
14. Clear					
15. Complete					
16. Comprehensive					
17. Understandable					
D. The components are all					
18. Understandable					
19. Necessary					
20. Relevant					
21. Sufficient					
E. The relationships between components are					
22. Understandable					
23. Clear					
24. Meaningful					
F. The graphical representation of the components is					
25. Suitable					
26. Clear					
27. Simple					

28. Understandable					
G. ‘Learning setting (f-2-f and Internet-based)’ components is					
29. Necessary					
30. in the right place					
H. ‘Synchronous/asynchronous communications methods’ component is					
31. Necessary					
32. in the right place					
I. Learning theories’ component is					
33. Necessary					
34. in the right place					
J. ‘Instructional strategies’ component is					
35. Necessary					
36. in the right place					
K. ‘Content delivery & media’ component is					
37. Necessary					
38. in the right place					
L. ‘Content’ component is					
39. necessary					
40. in the right place					
M. Instructor’ component is					
41. necessary					
42. in the right place					
N. ‘Learner’ component is					
43. Necessary					
44. in the right place					
O. ‘Factors’ component is					
45. Necessary					
46. in the right place					
P. ‘Quality/standards’ component is					
47. Necessary					
48. in the right place					
Q. ‘Learning style test’ component is					
49. Necessary					
50. in the right place					
R. ‘Create/update’ component is					
51. Necessary					
52. in the right place					
S. Outcome is					
53. Understandable					
54. Clear					
55. Reasonable					

Comments/suggestions:

Thank you for your cooperation.

A.2.2 Description of the Model

Objective of the model: The general objective of the model is to ease the problems, and help to improve the higher education system by transforming it from traditional to blended learning setting, while improving learner satisfaction and motivation; improving communications among learners and instructors, and reducing relative cost for both learner and institution.

The model is built based on the following factors and problems:

Factors: Instructor, Learner, Infrastructure, Cost, Pedagogy, Time, Political, Legal, Delivery mode, Instructional technology

The **problems** of higher education and e-learning are related to: Traditional education system, Impact of Occupation, Economic situation, High student-to-lecturer ratio, Instructor-related problems, Learner-related problems, and Infrastructure

The main **components** of the model are:

1. blending f-2-f setting with Internet based e-learning
2. blending several delivery modes
3. blending pedagogical approaches/learning theories
4. blending instructional strategies
5. blend of communications methods

These components represent the core 'solution'. In addition to these, 'contents' must be included as a component of the model. To make good use of the model; the 'Learning Style Test" is added to the model. This is necessary to identify learner's learning style before engaged with the learning process. The instructor and learners are considered the main participants/ users of the model. As their characteristics influence the way the model is developed and used, they are considered part of the blended model.

Following is an explanation of the various components of the model.

Components of the model

1. **Contents**: comprised of several types and formats such as:

a) Traditional text-based contents, be it text books, notes, handouts, or any other form of printed content,

b) E-content consists of any form of study material in electronic format (digital), which has been created/updated/uploaded by instructor. These contents are available also for use and demonstration in the classroom setting.

c) Web-based resources relevant to the course/ activity which can be found and accessed on the Internet.

d) Live lecture; be it in audio or in video form. The lecture would then be stored in the repository for later use and reference

e) Stored version of edited 'IM' or online chat between instructor and students

f) Approved contribution from students to be added to the repository or to the course/ activity material, either for immediate use, or perhaps for future use by next offering of the course/ activity

2. **Content delivery**: two main categories exist: in class delivery and Internet-based delivery. In-class delivery can be a traditional lecture, with or without the help of information technology. ICT can be used to deliver contents in class, as a supplement to the lecture. In addition, Internet can be utilized to access relevant contents on the WWW in the class. Other forms of delivery options include email, forum, live lecture, recorded lecture, text …

3. **Instructional strategies**. Different strategies would be blended. Instructor will have to match the learning and teaching styles. This is possible through the use of the results of the learning style test that each learner would take at the beginning of the activity / course. Another factor that will affect the adoption of a strategy is the nature of the activity / course, and the prior experience of instructor and learner in e-learning, in addition to the availability of other resources and technology. …

4. **Learning theories**. In this blended model, the setup allows for a blend of two approaches; behaviorism and constructivism. Blending both would be of two fold benefits to the learning and teaching process. First fold, moving gradually from behaviorism to constructivism would not alienate both learner and instructor from the approach they have been acquainted with for so long. The second fold is that blending the approaches would benefit learner and instructor alike in better learning, and better teaching.

5. **Synchronous/Asynchronous Communication**: variety of communication methods and types are employed. They are classified as: synchronous and asynchronous communications. Synchronous communication can be practiced in class (f-2-f) setting and in live interaction over the Internet. Using the Internet, students can interact with each other or/ and with the instructor using variety of methods such as: Live lecture, live chatting and IM. Asynchronous communication can be practiced over the Internet. Different choices and methods are available; forum, email, Q & A.

6. **Learning setting**: The model combines traditional classroom setting and Internet-based setting. This combination utilizes the benefits of both settings, and minimizes their disadvantages. Based on the credit hour system, the ratio between classroom contact and Internet-based should be at least 2:1, preferably 1:1. However, the ratio can be amended to suite the respective case/ situation.

7. **Learner**. Learners have the alternatives to choose the learning method, communication method, setting, and learning contents and delivery. Different cases should be monitored by instructors to decide and/ or assist learner on how to proceed.

8. **Instructor**. The model builds on the role of the instructor, both in the traditional learning setting and in the Internet-based part of the setting. The instructor has a major role –if not full responsibility- to set objectives of the activity / course to be achieved. Instructor is responsible for creating a cooperation environment among students through team work, group assignments/ projects and other means. While allowing for instructor control over the activity / course teaching and learning, the learner is kept in mind to allow for learner-centered learning to take place.

9. **Learning style test**. This component is used by learners to assess their learning styles. The test is taken at the beginning when the learner is about to be engaged in the learning process. The result of the test is saved in the learner database, where it can be used later by instructor and learner alike to find the best suitable way to teach/ learn that matches the learner's learning style. The learning style test can be adapted from any standard test, and it is up to the implementer of the model to decide on the suitable test for the case. The learning style test component through the learner database; has direct contact with the pedagogical approaches component of the model.

10. **Create/ update process**. This component/ process is used to create various types of contents in various forms. In addition, it is the responsibility of the instructor to keep these contents up to-date and amended as needed.

11. **External entities**. These are external elements that affect the overall structure, setup, and process of the model, comprising of factors and quality standards components.

12. **Outcome of the model**

The outcome of the model is of two folds. One is improved efficiency, and the other is improved effectiveness. *Efficiency* is measured in terms of reduced relative cost for both learner and institution. This is achieved through decreasing cost to learn, i.e. commuting cost, daily expenses, etc… and through decreasing cost to teach, i.e. classroom utilization, cutting utility expenses, etc as a consequence of the decrease in number of traditional classroom hours per activity/ course. In addition, efficiency is improved through saving time for learner in terms of commuting time and in campus time. *Effectiveness* is improved through various means; 1) learner's satisfaction, 2) learner motivation, 3) saving time, 4) improved communications among learners and instructor

A.2.3 Revised Questionnaire

Dear colleague

My name is Ghassan Omar Shahin, a lecturer at Palestine Polytechnic University in Hebron. I am currently on study leave to complete my PhD at University of Malaya, Malaysia. My research area is in E-learning, and I am developing a Blended Learning model for Higher Education. As I am developing the model, I have to evaluate the design of this model. This step comes before the final testing of the actual full model through implementing and trying it in institution of Higher education in Palestine.
The success of implementing any such models depends on the perception and acceptance of the lecturer. As such, it has been decided, based on previous work, that the most suitable persons to evaluate the model would be the lecturers who are the potential users and implementers. Therefore, I would very much appreciate your kind assistance in evaluating the model by filling in the attached questionnaire. Please read the accompanying model description before answering the questionnaire.

Once finish, please return the completed questionnaire to my email.

By answering the questionnaire you are helping the researcher in-person and the higher education in Palestine at large. Your cooperation and help is highly appreciated.
Thank you and have a nice summer vacation.

Yours

Ghassan Omar Shahin

Model Design Evaluation Form

Please read the attached brief description and the sketch of the model design. Based on that, please fill in this evaluation form. Your objective feedback is highly appreciated. Please feel free to comment on the model. Thank you for your time and invaluable feedback and comments.

*Please write (**X**) in the appropriate answer of each item of the evaluation form. ("SA" Strongly Agree, "A" Agree, "N" Neutral, "D" Disagree, and "SD" Strongly Disagree).*

Item	**SA**	**A**	**N**	**D**	**SD**
A. The model is					
1. Understandable					
2. Clear					
3. Complete					
4. Comprehensive					
5. Self-explained					
B. The graphical representation (layout) of the model is					
6. Understandable					
7. Clear					
8. Complete					
9. Comprehensive					
10. Matching the textual explanation					
C. The textual explanation of the model is					
11. Understandable					
12. Clear					
13. Complete					
14. Comprehensive					
D. The components are all					
15. Understandable					
16. Necessary					
17. Relevant					
18. Sufficient					
E. The relationships between components are					
19. Understandable					
20. Clear					
21. Meaningful					
F. The graphical representation of the components is					
22. Understandable					
23. Clear					
24. Suitable					
G. 'Learning setting (f-2-f and Internet-based)' components is					
25. Necessary					
26. In the right place					
H. 'Synchronous/asynchronous communications methods' component is					
27. Necessary					
28. In the right place					
I. Learning theories' component is					
29. Necessary					
30. In the right place					

J. 'Instructional strategies' component is					
31. Necessary					
32. In the right place					
K. 'Content delivery & media' component is					
33. Necessary					
34. In the right place					
L. 'Content' component is					
35. necessary					
36. in the right place					
M. Instructor' component is					
37. necessary					
38. in the right place					
N. 'Learner' component is					
39. Necessary					
40. In the right place					
O. 'Factors' component is					
41. Necessary					
42. In the right place					
P. 'Quality criteria' component is					
43. Necessary					
44. In the right place					
Q. 'Learning style test' component is					
45. Necessary					
46. In the right place					
R. 'Create/update' component is					
47. Necessary					
48. In the right place					
S. 'Assessment' component is					
49. Necessary					
50. In the right place					
T. Outcome is					
51. Understandable					
52. Clear					
53. Reasonable					

Comments/suggestions:

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____

____

____

____

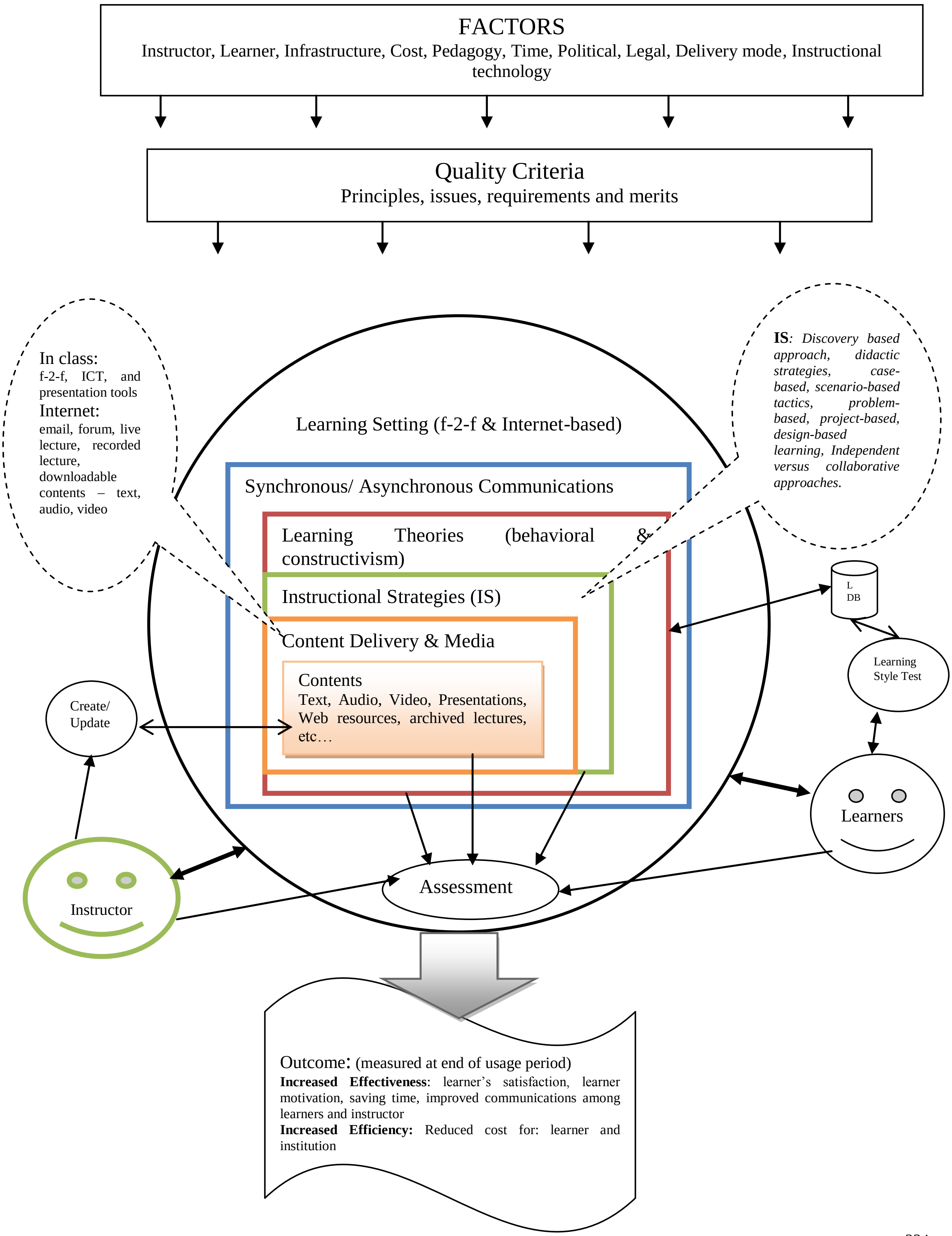
Thank you for your cooperation.

Ghassan Omar Shahin, PhD candidate, Faculty of Comp. Sc. & IT, University of Malaya – Malaysia

A.2.4 Revised Model and Description

The revised model and its description accompanied the evaluation form (questionnaire).

Blended Learning Model for Higher Education in Palestine



Objective of the model: The general objective of the model is to ease the problems, and help to improve the higher education system by transforming it from traditional to blended learning setting, while improving learner satisfaction and motivation; improving communications among learners and instructors, and reducing relative cost for both learner and institution.

The model is built based on the following factors and problems:
Factors: Instructor characteristics, Learner characteristics, Infrastructure, Cost, Pedagogy, Time, Political factor, Legal factor, Delivery mode, Instructional technology
The **problems** of higher education and e-learning are related to: Traditional education system, Impact of Occupation, Economic situation, High student-to-lecturer ratio, Instructor-related problems, Learner-related problems, and Infrastructure.
The main **components** of the model are:

1. blending face-to-face (f-2-f) setting with Internet based e-learning
2. blend of communications methods (synchronous/asynchronous)
3. blending learning theories
4. blending instructional strategies
5. blending several delivery modes

These components represent the core 'solution'. In addition to these, 'contents' is included as a component of the model. To make good use of the model; the 'Learning Style Test" is added to the model. This is necessary to identify learner's learning style before engaging in the learning process. The instructor and learners are considered the main participants/ users of the model. As their characteristics influence the way the model is developed and used, they are considered part of the blended model. Finally, the assessment component is considered for assessing the learner's performance and achievement as he/she used this model.
Following is an explanation of the various components of the model.
Components of the model

1. **Contents**: comprised of several types and formats such as:
   a) Traditional text-based contents, be it text books, notes, handouts, or any other form of printed content,
   b) E-content consists of any form of study material in electronic format (digital), which has been created/updated/uploaded by instructor. These contents are available also for use and demonstration in the classroom setting.
   c) Web-based resources relevant to the course/ activity which can be found and accessed on the Internet.
   d) Live lecture; be it in audio or in video form. The lecture would then be stored in the repository for later use and reference
   e) Stored version of edited 'IM' or online chat between instructor and students
   f) Approved contribution from students to be added to the repository or to the course/ activity material, either for immediate use, or perhaps for future use by next offering of the course/ activity
2. **Content delivery**: two main categories exist: in class delivery and Internet-based delivery. In-class delivery can be a traditional lecture, with or without the help of information technology. ICT can be used to deliver contents in class, as a supplement to the lecture. In addition, Internet can be utilized to access relevant contents on the WWW in the class. Other forms of delivery options include email, forum, live lecture, recorded lecture, text …
3. **Instructional strategies**. Different strategies would be blended. Instructor will have to match the learning and teaching styles. This is possible through the use of the results of the learning style test that each learner would take at the beginning of the activity / course. Another factor that will affect the adoption of a strategy is the nature of the activity / course, and the prior experience of instructor and learner in e-learning, in addition to the availability of other resources and technology. …
4. **Learning theories**. In this blended model, the setup allows for a blend of two approaches; behaviorism and constructivism. Blending both would be of two fold benefits to the learning and teaching process. First fold, moving gradually from behaviorism to

constructivism would not alienate both learner and instructor from the approach they have been acquainted with for so long. The second fold is that blending the approaches would benefit learner and instructor alike in better learning, and better teaching.

5. **Synchronous/Asynchronous Communication**: variety of communication methods and types are employed. They are classified as: synchronous and asynchronous communications. Synchronous communication can be practiced in class (f-2-f) setting and in live interaction over the Internet. Using the Internet, students can interact with each other or/ and with the instructor using variety of methods such as: Live lecture, live chatting and IM. Asynchronous communication can be practiced over the Internet. Different choices and methods are available; forum, email, Q & A.
6. **Learning setting**: The model combines traditional classroom setting (f-2-f) and Internet-based setting. This combination utilizes the benefits of both settings, and minimizes their disadvantages. Based on the credit hour system, the ratio between classroom contact and Internet-based should be at least 2:1, preferably 1:1. However, the ratio can be amended to suite the respective case/ situation.
7. **Learner**. Learners have the alternatives to choose the learning method, communication method, setting, and learning contents and delivery. Different cases should be monitored by instructors to decide and/ or assist learner on how to proceed.
8. **Instructor**. The model builds on the role of the instructor, both in the traditional learning setting and in the Internet-based part of the setting. The instructor has a major role –if not full responsibility- to set objectives of the activity / course to be achieved. Instructor is responsible for creating a cooperation environment among students through team work, group assignments/ projects and other means. While allowing for instructor control over the activity / course teaching and learning, the learner is kept in mind to allow for learner-centered learning to take place.
9. **Learning style test**. This component is used by learners to assess their learning styles. The test is taken at the beginning when the learner is about to be engaged in the learning process. The result of the test is saved in the learner database, where it can be used later by instructor and learner alike to find the best suitable way to teach/ learn that matches the learner's learning style. The learning style test can be adapted from any standard test, and it is up to the implementer of the model to decide on the suitable test for the case. The learning style test component through the learner database; has direct contact with the pedagogical approaches component of the model.
10. **Assessment**. This component is used to assess the performance and achievement of the learners as they are engaged in using this model. It could comprise a variety of assessment tests in the form of continuous or end of activity test/evaluation. This is necessary as it is one of the triangular elements of the teaching/learning process, where goals must be set; instructional strategy and technology must be adopted, and finally assessment must be carried out based on the previous two elements.
11. **Create/ update process**. This component/ process is used to create various types of contents in various forms. In addition, it is the responsibility of the instructor to keep these contents up-to-date and amended as needed.
12. **External entities**. These are external elements that affect the overall structure, setup, and process of the model, comprising of **factors** as shown earlier, and **quality** criteria components. Quality criteria component is used as an umbrella for the development and implementation of the model.
13. **Outcome of the model** The outcome of the model is of two folds. One is improved efficiency, and the other is improved effectiveness. *Efficiency* is measured in terms of reduced relative cost for both learner and institution. This is achieved through decreasing cost to learn, i.e. commuting cost, daily expenses, etc… and through decreasing cost to teach, i.e. classroom utilization, cutting utility expenses, etc as a consequence of the decrease in number of traditional classroom hours per activity/ course. In addition, efficiency is improved through saving time for learner in terms of commuting time and in campus time. *Effectiveness* is improved through various means; 1) learner's satisfaction, 2) learner motivation, 3) saving time, 4) improved communications among learners and instructor. The outcome will be measured at end of activity/course using evaluation form

that assesses the above efficiency and effectiveness criteria. Both learners and instructor shall participate.

A.3 Heuristic Evaluation

The cover page and the checklist, that were sent to evaluators for evaluating the system; are shown below.

Heuristic evaluation – a system checklist for Blended Learning system/site

Dear Evaluator

Thank you for your willingness to evaluate this system. Your time and effort are highly appreciated.
Please fill in the attached evaluation form, which is a form of checklist, by writing "X" in the appropriate place which mostly describes the best answer to the corresponding criterion. This form is to be filled after you have investigated the system interface i.e. have looked at, and examined the interface. The answer to each criterion is either "Yes", "No", or "N/A". Each question (criterion) is provided with a space for your comments. Please feel free to comment on any questions/criterion.

Thank you for your time and effort.

Ghassan O. A. Shahin
Faculty of Computer Science & Information Technology
University of Malaya, Malaysia
Gamoa2002@yahoo.com gshahin@siswa.um.edu.my

Disclaimer: This list is a simplified one of the original list which was developed by Xerox corporation (© Usability Analysis & Design, Xerox Corporation, 1995) and was *downloaded from* ***http://www.stcsig.org/usability/topics/articles/he-checklist.html*** *on 26/10/2010, at 4:00pm. It has been simplified to suite the purpose it is used for, which is to evaluate the software part of the blended learning model developed by the researcher as part of PhD thesis. The number of questions was reduced; however, the individual questions were left intact. Ghassan O. A. Shahin*

Heuristic Evaluation - A System Checklist

Disclaimer: This list is a simplified one of the original list which was developed by Xerox corporation (© Usability Analysis & Design, Xerox Corporation, 1995) and was *downloaded from* ***http://www.stcsig.org/usability/topics/articles/he-checklist.html*** *on 26/10/2010, at 4:00pm. It has been simplified to suite the purpose it is used for, which is to evaluate the software part of the blended learning model developed by the researcher as part of PhD thesis. The number of questions was reduced; however, the individual questions were left intact.. Ghassan O. A. Shahin*

1. Visibility of System Status

The system should always keep user informed about what is going on, through appropriate feedback within reasonable time.

#	Review Checklist	Yes No N/A	Comments
1.1	Does every display begin with a title or header that describes screen contents?	( ) ( ) ( )	
1.2	Do menu instructions, prompts, and error messages appear in the same place(s) on each menu?	( ) ( ) ( )	
1.3	Is there some form of system feedback for every operator action?	( ) ( ) ( )	
1.4	After the user completes an action (or group of actions), does the feedback indicate that the next group of actions can be started?	( ) ( ) ( )	
1.5	Is there visual feedback in menus or dialog boxes about which choices are selectable?	( ) ( ) ( )	
1.6	Is there visual feedback in menus or dialog boxes about which choice the cursor is on now?	( ) ( ) ( )	
1.7	If there are observable delays (greater than fifteen seconds) in the system's response time, is the user kept informed of the system's progress?	( ) ( ) ( )	
1.8	Are response times appropriate to the user's cognitive processing?	( ) ( ) ( )	
1.9	Is the menu-naming terminology consistent with the user's task domain?	( ) ( ) ( )	
1.10	Does the system provide *visibility:* that is, by looking, can the user tell the state of the system and the alternatives for action?	( ) ( ) ( )	
1.11	Do GUI menus make obvious which item has been selected?	( ) ( ) ( )	

2. Match Between System and the Real World

The system should speak the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

#	Review Checklist	Yes No N/A	Comments
2.1	Are icons concrete and familiar?	( ) ( ) ( )	
2.2	Are menu choices ordered in the most logical way, given the user, the item names, and the task variables?	( ) ( ) ( )	
2.3	Do related and interdependent fields appear on the same screen?	( ) ( ) ( )	
2.4	When prompts imply a necessary action, are the words in the message consistent with that action?	( ) ( ) ( )	
2.5	On data entry screens, are tasks described in terminology familiar to users?	( ) ( ) ( )	
2.6	Are field-level prompts provided for data entry screens?	( ) ( ) ( )	
2.7	Do menu choices fit logically into categories that have readily understood meanings?	( ) ( ) ( )	

3. User Control and Freedom

Users should be free to select and sequence tasks (when appropriate), rather than having the system do this for them. Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Users should make their own decisions (with clear information) regarding the costs of exiting current work. The system should support undo and redo.

#	Review Checklist	Yes No N/A	Comments
3.1	When a user's task is complete, does the system wait for a signal from the user before processing?	( ) ( ) ( )	
3.2	Are users prompted to confirm commands that have drastic, destructive consequences?	( ) ( ) ( )	
3.3	Are character edits allowed in data entry fields?	( ) ( ) ( )	
3.4	If menu lists are long (more than seven items), can users select an item either by moving the cursor or by typing a mnemonic code?	( ) ( ) ( )	
3.5	If the system uses a pointing device, do users have the option of either clicking on menu items or using a keyboard shortcut?	( ) ( ) ( )	
3.6	Are menus broad (many items on a menu) rather than deep (many menu levels)?	( ) ( ) ( )	

4. Consistency and Standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

#	Review Checklist	Yes No N/A	Comments
4.1	Has a heavy use of all uppercase letters on a screen been avoided?	( ) ( ) ( )	
4.2	Are icons labeled?	( ) ( ) ( )	
4.3	Are there no more than twelve to twenty icon types?	( ) ( ) ( )	
4.4	Does each window have a title?	( ) ( ) ( )	
4.5	Are vertical and horizontal scrolling possible in each window?	( ) ( ) ( )	
4.6	Are menu choice lists presented vertically?	( ) ( ) ( )	
4.7	Are menu titles either centered or left-justified?	( ) ( ) ( )	
4.8	Are menu items left-justified, with the item number or mnemonic preceding the name?	( ) ( ) ( )	
4.9	Do embedded field-level prompts appear to the right of the field label?	( ) ( ) ( )	
4.10	Are field labels and fields distinguished typographically?	( ) ( ) ( )	
4.11	Are field labels consistent from one data entry screen to another?	( ) ( ) ( )	
4.12	Do field labels appear to the left of single fields and above list fields?	( ) ( ) ( )	
4.13	Are attention-getting techniques used with care?	( ) ( ) ( )	
4.14	Are there no more than four to seven colors, and are they far apart along the visible spectrum?	( ) ( ) ( )	
4.15	Is the most important information placed at the beginning of the prompt?	( ) ( ) ( )	
4.16	Are user actions named consistently across all prompts in the system?	( ) ( ) ( )	
4.17	Are menu choice names consistent, both within each menu and across the system, in grammatical style and terminology?	( ) ( ) ( )	
4.18	Does the structure of menu choice names match their corresponding menu titles?	( ) ( ) ( )	
4.19	If the system has multipage data entry screens, do all pages have the same title?	( ) ( ) ( )	
4.20	Are high-value, high-chroma colors used to attract attention?	( ) ( ) ( )	

5. Help Users Recognize, Diagnose, and Recover From Errors

Error messages should be expressed in plain language (NO CODES).

#	Review Checklist	Yes No N/A	Comments
5.1	Is sound used to signal an error?	( ) ( ) ( )	
5.2	Are error messages worded so that the system, not the user, takes the blame?	( ) ( ) ( )	
5.3	Are error messages grammatically correct?	( ) ( ) ( )	
5.4	Do error messages avoid the use of violent or hostile words?	( ) ( ) ( )	
5.5	Do all error messages in the system use consistent grammatical style, form, terminology, and abbreviations?	( ) ( ) ( )	
5.6	If an error is detected in a data entry field, does the system place the cursor in that field or highlight the error?	( ) ( ) ( )	
5.7	Do error messages inform the user of the error's severity?	( ) ( ) ( )	
5.8	Do error messages suggest the cause of the problem?	( ) ( ) ( )	
5.9	Do error messages indicate what action the user needs to take to correct the error?	( ) ( ) ( )	
5.10	If the system supports both novice and expert users, are multiple levels of error-message detail available?	( ) ( ) ( )	

6. Error Prevention

Even better than good error messages is a careful design which prevents a problem from occurring in the first place.

#	Review Checklist	Yes No N/A	Comments
6.1	Are menu choices logical, distinctive, and mutually exclusive?	( ) ( ) ( )	
6.2	Are data inputs case-blind whenever possible?	( ) ( ) ( )	
6.3	Does the system prevent users from making errors whenever possible?	( ) ( ) ( )	
6.4	Does the system warn users if they are about to make a potentially serious error?	( ) ( ) ( )	
6.5	Do data entry screens and dialog boxes indicate the number of character spaces available in a field?	( ) ( ) ( )	
6.6	Do fields in data entry screens and dialog boxes contain default values when appropriate?	( ) ( ) ( )	

7. Recognition Rather Than Recall

Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

#	Review Checklist	Yes No N/A	Comments
7.1	For question and answer interfaces, are visual cues and white space used to distinguish questions, prompts, instructions, and user input?	( ) ( ) ( )	
7.2	Does the data display start in the upper-left corner of the screen?	( ) ( ) ( )	
7.3	Are multiword field labels placed horizontally (not stacked vertically)?	( ) ( ) ( )	
7.4	Are prompts, cues, and messages placed where the eye is likely to be looking on the screen?	( ) ( ) ( )	
7.5	Is there an obvious visual distinction made between "choose one" menu and "choose many" menus?	( ) ( ) ( )	
7.6	Have items been grouped into logical zones, and have headings been used to distinguish between zones?	( ) ( ) ( )	
7.7	Have zones been separated by spaces, lines, color, letters, bold titles, rules lines, or shaded areas?	( ) ( ) ( )	
7.8	Are field labels close to fields, but separated by at least one space?	( ) ( ) ( )	
7.9	Are optional data entry fields clearly marked?	( ) ( ) ( )	
7.10	Is reverse video or color highlighting used to get the user's attention?	( ) ( ) ( )	
7.11	Is reverse video used to indicate that an item has been selected?	( ) ( ) ( )	
7.12	Are size, boldface, underlining, color, shading, or typography used to show relative quantity or importance of different screen items?	( ) ( ) ( )	
7.13	Are borders used to identify meaningful groups?	( ) ( ) ( )	
7.14	Is color coding consistent throughout the system?	( ) ( ) ( )	
7.15	Is the first word of each menu choice the most important?	( ) ( ) ( )	
7.16	Are inactive menu items grayed out or omitted?	( ) ( ) ( )	
7.17	Are there menu selection defaults?	( ) ( ) ( )	
7.18	Do data entry screens and dialog boxes indicate when fields are optional?	( ) ( ) ( )	

8. Flexibility and Minimalist Design

Accelerators-unseen by the novice user-may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions. Provide alternative means of access and operation for users who differ from the "average" user (e.g., physical or cognitive ability, culture, language, etc.)

#	Review Checklist	Yes No N/A	Comments
8.1	If the system supports both novice and expert users, are multiple levels of error message detail available?	( ) ( ) ( )	
8.2	If menu lists are short (seven items or fewer), can users select an item by moving the cursor?	( ) ( ) ( )	
8.3	If the system uses a pointing device, do users have the option of either clicking on fields or using a keyboard shortcut?	( ) ( ) ( )	
8.4	On data entry screens, do users have the option of either clicking directly on a field or using a keyboard shortcut?	( ) ( ) ( )	
8.5	On menus, do users have the option of either clicking directly on a menu item or using a keyboard shortcut?	( ) ( ) ( )	
8.6	In dialog boxes, do users have the option of either clicking directly on a dialog box option or using a keyboard shortcut?	( ) ( ) ( )	

9. Aesthetic and Minimalist Design

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

#	Review Checklist	Yes No N/A	Comments
9.1	Are all icons in a set visually and conceptually distinct?	( ) ( ) ( )	
9.2	Have large objects, bold lines, and simple areas been used to distinguish icons?	( ) ( ) ( )	
9.3	Does each icon stand out from its background?	( ) ( ) ( )	
9.4	Are meaningful groups of items separated by white space?	( ) ( ) ( )	
9.5	Does each data entry screen have a short, simple, clear, distinctive title?	( ) ( ) ( )	
9.6	Are field labels brief, familiar, and descriptive?	( ) ( ) ( )	
9.7	Are menu titles brief, yet long enough to communicate?	( ) ( ) ( )	
9.8	Are there pop-up or pull-down menus within data entry fields that have many, but well-defined, entry options?	( ) ( ) ( )	

10. Help and Documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

#	Review Checklist	Yes No N/A	Comments
10.1	Are on-line instructions visually distinct?	( ) ( ) ( )	
10.2	If menu choices are ambiguous, does the system provide additional explanatory information when an item is selected?	( ) ( ) ( )	
10.3	Is the help function visible; for example, a key labeled HELP or a special menu?	( ) ( ) ( )	
10.4	Navigation: Is information easy to find?	( ) ( ) ( )	
10.5	Presentation: Is the visual layout well designed?	( ) ( ) ( )	
10.6	Conversation: Is the information accurate, complete, and understandable?	( ) ( ) ( )	
10.7	Is the information relevant?	( ) ( ) ( )	
10.8	Can users easily switch between help and their work?	( ) ( ) ( )	
10.9	Is it easy to access and return from the help system?	( ) ( ) ( )	
10.10	Can users resume work where they left off after accessing help?	( ) ( ) ( )	

Heuristic Evaluation
A System Checklist

Primary Source
Making Computers-People Literate. © Copyright 1993.
By
Elaine Weiss
ISBN: 0-471-01877-5

System Title:__________________________

Release #: ___________________________
Evaluator: ___________________________
Date: ___________________________

Secondary Source
Usability Inspection Methods. © Copyright 1994.
By
Jakob Nielsen and Robert Mack
ISBN: 1-55542-622-0

Xerox
The Document Company

A.4 Questionnaire Three

A.4.1 Cover letter

Questionnaire on evaluating Blended Learning Model at traditional universities in Palestine

Dear Student

Thank you for taking the time to complete this questionnaire. Your input is highly regarded and appreciated.

