Technology Applications in Education: Electronic systems (E-systems) to improve curriculum management

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Abstract

Leaders need alternative programs to support the rapid development of curriculum and teachers need online learning activities to support their classroom teaching. This dissertation reports an initial study in a long-term research agenda for developing an online curriculum.

The primary purpose of the study is to explore student and faculty perceptions of an online curriculum to help decision-makers and researchers determine whether they would pursue the use of such a tool to support online curriculum development. The secondary purpose of the study is to generate design knowledge to inform future development of, and research on, this or similar curriculum development. The methodology of this study includes three components: development research, rapid prototyping, and qualitative methods. Development research and rapid prototyping provided a three-stage framework for this study: conceptualization, development, and research.

I synthesized the literature to create conceptual models of an Online Curriculum Framework (OCF) at the conceptualization stage, built a prototype to implement the models at the development stage, and conducted research to evaluate the prototype at the research stage. Qualitative methods guided data gathering and analysis. To gather the data, I followed a two-step data collection process: pre-intervention email and group interviews, and post-intervention online questionnaire. Key themes identified through a constructivist approach to grounded theory were used as the basis of analysis of interview responses and the generation of theory.

This study found that on one hand, faculty members might use an OCF, because they perceived that this tool could support their classroom teaching. On the other hand, however, their perceived decision to use an OCF would also be influenced by the perceptions of the usefulness and usability of the tool. The study identified the initial evidence supporting an OCF as an online learning resource and the challenges involved in developing and implementing such a solution. It provides a 3D-E-Learning model as a base for decision-makers and departmental leaders to determine whether they should adopt this tool. It also offers some design guidance for those who do want to pursue this solution to curriculum development.

Dedication

This thesis is dedicated to my Father, Jean Rizk. Your determination continues to inspire me.

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List of Abbreviations

CBE	Computer Based Education
CCE	Computer Communcation Departement
CS	Computer Science Departement
EDU	Education Department
ELT	Experiencial Learning Theory
ICT	Information Communication Technology
IDT	Interactive Digital Technology
IT	Information Technology
JR	Junior standing
HE	Higher Education
HEI	Higher Education Institution
OCF	Online Curriculum Framework
VLE	Virtual Learning Environment
VLO	Virtual Learning Organisation
SO	Sophomore standing
SR	Senior standing

Chapter 1

Introduction

Nearly all colleges and universities are to change, dramatically their structures, their technologies, and their curricula over the next few years as they seek to better adjust themselves to the complex educational issues that are emerging in the Information Age (Rowley *et al.*, 1998). The condition of the academy today, the challenges of the Information Age, the global economy, the explosion of technology, and the development of a world-wide communications system all demand that each college and university campus develop an effective way of looking at itself and its conditions when determining the best path to security and prosperity (Rowley and Sherman, 2001). Therefore strategic planning is needed to make significant changes that help strengthen the programmes and resources of a university. Moreover, universities need tools that help them identify more easily what types of strategies are appropriate for them, tools that help them move from planning to implementation and that help them overcome many of the problems they may encounter, such as managing the quality of teaching and learning in an environment, where a society moving, from the Industrial Age to the Information Age, mandates change.

Universities need to fit better into their environment while societies need very high quality undergraduate education producing graduates with high-level skills capable of confronting the information-and technology-based global economy. Educational institutions may change significantly in terms of either programme or mission (Blustain *et al.*, 1999; Duderstadt, 1999; Farrington, 1999). They need to restructure themselves to be more efficient and responsive, they may change learning methodologies and pedagogies and they may develop a particular pattern of academic programming that meets the specific needs of a university's service community. They may make proper strategic choices and implement them in order to avoid the risk of irrelevance. Educational institutions find themselves following the changes in learning needs. Today's students are life-long learners (Trachtenberg, 1997); they seek knowledge and they are anxious to be part of the knowledge-creation process as well as to take part in the refinement and analytical processes that go along with it. Thus, higher education has

a central obligation to take values seriously by evaluating the curricula and it has to put learning at the heart of the institution by tailoring the programmes according to students' needs, teachers' expertise and leaders' management. In brief, higher education needs to redesign all the learning system to align the entire educational institution with the personal, civic, and workplace needs of the 21st century.