This questionnaire is intended to evaluate the implementation of the blended learning that you have used recently. We would like you to give us your feedback and evaluate your experience with blended learning. The questions are designed to test the level of student satisfaction, motivation and communications; in addition to test whether there is a cost saving and time flexibility in using blended learning.

Each answer in part "B" is represented by a scale from 7 to 1, where "7" is completely agree, "6" agree, "5" somehow agree, "4" neutral, "3" somehow disagree, "2" disagree, and "1" completely disagree.

Please read the questions carefully and tick the answer that most represents your opinion. Your cooperation is highly appreciated, and we assure you that this will be only used for research purposes.

Thank you for your kind cooperation.

Ghassan O. A. Shahin
Faculty of Computer Science & Information Technology,
University of Malay, Malaysia

Disclaimer: The official language of the questionnaire is English. However, the researcher has added an Arabic text as an explanation of the English text. It is by no mean an official translation of the original English text. The English text remains the official one.

اللغة الرسمية لهذا الاستبيان هي الانجليزية. مع ذلك قام الباحث باضافة شرح للنص الانجليزي الاصلي باللغة العربية لتوضيحه. لا يعتبر النص العربي ولا باي شكل من الاشكال ترجمة رسمية معتمدة للتص الانجليزي الاصلي. يبقى النص الانحليزي هو النص الاصلي المعتمد.

A.4.2 The Questionnaire

PART A: Demographic data

This part contains 8 questions. Please mark the suitable answer.
يحتوي هذا الجزء على 8 اسئلة. رجاء اختيار الاجابة المناسبة .

Q1. Your Gender: ( ) Male ( ) Female

Q2. Age: ( ) <20 ( ) 20-25 ( ) Above 25

Q3. Level of study: ( ) First year ( ) Second year ( ) Third Year ( ) Fourth Year
( ) Fifth Year

Q4. Program of study:( ) Bachelor ( ) Masters

Q5. Field of study: ( ) Science ( ) Business Administration ( ) Engineering
( ) Computer Sc. / IT ( ) Arts/Humanities

Q6. Which of the following best describes you?
( ) I have my own Laptop ( ) I have my own PC at home ( ) I have a family PC at home
( ) I have both a laptop and a PC ( ) I do not have a computer

Q7. Internet connection at home: ( ) No Connection ( ) Dialup ( ) DSL
( ) ISDN ( ) Satellite Internet ( ) Wireless
( ) Others; please describe ___________________

Q8. Which course you are registered in: ____

PART B: Evaluating the model

This part contains 68 questions. All questions are 7-point Likert-type scale, where "7" represents completely agree and "1" completely disagree. Please mark the suitable answer, and answer all questions.
جميع الاسئلة تستخدم مقياس ليكرت ذو السبع نقاط، بحيث تمثل رقم "7" اوافق بشكل كامل ، ورقم "1" لا اوافق بشكل كامل. الرجاء اختيار الاجابة المناسبة. نرجو الاجابة على جميع الاسئلة

No	Question السؤال	7	6	5	4	3	2	1
1.	I can reach the web environment wherever I want استطيع الوصول الى الويب في اي مكان اريد							
2.	I find the web site clear. وجدت الموقع واضح							
3.	I can use the forum easily. استطيع استخدام منتدى النقاش بسهوله							
4.	I can use the Chat easily. استطيع استخدام الدردشة بسهوله							
5.	I can use the Conference easily. استطيع استخدام المؤتمر بسهوله							

No	Question السؤال	7	6	5	4	3	2	1
6.	I can use the IM easily. استطيع استخدام الرسائل الفورية بسهوله							
7.	I can use the "View Assessment" easily							
8.	I can use "Assessment Solution" easily							
9.	The system is easy to use							
10.	The system is user-friendly							
11.	The system makes it easy for me to find the content I need النظام يسهل علي ايجاد المحتوى التعليمي الذي احتاجه							
12.	The system makes it easy for me to discuss questions with other students. النظام يسهل علي مناقشة الاسئلة مع الطلبة الاخرين							
13.	The system makes it easy for me to discuss questions with my lecturer النظام يسهل علي مناقشة الاسئلة مع المدرس							
14.	The communications and interactions in the web environment is enough for me الاتصال والتفاعل في بيئة الموقع كافية بالنسبة لي							
15.	I can share my thoughts and experiences with my colleagues through the communication methods (Forum, Chat, IM, Email, and Conference). استطيع تبادل الافكار مع زملائي من خلال وسائل التواصل (المنتدى والدردشة والبريد الالكتروني والرسائل الفورية والمؤتمر)							
16.	My lecturer gives feedback through the web (Forum, Conference …) about my questions; inquiries etc المدرس يقوم بتزويدي بالتغذية الراجعة من خلال الويب (المنتدى والمؤتمر ...) فيما يتعلق باستفساراتي واسئلتي الخ ...							
17.	The communication methods available are supportive and help me reinforce what I have learned. وسائل التواصل المتوفرة في النظام (المنتدى والمؤتمر والدردشة والبريد الالكتروني والرسايل الفورية) تدعم وتساعد في تعزيز وتثبيت ما اتعلمه							
18.	The quality of the interactions, through the web, between the lecturer and learners is good جودة التفاعل من خلال الويب بين المدرس والمتعلمين جيدة							
19.	The possibility to interact with the lecturer and with the other students is good. امكانية التفاعل مع المدرس والطلبة الاخرين جيدة							
20.	I can flexibly communicate/ interact with my lecturer in a convenient manner 24/7. استطيع التواصل / التفاعل مع المدرس بشكل ملائم ومريح طيلة اليوم							
21.	I can flexibly communicate/ interact with learners in a convenient manner 24/7. استطيع التواصل / التفاعل مع الطلبة بشكل ملائم ومريح طيلة اليوم							
22.	I am satisfied with the cooperation and collaboration environment among learners which the model offers. انا راض عن بيئة التعاون والتأزر بين الطلبة التي يقدمها النموذج							
23.	The quality of the face-to-face interaction (in this model) between lecturer and learners is good جودة التفاعل وجها لوجه (في هذا النموذج) بين المدرس والمتعلمين جيدة							
24.	The quality of the face-to-face interaction (in this model) between learners themselves is good جودة التفاعل وجها لوجه (في هذا النموذج) بين المتعلمين انفسهم جيدة							
25.	Sharing and discussion environment in face to face							

No	Question السؤال	7	6	5	4	3	2	1
	sessions (in this model) are good. بيئة النقاش وتبادل الافكار في لقاءات وجها لوجه (في هذا النموذج) جيدة							
26.	The teacher completes missing subjects during the face-to-face sessions of this model. يكمل المدرس اية مواضيع ناقصة خلال لقاءات وجها لوجه							
27.	Generally, I can find the answers to my questions during the face-to-face sessions of this model. بشكل عام يمكنني العثور على اجوبة لأسئلتي خلال لقاءات وجها لوجه المتوفرة في النموذج							
28.	To learn through website makes me responsible for the course and motivates me to attend the course. التعلم من خلال الويب يجعلني مسؤولا عن المساق ويحفزني على الدوام والمواظبة فيه							
29.	To learn the subject through this model is much more interesting than other methods. تعلم الموضوع من خلال هذا النموذج ممتع اكثر بكثير من الطرق الاخرى							
30.	By following this model, I can study at my own pace عند اتباع هذا النموذج، باستطاعتي ان ادرس حسب رغبتي (وتيرتي الخاصة)							
31.	The model enables me to learn the content I need النموذج يمكنني من تعلم المادة التعليمية التي احتاجها							
32.	The model enables me to choose what I want to learn النموذج يمكنني من اختيار ما اريد ان اتعلمه							
33.	The Web environment helps us prepare for the course. الويب يساعدنا على التحضير للمساق							
34.	I can study over and over again in the web environment (system). بامكاني الدراسة والتعلم بشكل متكرر باستخدام بيئة الويب (النظام)							
35.	My motivation is high while I am studying on the web (System) الدافعية لدي تكون مرتفعة عندما اتعلم من خلال الويب (النظام)							
36.	This model motivates me to study. هذا النموذج يحفزني لكي ادرس							
37.	This model allows me to play a more active role in learning يسمح لي النموذج بلعب دور فاعل اكثر في عملية التعلم							
38.	I enjoyed learning through this model. استمتعت بالتعلم من خلال هذا النموذج							
39.	I felt more comfortable communicating with the lecturer through this model than traditional system. شعرت بارتياح اكبر بالتواصل مع المدرس من خلال هذا النموذج اكثر من النظام التقليدي							
40.	I felt more comfortable communicating with peer students through this model than traditional system. شعرت بارتياح اكبر بالتواصل مع زملائي الطلبة من خلال هذا النموذج اكثر من النظام التقليدي							
41.	This model provides a satisfying learning experience. يوفر هذا النموذج تجربة تعلمية مرضية							
42.	This model is more satisfying than most other methods. هذا النموذج يرضيني اكثر من معظم الطرق الاخرى							
43.	The model meets all my learning needs النموذج يلبي جميع احتياجاتي التعلمية							
44.	To use the system, I do not need additional technical skills							

No	Question السؤال	7	6	5	4	3	2	1
	لا احتاج الى مهارات فنية اضافية لاستخدام النظام							
45.	While using the system, I do not need much technical support لا احتاج الى مساندة ودعم فني كبير عند استخدام النظام							
46.	The workload, in comparison to the traditional classroom mode, is lower. العبء الكلي مقارنة مع نمط المحاضرة الصفية التقليدية اخف (اقل)							
47.	This model gives me flexibility for study time. النموذج يعطيني مرونة لوقت الدراسة (المذاكرة)							
48.	My schedule is more flexible because of this model. جدولي اكثر مرونة بسبب هذا النموذج							
49.	This model decreases the need to attend f-2-f classes and saves some of my time يخفض النموذج من الحاجة لحضور اللقاءات الصفية ويوفر جزأ من وقتي							
50.	This model is more convenient for my study time هذا النموذج اكثر ملائمة لوقت دراستي							
51.	If this model is applied for all courses, I think it will decrease my transportation cost. في حال تم تطبيق هذا النموذج على جميع المساقات، اعتقد انه سيخفض من تكلفة التنقل/ المواصلات علي							
52.	If this model is applied for all courses, I think it will decrease my daily expenses. في حال تم تطبيق هذا النموذج على جميع المساقات، اعتقد انه سيخفض مصاريفي اليومية							
53.	Content types (text, audio, video …) available are sufficient for me. انواع المحتوى (المادة الدراسية) المتوفرة كافية بالنسبة لي							
54.	Content types (text, audio, video, …) available are suitable for me. انواع المحتوى (المادة الدراسية) المتوفرة ملائمة بالنسبة لي							
55.	Content types (text, audio, video, …) available meet my needs انواع المحتوى (المادة الدراسية) المتوفرة تلبي احتياجاتي							
56.	Contents on the web support other text-based contents المحتويات الدراسية المتوفرة على الويب تدعم المحتويات النصية (المكتوبة) الاخرى							
57.	The Learning Style Test (LST) helped me improve my learning امتحان تحديد الاسلوب التعلمي ساعدني في تحسين تعلمي							
58.	The LST helped me choose suitable contents for my Learning Style (LS). الامتحان ساعدني في اختيار المحتوى الملائم لاسلوبي في التعلم							
59.	The LST helped me choose suitable communication method(s) for my LS. الامتحان ساعدني في اختيار طرق الاتصال المناسبة لاسلوبي في التعلم							
60.	Teaching approaches used in this model are suitable to my LS طرق التدريس المستخدمة في هذا النموذج تلائم اسلوبي في التعلم							
61.	Knowing my LS increased my satisfaction with learning معرفة اسلوبي في التعلم زاد من رضاي عن عملية التعلم							
62.	I would be more satisfied if there is a bilingual feature (Arabic/English) in the system. كنت ساكون راضيا أكثر لو كان هناك ميزة ثنائية اللغة (عربي/انجليزي) في النظام							

No	Question السؤال	7	6	5	4	3	2	1
63.	There are advantages to learn through this model يوجد ايجابيات في التعلم من خلال هذا النظام							
64.	Using this model, I feel I can retain information and knowledge better than using traditional system. باستخدام هذا النظام اشعر انه بامكاني الاحتفاظ بالمعرفة والمعلومات افضل منها عند استخدام النظام التقليدي							
65.	I do not need to change my connection speed to use the system. لا احتاج لتغيير سرعة الاتصال من اجل استخدام النظام							
66.	I do not need to buy additional hardware to use the system لا احتاج لشراء اجهزة اضافية من اجل استخدام النظام							
67.	The model can be applied to all courses يمكن للنموذج ان يطبق على جميع المساقات							
68.	If this model is to be applied/used in the future (next semester onward), I would like to use it. اذا طبق/استخدم النظام في المستقبل (بدء من الفصل القادم) فانني ارغب باستخدامه							

PART C: Open Questions

This part contains 6 questions. Please feel free to write your answer in either Arabic or English.

هذا الجزء يحتوي على 6 اسئلة. بامكانك الاجابة اما باللغة الانجليزية او باللغة العربية

Question 1: The things I like most about the model are: اكثر الاشياء التي اعجبتني في النموذج هي

1-
2-
3-
4-
5-

Questions 2: The things that I disliked most about the model are: الاشياء التي لم تعجبني كثيرا في النموذج هي

1-
2-
3-
4-
5-

Question 3: The main advantages of this model are: المزايا الرئيسية في هذا النموذج هي

1-
2-
3-
4-
5-

Question 4: The main disadvantages of this model are: العيوب / المساويء الرئيسية في هذا النموذج هي

1-
2-
3-
4-

5-

Question 5: If you could not apply (use) the model fully during the test period, the reasons behind that are:

اذا لم تتمكن من تطبيق (استخدام) النموذج بشكل كامل/ شامل خلال فترة التجربة، فان الاسباب وراء ذلك هي:

1-
2-
3-
4-
5-

Question 6: The main problems that I faced while using the model; and in particular the system; are:

المشاكل الرئيسية التي واجهتني اثناء استخدام النموذج وتحديدا اثناء استخدام النظام، هي:

1-
2-
3-
4-
5-

Comments/Suggestions: ملاحظات/اقتراحات

Thank you for your cooperation

Ghassan O. A. Shahin, Faculty of Computer Science & Information Technology, University of Malaya, Malaysia
mailto:Gamoa2002@yahoo.com gshahin@ppu.edu

A.5 Lecturers Evaluation

A.5.1 Cover letter

Evaluation form for Blended Learning Model at traditional universities in Palestine

Dear Lecturer

Thank you for taking the time to complete this evaluation form, and most, for participating in the testing of the implementation of the blended learning model. Your input is highly regarded and appreciated.

This evaluation form is intended to get feedback from lecturers who participated in testing the implementation of the blended learning that you have used recently. We would like you to give us your feedback and evaluate your experience with this blended learning model.

It contains questions on general data, usage of the system, and open ended questions to express your opinion on problems you have faced, advantages and disadvantages of the model, things you liked and disliked about the model, in addition to more comments and suggestions for improvements.

Your cooperation is highly appreciated, and we assure you that this will be only used for research purposes.

After completing this evaluation, please return it back to me by e-mail to gamoa2002@yahoo.com or gshahin@ppu.edu

Thank you for your kind cooperation.

Ghassan O. A. Shahin
Faculty of Computer Science & Information Technology,
University of Malay, Malaysia

A.5.2 The evaluation form

Evaluation form for Blended Learning Model at traditional universities in Palestine

General

Q1. Academic Qualification: ( ) Masters ( ) PhD

Q2. Course Code and Title (used in the testing): ____

Q3. Level of the Course: ( ) First year ( ) Second year ( ) Third year ( ) Fourth year ( ) Masters

Q4. Number of registered students in the course: _______

Q5. Ratio of Classroom sessions to Online sessions used during the testing period is: ( ) 1:1 ( ) 2:1

Q6. I have used the following functions of the system (please write **X** in the appropriate place):

Function	**Frequently**	**Moderately**	**Rarely**	**Never**
Manage Activity				
Manage Content				
Suggested Content				
Manage Assessments				
View Student List				
E-mail				
Instant Messages				
Manage Forums				
Conference				
Chat				
Announcement				
FAQ				

Open-Ended Questions

Question 1: The things I, as a lecturer, like most about the model are:

1-

.

.

Questions 2: The things that I disliked most about the model are:

1-

.
.
Question 3: The main advantages of this model are:
1-
.
.
Question 4: The main disadvantages of this model are:
1-
.
.
Question 5: If you could not apply (use) the model fully during the test period, the reasons behind that are:
1-
.
.
Question 6: The main problems that I faced while using the model; and in particular the system; are:
1-
.
.
Question 7: Please give us your overall opinion on the model and its applicability in traditional universities, its benefits, and its acceptance by lecturers and students.

Comments/Suggestions for improvement:

Thank you for your cooperation

Ghassan O. A. Shahin, Faculty of Computer Science & Information Technology, University of Malaya, Malaysia. Gamoa2002@yahoo.com , gshahin@ppu.edu

A.6 Instruction to execute the model

These instructions have been sent to lecturers who tested the model, in order to help them execute and test the model, providing some tips and recommendations on how to do it.

Instructions on using the system

The system (software) is part of the blended learning model developed and implemented for traditional universities in general; and in Palestine particularly. To be able to use the system, please follow these simple instructions, and perform the actions and procedures described below.

- go to the website at http://blearning.ppu.edu
- Create your instructor account (it will be in a pending status until the admin activates it). Fill in your details as required. The system will automatically notify the admin.
- After your account is activated, you can login to the system and try experimenting with it.
- You can create your own course.
- Then, you may manage your course (modifying deleting or un-signing from it).
- Within each course you can create several Activities (an activity corresponds to either a chapter in the text book, or to a particular topic of the course). You may add new ones, or delete / edit existing ones. Once you go for managing Activities, and after you select which course, you will be prompted with the following information beneath the course list and above the activity list (area). The message is [Recommendation to lecturer based on the learning style test results] (if you want to show these recommendations click here). This in fact gives you some recommendation on planning for your activity/course, and it is based on the Learning Style Test results. Based on students learning styles, it shows you what contents, delivery media, communication methods, instructional strategies and learning theories suites each group of students (number of students in each group will be given together with percentages and a complete list of names in each group). This should help you decide on what best suites your students. It is recommended to try and satisfy each group needs.
- Each activity can have several "Contents" associated with it (Content is the study material that can be either in the form of text, audio, video ...). Here, choose manage contents, then you select a course and then an activity. Now you may create new content, by filling in some data in the fields, where you will specify the type of content you are "creating"/uploading. You may also delete / edit existing contents
- You can upload assessments for each activity. In this option, you will specify to which activity is this assessment, then complete the form by filling in some data. You may also delete /edit existing assessment. The assessment can be in the form of a document which student can access / download (it could be a home work, a case study or anything even a quiz). You are given the flexibility to specify date that this assessment can be accessed.
- You can View the solution to the assessments uploaded by students…
- You can View list of student registered (with some more detailed information)
- You can have your own Frequently Asked Questions (FAQ), where you can create a list of the most common questions that students might have in mind or ask, so they can view it whenever they want.
- You are provided with an announcement option (icon) on the top left side of the menu bar, where you can post announcements to your students of a particular course. Only students

registered in that course will be able to view the announcements of that course. Of course you can delete / edit an announcement, and add new ones.

- In the networking section of the system, you can send email to students as well as receiving from them. You can have Forums for each course, and within each forum you can as many topics as you need. This can be done through the manage Forum option, where the forums are created, and managed. Topics can be also created and managed from within this option.
- To use the Forum, just select Forums from the options; then select the course, followed by Forum, then the topic
- You can “Chat” with students (text only) by going to the Chat rooms. To do that,, select Chat from the option on the left of the screen, then a new dialogue box will be displayed in a new window. Type in your login name and password, and you will be in. Select the Chat room you want to join and start the Chat. You can create Temporary Chat rooms for particular purpose, where it will be removed automatically after about 30 minutes of the last user logged out from it.
- You can send and receive instant messages using the IM option. This allows you to send text messages (offline) to students as well as receiving from them. You can create your own IM list by searching/choosing from the available users (lecturers/students)
- You can have a full conference with your students. This module will ask you to create your login name and password - preferable same as your main account. This option provides you with conferencing facilities like, Audio, Video, Whiteboard and Chat. You can have any of them alone or combination of all. The best simulation of a classroom setup is when you have all options; audio, video, chat and whiteboard together. You can interact with the students in a real-time /synchronous interaction. You can see them and they can see you and other students. You can grant them the rights to use the whiteboard (i.e. write and draw on it) and to talk… This is a good place for out-of-classroom interaction, where this session can be utilized for direct discussion rather than just a repetition of the traditional classroom. Students can express their opinions and thoughts and ask questions, as well as discussing things with you and with their peer students in and open/free discussion or as a guided discussion by you; the lecturer. They even can have their own/ group conference without you needing to be present.
- PLEASE start preparing for the testing of the system. As I explained in the previous email, we need to use the model (the system is one part of it) for about 2 weeks in a course you teach. Different content types like text, video, audio ... need to be prepared / available for it to be uploaded on the system so that student will have access to it in the due time. The more contents we have for every activity, the more reliable the test will be. Try to use all kind of communications with students during the testing period (Networking such as email, Forum, Chat, Conference ...). It is one of the indications of the success of the model. PLEASE divide your contact hours in a ration of 2:1 (classroom : online) or 1:1 i.e. for a 3 credit hour course, you may have 2 classroom hours and one hour is dedicated to the online activities, or you may have 1.5 hours classroom lecture and 1.5 hours dedicated for the online. In this context, please DO NOT keep the original lectures as before only 2 or 1.5 hours of lecturing as this is a main dimension of the "blended learning model".
- The system is supported with a translation option where you or the students can highlight a text, then press on the translator, where it would translate the text to Arabic. The translation is not a perfect and very accurate one, but it helps.

General principles:

Please have the following principles of good teaching based on the work of Chickering and Ehrmann (1996). The positive online-learning environment incorporates seven principles of good teaching:

a) encouraging student-faculty contact,
b) encouraging cooperation among students,
c) encouraging active learning,
d) giving prompt feedback,
e) emphasizing time on task,
f) communicating high expectations, and

g) respecting diverse talents and ways of learning

Recommendations for Content creation and use

The content you would have for the course can vary. It can be text, audio, video, graphs, illustrations, presentation … and/ or a combination of two or more of these. However, the use of multimedia content whenever possible, feasible and suitable can make a difference on the teaching/learning process resulting in a would be better outcome in terms of efficiency and effectiveness. The use of multimedia contents is now easier than before due to the availability of ICT and the Internet. However, it should not be used arbitrary. Rather, careful use is advised for better utilization of the content for knowledge transfer especially from lecturer to students. Ruth Clark (2002), quoted in Carman (2002), provide three principles regarding the use of multimedia for knowledge transfer. The three principles are:

1) The Multimedia Principles: Adding Graphics to Text Can Improve Learning;
2) The Contiguity Principle: Placing text Near Graphics Improves Learning; and
3) The Modality Principle: Explaining Graphics with Audio Improves Learning (Carman, 2002).

In this context, it is recommended that you try to have these principles in mind when creating or selecting MM contents.

Recommendations for better execution of the model

Try to maintain direct interaction between you and learners, and between learners themselves
Provide Just-In-Time feedback to learner's inquiries; questions etc…
Emphasis on contextual understanding
Offer platform-independent materials
Provide and promote social interaction
Promote, encourage and maintain a blended learning culture
Motivate learner
Improve academic practice, both on your side and on the learner's side
Enhance learner's perception on learning in general and on blended learning in particular.
Accommodate characteristics and teaching style of each student or at least groups sharing same or similar characteristics
Offer variety of communication/ interaction methods/approaches both synchronous and asynchronous methods. Make good use of the available communications / networking provided by the model, such as email, IM, Forum, Chat, and Conferencing, in addition to the in-classroom f-2-f contact
Allow for self-paced learning, where learner can practice parts of the learning process by him/herself. In other words, let learners partly "decide" when, what, where and how to learn.
Engage student in more active role in learning
Make content available in variety of formats, with variety of delivery options

Utilize online resources available on the Internet and WWW, either by using them directly or by uploading the links. In addition, you may encourage learners to research the Internet and WWW for relevant resources.
Try to utilize a mixture of educational/ learning theories such as Behavioral and Constructivism. The model offers you this flexibility to blend these two, through the availability of f-2-f and Internet-based settings, communications methods, instructional strategies, contents and content delivery options. For example, when you allow for self-paced learning, and encourage learners to have more active role in learning; you are implementing elements of the constructivism theory. When you lecture and present content/study material in a pre-defined and systematic way; you are implementing elements of the Behavioral theory.
Enrich content and learning process,
Provide the opportunity and environment for learners to practice knowledge construction and transfer, which is one of the elements of the constructivism theory.
Aim at effective pedagogical outcome
Utilize instructional technology and multimedia
Provide for variety of instructional strategies. The model provides recommendations regarding instructional strategies to be used in relation to learning style
Allow learners to interact / communicate with you in a flexible, convenient way 24/7
Provide interactive, creative and collaborative activities for learners
Provide live events (ARCS model of motivation: Attention, Relevance, Confidence, and Satisfaction),
Assist learner in self-paced learning by offering learning based on Gagné nine events of instruction. These are: [for more details visit http://tip.psychology.org/gagne.html

(1) gaining attention (reception)
(2) informing learners of the objective (expectancy)
(3) stimulating recall of prior learning (retrieval)
(4) presenting the stimulus (selective perception)
(5) providing learning guidance (semantic encoding)
(6) eliciting performance (responding)
(7) providing feedback (reinforcement)
(8) assessing performance (retrieval)
(9) enhancing retention and transfer (generalization).

Offer collaboration environment among learners,

Offer assessment based on Bloom's taxonomy:

Category	Example and Key Words (verbs)
Knowledge: Recall data or information.	**Examples**: Recite a policy. Quote prices from memory to a customer. Knows the safety rules. **Key Words**: defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.
Comprehension: Understand the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words.	**Examples**: Rewrites the principles of test writing. Explain in one's own words the steps for performing a complex task. Translates an equation into a computer spreadsheet. **Key Words**: comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates.
Application: Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into	**Examples**: Use a manual to calculate an employee's vacation time. Apply laws of statistics to evaluate the reliability of a written test. **Key Words**: applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.

novel situations in the work place.	
Analysis: Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.	**Examples**: Troubleshoot a piece of equipment by using logical deduction. Recognize logical fallacies in reasoning. Gathers information from a department and selects the required tasks for training. **Key Words**: analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates.
Synthesis: Builds a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure.	**Examples**: Write a company operations or process manual. Design a machine to perform a specific task. Integrates training from several sources to solve a problem. Revises and process to improve the outcome. **Key Words**: categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes.
Evaluation: Make judgments about the value of ideas or materials.	**Examples**: Select the most effective solution. Hire the most qualified candidate. Explain and justify a new budget. **Key Words**: appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports.

(the above Table is taken from: http://www.nwlink.com/~donclark/hrd/bloom.html)

Develop small dynamic multimedia components,
Utilize streaming video, rich visualization and interactivity
Use multimedia and combine text, graphics and audio together to improve learning
When using multimedia and instructional technology, implement the design, development, utilization, management and evaluation principles on processes and resources
Use Instructional Design to create effective teaching / learning
Allow for independent study while maintaining control and provide directions
Utilize the available infrastructure
Improve pedagogical methods
Improve teaching and learning methods
Use small size and simple contents

APPENDIX B

Table B.1 Requirements for Model Development and Implementation with indication of which have been achieved.

Requirement/ Input Derived From	**Requirements/ Inputs**	**Achieved through**
Problems Of E-Learning	1. Provide direct interaction between instructor and learner	face-to-face and synchronous communications methods such as conference and chat modules
	2. Provide JIT feedback and interaction in synchronous and asynchronous learning	face-to-face, synchronous and asynchronous components, through classroom sessions, conference, chat, forum, IM, email
	3. Offer platform-independent materials	
	4. Decrease cost	Open source, gradual development
	5. Provide face-to-face contact and social interaction	face-to-face sessions, synchronous and asynchronous communications methods open to students all time around
	6. Keep technology requirement to the minimum	Does not require high technology, uses whatever available, one technology/ method compensates for the absence of other (example: chat, forum, conference, email), tested with different Internet connections at students' homes and almost work with all types. Responses to question B66 of the students' evaluation questionnaire- 3rd questionnaire- support this requirement, (see analysis)
	7. Keep extra preparation time demand to a minimum	Lecturers can easily create their own contents, and at the same time use existing ones. Gradual implementation (use of the model) where lecturers can start with one or few activities of a course, then later can expand on it. Materials therefore can be used at later offerings of a course.
	8. Make learning comfortable to learner and instructor	face-to-face and Internet-based settings. Availability of synchronous and asynchronous

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
		communications and interactions 24/7, availability of contents, matching communications and contents to learning style, self-paced learning.
	9. Should be applicable to all students and courses	Tested in four courses, using learning style helps in meeting students learning needs, the flexibility of what and how to blend makes it almost suitable for, if not all courses, for some activities within each course.
	10. Simplify the exploration of all functions with minimum effort	It has been proofed through the usability evaluation of the interface that it is easy to use, and the results of the students' evaluation showed that it is acceptably easy to use.
	11. Simplify and make easy to use with minimum technical skills	Demonstrated through the test of the model that it does not require high technical skills to be used (lecturers were able to use it with minimum instructions and information, and they in turn conveyed that to their students who were able to use it with minimum efforts)
	12. Improve instructor's skills	Not directly proofed, however, once lecturers start using the model they would be improving their technical as well as teaching and interpersonal skills. This achieved through the availability of communications methods, variety of contents to be used, possibility to use blend of learning theories and instructional strategies.
	13. Balance focus on content, process and setting	Flexible blended setting, variety of contents that can be used (not restricted by the model), and flexible process of handling the execution of the model and how to implement it.
The Barriers	14. Require minimum skills from instructor and learner	See requirement(s) 10 and 11 above

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
	15. Provide social interaction	See requirement(s) 5 above
	16. Encourage blended learning culture	The availability of various blends within this blended learning model call for and promotes blended learning, in addition to the flexibility of implementing the model on activity or course level.
	17. Decrease time needed for preparation & for course development, Provide support for studies and technical problems	See requirement(s) 7. The second part of the requirement is not directly addresses through the model and was not directly demonstrated during the implementation and testing of the model. However, this is part of the overall duties of the support team within the institution.
	18. Decrease cost for students and institutions	Decreasing relative cost for student by blending face-to-face and Internet-based setting which does not require student to attend all lectures in face-to-face sessions, thus saving commuting and daily expenses and cost, while for the institution it reduces the room occupancy rate as not all lectures would be conducted in face-to-face session, thus reducing relative utility and utilization cost.
	19. Provide simple and friendly environment	See requirement(s) 10, 11, and supported by Factor five 'ease of use' with a mean of 4.402 (see Table 7.6)
	20. Provide for smooth change in the organization	Not directly. However, the implementation on activity or course level would gradually introduce change to the organization through creating a culture where blended learning will be accepted. Results from the test of model show that the model is accepted and students indicate they would use it if it is adopted in the future. Lecturers also indicate that it is applicable

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
		and can be used.
	21. Minimize the need for technical expertise	Results from test show that lecturers and students do not need technical expertise to use it.
	22. Adopt and adapt to quality standards and issues	Developed and evaluated against usability criteria (see section 6.6)
	23. Comply with the existing legal issues	It does not violate existing rules when implemented at activity level. However, implementation on course, program or institutional levels would require prior permission and/ or change in some rules in regards to accreditation
	24. Provide for measures against plagiarism	Not directly, however, the use of authentic measures like user name and password, and signing in, in addition to possibility for the lecturer to monitor students can be considered as partial measures.
	25. Improve academic practice	Blending face-to-face and Internet-based, variety of communication methods to interact with students, blend of learning theories, instructional strategies encourage lecturer to improve the way he/she teaches while giving freedom to self-paced learning and direct involvement of students in the process (example: student can suggest contents to be used for an activity)
Factors In Blended Learning	26. Accommodate characteristics and teaching style	See requirement(s) 28, and this blend gives the lecturer flexibility on what to use and adapt for teaching
	27. Offer student-2-Student social relation	See requirement(s) 5
	28. Accommodate characteristics and learning style	The use of learning style test which offer advice to both student and lecturer on what content and communication method to use for example. The variety of contents

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
		available and communication methods, and the 24/7 access to the model and it modules (communication, contents …) make it suites most if not all learning styles.
	29. Offer variety of communication/ interaction methods/approaches	See requirement(s) 1, 2, 5, and through the synchronous/asynchronous communication component of the model, which is reflected through the Chat, email, Conference, Forum, IM and announcement modules in the system (see section 6.5.2)
	30. Allow for self-paced learning and self discipline	Variety of content and interaction/ communication methods, and their availability almost 24/7, blend of face-to-face and Internet-based delegate more responsibilities to student for the learning process
	31. Engage student in more active role in learning	See requirement 30, and the student's ability to suggest contents for activities of a course.
	32. Simplify to decrease need for technical skills by both student and lecturer	See requirement 11
	33. Make content available in variety of formats 24/7	Contents are available in a variety of formats 24/7 through the content module.
	34. Utilize online resources	Through content module, lecturer can upload available contents from the web, or direct students to suitable websites and resources
	35. Offer mix of learning theories	While in face-to-face and online, lecturer can (indirectly 'forced' to) use mix of learning theories such as behavioral, cognitive and constructivism. For example, when student suggest contents for an activity, he/she is involved in the adoption of constructivism theory as he/she is constructing knowledge. Discussion through

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
		forums, chat and conference is another practice of the use of constructivism.
	36. Enrich content and learning process	Indirectly addressed through the availability of variety of content types, delivery media, communications and interactions methods,
	37. Provide for knowledge construction and transfer	Through blend of learning theories, and through the self-paced learning opportunity, variety of content types, delivery and time flexibility
	38. Utilize instructional technology and multimedia	Not directly, depends on lecturer
	39. Provide for variety of instructional strategies	Lecturer can adopt what strategy to use, and students can accommodate such strategy. Through learning style test, suggestions are given to both lecturer and student on the suitable strategy to be adopted for teaching and learning
	40. Decrease cost for student and institution	See requirement 18
	41. Allow for flexible time to learn	Blend of face-to-face and Internet-based, availability of Internet-based settings where variety of communications methods and contents 24/7
	42. Allow for learner to learn at convenient time	Availability of variety of contents any time anywhere
	43. Allow learner and instructor to interact / communicate in a flexible and convenient way 24/7	See requirement 29
	44. Be flexible in regards to development level (activity, course, …)	It has been demonstrated that the model can be developed on activity and /or course level. However, for program and institutional levels it was not demonstrated.
	45. Make good use of available infrastructure	Results of testing the model show that it works with whatever students have (computers and Internet connections), though very few had limited difficulties

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
	46. Minimize the need for simple technical support	Lecturers and students used it without much help and support after they have been given the instructions and basic training
	47. Minimize the need for simple content development support	Not directly, though lecturer were able to use their own developed contents or ready ones.
	48. Offer variety of delivery options of contents and lectures	face-to-face (in classroom delivery) and over Internet-based setting through the communications methods (conference – video and audio-, email, viewing contents directly in the browser, and downloading them
Concepts And Criteria For Blended Learning	49. Provide for interactive, creative and collaborative activities for learners	Availability of communications and interaction methods, the use of blend of instructional strategies, and learning theories which depend mainly on the lecturer teaching strategy based on his/her teaching style and students' learning style
	50. Provide for live events based on ARCS model of motivation (Attention, Relevance, Confidence, and Satisfaction)	Not directly, as it depends heavily on lecturer handling of the teaching, and the suitable contents to be used
	51. Assist learner in self-paced learning by offering learning based on Gagné nine events of instruction	Offers opportunity for self-paced learning environment, however the implementation of Gagné's events depends on lecturer and student
	52. Implement Clark's three principles on the use of multimedia	Not directly because this is content-specific and depends on the course and level of sophistication of MM used. However, lecturers are advised to do so.
	53. Offer assessment based on Bloom's taxonomy	Provision for activity based assessment is available through the assessment module. However, it all depends on how lecturer implements this, and on quality criteria in use at the respected institution.
	54. Develop small dynamic multimedia components	Not directly, provision for using variety of contents is

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
		there. It is the lecturer's responsibility to do so.
	55. Utilize streaming video, rich visualization and interactivity	Not directly, however it is available through the content module. The lecturer is responsible for providing the material
	56. Provide interactive learning environment	Variety of communications and interaction methods,
	57. Comply with the usability attributes	Built and tested against usability criteria (see heuristic evaluation of the system, chapter 6).
	58. Provide for consistency and smooth transition among interrelated components, and allow for redundancy among components	The design and implementation of the model, and the availability of variations of options within each component of the model
Pedagogy	59. The model must accommodate the different learning styles of learners.	Learning style test, and suggestions/recommendation for appropriate contents, communications method, instructional strategies, and the blend of face-to-face with Internet-based settings
	60. The model should be able to motivate learners.	Learner's motivation has been achieved through what the model offers (components and modules) and has been proofed through the model test results (see section 7.3.1.4.1 on 'motivation' Factor which scored a mean of 4.774 –table 7.6)
	61. The model should offer a mix of learning theories like behaviorism, constructivism, cognitive.	Does not directly impose the use of such theories, however, the provisions for various instructional strategies, communications and interactions methods, variety of contents and content delivery, the use of learning style test results, and the option for student to suggest contents, in addition to provision for self-paced learning
	62. Lecturer should be able to adopt any of the theories as	Having students learning styles in mind, and the availability of

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
	deemed suitable.	various communications and contents, in addition to other features
	63. Student should be able to follow the selected theory, as well as adopt his/her own, especially in learner-centered learning	Using learning style test results (and suggestions based on them), in addition to availability of various contents 24/7 and variety of communications methods.
Learner Characteristics	64. Motivate learner	See requirement 60
	65. Assist in learning plan	Not directly addressed
	66. Minimize needed technical and computer skills by learner	See requirement 11
	67. Allow for independent study while maintaining control and provide directions	See requirement 30, availability of communication methods, lecturer has control over activities of the course, contents for each activity, …
Good Teaching Principles	68. Allow for learner-lecturer interaction	See requirement(s) 1, 43
	69. Provide a cooperation environment among students	See requirement(s) 49, 56
	70. Accommodate different learning styles	See requirement(s) 59
	71. Make lecturer's tasks as easy as possible, bearing in mind the different roles of the lecturer	See requirement(s) 7, 10, 14, 17, 26
	Input from Palestine	
Lecturer-Related Problems	72. Minimize requirement for new skills	See requirement(s) 11, 14. The test results show that students do not need additional skills to use the model (refer to 'support & needs' Factor with 4.903 mean, Table 7.6, and section 7.3.1.4.6)
	73. Keep technology requirement to the minimum	See requirement 6
	74. Simplify and make easy to use with minimum technical skills	See requirement 11
	75. Improve instructor's skills	See requirement 12
	76. Require minimum skills from instructor	See requirement 14
	77. Minimize time needed for preparation & for course development	See requirement 17

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
Student-Related Problems	78. Provide direct interaction between instructor and learner	See requirement 1
	79. Make learning comfortable to learner	See requirement 8
	80. Improve human interaction and interest	See requirement(s) 27, 29
	81. Keep technology requirement to the minimum	See requirement 6
	82. Simplify the exploration of all functions with minimum effort	See requirement 10
	83. Simplify and make easy to use with minimum technical skills	See requirement 11
	84. Provide support for studies and technical problems	See requirement 17, 46
Computers-Related Problems	85. Keep technology requirement to the minimum	See requirement 6
	86. Offer a mixture of face-to-face setting and Internet-based setting	Blend of face-to-face and Internet-based setting,
Infrastructure Problems	87. Keep technology requirement to the minimum	See requirement 6
	88. Offer a mixture of face-to-face setting and Internet-based setting	See requirement 86
Administrative Problems	89. Provide simple and friendly environment	See requirement 19
	90. Provide for smooth change in the organization,	See requirement 20
	91. Offer a mixture of face-to-face setting and Internet-based setting	See requirement 86
Facilities And Equipments Problems	92. Keep technology requirement to the minimum	See requirement 6
	93. Balance focus on content, process and setting	See requirement 13
	94. Offer a mixture of face-to-face setting and Internet-based setting	See requirement 86
Cost Problems	95. Keep technology requirement to the minimum	See requirement 6
	96. Minimize cost for students and institutions	See requirement 4, 18
	97. Minimize the need for technical expertise	See requirement 21
	98. Offer a mixture of face-to-face setting and Internet-based setting	See requirement 86

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
Training Problems	99. Minimize requirement for new skills	See requirement 72
	100. Simplify and make easy to use with minimum technical skills	See requirement 11
	101. Improve instructor's skills	See requirement 12
	102. Require minimum skills from instructor and learner	See requirement 14
	103. Provide simple and friendly environment	See requirement 19
	104. Minimize the need for technical expertise	See requirement 21
Expertise/ Experience-Related Problems	105. Simplify the exploration of all functions with minimum effort	See requirement 10
	106. Simplify and make easy to use with minimum technical skills	See requirement 11
	107. Improve instructor's skills	See requirement 12
	108. Require minimum skills from instructor and learner	See requirement 14
	109. Provide support for studies and technical problems	See requirement 17
	110. Minimize the need for technical expertise	See requirement 21
Psychological Problems	111. Provide direct interaction between instructor and learner	See requirement 1
	112. Provide JIT feedback and interaction	See requirement 2
	113. Minimize requirement for new skills	See requirement 72
	114. Provide face-to-face contact and social interaction	See requirement 5
	115. Learner should be self-discipline and responsible person	Indirectly addressed through the provision for self-paced learning and time flexibility to study
	116. Make learning comfortable to learner and instructor	See requirement 8
	117. Simplify the exploration of all functions with minimum effort	See requirement 10
	118. Simplify and make easy to use with minimum technical skills	See requirement 11

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
	119. Require minimum skills from instructor and learner	See requirement 14
	120. Provide support for studies and technical problems	See requirement 17
	121. Provide simple and friendly environment	See requirement 19
	122. Motivate learner	See requirement 64
Pedagogical/ Educational Problems	123. Provide face-to-face contact and social interaction	See requirement 5
	124. Learner should be self-discipline and responsible person	See requirement 115
	125. Make learning comfortable to learner and instructor	See requirement 8
	126. Should be applicable to all students and courses	See requirement 9
	127. Balance focus on content, process and setting	See requirement 13
	128. Provide for measures against plagiarism,	See requirement 24
	129. Improve academic practice	See requirement 25
	130. Offer a mixture of face-to-face setting and Internet-based setting	See requirement 86
Technical Problems	131. Keep technology requirement to the minimum	See requirement 6
	132. Require minimum skills from instructor and learner	See requirement 14
	133. Provide support for studies and technical problems	See requirement 17
	134. Minimize the need for technical expertise	See requirement 21
Software Problems	135. Simplify the exploration of all functions with minimum effort	See requirement 10
	136. Simplify and make easy to use with minimum technical skills	See requirement 11
	137. Require minimum skills from instructor and learner	See requirement 14
	138. Provide simple and friendly environment	See requirement 19
Legislative And Political Problems	139. Make learning comfortable to learner and instructor	See requirement 8
	140. Minimize cost for students and institutions	See requirement 18

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
	141. Adopt and adapt to quality standards and issues	See requirement 22
	142. Comply with the existing legal issues	See requirement 23
	143. Offer a mixture of face-to-face setting and Internet-based setting	See requirement 86
Content Problems	144. Balance focus on content, process and setting	See requirement 13
	145. Minimize time needed for preparation & for course development	See requirement 17
	146. Make contents available 24/7	See requirement 33
	147. Make use of available relevant resources from the Web	See requirement 34
Needs	148. Keep technology requirements to a minimum	See requirement 6
	149. Make use of the available bandwidth and connections without overwhelming it with high-demand applications and contents	See requirement(s) 6, 45, 54. Responses to question B65 of the 3rd questionnaire on evaluating the model by students show that this requirement was achieved as the question scored a mean of 5.13.
	150. Use small size and simple contents	See requirement 54
	151. Keep demand for high skills as low as possible	See requirement(s) 11, 32, 72
	152. Offer mixture of face-to-face and Internet-based settings	See requirement 86
	153. Offer blended environment of the various components of the model	The model blends several components together as shown in the model diagram and explanation (see Figure 5.3, and section 5.3)
	154. Make use of available contents/ resources on the Internet	See requirement 34
	155. Utilize free open source tools and software	No directly addressed, although the system was developed and implemented using open source software such as PHP, MySQL, OpenMeeting …
	156. Motivate learners and instructor	See requirement 64

Requirement/ Input Derived From	Requirements/ Inputs	Achieved through
	157. Encourage self-paced learning	See requirement(s) 33, 42, 51
	158. Keep the need for extra preparation time to a minimum	See requirement 17
	159. Easy to use	See requirement 11, 19
	160. Simple	See requirement 10
Factors	161. Decrease the need to attend face-to-face classes	See requirement(s) 18, 86, and availability of contents in variety of forms, and the availability of variety of communications methods 24/7
	162. Decrease daily cost for learner to be physically present in campus.	See requirement 18, and results of test analysis show that this requirement was achieved (see Factor four 'time and cost saving' with a mean of 4.968 - table 7.6, and section 7.3.1.4.4)
	163. Decrease cost for institution	See requirement 18
	164. Comply with the current rules and regulations	See requirement 23
	165. Utilize the available infrastructure	See requirement 45
	166. Improve instructor skills	See requirement 12
	167. Accommodate learner and instructor characteristics	See requirement(s) 26, 28, 30
	168. Help improve the educational system	24, 25 (achieving the requirements might influence the education system)
	169. Improve teaching and learning methods	See requirement(s) 35, 38, 39, 42, 48 through 56, 59, 60
	170. Save learner time	See requirements(s) 7, 17, 32

Table B.2: Raw categories of problems as have been expressed by respondents (not altered).

Resp. #	Problems as expressed by respondent
1.	1- Technical problem 2- Ignorance of faculty in using technology 3- Ability of students
2.	Nil
3.	1- Higher education of Palestine might not support this course
4.	Nil
5.	1- Quality of Tutors

Resp. #	Problems as expressed by respondent
	2- The perception to e-learning
6.	1- Students are poor in using e-learning 2- Not all students can buy a computer
7.	1- Training
8.	Nil
9.	Nil
10.	1- How to start
11.	Nil
12.	1- Lack of availability of computers for student 2- Large number of students
13.	1- Time to prepare the instructions 2- Not easy for students to go within this system
14.	1- Not enough computers 2- Sometimes LCD not available
15.	Nil
16.	Nil
17.	1- Students background 2- Availability of computers 3- Road blocks and closure
18.	1- Lack of awareness among staff 2- Administrative problems 3- Lack of experience
19.	1- Facilities 2- Adaptation
20.	1- Technical and support 2- Lack of assistance
21.	1- Daily absence 2- Serious use
22.	1- Equipments and rooms 2- Computers 3- Funds
23.	1- No suitable computer labs

Resp. #	Problems as expressed by respondent
	2- No e-learning specialists for directing the e-learning process
24.	1- Not enough online computer labs 2- People do not know how to deal with such facility (e-learning) 3- Money
25.	1- Evaluation may not be fair 2- Some fields can't be taught enough by e-learning 3- Practical courses can't be taught that way
26.	1- Instruments and materials 2- Infrastructure
27.	1- Availability of hardware 2- Confidence in the software and its security 3- Know how of staff
28.	Nil
29.	1- Network bandwidth 2- Commitment of the academic staff to preparing e-courses 3- Budget
30.	1- The bandwidth of the communications network at the university 2- The number of computer open labs is not enough 3- Most students cannot afford having ADSL at home
31.	1- Instructional material development 2- Technical support 3- Instructors and students motivation
32.	1- Internet connection speed 2- Server with limited capacity 3- Lecturers training
33.	1- Server 2- Available computers 3- Software
34.	1- Installation 2- Lack of knowledge how to use it on the part of faculty 3- No direct communications with instructor

Resp. #	Problems as expressed by respondent
35.	1- Familiarity of teachers with e-learning 2- Familiarity of students with e-learning
36.	1- Student accessibility to Internet and computers 2- Lack of knowledge among staff 3- Time needed to put it up
37.	1- Not popular 2- Not applicable in all fields 3- Rare knowledge
38.	Nil
39.	1- Staff 2- Student 3- Professional staff
40.	1- Lack of training programs for teachers 2- Lack of suitable equipments
41.	1- Time 2- The question of need: do we really need it? 3- Teacher who are used to traditional methods of teaching
42.	Nil
43.	I do not know
44.	1- Literacy in use of computer programs 2- Hesitancy by faculty members to use new methods 3- Lack of incentives from administration towards faculty development
45.	1- Skills and expertise of the teacher 2- Skills of the students 3- Financial problems
46.	1- Servers 2- Students
47.	1- Lack of training for teachers and students 2- The shift itself is serious and we should be prepared for that 3- Availability of software that will enhance e-learning
48.	1- Students do not have access to computers 2- Students need to be trained to be self learners

Resp. #	Problems as expressed by respondent
49.	1- Team work (computer experts + subject teachers + technicians) 2- Accessibility for students on Internet 3- Financial problems of implementation
50.	1- The students will not take it serious 2- Availability of computers or Internet lines for all students 3- Require hard work from the instructor to prepare it
51.	1- Infrastructure 2- Expert staff 3- Funding
52.	Nil
53.	Nil
54.	1- Training teachers for new techniques 2- Infrastructure 3- Courses to be reported in e-learning
55.	1- Students are not able to use this system 2- Some lecturers are not familiar with this system 3- Need for equipments and devices
56.	1- Lack of available access to Internet 2- Lack of personal sets 3- Lack of training
57.	1- Teachers do not know much about computers 2- Slow Internet access 3- Limited number of computers
58.	1- Lack of equipments 2- Teachers 3- Students
59.	1- Lecturer abilities in using Internet 2- Students ability must be enhanced 3- Shortage of e-instruments
60.	1- There is no skill in using computers 2- Students and staff are not familiar with e-learning

Resp. #	Problems as expressed by respondent
61.	1- Lack of PCs 2- Lack of computer literacy
62.	1- Lack of computers 2- Lack of knowledge in the topic 3- Load is high and time is limited
63.	1- Lack of resources 2- Lack of knowledge and skills for using e-learning 3- Lack of teachers to teach this program
64.	1- Unfamiliarity of students with this technique 2- Objections from the academic community
65.	1- Students cannot use computer fluently 2- Insufficient computers and equipments
66.	1- Staff experience & ability to cope with 2- Ability of students to use 3- Infrastructure is not ready yet
67.	1- Lack in computers and computer labs 2- Teachers are not trained how to use or to work with e-learning 3- No computers for every lecturer
68.	1- Having an active e-learning unit 2- Internet facilities / speed 3- Choosing the appropriate courses
69.	1- Change management 2- Pedagogical problems 3- Legislative issues (copy right)
70.	Nil
71.	1- Lack of commitment from the faculty members 2- Lack of skills from the faculty members 3- Bandwidth problems
72.	1- Lack of students and lecturers cooperation 2- Lack of knowledge and flexibility to lecturers 3- Lack of confidence in technology (reliability)

Resp. #	Problems as expressed by respondent
73.	1- Technical problems 2- Poor & unqualified trainers
74.	1- Funds 2- Internet bandwidth
75.	1- Connection 2- Controlling
76.	1- Hardware and software facilities 2- Student culture 3- Management culture
77.	

Table B.3: Categories of problems as extracted from SPSS Text Analysis for Surveys 2.1

Resp. #	catA	catB	catC	catD	catE	
1	students	faculty				
2						
3	support					
4						
5						
6	students	computers				
7	trainers					
8						
9						
10						
11						
12	students	computers				
13	students	instructions				
14	computers					
15						
16						
17	students	computers				
18	staff	experience				
19	facility					
20	support					
21						
22	computers					
23	computers					
24	facility	computers				
25	courses					

26	materials					
27	staff	software	hardware			
28						
29	staff	bandwidth	network			
30	students	network	computers			
31	students	instructions	support	teachers		
32	network	trainers	computers			
33	software	computers				
34	knowledge	faculty				
35	students	teachers				
36	staff	students	computers			
37	knowledge					
38						
39	staff	students				
40	teachers					
41	teachers					
42						
43						
44	faculty	programs	skills			
45	students	financial problems	skills	teachers		
46	students	computers				
47	students	software	teachers			
48	students	computers				
49	students	work	computers	financial problems	teachers	
50	students	computers	teachers			
51	staff					
52						
53						
54	courses	teachers				
55	students	lecturers				
56	network	trainers				
57	network	computers	teachers			
58	students	teachers				
59	students	network	lecturers			
60	staff	students	computers	skills		
61	computers					
62	knowledge	computers				
63	knowledge	teachers	skills			
64	students					
65	students	computers				
66	staff	students	ability			
67	work	computers	lecturers	teachers		
68	courses	network				
69						

70						
71	bandwidt h	faculty				
72	knowledg e	students	cooperatio n	lecturers		
73	trainers					
74	bandwidt h	network				
75	connectio n					
76	students	software	hardware			

Table B.4: Categories of Problems in descending order according to number of occurrences (manual)

Categories of Problems	**Respondents**	**Count**
Availability of technology	12, 14, 14, 17, 19, 22, 26, 27, 33, 33, 47, 48, 55, 57, 58, 59, 61, 62, 63, 65, 67, 67, 76	23
Infrastructure	22, 23, 24, 26, 29, 30, 30, 32, 33, 40, 46, 51, 54, 66, 71	15
Faculty Skills/experience	1, 18, 24, 27, 34, 35, 36, 39, 45, 57, 58, 59, 71, 72,	14
Student skills	1, 6, 17, 35, 39, 45, 46, 58, 65, 66,	10
Training	7, 32, 40, 47, 54, 55, 55, 56, 59, 67,	10
Cost	6, 22, 24, 29, 30, 45, 49, 51, 74,	9
Internet; speed and access	32, 36, 49, 50, 56, 57, 68, 74, 75	9
Administrative	10, 18, 41, 47, 68, 69, 75	7
Lack of Experts	23, 39, 49, 51, 63, 66, 73,	7
Psychological	5, 27, 41, 44, 50, 64, 72,	7
Technical problems	1, 20, 34, 36, 44, 54, 73,	7
Pedagogical	12, 25,25, 37, 68, 69,	6
Awareness	18, 37, 60, 62, 64,	5
Culture / Social	21, 34, 48, 76, 76	5
Preparation time	13, 41, 50, 62,	4
Technical skills	60, 61, 63,	3
Commitment	29, 71,	2
Legal	3, 69,	2
Motivation	21, 31,	2
Others: (adaptation, credibility,)	19, 72,	2
Technical support	20,31,	2
Content Development	31	1
Evaluation/ Assessment	25	1
Incentives	44,	1
Political	17	1
Publicity	37,	1
Quality	5	1
Organizational change		

APPENDIX C

Table C.1: Details of Item Descriptive Statistics of Questionnaire on Model Evaluation

Question	Valid Cases	Mean	Std. Dev.
A. The model is			
1. Understandable	60	4.25	.654
2. Clear	60	3.98	.748
3. Complete	60	3.83	.867
4. Comprehensive	60	3.87	.833
5. Self-explained	60	3.73	.821
B. The graphical representation (layout) of the model is			
6. Understandable	60	3.98	.833
7. Clear	60	3.97	.802
8. Complete	60	3.75	.795
9. Comprehensive	60	3.78	.783
10. Matching the textual explanation	60	4.00	.759
C. The textual explanation of the model is			
11. Understandable	60	4.33	.572
12. Clear	60	4.32	.596
13. Complete	60	4.05	.746
14. Comprehensive	60	3.97	.802
D. The components are all			
15. Understandable	60	4.15	.659
16. Necessary	60	4.20	.798
17. Relevant	60	4.17	.827
18. Sufficient	60	***3.67***	***1.052***
E. The relationships between components are			
19. Understandable	58	4.17	.752
20. Clear	58	4.03	.837
21. Meaningful	58	4.07	.835
F. The graphical representation of the components is			
22. Understandable	60	3.90	.817
23. Clear	60	3.82	.770
24. Suitable	59	3.78	.721
G. ‘Learning setting (f-2-f and Internet-based)’ components is			
25. Necessary	60	4.38	.666
26. In the right place	60	4.18	.701
H. ‘Synchronous/asynchronous communications methods’ component is			

27. Necessary	58	4.29	.649
28. In the right place	58	4.07	.746

Table C.1, Continue

Question	**Valid Cases**	**Mean**	**Std. Dev.**
I. Learning theories' component is			
29. Necessary	59	4.34	.779
30. In the right place	59	3.95	.818
J. 'Instructional strategies' component is			
31. Necessary	60	4.38	.666
32. In the right place	60	4.10	.681
K. 'Content delivery & media' component is			
33. Necessary	60	4.47	.566
34. In the right place	60	4.23	.673
L. 'Content' component is			
35. necessary	60	4.52	.537
36. in the right place	60	4.33	.572
M. Instructor' component is			
37. necessary	60	**4.60**	**.527**
38. in the right place	60	4.37	.551
N. 'Learner' component is			
39. Necessary	60	4.55	.594
40. In the right place	60	4.30	.646
O. 'Factors' component is			
41. Necessary	59	4.31	.856
42. In the right place	59	4.08	.988
P. 'Quality criteria' component is			
43. Necessary	60	4.43	.722
44. In the right place	60	3.98	.748
Q. 'Learning style test' component is			
45. Necessary	60	4.33	.681
46. In the right place	60	4.15	.755
R. 'Create/update' component is			
47. Necessary	60	4.52	.567
48. In the right place	60	4.27	.710
S. 'Assessment' component is			
49. Necessary	60	4.48	.624
50. In the right place	60	4.27	.710
T. Outcome is			
51. Understandable	60	4.25	.836
52. Clear	60	4.22	.804
53. Reasonable	60	4.08	.829

Table C.2: Cross Tabulating Components with Components' Relationship

Cross-tabulation of Components with Components' Relationship						
		Relationship between Components (group E- Q19-21)				
		D	N	A	SA	Total
Components (group D- Q15-18)	SD	.0%	.3%	.0%	.1%	.4%
	D	1.0%	1.3%	3.3%	.9%	6.5%
	N	.9%	4.5%	7.6%	1.7%	14.7%
	A	1.0%	10.3%	25.4%	9.8%	46.6%
	SA	.6%	1.4%	8.5%	21.4%	31.9%
	Total	3.4%	17.8%	44.8%	33.9%	100.0%

Table C.3: Cross Tabulating Components with Components' Graphical Representation

Cross-tabulation of Components with Components' Graphical Representation						
		Components' Graphical Representation (group F- Q22-24)				
		D	N	A	SA	Total
Components (group D- Q15-18)	SD	.0%	.0%	.4%	.0%	.4%
	D	.0%	2.9%	3.2%	.1%	6.3%
	N	1.3%	6.3%	5.2%	1.5%	14.2%
	A	2.5%	12.8%	27.5%	4.1%	46.9%
	SA	.1%	5.3%	14.0%	12.7%	32.1%
	Total	3.9%	27.4%	50.3%	18.4%	100.0%

Table C.4: Cross Tabulating Components with Outcome

Cross-tabulation of Components with Outcome						
		Outcome (group T- Q51-53)				
		D	N	A	SA	Total
Components (group D- Q15-18)	SD	.3%	.1%	.0%	.0%	.4%
	D	2.5%	.1%	3.1%	.6%	6.2%
	N	.8%	1.7%	8.5%	3.2%	14.2%
	A	.8%	5.0%	24.7%	16.1%	46.7%
	SA	1.7%	.8%	11.5%	18.5%	32.5%
	Total	6.1%	7.8%	47.8%	38.3%	100.0%

Table C.5: Cross tabulating Components with All individual Components

Cross-tabulation of Components with All individual Components							
		ALL Components (groups G to S- Q25-50)					
		SD	D	N	A	SA	Total
Components (group D- Q15-18)	SD	.0%	.0%	.0%	.4%	.0%	.4%
	D	.0%	.2%	.5%	3.9%	1.6%	6.3%
	N	.0%	.2%	2.3%	7.4%	4.3%	14.2%
	A	.0%	.5%	4.9%	25.1%	15.9%	46.5%
	SA	.1%	.0%	2.8%	8.2%	21.5%	32.7%
	Total	.1%	1.0%	10.6%	45.0%	43.3%	100.0%

Table C.6: Cross Tabulating Relationship between Components with All Individual Components

Cross-tabulation of Relationship between components with All individual Components							
		ALL Components (groups G to S- Q25-50)					
		SD	D	N	A	SA	Total
Relationship between Components (group E- Q19-21)	D	.0%	.2%	.5%	1.5%	1.3%	3.5%
	N	.0%	.6%	3.7%	9.6%	3.9%	17.8%
	A	.1%	.1%	4.0%	24.0%	16.5%	44.7%
	SA	.0%	.1%	2.7%	9.5%	21.7%	34.0%
	Total	.1%	1.0%	10.9%	44.7%	43.3%	100.0%

Table C.7: Cross-tabulation of Components Graphical Representation with All Individual Components

Cross-tabulation of Components Graphical Representation with All Individual Components							
		ALL Components (groups G to S- Q25-50)					
		SD	D	N	A	SA	Total
Components' Graphical Representation (group F- Q22-24)	D	.0%	.0%	1.9%	.9%	1.0%	3.8%
	N	.0%	.6%	3.3%	15.6%	8.0%	27.5%
	A	.0%	.4%	4.6%	**25.6%**	19.6%	**50.2%**
	SA	.0%	.0%	.9%	3.2%	14.4%	**18.5%**
	Total	.1%	1.0%	10.6%	**45.2%**	**43.0%**	100.0%

APPENDIX D

Table D.1: Detailed Results of the Heuristic Evaluation of Usability of the System Interface

Criteria	Description	YES		NO		N/A	
		#	%	#	%	#	%
	All Criteria	715	78	142	15	61	7
1.1	Does every display begin with a title or header that describes screen contents?	9	100	0	0	0	0
1.2	Do menu instructions, prompts, and error messages appear in the same place(s) on each menu?	8	89	1	11	0	0
1.3	Is there some form of system feedback for every operator action?	5	56	4	44	0	0
1.4	After the user completes an action (or group of actions), does the feedback indicate that the next group of actions can be started?	6	67	1	11	2	22
1.5	Is there visual feedback in menus or dialog boxes about which choices are selectable?	9	100	0	0	0	0
1.6	Is there visual feedback in menus or dialog boxes about which choice the cursor is on now?	7	78	1	11	1	11
1.7	If there are observable delays (greater than fifteen seconds) in the system’s response time, is the user kept informed of the system's progress?	7	78	2	22	0	0
1.8	Are response times appropriate to the user's cognitive processing?	8	89	1	11	0	0
1.9	Is the menu-naming terminology consistent with the user's task domain?	9	100	0	0	0	0
1.10	Does the system provide *visibility:* that is, by looking, can the user tell the state of the system and the alternatives for action?	8	89	1	11	0	0
1.11	Do GUI menus make obvious which item has been selected?	9	100	0	0	0	0
2.1	Are icons concrete and familiar?	7	78	2	22	0	0
2.2	Are menu choices ordered in the most logical way, given the user, the item names, and the task variables?	8	89	1	11	0	0
2.3	Do related and interdependent fields appear on the same screen?	9	100	0	0	0	0
2.4	When prompts imply a necessary action, are the words in the message consistent with that action?	9	100	0	0	0	0
2.5	On data entry screens, are tasks described in terminology familiar to users?	9	100	0	0	0	0
2.6	Are field-level prompts provided for data entry screens?	8	89	1	11	0	0
2.7	Do menu choices fit logically into categories that have readily understood meanings?	7	78	2	22	0	0
3.1	When a user's task is complete, does the system wait for a signal from the user before processing?	9	100	0	0	0	0
3.2	Are users prompted to confirm commands that have drastic, destructive consequences?	5	56	3	33	1	11
3.3	Are character edits allowed in data entry fields?	7	78	2	22	0	0

Table D.1, Continue

Criteria	Description	YES		NO		N/A	
		#	%	#	%	#	%
3.4	If menu lists are long (more than seven items), can users select an item either by moving the cursor or by typing a mnemonic code?	3	33	3	33	3	33
3.5	If the system uses a pointing device, do users have the option of either clicking on menu items or using a keyboard shortcut?	4	44	2	22	3	33
3.6	Are menus broad (many items on a menu) rather than deep (many menu levels)?	5	56	3	33	1	11
4.1	Has a heavy use of all uppercase letters on a screen been avoided?	7	78	2	22	0	0
4.2	Are icons labeled?	6	67	3	33	0	0
4.3	Are there no more than twelve to twenty icon types?	7	78	2	22	0	0
4.4	Does each window have a title?	8	89	1	11	0	0
4.5	Are vertical and horizontal scrolling possible in each window?	8	89	1	11	0	0
4.6	Are menu choice lists presented vertically?	9	100	0	0	0	0
4.7	Are menu titles either centered or left-justified?	9	100	0	0	0	0
4.8	Are menu items left-justified, with the item number or mnemonic preceding the name?	7	78	1	11	1	11
4.9	Do embedded field-level prompts appear to the right of the field label?	7	78	0	0	2	22
4.10	Are field labels and fields distinguished typographically?	9	100	0	0	0	0
4.11	Are field labels consistent from one data entry screen to another?	8	89	1	11	0	0
4.12	Do field labels appear to the left of single fields and above list fields?	8	89	1	11	0	0
4.13	Are attention-getting techniques used with care?	7	78	2	22	0	0
4.14	Are there no more than four to seven colors, and are they far apart along the visible spectrum?	7	78	2	22	0	0
4.15	Is the most important information placed at the beginning of the prompt?	7	78	2	22	0	0
4.16	Are user actions named consistently across all prompts in the system?	7	78	2	22	0	0
4.17	Are menu choice names consistent, both within each menu and across the system, in grammatical style and terminology?	8	89	0	0	1	11
4.18	Does the structure of menu choice names match their corresponding menu titles?	9	100	0	0	0	0
4.19	If the system has multipage data entry screens, do all pages have the same title?	4	44	3	33	2	22
4.20	Are high-value, high-chroma colors used to attract attention?	7	78	0	0	2	22

Table D.1, Continue

Criteria	Description	YES		NO		N/A	
		#	%	#	%	#	#
5.1	Is sound used to signal an error?	4	44	5	56	0	0
5.2	Are error messages worded so that the system, not the user, takes the blame?	8	89	1	11	0	0
5.3	Are error messages grammatically correct?	4	44	3	33	2	22
5.4	Do error messages avoid the use of violent or hostile words?	8	89	1	11	0	0
5.5	Do all error messages in the system use consistent grammatical style, form, terminology, and abbreviations?	7	78	0	0	2	22
5.6	If an error is detected in a data entry field, does the system place the cursor in that field or highlight the error?	4	44	2	22	3	33
5.7	Do error messages inform the user of the error's severity?	5	56	2	22	2	22
5.8	Do error messages suggest the cause of the problem?	6	67	3	33	0	0
5.9	Do error messages indicate what action the user needs to take to correct the error?	6	67	3	33	0	0
5.10	If the system supports both novice and expert users, are multiple levels of error-message detail available?	3	33	3	33	3	33
6.1	Are menu choices logical, distinctive, and mutually exclusive?	9	100	0	0	0	0
6.2	Are data inputs case-blind whenever possible?	9	100	0	0	0	0
6.3	Does the system prevent users from making errors whenever possible?	6	67	2	22	1	11
6.4	Does the system warn users if they are about to make a potentially serious error?	5	56	3	33	1	11
6.5	Do data entry screens and dialog boxes indicate the number of character spaces available in a field?	1	11	6	67	2	22
6.6	Do fields in data entry screens and dialog boxes contain default values when appropriate?	2	22	6	67	1	11
7.1	For question and answer interfaces, are visual cues and white space used to distinguish questions, prompts, instructions, and user input?	9	100	0	0	0	0
7.2	Does the data display start in the upper-left corner of the screen?	9	100	0	0	0	0
7.3	Are multiword field labels placed horizontally (not stacked vertically)?	9	100	0	0	0	0
7.4	Are prompts, cues, and messages placed where the eye is likely to be looking on the screen?	9	100	0	0	0	0
7.5	Is there an obvious visual distinction made between "choose one" menu and "choose many" menus?	6	67	3	33	0	0
7.6	Have items been grouped into logical zones, and have headings been used to distinguish between zones?	9	100	0	0	0	0
7.7	Have zones been separated by spaces, lines, color, letters, bold titles, rules lines, or shaded areas?	9	100	0	0	0	0
7.8	Are field labels close to fields, but separated by at least one space?	9	100	0	0	0	0

Table D.1, Continue

Criteria	Description	YES		NO		N/A	
		#	%	#	%	#	%
7.9	Are optional data entry fields clearly marked?	4	44	3	33	2	22
7.10	Is reverse video or color highlighting used to get the user's attention?	7	78	2	22	0	0
7.11	Is reverse video used to indicate that an item has been selected?	5	56	3	33	1	11
7.12	Are size, boldface, underlining, color, shading, or typography used to show relative quantity or importance of different screen items?	6	67	2	22	1	11
7.13	Are borders used to identify meaningful groups?	7	78	1	11	1	11
7.14	Is color coding consistent throughout the system?	8	89	1	11	0	0
7.15	Is the first word of each menu choice the most important?	8	89	0	0	1	11
7.16	Are inactive menu items grayed out or omitted?	6	67	2	22	1	11
7.17	Are there menu selection defaults?	6	67	2	22	1	11
7.18	Do data entry screens and dialog boxes indicate when fields are optional?	3	33	4	44	2	22
8.1	If the system supports both novice and expert users, are multiple levels of error message detail available?	6	67	2	22	1	11
8.2	If menu lists are short (seven items or fewer), can users select an item by moving the cursor?	8	89	1	11	0	0
8.3	If the system uses a pointing device, do users have the option of either clicking on fields or using a keyboard shortcut?	6	67	2	22	1	11
8.4	On data entry screens, do users have the option of either clicking directly on a field or using a keyboard shortcut?	6	67	2	22	1	11
8.5	On menus, do users have the option of either clicking directly on a menu item or using a keyboard shortcut?	7	78	2	22	0	0
8.6	In dialog boxes, do users have the option of either clicking directly on a dialog box option or using a keyboard shortcut?	7	78	2	22	0	0
9.1	Are all icons in a set visually and conceptually distinct?	7	78	2	22	0	0
9.2	Have large objects, bold lines, and simple areas been used to distinguish icons?	6	67	2	22	1	11
9.3	Does each icon stand out from its background?	8	89	1	11	0	0
9.4	Are meaningful groups of items separated by white space?	8	89	0	0	1	11
9.5	Does each data entry screen have a short, simple, clear, distinctive title?	9	100	0	0	0	0
9.6	Are field labels brief, familiar, and descriptive?	9	100	0	0	0	0
9.7	Are menu titles brief, yet long enough to communicate?	9	100	0	0	0	0
9.8	Are there pop-up or pull-down menus within data entry fields that have many, but well-defined, entry options?	7	78	1	11	1	11
10.1	Are on-line instructions visually distinct?	8	89	1	11	0	0
10.2	If menu choices are ambiguous, does the system provide additional explanatory information when an item is selected?	4	44	2	22	3	33

Table D.1, Continue

Criteria	Description	YES		NO		N/A	
		#	%	#	%	#	%
10.3	Is the help function visible; for example, a key labeled HELP or a special menu?	5	56	4	44	0	0
10.4	Navigation: Is information easy to find?	9	100	0	0	0	0
10.5	Presentation: Is the visual layout well designed?	9	100	0	0	0	0
10.6	Conversation: Is the information accurate, complete, and understandable?	9	100	0	0	0	0
10.7	Is the information relevant?	9	100	0	0	0	0
10.8	Can users easily switch between help and their work?	6	67	2	22	1	11
10.9	Is it easy to access and return from the help system?	7	78	0	0	2	22
10.10	Can users resume work where they left off after accessing help?	6	67	1	11	2	22

APPENDIX E

Part I: Screen shots of the system during the test – lecturer

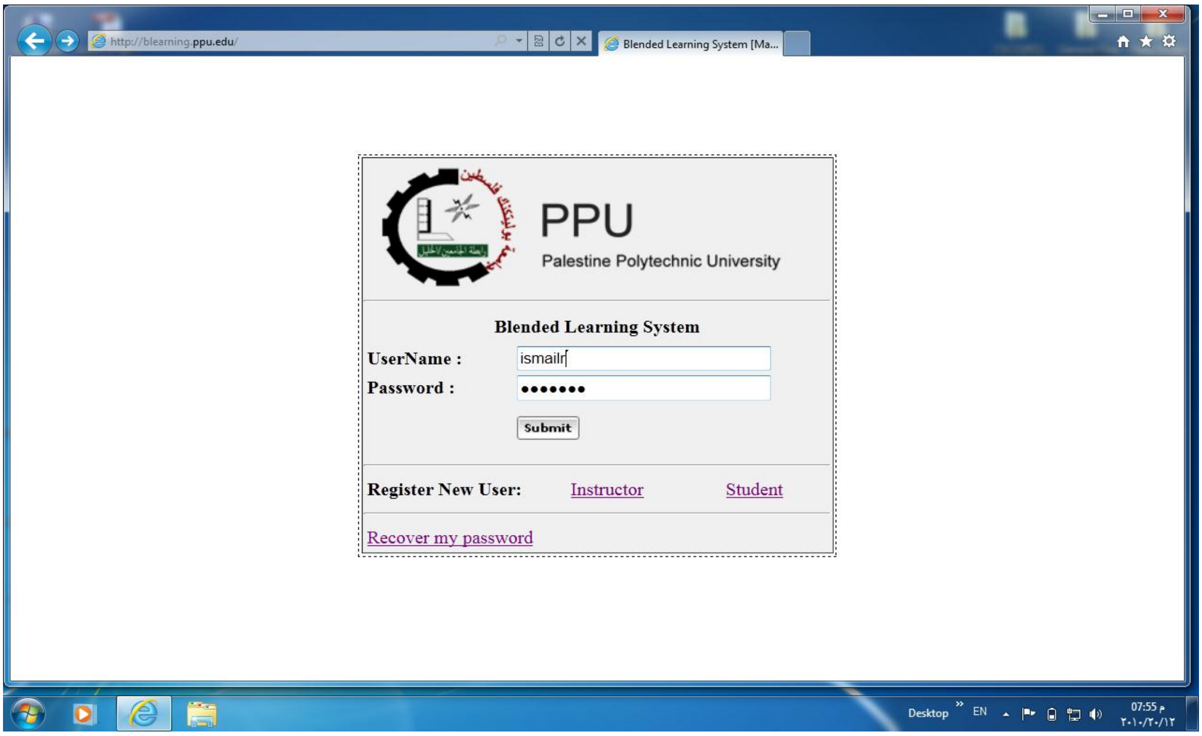


Figure E.1: Login Screen

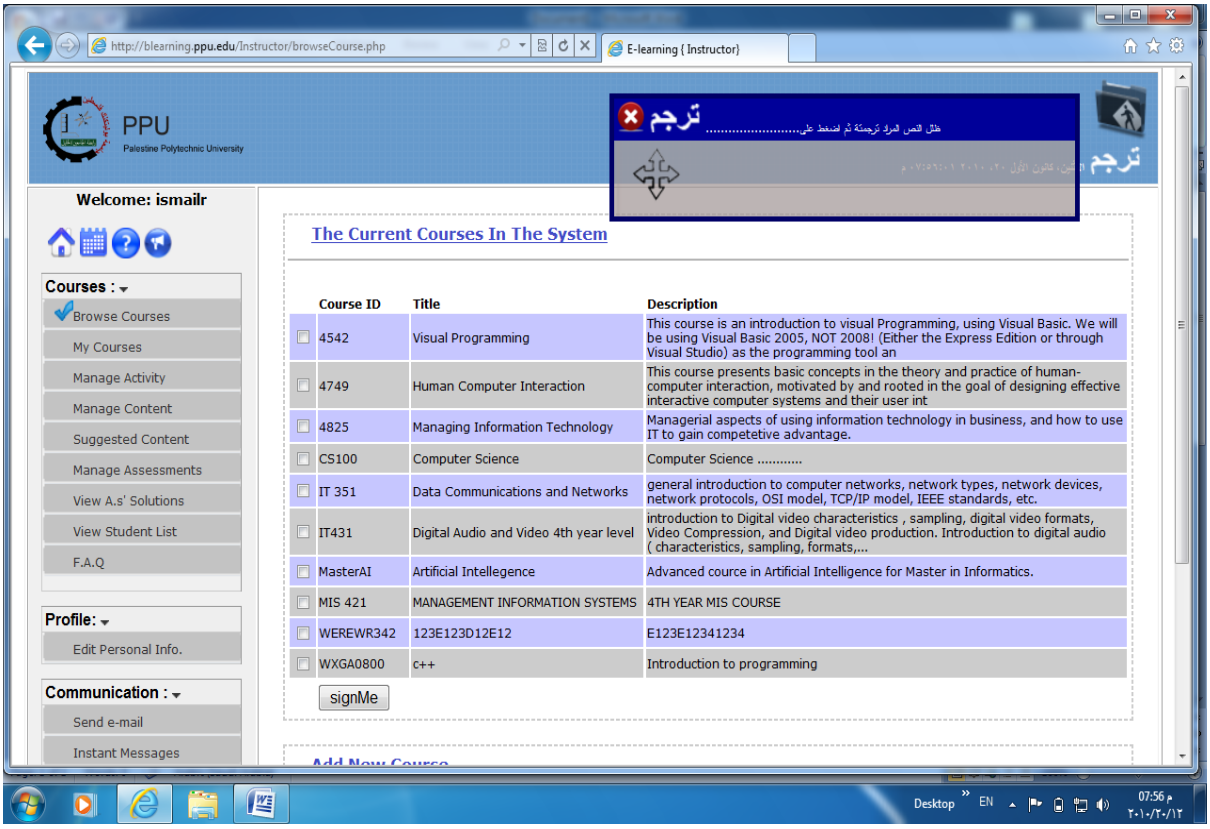


Figure E.2 Browse Courses

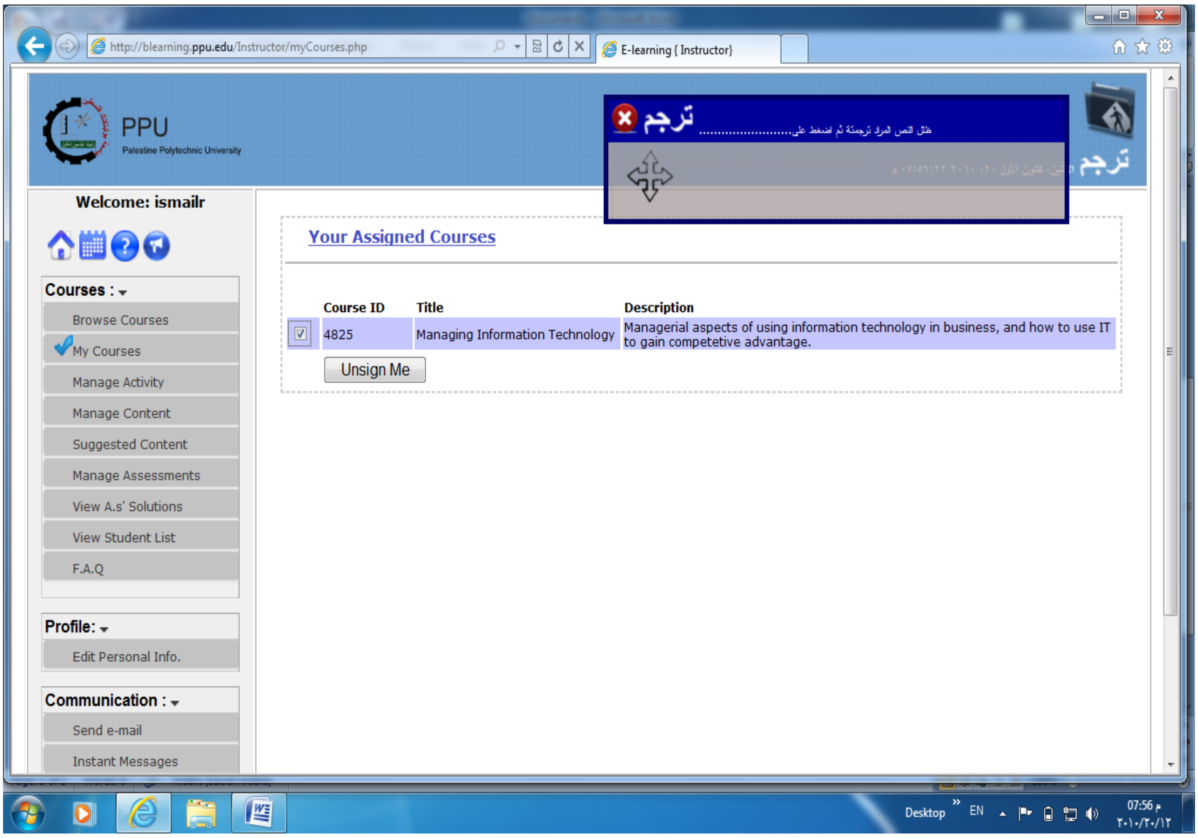


Figure E.3: My Courses (lecturer)

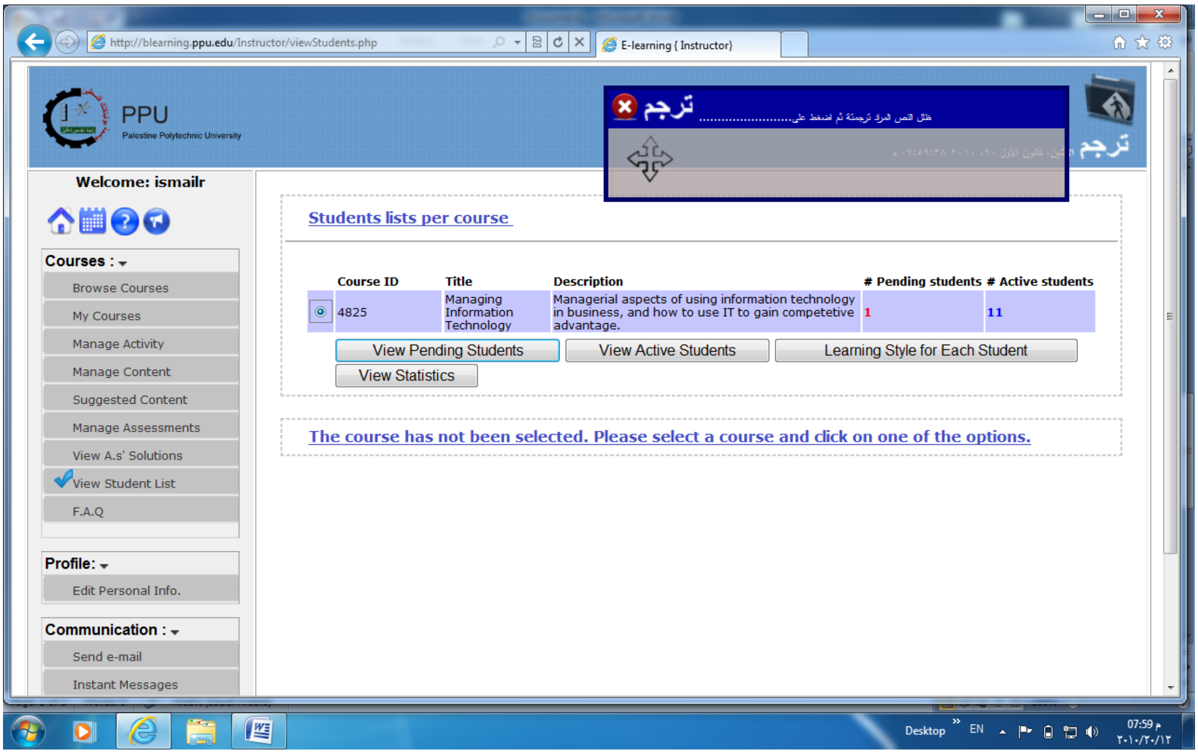


Figure E.4: View Student List

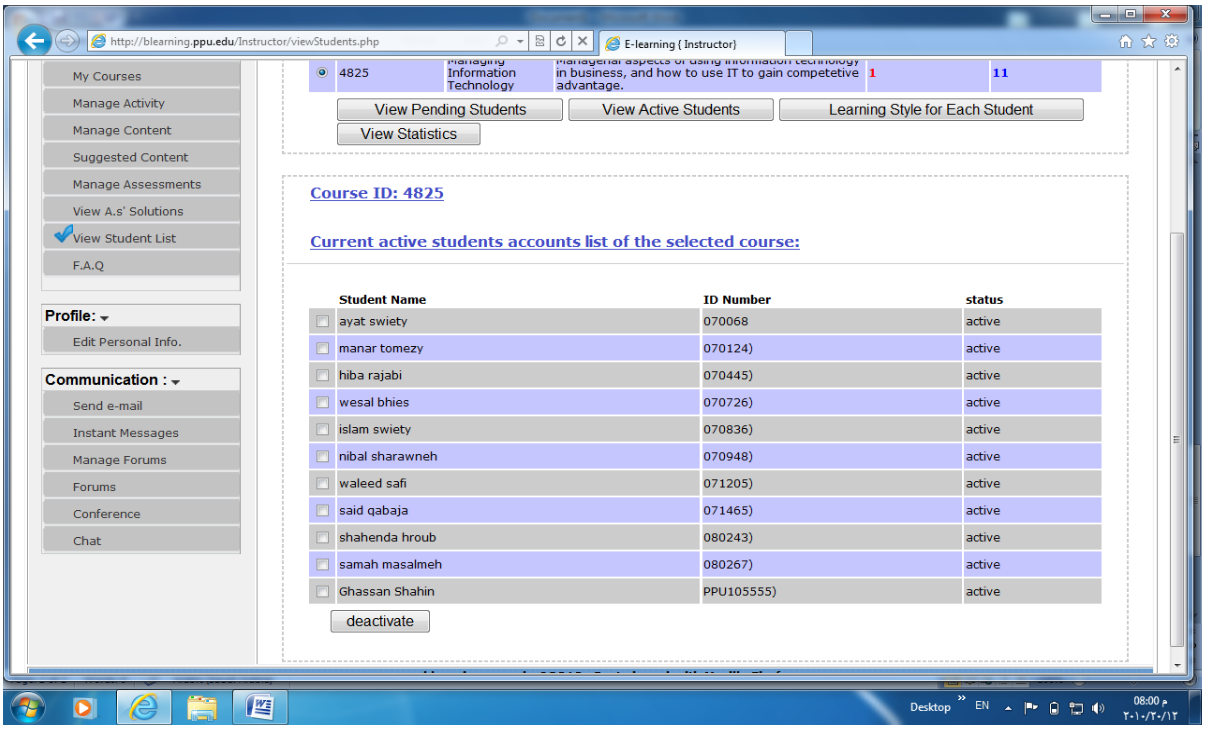


Figure E.5: Active Students in the Selected Course

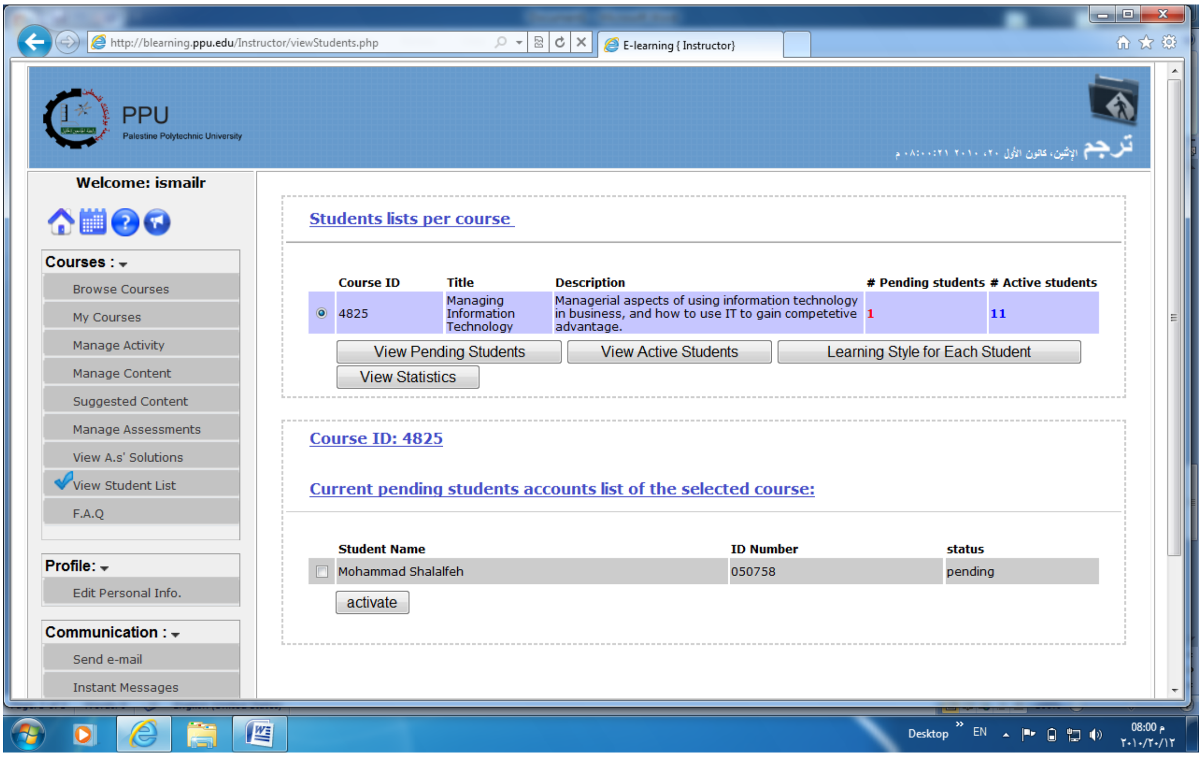


Figure E.6 Pending Students in the Selected Course

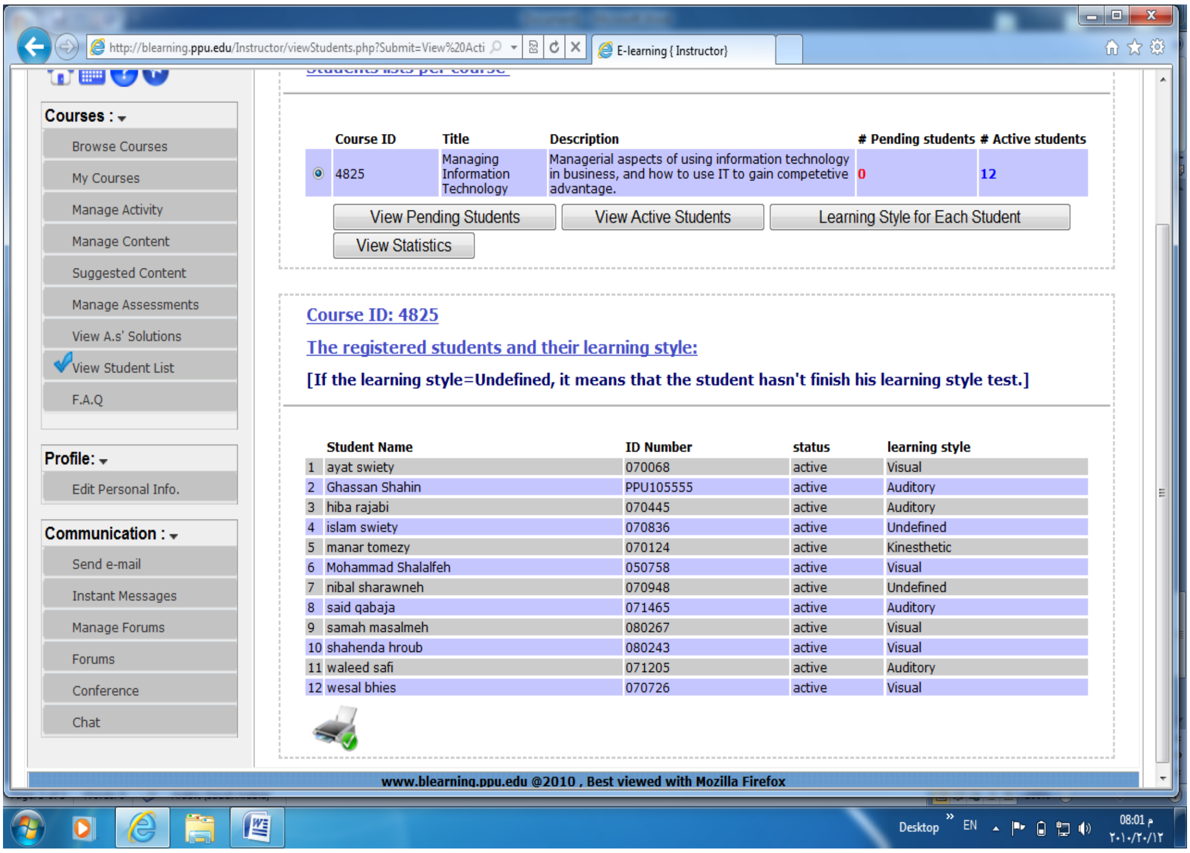


Figure E.7: Registered Students Showing Their Learning Styles

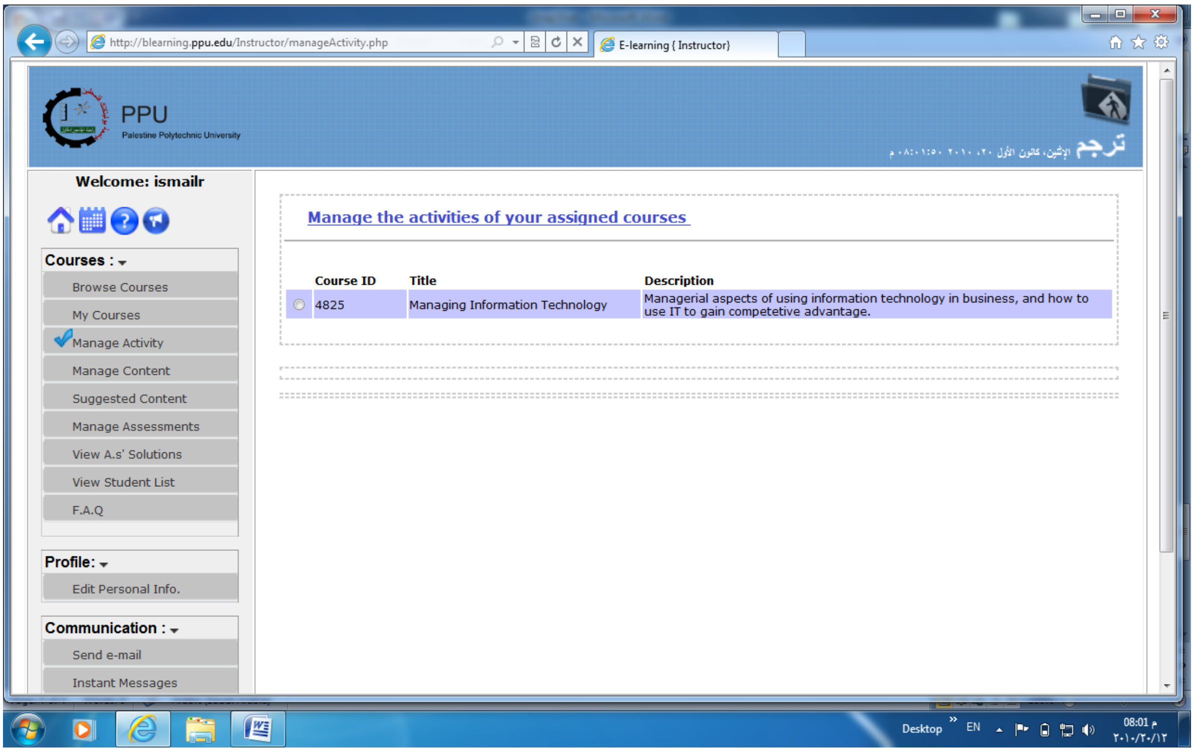


Figure E.8: Manage Activities of the Selected Course

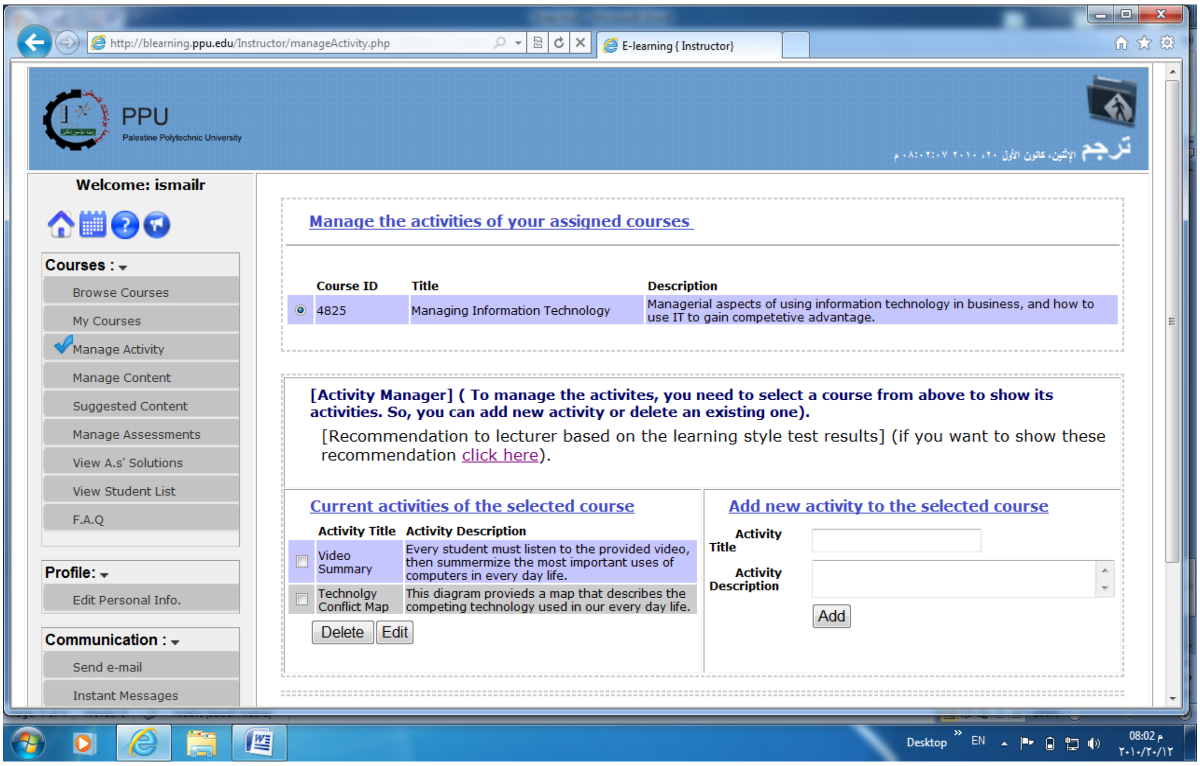


Figure E.9: Manage Activities – Current Activities of the Selected Course

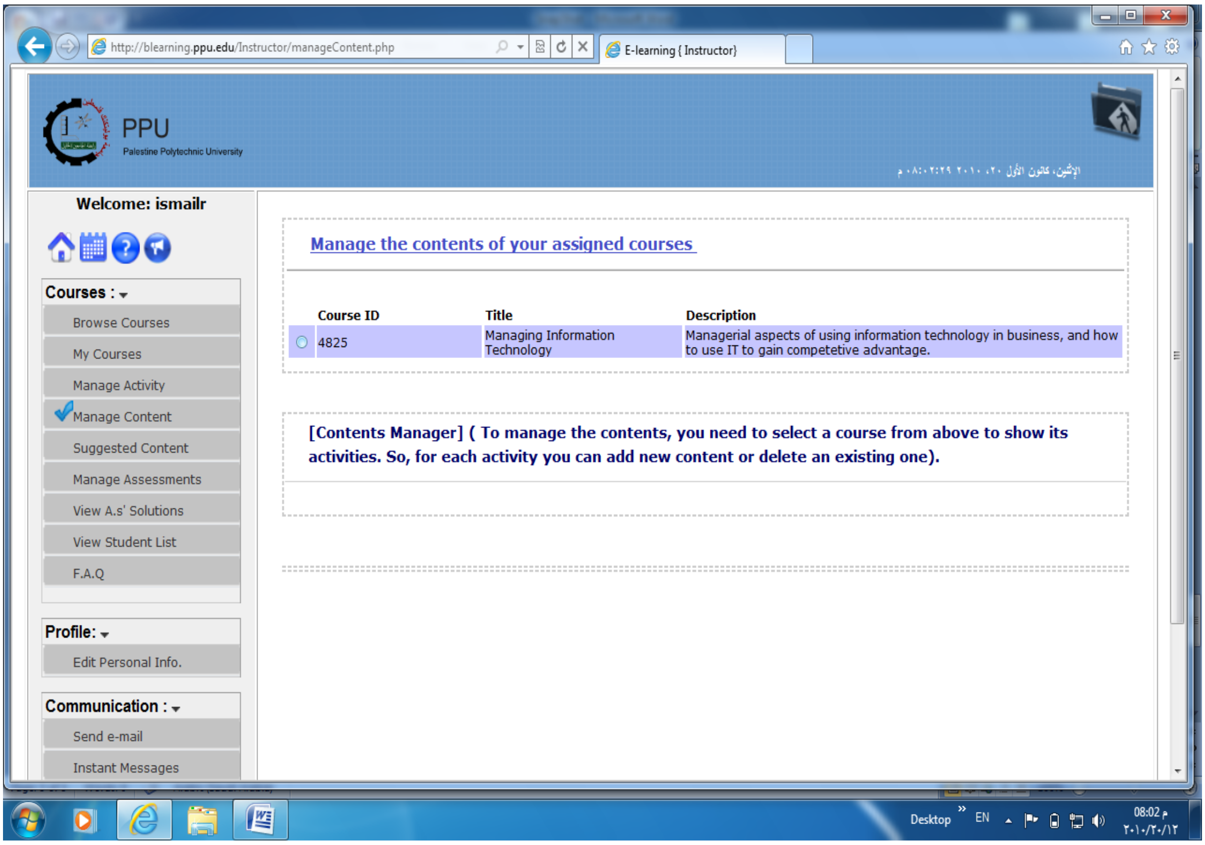


Figure E.10: Manage Contents

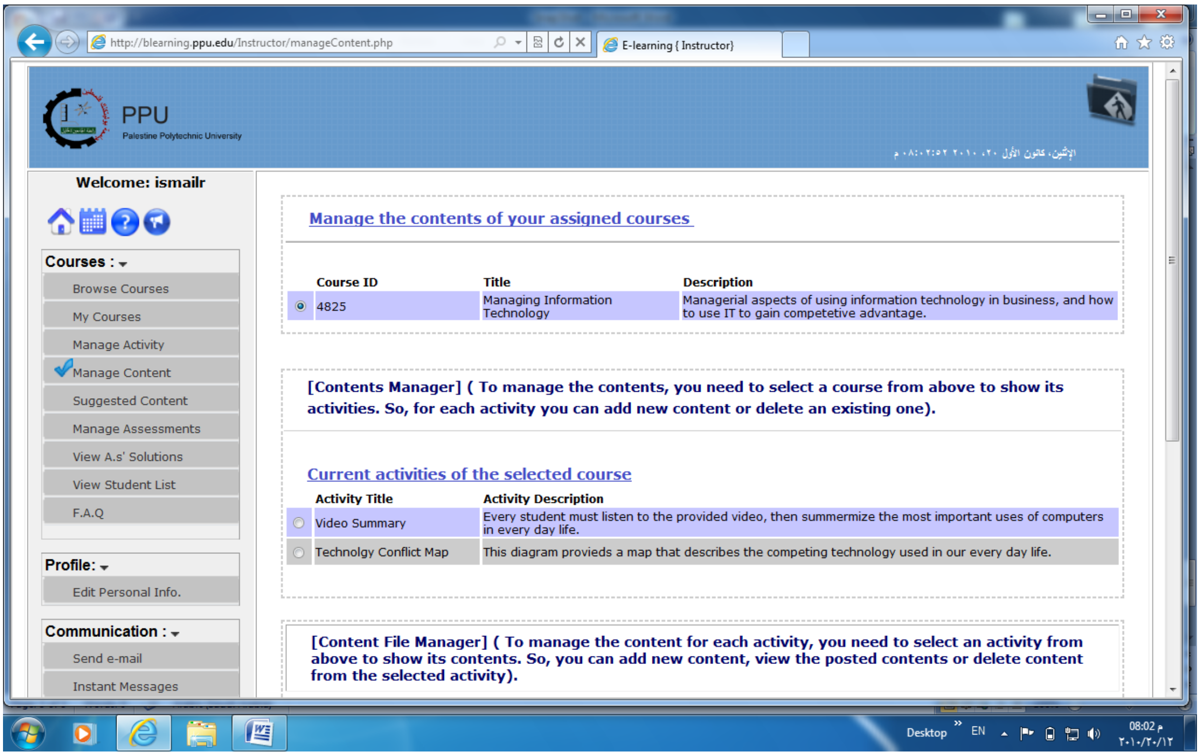


Figure E.11: Manage Contents; Showing Activities of the Selected Course

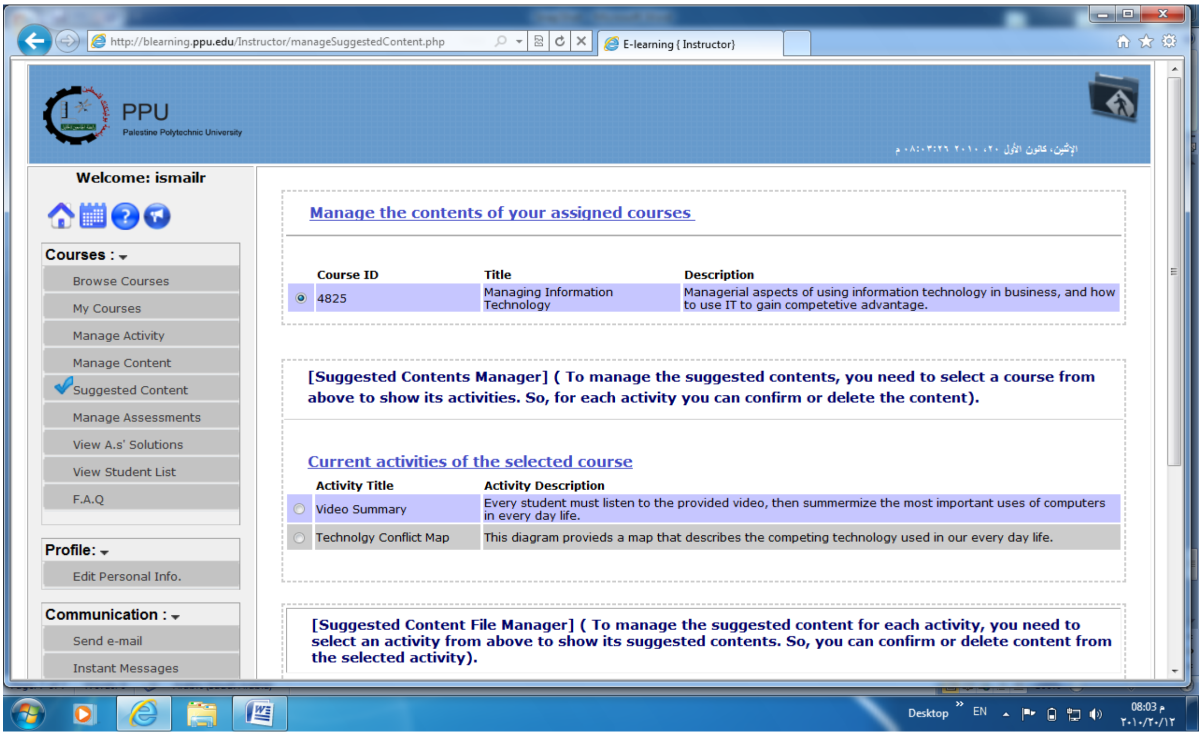


Figure E.12: Manage Suggested Contents by Students of an Activity within a Selected Course

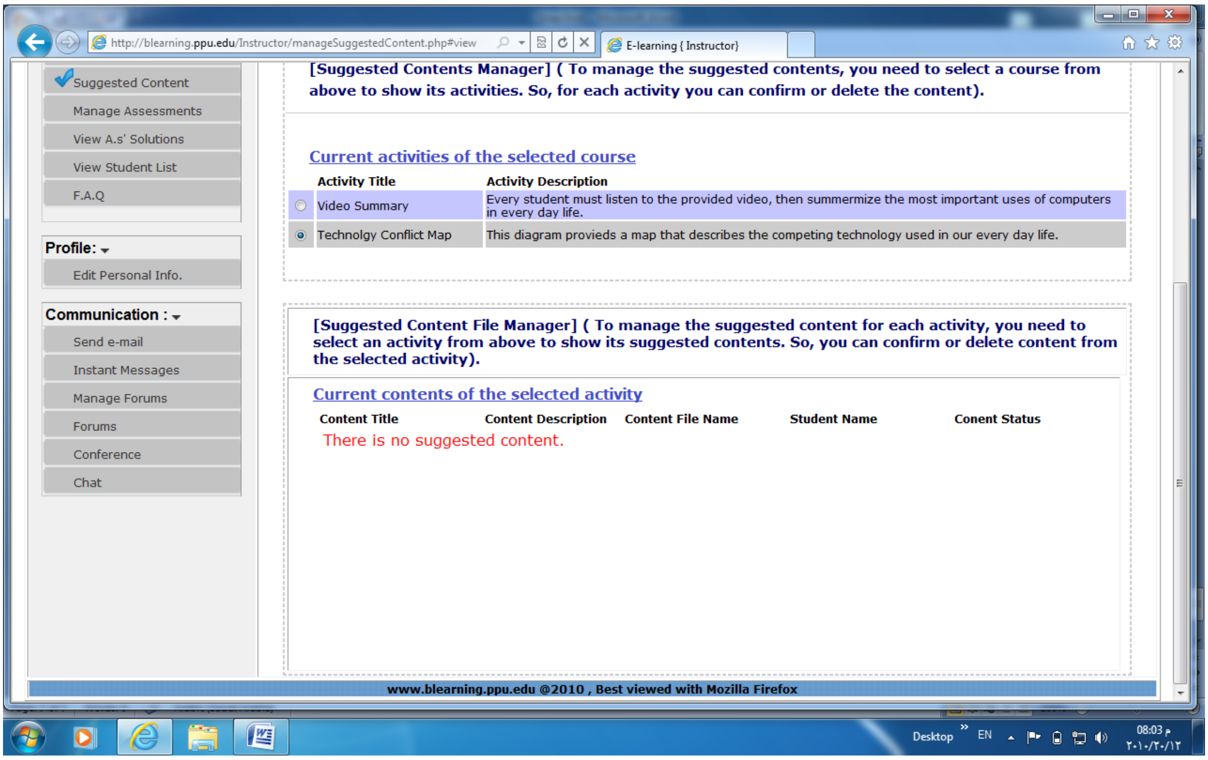


Figure E.13 Manage Suggested Contents; Showing an Activity with No Suggested Contents

Appendix E part II

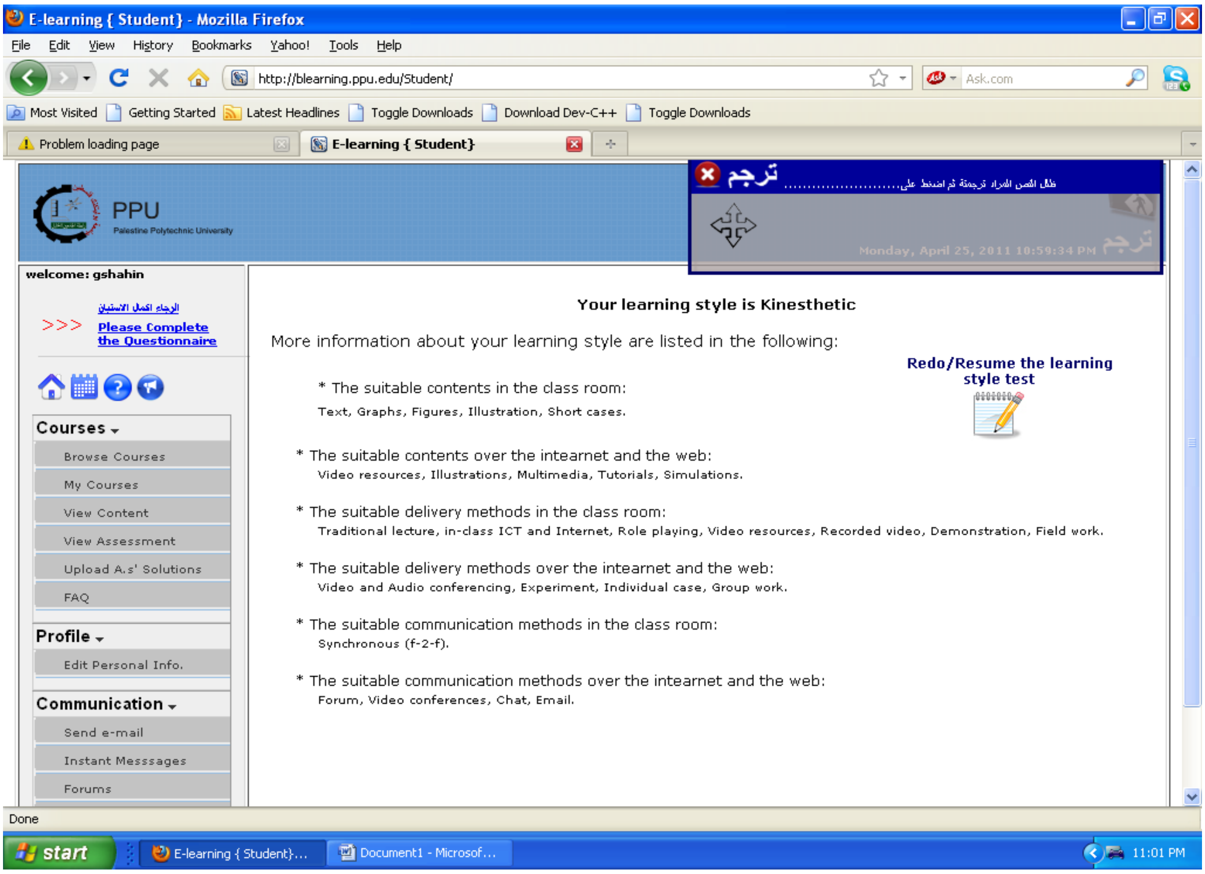


Figure E.14 Opening Screen for Student Account

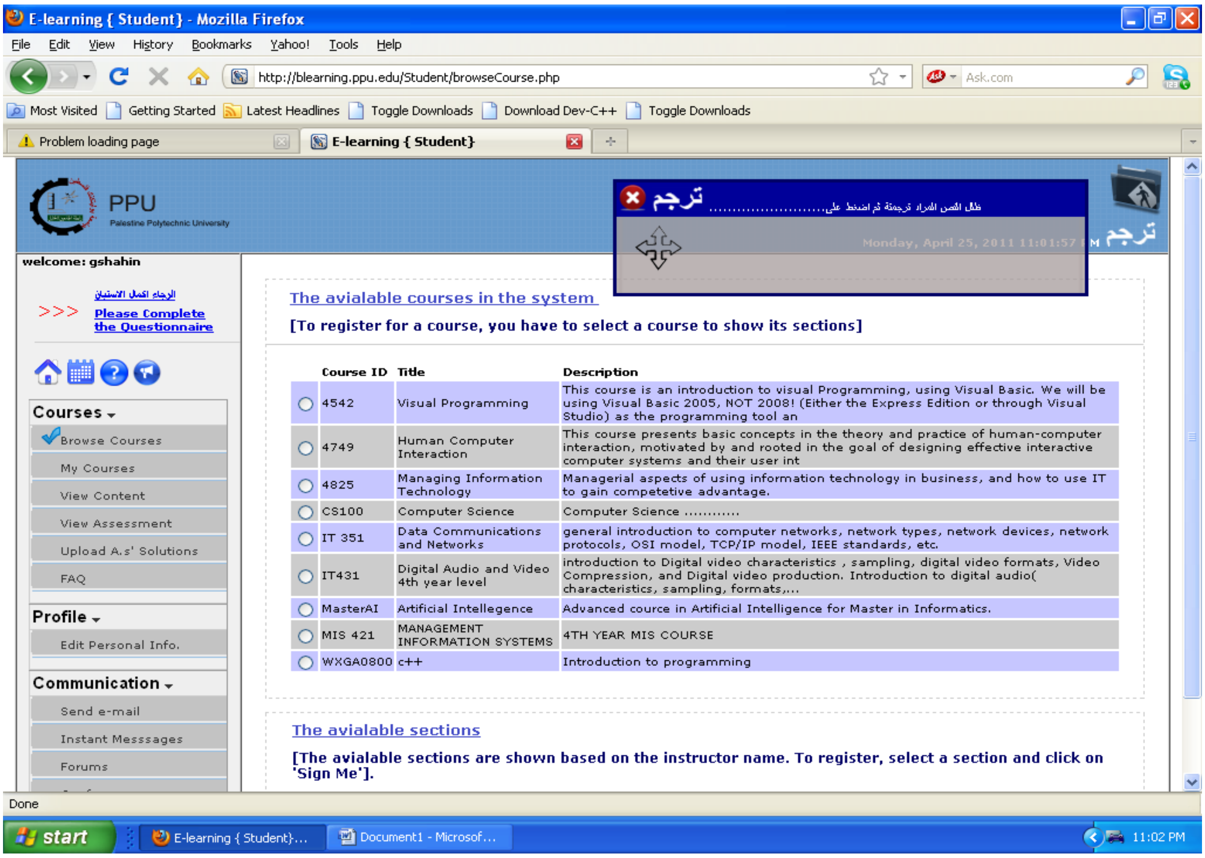


Figure E.15 Browse Courses Available in the System to Register

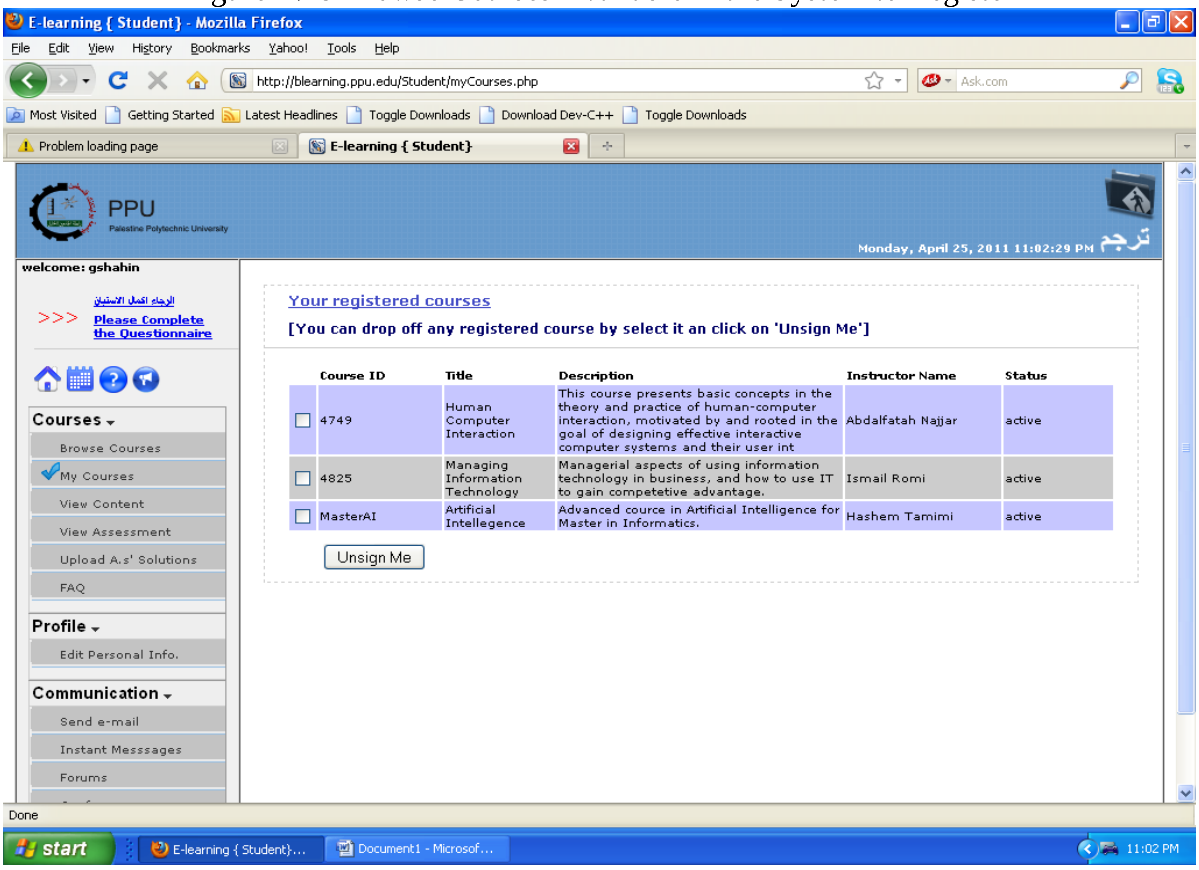


Figure E.16 Browsing Registered Courses

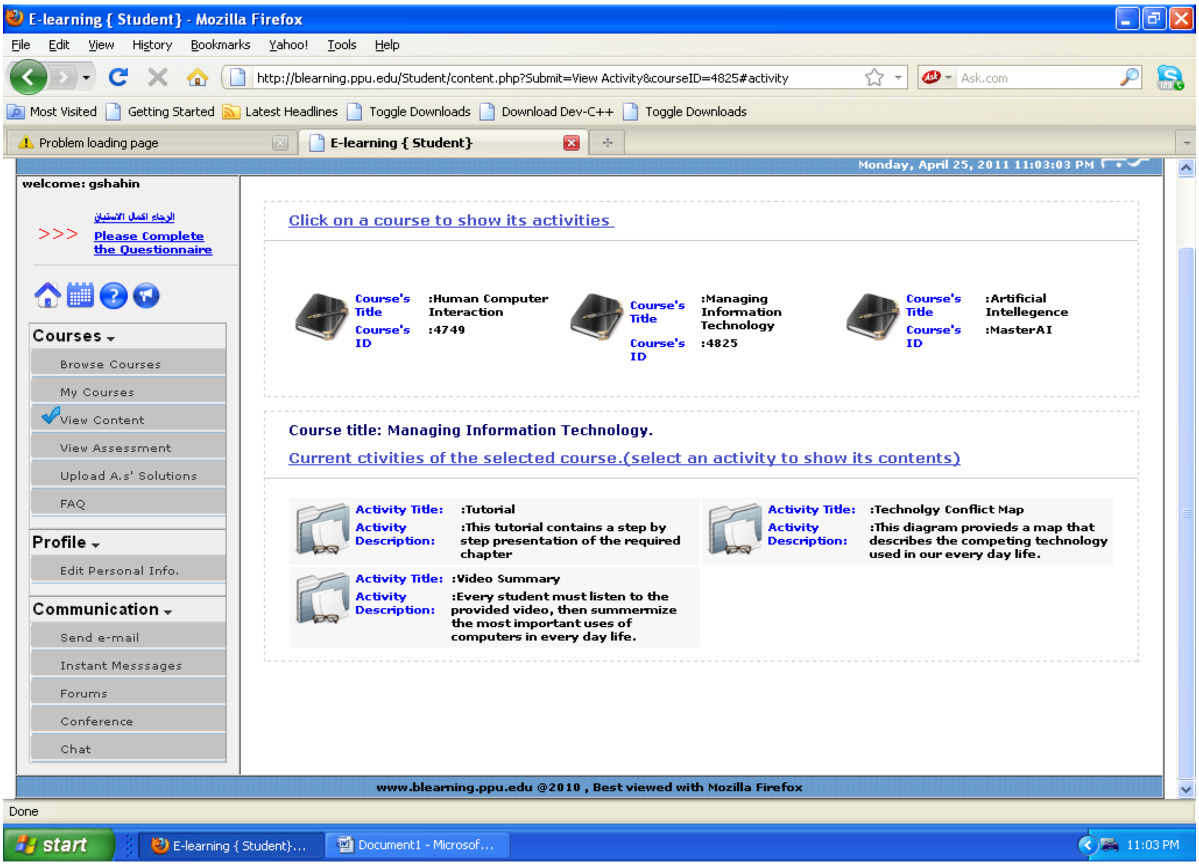


Figure E.17: View Contents of an Activity of a Selected Course

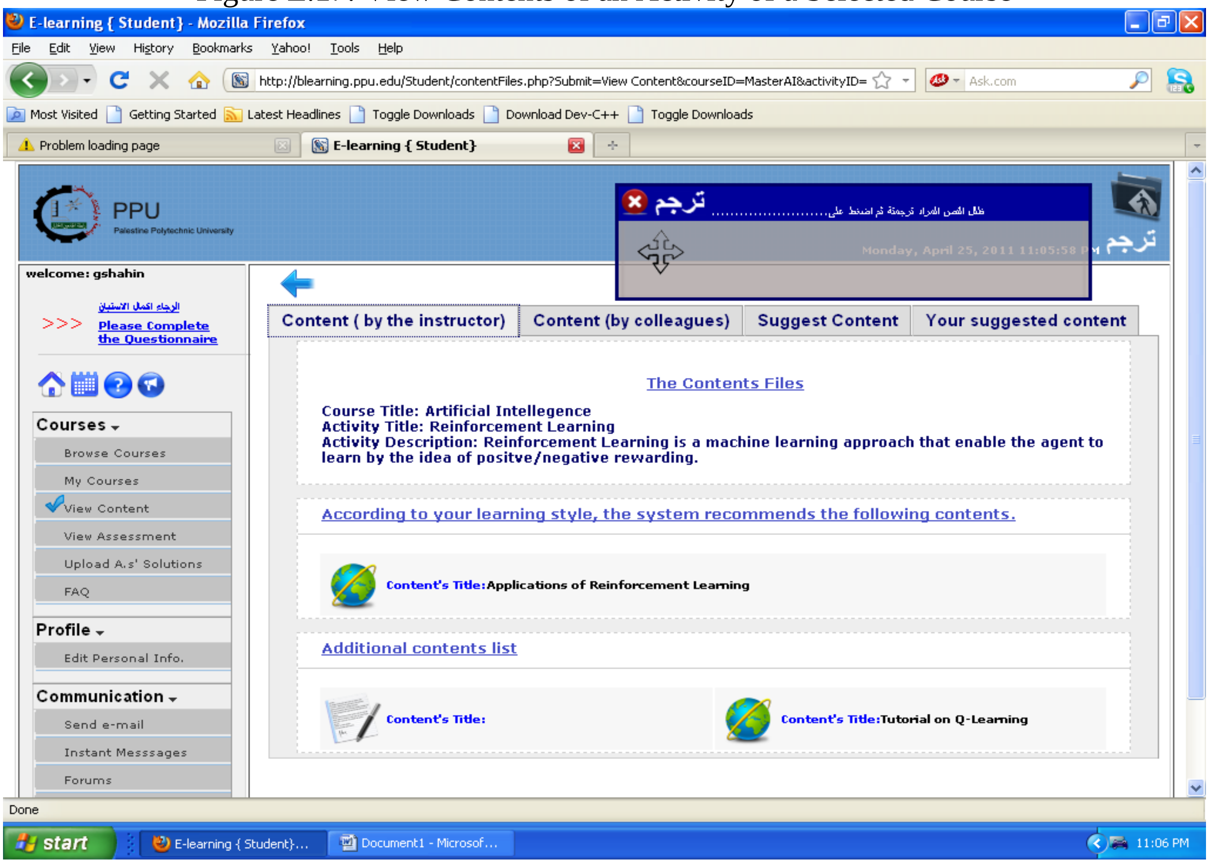


Figure E.18: Browsing Contents of an Activity of a Selected Course by Instructor or Colleagues, and Suggesting Content or Viewing Own Suggested Ones

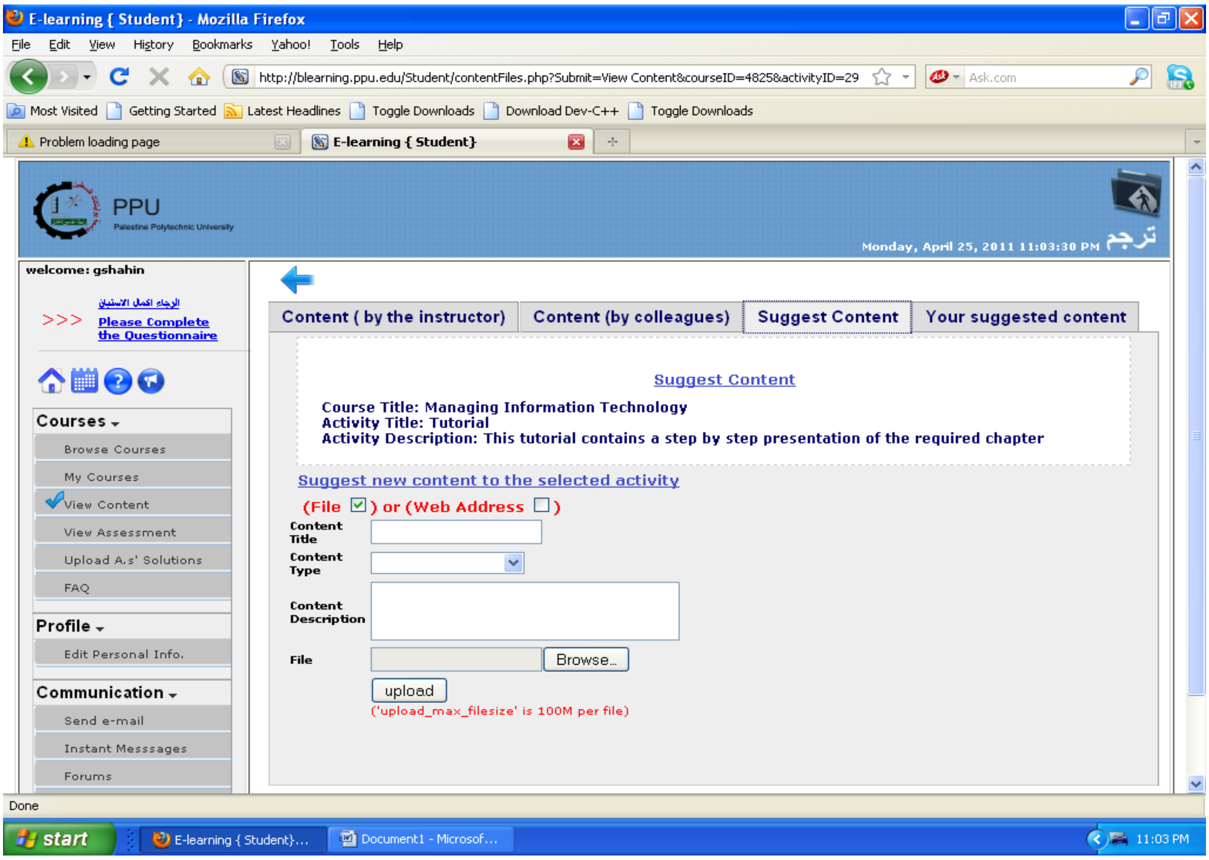


Figure E.19: Suggesting Contents by Student for an Activity of a Selected Course

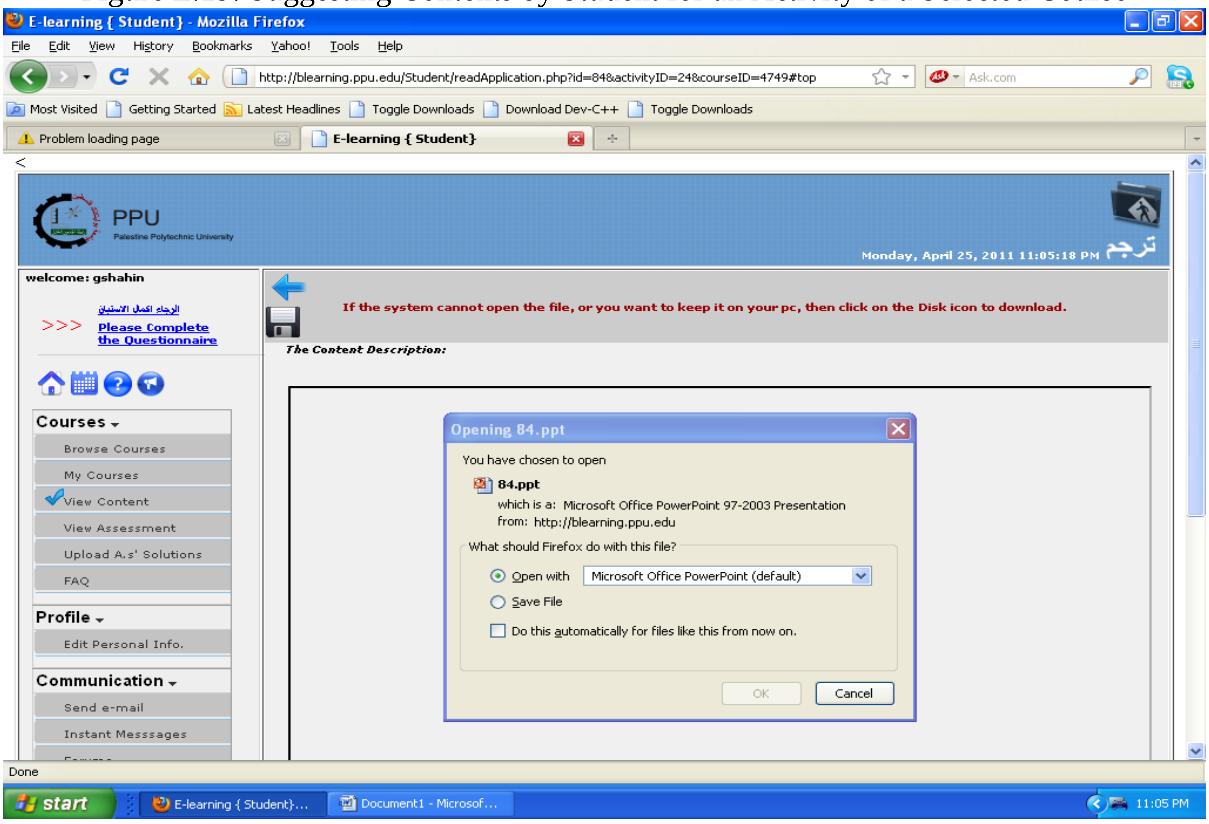


Figure E.20: Viewing Content with Options to Open or Save

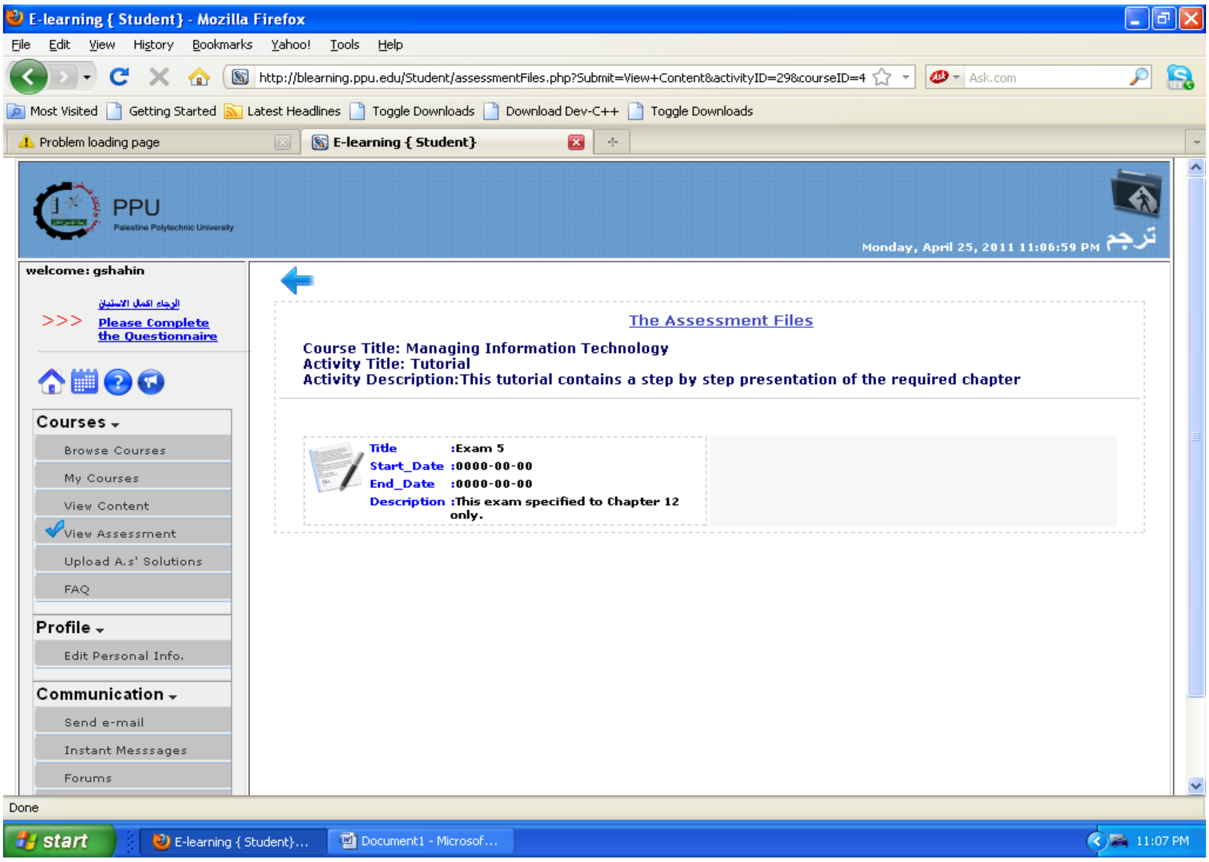


Figure E.21: View Assessments for an Activity of a Selected Course

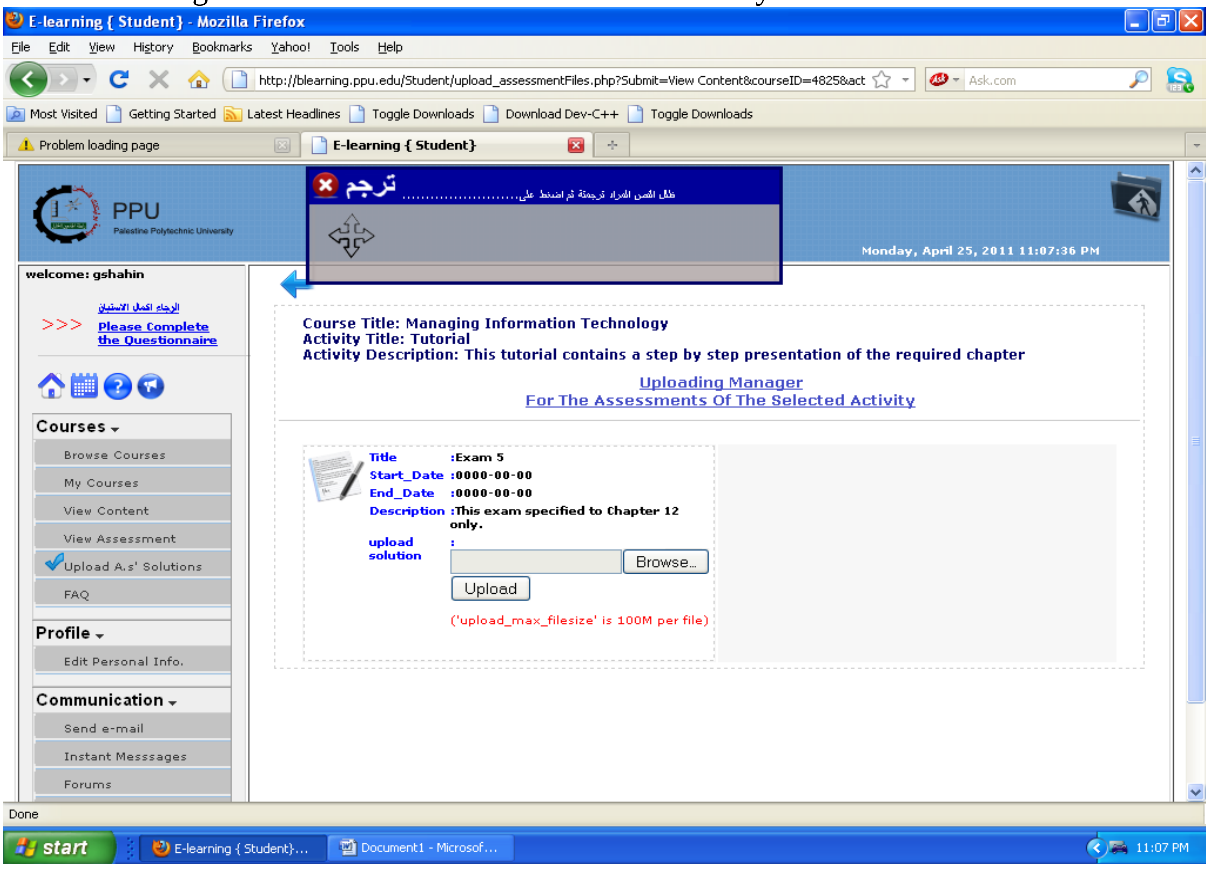


Figure E.22: Upload a Solution for an Assessment of an Activity of a Selected Course

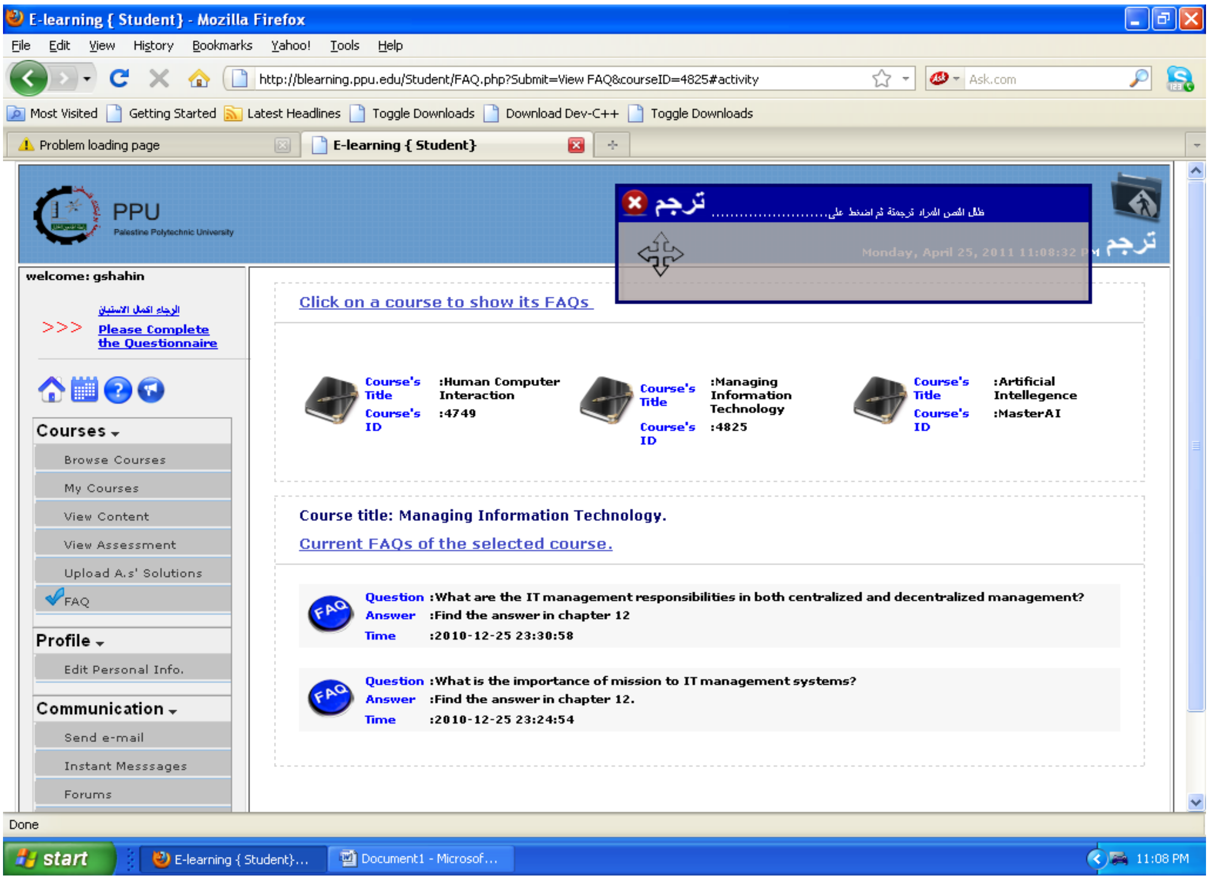


Figure E.23 Frequently Asked Questions for a Selected Course

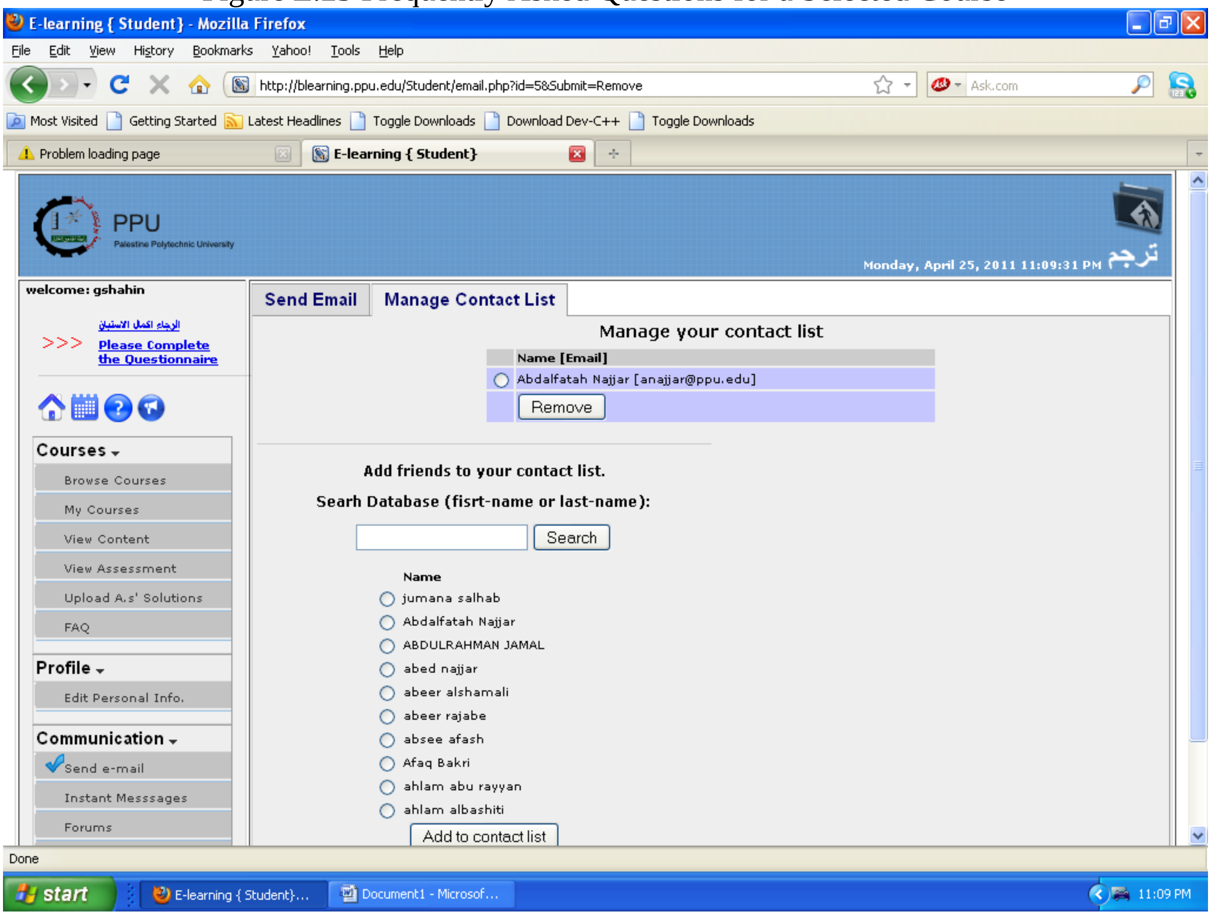


Figure E.24 Send Email: Manage Contact List/Search DB

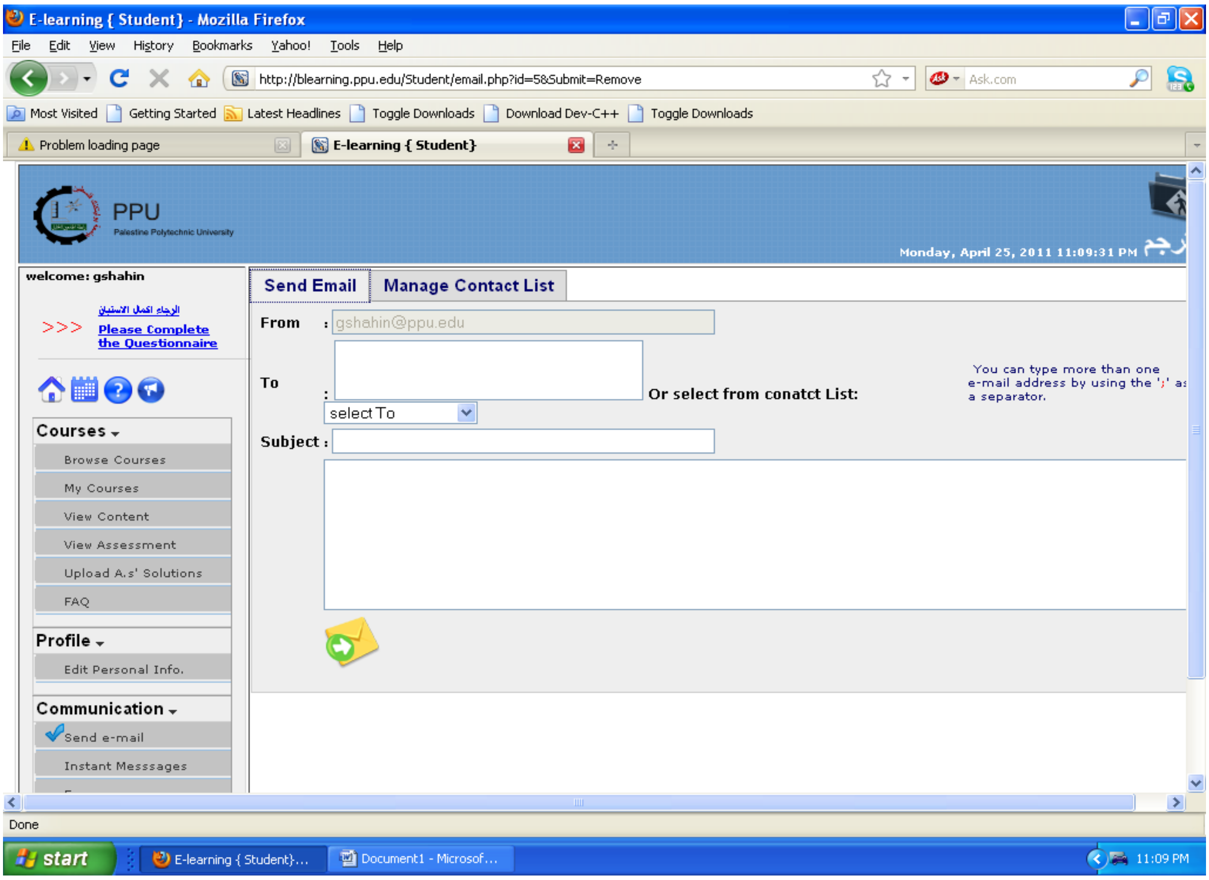


Figure E.25 Send Email: Composing a Message

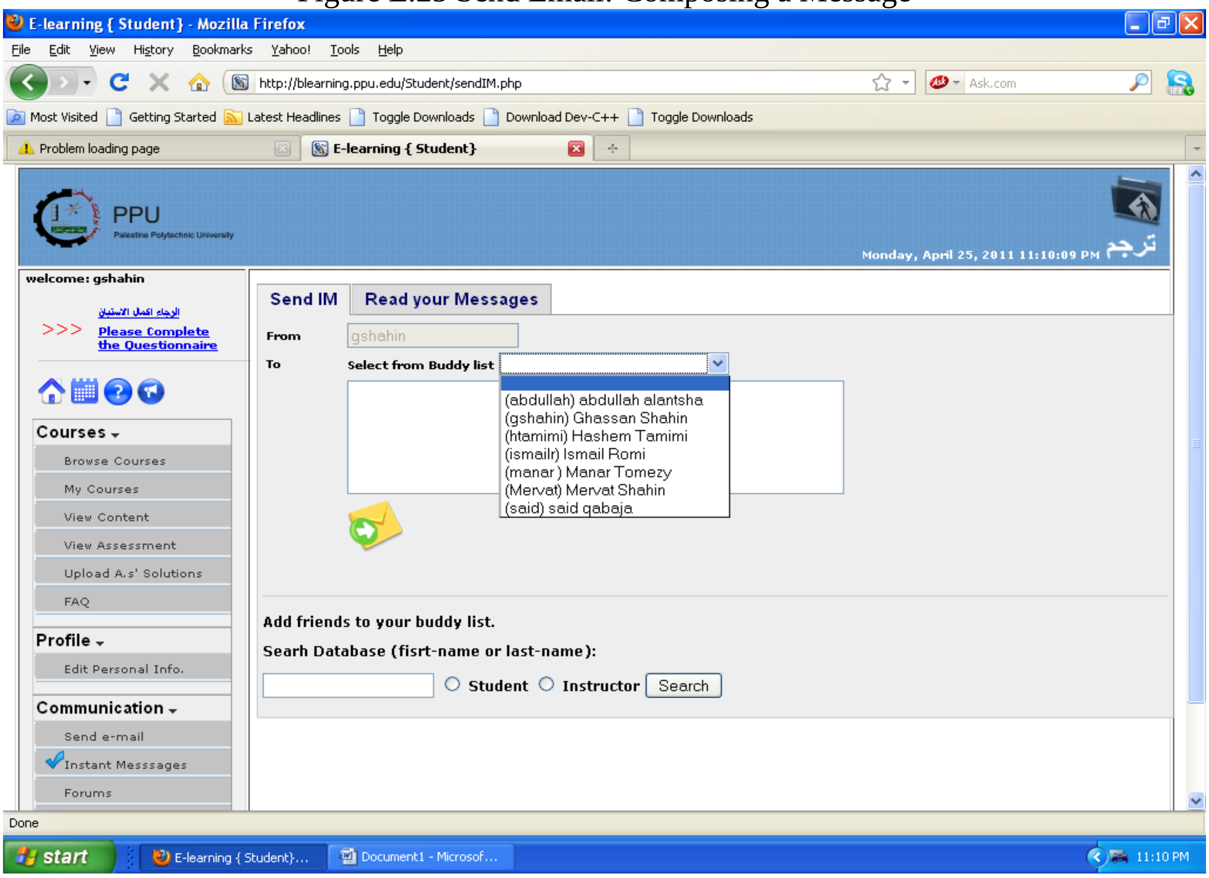


Figure E.26 Instant Messages: Sending IM

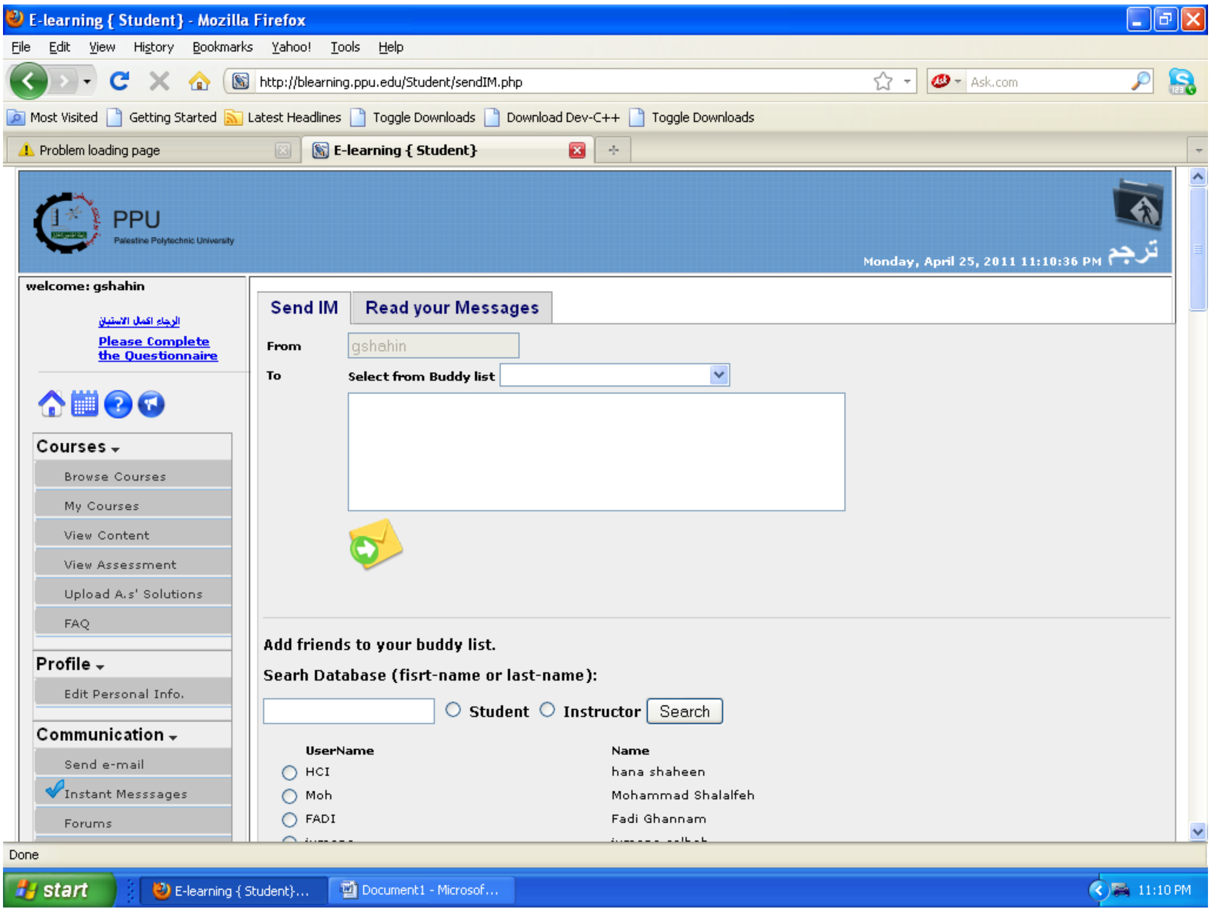


Figure E.27 Instant Messages: Search/Add Friends to List

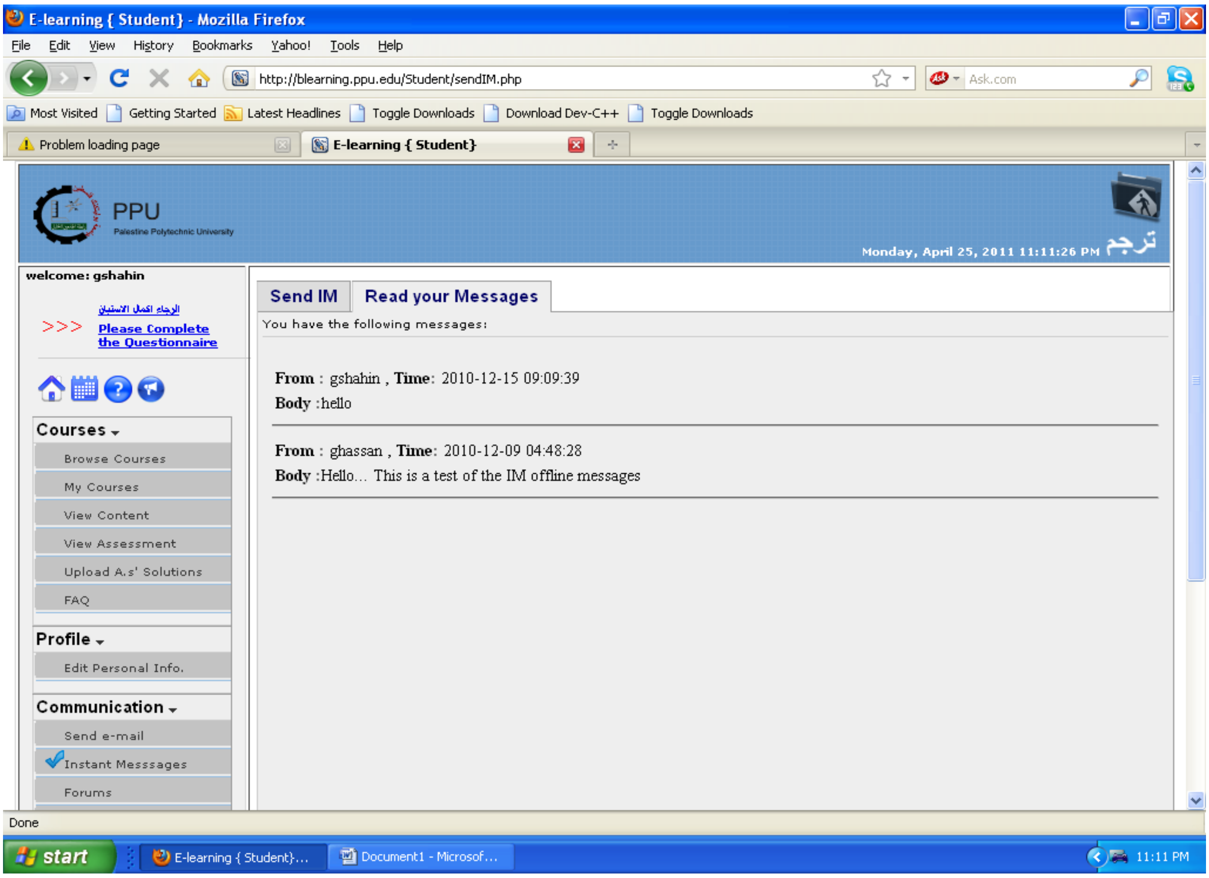


Figure E.28 Instant Messages: Reading Messages

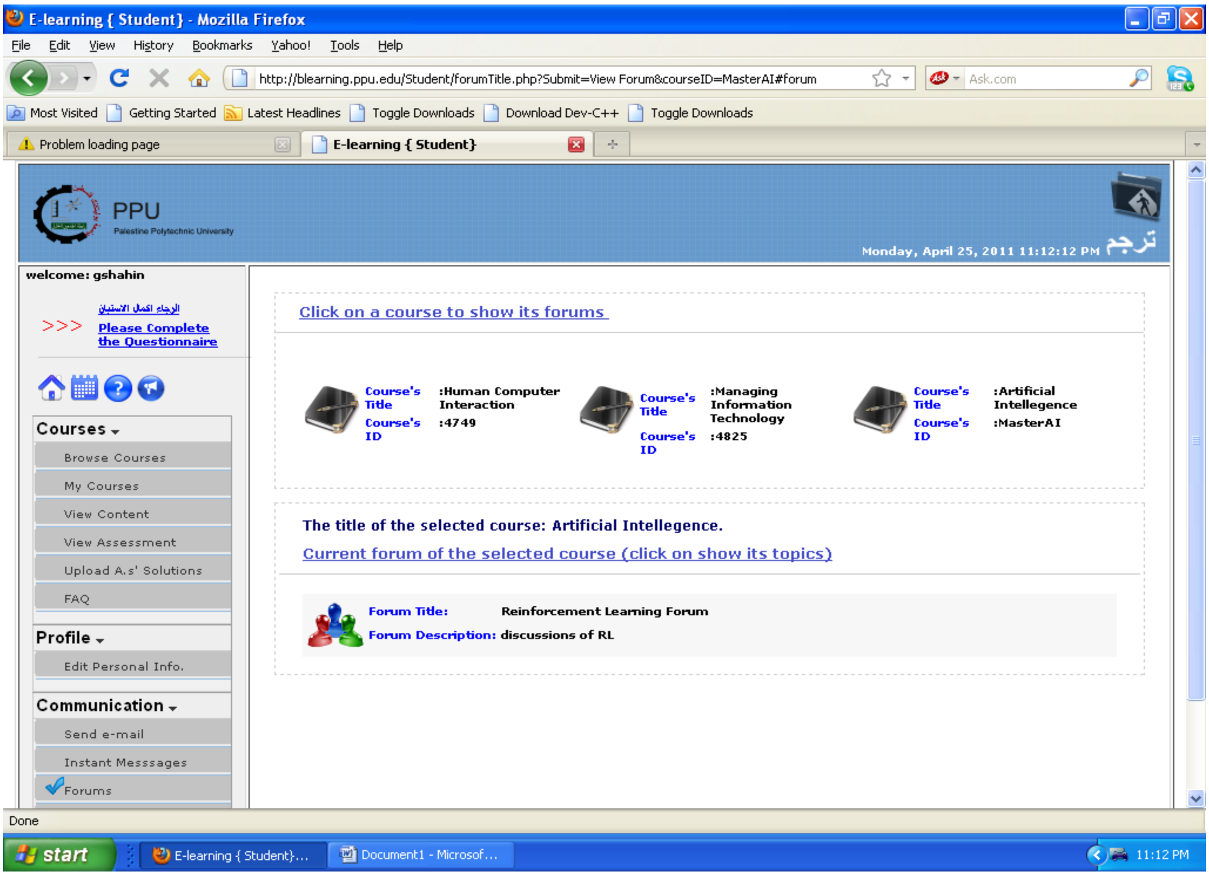


Figure E.29 Forums: Showing Forums of a Selected Course

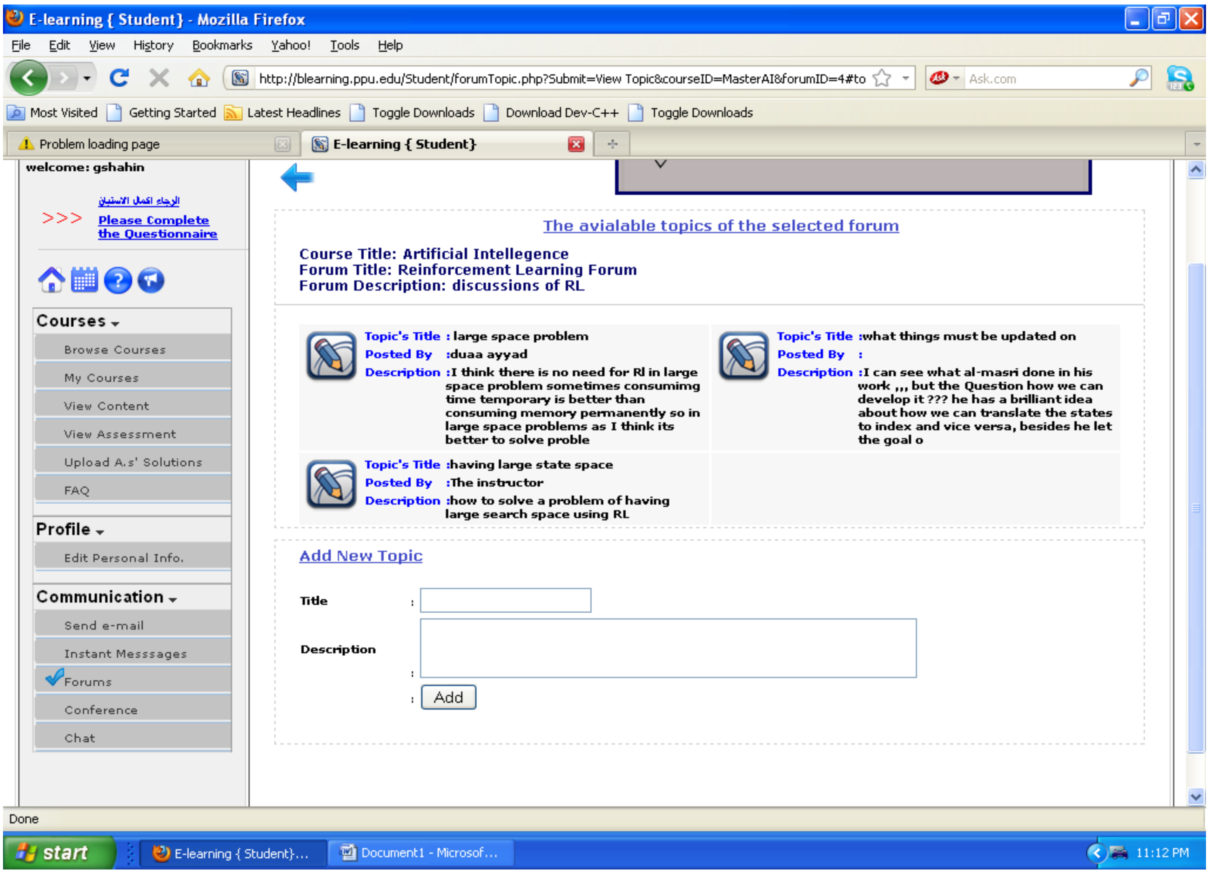


Figure E.30 Forums: Showing Available Topics (with Option to Add new Topic) in a Forum of a Selected Course

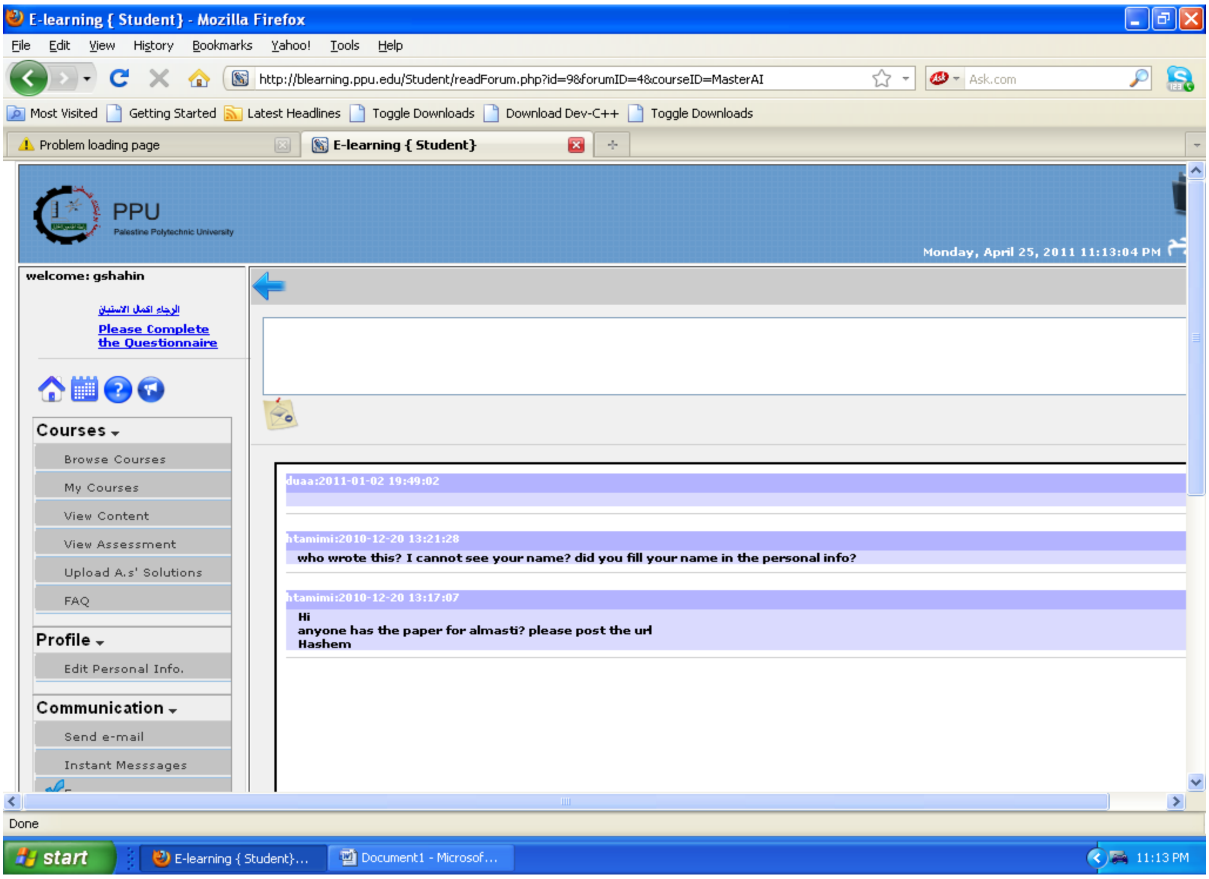


Figure E.31 Forums: Browsing Posts in Forum of a Selected Course

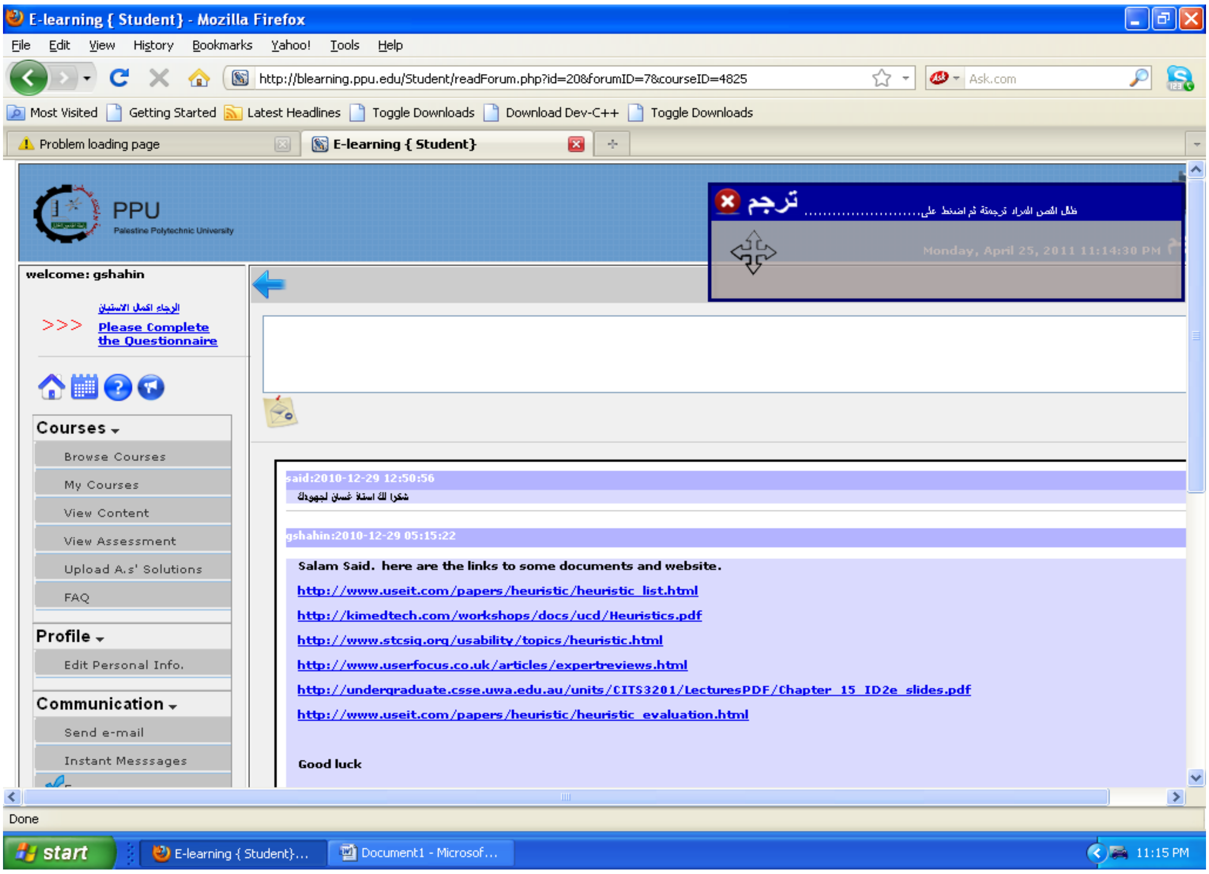


Figure E.32 Forums: Posting in Forum of a Selected Course

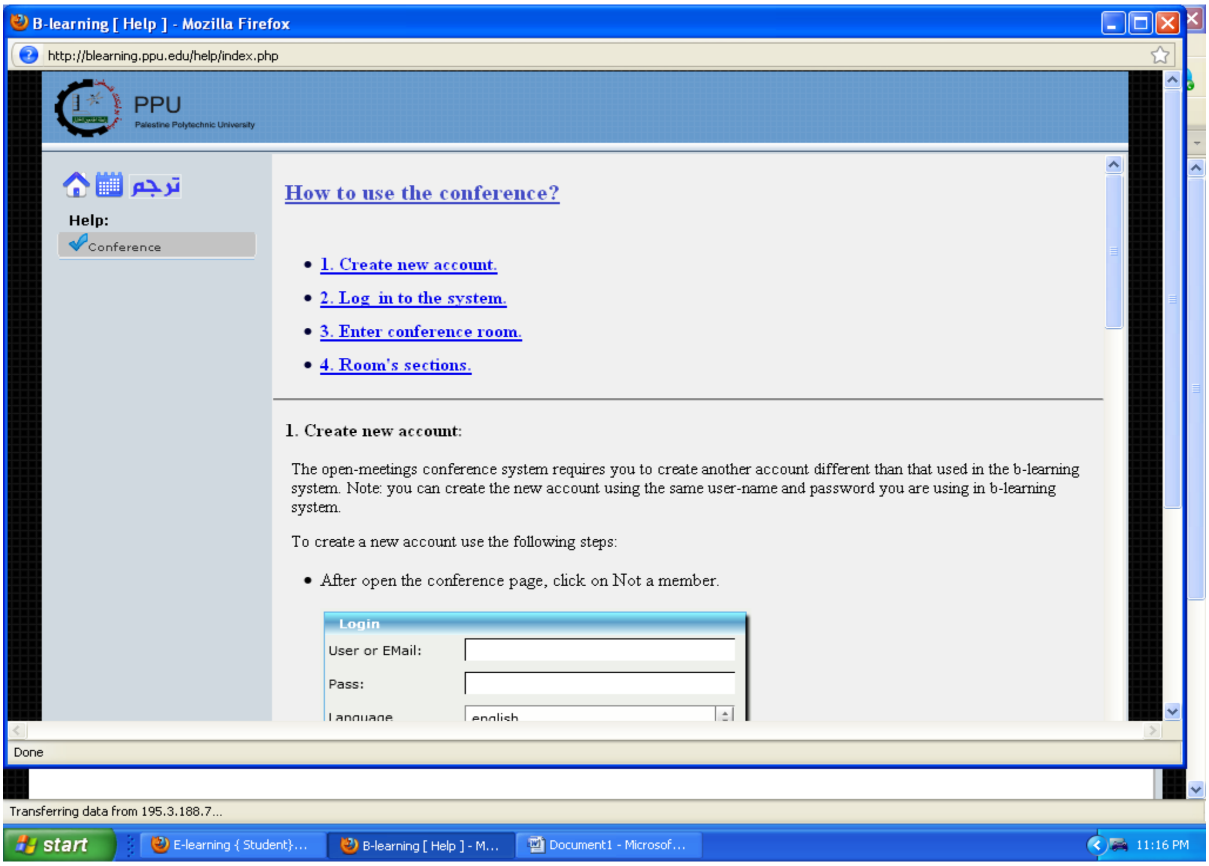


Figure E.33 Sample Help Screen

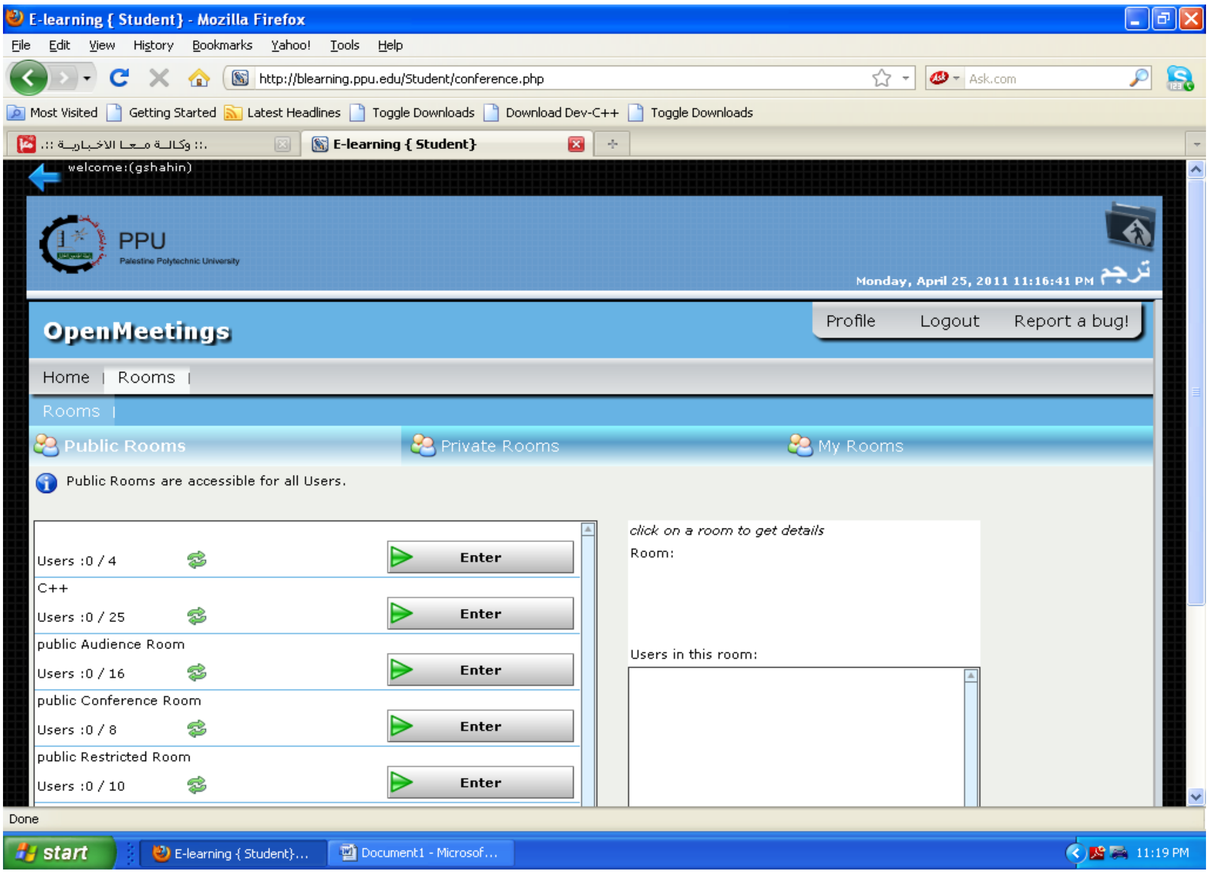


Figure E.34 Open Meetings: Selecting Room for Conferencing

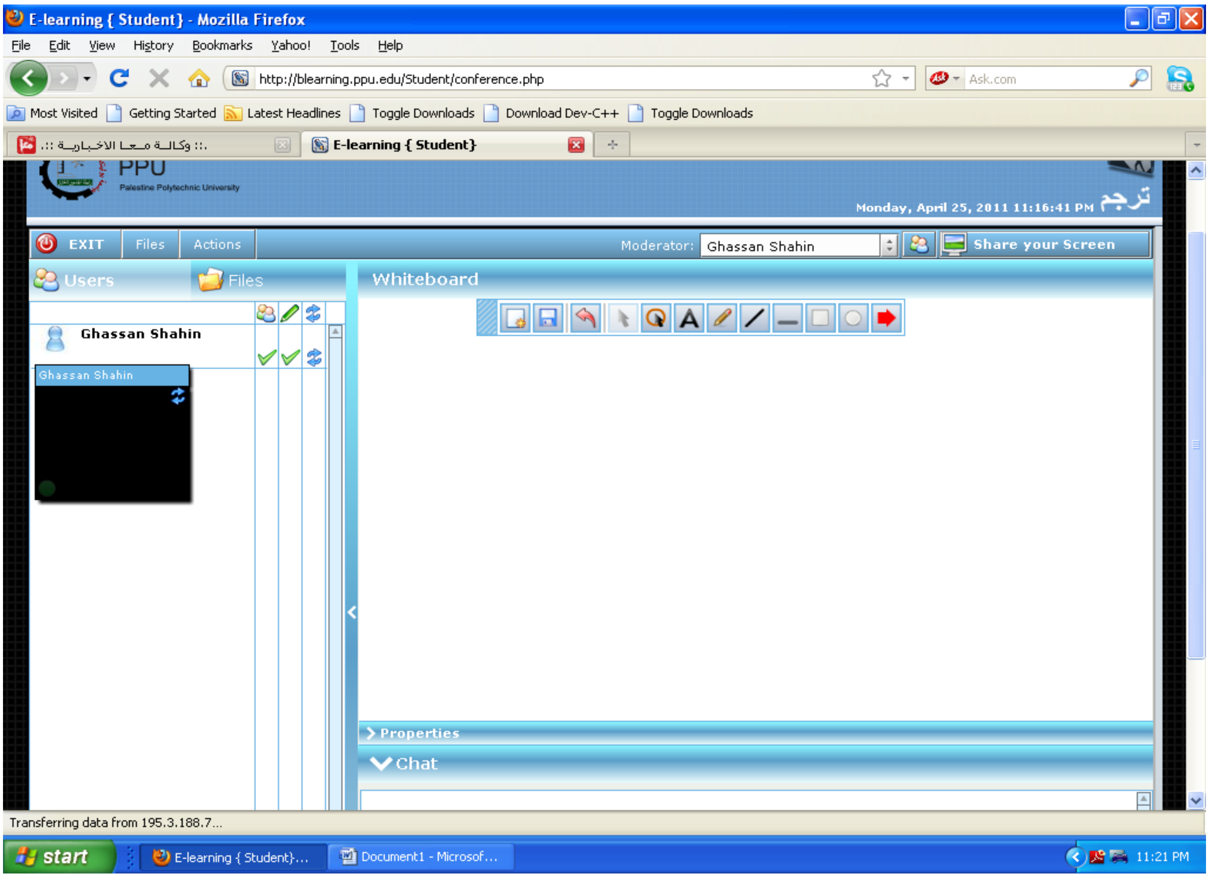


Figure E.35 Audio/Video Conference with Whiteboard

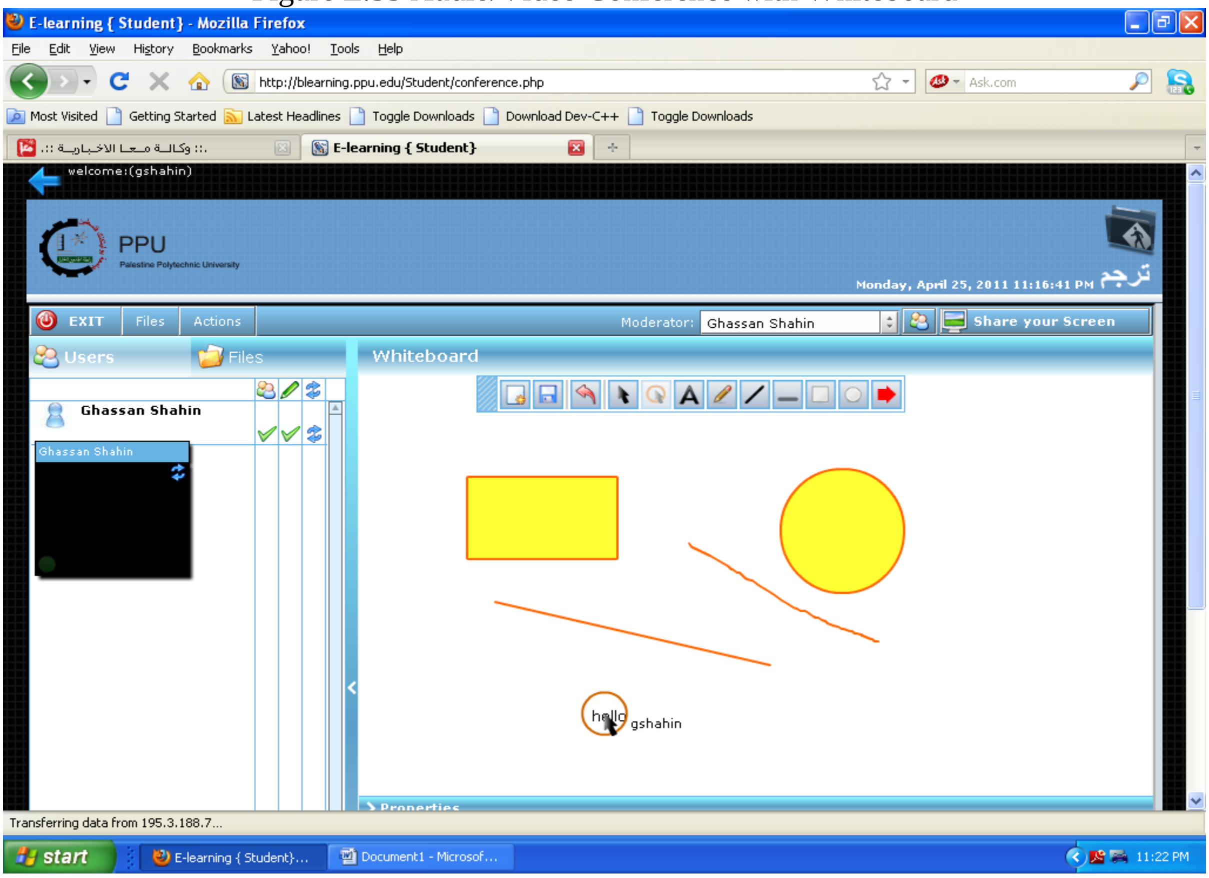


Figure E.36 Audio/Video Conference with Whiteboard in Action

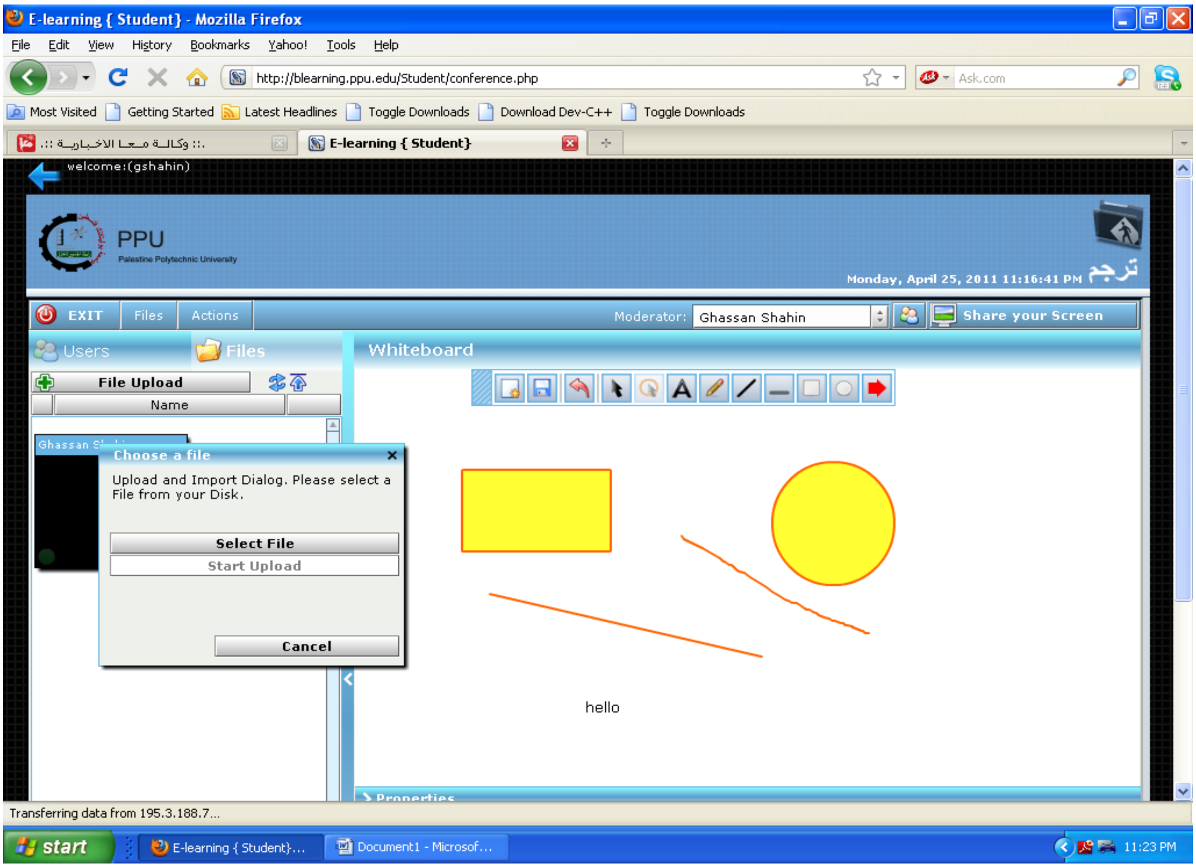


Figure E.37 Audio/Video Conference with Whiteboard in Action; Uploading File

VAK Learning Styles Self-Assessment Questionnaire

Circle or tick the answer that most represents how you generally behave.

(It's best to complete the questionnaire before reading the accompanying explanation.)

1. When I operate new equipment I generally: عندما اشغل حهاز/الة جديدة فانني اجمالا:
   a) read the instructions first اقرأ التعليمات اولا
   b) listen to an explanation from someone who has used it before
      استمع لشرح من شخص استعملها من قبل
   c) go ahead and have a go, I can figure it out as I use it
      احاول مباشرة لاني استطيع معرفة كيف تعمل مع الاستخدام

2. When I need directions for travelling I usually: عندما احتاج لمعرفة الاتجاهات لاجل التنقل فانني عادة
   a) look at a map انظر الى خارطة
   b) ask for spoken directions استعين بارشادات صوتية
   c) follow my nose and maybe use a compass اتبع احساسي وربما استعمل بوصلة

3. When I cook a new dish, I like to: عندما اطبخ طبق جديد افضل ان
   a) follow a written recipe اتباع وصفة مكتوبة
   b) call a friend for an explanation اتصل بصديق لاعطائي شرح للطريقة
   c) follow my instincts, testing as I cook اتبع غريزتي، واتفحص خلال الطبخ

4. If I am teaching someone something new, I tend to: عندما أعلم شخص شيئ جديد فانني اميل الى
   a) write instructions down for them كتابة التعليمات لهم
   b) give them a verbal explanation اعطائهم تعليمات لفظية
   c) demonstrate first and then let them have a go اعرض لهم ثم ادعهم يجربون

5. I tend to say: اميل عادة الى قول
   a) watch how I do it راقب كيف اقوم بعمل ذلك
   b) listen to me explain استمع لما اشرح
   c) you have a go بامكانك ان تجرب انت

6. During my free time I most enjoy: خلال وقت الفراغ فانني استمتع اكثر ب
   a) going to museums and galleries الذهاب الى المتاحف والمعارض
   b) listening to music and talking to my friends الاستماع والتحدث مع الاصدقاء
   c) playing sport or doing DIY(Do It Yourself) ممارسة الرياضة او القيام باعمال لي لا تحتاج الى
      متخصص للقيام بها

7. When I go shopping for clothes, I tend to: عند ذهابي لشراء الملابس فانني اميل الى
   a) imagine what they would look like on تخيل كيف ستبدو علي
   b) discuss them with the shop staff التحدث مع البائع بخصوصها
   c) try them on and test them out اقوم بقياسها وتجربتها

8. When I am choosing a holiday I usually: اذا اردت اختيار مكان لقضاء عطلة فانني بالعادة
   a) read lots of brochures اقرأ الكثير من النشرات
   b) listen to recommendations from friends استمع لنصائح وتوصيات الاصدقاء
   c) imagine what it would be like to be there اتخيل كيف سيكون شعوري عندما اكون في ذلك المكان

9. If I was buying a new car, I would: فيما لو اردت شراء سيارة فاني
   a) read reviews in newspapers and magazines سأقوم بقراءة الشروحات في الصحف والمجلات
   b) discuss what I need with my friends اتباحث فيما اريد مع الاصدقاء

c) test-drive lots of different types اجرب انواع وموديلات مختلفة

10. When I am learning a new skill, I am most comfortable: عندما اتعلم مهارة جديدة فانني اكون مرتاحا اكثر:
    a) watching what the teacher is doing مراقبة ما يقوم به المعلم
    b) talking through with the teacher exactly what I'm supposed to do اتحدث مع المعلم عن ماذا يتوجب علي عمله بالظبط
    c) giving it a try myself and work it out as I go اجرب بنفسي واتعرف عليها مع الوقت

11. If I am choosing food off a menu, I tend to: اذا ما قمت باختيار الطعام من قائمة الطعام، فانني اميل الى
    a) imagine what the food will look like اتخيل كيف سيبدو الطعام
    b) talk through the options in my head or with my partner اتحدث عن الخيارات المتاحة مع نفسي او مع شريكي
    c) imagine what the food will taste like اتخيل كيف سيكون مذاق الطعام

12. When I listen to a band, I can't help: عندما استمع لفرقة، فانني لا استطيع التوقف عن
    a) watching the band members and other people in the audience النظر الى اعضاء الفرقة والاشخاص الاخرين من جمهور الحاضرين
    b) listening to the lyrics and the beats الاستماع الى الكلمات والالحان
    c) moving in time with the music التحرك في الوقت المناسب مع الموسيقى

13. When I concentrate, I most often: عندما اكون في حالة تركيز فانني غالبا ما
    a) focus on the words or the pictures in front of me اركز بالكلمات او الصور التي امامي
    b) discuss the problem and the possible solutions in my head اناقش المسالة والحلول الممكنة مع ذاتي
    c) move around a lot, fiddle with pens and pencils and touch things اتحرك كثيرا في المكان، اكتب او أخط بالقلم واقوم بلمس الاشياء

14. I choose household furnishings because I like: اختار المفروشات والادوات المنزلية لاني احب
    a) their colours and how they look الوانها وكيف تبدو
    b) the descriptions the sales-people give me الوصف الذي قدمه البائع
    c) their textures and what it feels like to touch them مكوناتها والشعور المرافق لملامستها

15. My first memory is of: اول مايخطر ببالي (اتذكره جيدا) هو
    a) looking at something ما نظرت اليه
    b) being spoken to ما تم التحدث به الي
    c) doing something ما قمت بعمله

16. When I am anxious, I: عندما اكون منزعجا (متوترا) فاني
    a) visualise the worst-case scenarios اتخيل اسؤا الاسيناريوهات
    b) talk over in my head what worries me most اتحدث مع نفسي عما يزعجني
    c) can't sit still, fiddle and move around constantly لا استطيع المكوث جالسا، اتحرك عشوائيا وباستمرار

17. I feel especially connected to other people because of: اسعر بالقرب من الاشخاص الاخرين بسبب
    a) how they look كيف يبدون لي (منظرهم)
    b) what they say to me ما يقولونه لي
    c) how they make me feel كيف يجعلونني احس اتجاههم

18. When I have to revise for an exam, I generally: عندما اقوم بالمراجعة من اجل الامتحان فانني عموما
    a) write lots of revision notes and diagrams اكتب الكثير من الملاحظات والاشكال
    b) talk over my notes, alone or with other people اتحدث عن ملخصاتي اما منفردا او مع اشخاص اخرين
    c) imagine making the movement or creating the formula اتخيل القيام بحركة او ايجاد المعادلة (الصيغة)

19. If I am explaining to someone I tend to: عندما اقوم بالشرح فانني اميل الى ان
    a) show them what I mean اريهم ما اعنيه
    b) explain to them in different ways until they understand اشرح لهم بطرق مختلفة الى ان يفهموا المقصود

c) encourage them to try and talk them through my idea as they do it اشجعهم ليجربوا واتحدث اليهم عن الفكرة اثناء قيامهم بالعمل

20. I really love: حقيقة احب
   a) watching films, photography, looking at art or people watching مشاهدة الافلام والتصوير والرسومات ومشاهدة الناس
   b) listening to music, the radio or talking to friends الاستماع للموسيقى (الحان) او المذياع او التحدث مع الاصدقاء
   c) taking part in sporting activities, eating fine foods and wines or dancing الاشتراك في انشطة رياضية أوأكل وجبات لذيذة أوالرقص

21. Most of my free time is spent: معظم وقت فراغي اقضيه ب
   a) watching television مشاهدة التلفاز
   b) talking to friends التحدث مع الاصدقاء
   c) doing physical activity or making things القيام باتشطة بدنية او صنع اشياء

22. When I first contact a new person, I usually: عندما اتواصل مع شخص للمرة الاولى فانني عادة
   a) arrange a face to face meeting ارتب لقاء مباشر معهم
   b) talk to them on the telephone اتحدث معهم بواسطة الهاتف
   c) try to get together whilst doing something else, such as an activity or a meal احاول اللقاء معهم خلال القيام بعمل ما مثل نشاط ما او وجبة طعام

23. I first notice how people: اول ما الاحظه في الناس هو
   a) look and dress كيف يبدون لي وملابسهم
   b) sound and speak أصواتهم وكيف يتحدثون
   c) stand and move كيف يقفون ويتحركون

24. If I am angry, I tend to: عندما اغضب فانني اميل الى
   a) keep replaying in my mind what it is that has upset me اكرر مراجعة سبب الغضب مع نفسي
   b) raise my voice and tell people how I feel ارفع صوتي واخبر الناس عن شعوري
   c) stamp about, slam doors and physically demonstrate my anger اضرب بقدمي واغلق الابواب بعنف واظهر غضبي بوضوح

25. I find it easiest to remember: اجد ان اسهل شيئ لتذكره هو
   a) faces الوجوه
   b) Names الاسماء
   c) things I have done الاشياء التي قمت بعملها

26. I think that you can tell if someone is lying if: اعتقد انه يمكن ان تدرك ان احدهم يكذب اذا
   a) they avoid looking at you عندما يتحاشوا النظر اليك
   b) their voices changes عندما تتغير نبرة الصوت
   c) they give me funny vibes عندما يظهروا لي ويقوموا بافعال مضحكة

27. When I meet an old friend: عندما التقي بصديق قديم
   a) I say "it's great to see you!" اقول " شيء رائع ان اراك"
   b) I say "it's great to hear from you!" اقول " شيء رائع ان اسمع منكم"
   c) I give them a hug or a handshake اضمهم او اصافحهم

28. I remember things best by: اتذكر الاشياء بشكل افضل عن طريق
   a) writing notes or keeping printed details كتابة ملاحظات او الاحتفاظ بتفاصيل مكتوبة
   b) saying them aloud or repeating words and key points in my head التحدث بها بصوت مرتفع او تكرار الكلمات والامور الهامة براسي
   c) doing and practising the activity or imagining it being done عمل او ممارسة النشاط او تخيل انه ينجز

29. If I have to complain about faulty goods, I am most comfortable: اذا اردت ان اشتكي بخصوص خلل في منتج ، فانا اكون مرتاحا اكثر:
   a) writing a letter كتابة رسالة

b) complaining over the phone تقديم شكوى عن طريق الهاتف
c) taking the item back to the store or posting it to head office اخذ المنتج الى المحل او ارساله بالبريد الى المكتب الرئيسي

30. I tend to say: اميل الى قول
a) I see what you mean ارى ما تعنيه
b) I hear what you are saying اسمع ما تقول
c) I know how you feel اعرف كيف تشعر

Now add up how many A’s, B’s and C’s you selected.

A’s = B’s = C’s =

If you chose mostly A’s you have a **VISUAL** learning style.

If you chose mostly B’s you have an **AUDITORY** learning style.

If you chose mostly C’s you have a **KINAESTHETIC** learning style.

Some people find that their learning style may be a blend of two or three styles, in this case read about the styles that apply to you in the explanation below.

When you have identified your learning style(s), read the learning styles explanations and consider how this might help you to identify learning and development that best meets your preference(s).

Now see the VAK Learning Styles Explanation.

VAK Learning Styles Explanation

The VAK learning styles model suggests that most people can be divided into one of three preferred styles of learning. These three styles are as follows, (and there is no right or wrong learning style):

- Someone with a **Visual** learning style has a preference for seen or observed things, including pictures, diagrams, demonstrations, displays, handouts, films, flip-chart, etc. These people will use phrases such as ‘show me’, ‘let’s have a look at that’ and will be best able to perform a new task after reading the instructions or watching someone else do it first. These are the people who will work from lists and written directions and instructions.

- Someone with an **Auditory** learning style has a preference for the transfer of information through listening: to the spoken word, of self or others, of sounds and noises. These people will use phrases such as ‘tell me’, ‘let’s talk it over’ and will be best able to perform a new task after listening to instructions from an expert. These are the people who are happy being given spoken instructions over the telephone, and can remember all the words to songs that they hear!

- Someone with a **Kinaesthetic** learning style has a preference for physical experience - touching, feeling, holding, doing, practical hands-on experiences. These people will use phrases such as ‘let me try’, ‘how do you feel?’ and will be best able to perform a new task by going ahead and trying it out, learning as they go. These are the people who like to experiment, hands-on, and never look at the instructions first!

People commonly have a main preferred learning style, but this will be part of a blend of all three. Some people have a very strong preference; other people have a more even mixture of two or less commonly, three styles.

When you know your preferred learning style(s) you understand the type of learning that best suits you. This enables you to choose the types of learning that work best for you.

There is no right or wrong learning style. The point is that there are types of learning that are right for your own preferred learning style.

Please note that this is not a scientifically validated testing instrument – it is a free assessment tool designed to give a broad indication of preferred learning style(s).

More information about learning styles, personality, and personal development is at www.businessballs.com.

With acknowledgements to Victoria Chislett for developing this assessment.

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APPENDIX F

Table F.1: Reliability of the Likert Scale Items

Item	Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
B1	I can reach the web environment wherever I want	319.58	4833.014	.408	.984
B2	I find the web site clear.	319.35	4804.829	.584	.984
B3	I can use the forum easily.	319.92	4781.184	.709	.984
B4	I can use the Chat easily.	319.98	4792.829	.634	.984
B5	I can use the Conference easily.	320.00	4854.681	.408	.984
B6	I can use the IM easily.	319.52	4803.574	.650	.984
B7	I can use the "View Assessment" easily	319.63	4799.984	.644	.984
B8	I can use "Assessment Solution" easily	319.65	4827.042	.566	.984
B9	The system is easy to use	319.40	4798.159	.702	.984
B10	The system is user-friendly	319.50	4784.383	.718	.984
B11	The system makes it easy for me to find the content I need	319.31	4792.858	.782	.984
B12	The system makes it easy for me to discuss questions with other students.	319.52	4788.893	.765	.984
B13	The system makes it easy for me to discuss questions with my lecturer	319.52	4775.234	.765	.984
B14	The communications and interactions in the web environment is enough for me	319.94	4808.698	.676	.984
B15	I can share my thoughts and experiences with my colleagues through the communication methods (Forum, Chat, IM, Email, and Conference).	319.63	4793.516	.687	.984

Table F.1, Continue

Item	Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
B16	My lecturer gives feedback through the web (Forum, Conference …) about my questions; inquiries etc	319.17	4797.589	.632	.984
B17	The communication methods available are supportive and help me reinforce what I have learned.	319.17	4806.738	.721	.984
B18	The quality of the interactions, through the web, between the lecturer and learners is good	319.40	4799.180	.799	.984
B19	The possibility to interact with the lecturer and with the other students is good.	319.31	4791.709	.797	.984
B20	I can flexibly communicate/ interact with my lecturer in a convenient manner 24/7.	319.73	4784.925	.712	.984
B21	I can flexibly communicate/ interact with learners in a convenient manner 24/7.	319.69	4798.475	.731	.984
B22	I am satisfied with the cooperation and collaboration environment among learners which the model offers.	319.65	4765.766	.776	.984
B23	The quality of the face-to-face interaction (in this model) between lecturer and learners is good	319.71	4796.126	.817	.984
B24	The quality of the face-to-face interaction (in this model) between learners themselves is good	319.60	4765.351	.861	.984
B25	Sharing and discussion environment in face to face sessions (in this model) are good.	319.42	4800.716	.694	.984
B26	The teacher completes missing subjects during the face-to-face sessions of this model.	319.31	4797.496	.695	.984
B27	Generally, I can find the answers to my questions during the face-to-face sessions of this model.	319.73	4769.521	.828	.984

Table F.1, Continue

Item	Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
B28	To learn through website makes me responsible for the course and motivates me to attend the course.	319.58	4749.014	.821	.984
B29	To learn the subject through this model is much more interesting than other methods.	319.67	4776.014	.805	.984
B30	By following this model, I can study at my own pace	319.48	4788.808	.746	.984
B31	The model enables me to learn the content I need	319.42	4796.376	.782	.984
B32	The model enables me to choose what I want to learn	319.35	4778.872	.766	.984
B33	The Web environment helps us prepare for the course.	319.27	4761.436	.738	.984
B34	I can study over and over again in the web environment (system).	319.52	4781.872	.709	.984
B35	My motivation is high while I am studying on the web (System)	319.56	4785.400	.764	.984
B36	This model motivates me to study.	319.63	4758.324	.817	.984
B37	This model allows me to play a more active role in learning	319.33	4804.440	.693	.984
B38	I enjoyed learning through this model.	319.83	4757.206	.828	.984
B39	I felt more comfortable communicating with the lecturer through this model than traditional system.	319.83	4764.993	.806	.984
B40	I felt more comfortable communicating with peer students through this model than traditional system.	319.75	4784.149	.796	.984
B41	This model provides a satisfying learning experience.	319.60	4781.648	.772	.984
B42	This model is more satisfying than most other methods.	319.73	4766.159	.836	.984
B43	The model meets all my learning needs	319.56	4802.549	.686	.984
B44	To use the system, I do not need additional technical skills	319.48	4844.383	.487	.984

Table F.1, Continue

Item	Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
B45	While using the system, I do not need much technical support	319.60	4826.372	.589	.984
B46	The workload, in comparison to the traditional classroom mode, is lower.	319.50	4856.766	.453	.984
B47	This model gives me flexibility for study time.	319.25	4830.787	.557	.984
B48	My schedule is more flexible because of this model.	319.38	4827.133	.524	.984
B49	This model decreases the need to attend f-2-f classes and saves some of my time	319.29	4818.424	.562	.984
B50	This model is more convenient for my study time	319.33	4817.801	.661	.984
B51	If this model is applied for all courses, I think it will decrease my transportation cost.	318.85	4844.340	.469	.984
B52	If this model is applied for all courses, I think it will decrease my daily expenses.	318.90	4837.755	.549	.984
B53	Content types (text, audio, video …) available are sufficient for me.	319.60	4803.266	.725	.984
B54	Content types (text, audio, video, …) available are suitable for me.	319.52	4792.595	.798	.984
B55	Content types (text, audio, video, …) available meet my needs	319.48	4817.617	.743	.984
B56	Contents on the web support other text-based contents	319.63	4802.112	.808	.984
B57	The Learning Style Test (LST) helped me improve my learning	319.63	4826.197	.708	.984
B58	The LST helped me choose suitable contents for my Learning Style (LS).	319.56	4802.677	.731	.984
B59	The LST helped me choose suitable communication method(s) for my LS.	319.50	4820.638	.673	.984

Table F.1, Continue

Item	Question	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
B60	Teaching approaches used in this model are suitable to my LS	319.75	4785.894	.707	.984
B61	Knowing my LS increased my satisfaction with learning	319.44	4805.400	.713	.984
B62	I would be more satisfied if there is a bilingual feature (Arabic/English) in the system.	318.88	4839.686	.589	.984
B63	There are advantages to learn through this model	319.27	4827.095	.727	.984
B64	Using this model, I feel I can retain information and knowledge better than using traditional system.	319.13	4814.750	.745	.984
B65	I do not need to change my connection speed to use the system.	319.10	4796.691	.561	.984
B66	I do not need to buy additional hardware to use the system	318.92	4810.546	.567	.984
B67	The model can be applied to all courses	319.21	4816.381	.557	.984
B68	If this model is to be applied/used in the future (next semester onward), I would like to use it	319.13	4806.750	.655	.984

Table F.2 Description of Items with their Mean, Standard Deviation, and Percentages of all Frequencies of Answers

Item	Description	N	Mean	Std. Dev.	Percentages of all Frequencies of Answers							
					CD	D	SHD	N	SHA	A	CA	Missing
B1	I can reach the web environment wherever I want	57	4.46	1.937	12.3	5.3	8.8	24.6	17.5	10.5	21.1	0
B2	I find the web site clear.	57	4.84	1.623	3.5	3.5	14	21.1	19.3	19.3	19.3	0
B3	I can use the forum easily.	57	4.28	1.544	1.8	17.5	10.5	19.3	28.1	17.5	5.3	0
B4	I can use the Chat easily.	57	4.32	1.638	3.5	17.5	.35	28.1	24.1	12.3	10.5	0
B5	I can use the Conference easily.	56	4.21	1.486	3.5	12.3	10.5	28.1	28.1	8.8	7	1.8
B6	I can use the IM easily.	56	4.75	1.468	3.5	7	5.3	21.1	24.6	31.6	5.3	1.8
B7	I can use the “View Assessment” easily	57	4.56	1.690	7	8.8	8.8	14	28.1	24.6	8.8	0
B8	I can use “Assessment Solution” easily	55	4.64	1.458	1.8	7	14	15.8	28.1	22.8	7	3.5
B9	The system is easy to use	56	4.75	1.455	0	7	12.3	24.6	22.8	17.5	14	1.8
B10	The system is user-friendly	57	4.67	1.574	3.5	8.8	7	22.8	26.3	19.3	12.3	0
B11	The system makes it easy for me to find the content I need	56	4.82	1.390	0	0	22.8	17.5	29.8	10.5	17.5	1.8
B12	The system makes it easy for me to discuss questions with other students.	56	4.66	1.456	0	7	15.8	22.8	22.8	17.5	12.3	1.8
B13	The system makes it easy for me to discuss questions with my lecturer	56	4.66	1.564	1.8	3.5	21.1	21.1	21.1	12.3	17.5	1.8
B14	The communications and interactions in the web environment is enough for me	56	4.32	1.377	0	10.5	15.8	29.8	22.8	12.3	7	1.8
B15	I can share my thoughts and experiences with my colleagues through the communication methods (Forum, Chat, IM, Email, and Conference).	56	4.45	1.548	1.8	10.5	15.8	21.1	21.1	19.3	8.8	1.8

Legend: CD: completely disagree, D: disagree, SHD: somehow disagree, N: neutral, SHA: somehow agree, A: agree, CA: completely agree.

Table F.2, Continue

Item	Description	N	Mean	Std. Dev.	Percentages of all Frequencies of Answers							
					CD	D	SHD	N	SHA	A	CA	Missing
B16	My lecturer gives feedback through the web (Forum, Conference …) about my questions; inquiries etc	56	4.95	1.612	1.8	7	8.8	19.3	24.6	14	22.8	1.8
B17	The communication methods available are supportive and help me reinforce what I have learned.	55	5.02	1.340	0	1.8	12.3	19.3	29.8	15.8	17.5	3.5
B18	The quality of the interactions, through the web, between the lecturer and learners is good	55	4.76	1.276	0	1.8	19.3	15.8	29.8	22.8	7	3.5
B19	The possibility to interact with the lecturer and with the other students is good.	55	4.87	1.389	0	7	7	22.8	26.3	21.1	12.3	3.5
B20	I can flexibly communicate/ interact with my lecturer in a convenient manner 24/7.	55	4.36	1.556	1.8	10.5	17.5	21.1	22.8	12.3	10.5	3.5
B21	I can flexibly communicate/ interact with learners in a convenient manner 24/7.	55	4.51	1.399	0	12.3	10.5	19.3	28.1	22.8	3.5	3.5
B22	I am satisfied with the cooperation and collaboration environment among learners which the model offers.	55	4.60	1.547	5.3	1.8	15.8	21.1	21.1	22.8	8.8	3.5
B23	The quality of the face-to-face interaction (in this model) between lecturer and learners is good	55	4.45	1.274	0	3.5	19.3	35.1	10.5	24.6	3.5	3.5
B24	The quality of the face-to-face interaction (in this model) between learners themselves is good	55	4.56	1.450	0	7	19.3	19.3	24.6	15.8	10.5	3.5
B25	Sharing and discussion environment in face to face sessions (in this model) are good.	55	4.75	1.430	0	7	12.3	22.8	21.1	22.8	10.5	3.5
B26	The teacher completes missing subjects during the face-to-face sessions of this model.	55	4.85	1.508	0	7	12.3	15.8	35.1	5.3	21.1	3.5
B27	Generally, I can find the answers to my questions during the face-to-face sessions of this model.	55	4.47	1.489	0	10.5	17.5	17.5	28.1	12.3	10.5	3.5

Legend: CD: completely disagree, D: disagree, SHD: somehow disagree, N: neutral, SHA: somehow agree, A: agree, CA: completely agree.

Table F.2, Continue

Item	Description	N	Mean	Std. Dev.	Percentages of all Frequencies of Answers							
					CD	D	SHD	N	SHA	A	CA	Missing
B28	To learn through website makes me responsible for the course and motivates me to attend the course.	55	4.69	1.632	0	14	7	21.1	26.3	8.8	19.3	3.5
B29	To learn the subject through this model is much more interesting than other methods.	55	4.60	1.461	3.5	5.3	8.8	26.3	26.3	17.5	8.8	3.5
B30	By following this model, I can study at my own pace	55	4.78	1.410	0	7	8.8	24.6	28.1	14	14	3.5
B31	The model enables me to learn the content I need	55	4.85	1.283	0	0	19.3	17.5	28.1	21.1	10.5	3.5
B32	The model enables me to choose what I want to learn	55	4.98	1.509	0	1.8	21.1	12.3	26.3	12.3	22.8	3.5
B33	The Web environment helps us prepare for the course.	54	4.98	1.699	7	1.8	3.5	19.3	29.8	8.8	24.6	5.3
B34	I can study over and over again in the web environment (system).	54	4.65	1.556	1.8	7	12.3	26.3	14	21.1	12.3	5.3
B35	My motivation is high while I am studying on the web (System)	54	4.69	1.438	0	7	12.3	22.8	28.1	10.5	14	5.3
B36	This model motivates me to study.	54	4.61	1.571	1.8	7	14	24.6	17.5	15.8	14	5.3
B37	This model allows me to play a more active role in learning	54	4.85	1.393	3.5	0	10.5	21.1	28.1	21.1	10.5	5.3
B38	I enjoyed learning through this model.	54	4.44	1.562	3.5	8.8	14	19.3	19.3	24.6	5.3	5.3
B39	I felt more comfortable communicating with the lecturer through this model than traditional system.	54	4.28	1.630	5.3	7	17.5	24.6	17.5	12.3	10.5	5.3
B40	I felt more comfortable communicating with peer students through this model than traditional system.	54	4.43	1.409	1.8	0	28.1	24.6	15.8	15.8	8.8	5.3
B41	This model provides a satisfying learning experience.	54	4.61	1.459	1.8	5.3	14	22.8	24.6	15.8	10.5	5.3
B42	This model is more satisfying than most other methods.	54	4.44	1.488	0	10.5	15.8	22.8	22.8	12.3	10.5	5.3
B43	The model meets all my learning needs	54	4.61	1.406	0	7	12.3	29.8	15.8	21.1	8.8	5.3

Legend: CD: completely disagree, D: disagree, SHD: somehow disagree, N: neutral, SHA: somehow agree, A: agree, CA: completely agree.

Table F.2, Continue

Item	Description	N	Mean	Std. Dev.	Percentages of all Frequencies of Answers							
					CD	D	SHD	N	SHA	A	CA	Missing
B44	To use the system, I do not need additional technical skills	54	4.70	1.487	1.8	8.8	5.3	21.1	35.1	8.8	14	5.3
B45	While using the system, I do not need much technical support	54	4.65	1.362	1.8	3.5	14	19.3	33.3	14	8.8	5.3
B46	The workload, in comparison to the traditional classroom mode, is lower	54	4.70	1.312	0	3.5	12.3	29.8	22.8	15.8	10.5	5.3
B47	This model gives me flexibility for study time.	54	5.02	1.421	0	3.5	8.8	28.1	14	22.8	17.5	5.3
B48	My schedule is more flexible because of this model.	54	4.91	1.521	3.5	0	12.3	22.8	21.1	17.5	17.5	5.3
B49	This model decreases the need to attend f-2-f classes and saves some of my time	54	4.83	1.526	1.8	5.3	12.3	17.5	22.8	21.1	14	5.3
B50	This model is more convenient for my study time	54	4.85	1.338	1.8	3.5	10.5	14	33.3	24.6	7	5.3
B51	If this model is applied for all courses, I think it will decrease my transportation cost.	54	5.35	1.532	0	5.3	7	17.5	12.3	24.6	28.1	5.3
B52	If this model is applied for all courses, I think it will decrease my daily expenses.	54	5.24	1.413	0	3.5	8.8	15.8	21.1	24.6	21.1	5.3
B53	Content types (text, audio, video …) available are sufficient for me.	54	4.61	1.420	0	8.8	12.3	22.8	21.1	22.8	7	5.3
B54	Content types (text, audio, video, …) available are suitable for me.	54	4.72	1.323	0	5.3	12.3	24.6	19.3	28.1	5.3	5.3
B55	Content types (text, audio, video, …) available meet my needs	54	4.80	1.234	0	1.8	14	24.6	21.1	28.1	5.3	5.3
B56	Contents on the web support other text-based contents	53	4.70	1.249	1.8	0	14	22.8	31.6	15.8	7	7
B57	The Learning Style Test (LST) helped me improve my learning	54	4.57	1.159	0	1.8	14	33.3	24.6	15.8	5.3	5.3

Legend: CD: completely disagree, D: disagree, SHD: somehow disagree, N: neutral, SHA: somehow agree, A: agree, CA: completely agree.

Table F.2, Continue

Item	Description	N	Mean	Std. Dev.	Percentages of all Frequencies of Answers							
					CD	D	SHD	N	SHA	A	CA	Missing
B58	The LST helped me choose suitable contents for my Learning Style (LS).	54	4.70	1.341	1.8	0	14	29.8	24.6	12.3	12.3	5.3
B59	The LST helped me choose suitable communication method(s) for my LS.	54	4.67	1.274	0	1.8	17.5	24.6	26.3	15.8	8.8	5.3
B60	Teaching approaches used in this model are suitable to my LS	54	4.41	1.596	5.3	3.5	21.1	17.5	21.1	17.5	8.8	5.3
B61	Knowing my LS increased my satisfaction with learning	54	4.80	1.392	1.8	0	17.5	21.1	21.1	22.8	10.5	5.3
B62	I would be more satisfied if there is a bilingual feature (Arabic/English) in the system.	54	5.37	1.248	0	0	7	19.3	21.1	26.3	21.1	5.3
B63	There are advantages to learn through this model	54	5.00	1.197	0	0	10.5	24.6	24.6	24.6	10.5	5.3
B64	Using this model, I feel I can retain information and knowledge better than using traditional system.	54	5.09	1.248	0	0	12.3	17.5	28.1	22.8	14	5.3
B65	I do not need to change my connection speed to use the system.	55	5.13	1.764	5.3	7	5.3	8.8	19.3	28.1	22.8	3.5
B66	I do not need to buy additional hardware to use the system	55	5.36	1.591	3.5	3.5	5.3	8.8	24.6	22.8	28.1	3.5
B67	The model can be applied to all courses	55	4.89	1.663	1.8	8.8	10.5	15.8	19.3	21.1	19.3	3.5
B68		55	5.05	1.568	1.8	5.3	8.8	17.5	21.1	21.1	21.1	3.5

Legend: CD: completely disagree, D: disagree, SHD: somehow disagree, N: neutral, SHA: somehow agree, A: agree, CA: completely agree.

APPENDIX G

Detailed descriptive statistics of questionnaire two on model evaluation.

Question	1	2	3	4	5	6	7	8	9	10	11
Mean	**4.25**	**3.98**	**3.83**	**3.87**	**3.73**	**3.98**	**3.97**	**3.75**	**3.78**	**4.00**	**4.33**
SD	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
D	2%	3%	7%	5%	8%	5%	7%	3%	3%	3%	0%
N	7%	18%	27%	27%	25%	20%	13%	37%	33%	18%	5%
A	57%	55%	43%	45%	52%	47%	57%	42%	45%	53%	57%
SA	35%	23%	23%	23%	15%	28%	23%	18%	18%	25%	38%

Question	12	13	14	15	16	17	18	19	20	21	22
Mean	**4.32**	**4.05**	**3.97**	**4.15**	**4.20**	**4.17**	**3.67**	**4.17**	**4.03**	**4.07**	**3.90**
SD	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**2%**	**0%**	**0%**	**0%**	**0%**
D	2%	2%	3%	2%	3%	3%	17%	2%	5%	3%	3%
N	2%	20%	23%	10%	13%	17%	17%	15%	17%	20%	28%
A	60%	50%	47%	60%	43%	40%	43%	45%	45%	40%	43%
SA	37%	28%	27%	28%	40%	40%	22%	35%	30%	33%	25%

Question	23	24	25	26	27	28	29	30	31	32	33
Mean	**3.82**	**3.78**	**4.38**	**4.18**	**4.29**	**4.07**	**4.34**	**3.95**	**4.38**	**4.10**	**4.47**
SD	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
D	5%	3%	2%	0%	0%	2%	3%	5%	0%	0%	0%
N	25%	28%	5%	17%	10%	18%	8%	20%	10%	18%	3%
A	53%	53%	47%	48%	48%	48%	38%	48%	42%	53%	47%
SA	17%	13%	47%	35%	38%	28%	48%	25%	48%	28%	50%

Question	34	35	36	37	38	39	40	41	42	43	44
Mean	**4.23**	**4.52**	**4.33**	**4.60**	**4.37**	**4.55**	**4.30**	**4.31**	**4.08**	**4.43**	**3.98**
SD	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**2%**	**2%**	**0%**	**0%**
D	0%	0%	0%	0%	0%	0%	0%	2%	7%	0%	2%
N	13%	2%	5%	2%	3%	5%	10%	10%	13%	13%	23%
A	50%	45%	57%	37%	57%	35%	50%	37%	37%	30%	50%
SA	37%	53%	38%	62%	40%	60%	40%	48%	40%	57%	25%

Question	45	46	47	48	49	50	51	52	53	
Mean	**4.33**	**4.15**	**4.52**	**4.27**	**4.48**	**4.27**	**4.25**	**4.22**	**4.08**	**4.16**
SD	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	
D	0%	2%	0%	0%	0%	2%	7%	7%	5%	
N	12%	17%	3%	15%	7%	10%	5%	3%	15%	
A	43%	47%	42%	43%	38%	48%	45%	52%	47%	
SA	45%	35%	55%	42%	55%	40%	43%	38%	33%	

APPENDIX H

List of Publications:

1. **Shahin, G., Singh, D., and Wah, T. "Barriers to Implementation of E-learning in Traditional Universities: a Palestinian Faculty Perspective", submitted in revised form to an ISI Journal, waiting acceptance.**

2. **Shahin, G., Singh, D., and Wah, T. (2007), AN ACTIVITY-LEVEL INTERNET-BASED E-LEARNING MODEL FOR UNIVERSITY LEVEL COURSES**, *International Journal of the Computer, the Internet and Management, Special Issue Vol. 15, No. SP4, November 2007, Online at http://www.ijcim.th.org/v15nSP4/P28SEARCC_AnActivityLevelInternetBased.pdf*

3. **Shahin, G. and Singh, D. (2007), Perceptions of Faculty Members at Palestinian Universities Towards E-Learning,** *UiTM Conference on E-Learning 2007*, UiTM, Shah Alam, Selangor, Malaysia, 12-14 December 2007 (CD publication)

4. **Shahin, G. Singh, D., and Wah, T. (2007), Factors in Blended Learning in Higher Education,** In Proceedings of *APRU Distance Learning and the Internet Conference 2007*, 12-15 December 2007, Chulalongkorn University, Bangkok, Thailand, pg 104-110.

5. **Shahin, G., Singh, D., and Wah, T. (2007), AN ACTIVITY-LEVEL INTERNET-BASED E-LEARNING MODEL FOR UNIVERSITY LEVEL COURSES**, in Proceedings of 24th South East Asia Regional Computer Conference - SEARCC07, 18-19 November, 2007, Bangkok, Thailand, pg 28.1-28.8, Online at http://www.searcc07.com/SEARCC07/Proceedings/P28SEARCC_AnActivityLevelInternetBased.pdf

Two more papers are being written to be submitted to ISI journals soon.