There are many forces working to keep the curriculum the way it is and many counter forces aimed at changing the curricula, including tradition, textbooks, laws, religious beliefs, multicultural concerns, poverty, the expansion of knowledge, and growth in technology (Henson, 2001). One of the most frequent suggestions education leaders make for improving today's educational institutions is the integration of technology into the teaching and learning process (Elam, 1996). Moreover, twenty-first century educational institutions must address students' social needs. Academic success cannot come in an environment that ignores students' personal needs (Erb, 1997). At the same time, teachers must provide students with opportunities to develop knowledge and skills.

On the other hand, Stoll (1999) and Healy (1998) have criticized investments in educational technologies, arguing that there is little evidence they affect teaching and learning in a positive way. Moreover, Cuban (2001) argued that despite widespread use of computers by teachers outside of the classroom, instructional practices and educational institution culture have not incorporated computer-based technologies into regular instructional practices. Recognizing the importance of using technologies in classrooms, this thesis uses data collected from students and teachers to explore issues related to instructional practices. These issues include examining students' outcomes; examining the relationship between student progress and the use of technology; and identifying the ways in which leaders promote the use of technology in their institutions. Based on these findings, implications for curriculum management will be explored.

On the basis of work with one of the top English medium universities in Lebanon, this study is designed to provide information to departments' leaders for them to better understand how teachers and students are using educational technologies and how these uses affect student learning. Thus, leaders can support new ways in teaching and

learning by implementing an instructional design process throughout an effective change of the curriculum (Busher, 2003). In the university where the study is done, students cannot take control of their own learning through discovery-oriented classroom by using Internet. Lecturing is the source of information. However, a lecturer can help students to learn some skills such as challenging information and sources. Students can achieve such skills within the context of a technologically-updated curriculum.

1. Need for the Study

The prime task of the education service is to promote learning by managing teaching and learning through curriculum management and through pedagogy by helping all the stakeholders to adapt to change. The teaching and learning process is a delivery system, so issues of content design and creation are to be considered in order to assure effective learning (Stiles, 2000b). Thus, managing teaching and learning has become the manipulation of knowledge (Field *et al.,* 1999). It suggests that learning is the result of an interaction between the learner and the environment. So, creating a dynamic and adaptive learning environment enables learners to acquire knowledge tailored to their learning needs. In a technology-enhanced environment, the relation between learning and curriculum has assumed now a new dimension. Managing teaching and learning involves teachers working with students to help them engage with the curriculum. Thus, there is a possibility to develop curricula by learners assisted by instructors (Betz, 2001). In spite of the fact that some teachers may question the role of technology in education and in society in general, citing information overload and inappropriate applications as symptoms of over-reliance on technological innovations, teachers play a leadership role in determining the ways in which technology is used to support educational goals and they also have a pedagogical role in motivating students to higher levels of achievement and they also have the responsibility to help students be technologically literate.

“Managing the curriculum” and “managing teaching and learning” are sometimes used as if they were synonymous expressions and sometimes as if they were different. Managing the curriculum means implementing national and/or international directives on what should be taught and how, the means of assessment and the expected outcomes. On the other hand, managing the curriculum can have another meaning,

namely to indicate the internal arrangements within an educational institution to facilitate learning, what Clark (1996) calls the organized learning process. The implication is that managing the curriculum involves not only the formally recognized process of teaching, but also all other processes. Interpreted in this way, managing the curriculum could be seen as equivalent to managing the whole institution.

Therefore, the similarity lies in the facts that managing the curriculum, and the linked management of teaching and learning, are at the heart of the educational process. The difference is the fact that curriculum change offers a solution for engaging students in the social environment; managing teaching and learning provides an effective learning environment which requires emphasis on the quality of course design, on the use of appropriate tools and on the context in which learning takes place (Jones *et al.*, 2001). In summary, managing curriculum focuses on the latest information and theories needed to support the educational process, while managing teaching and learning focuses on the manipulation of this information, taking into consideration people's attitudes towards change.

This thesis tries to address the problem of efficient integration of technology in the educational process by doing the needed curriculum changing. Such integration of technology promotes teaching and learning by using software to manage curriculum change according to learners' needs, and teachers' competencies and transformational leadership characteristics (Mangin, 2004; Martinez, 2005). This study gives emphasis to two kinds of teacher leadership activities: classroom assistance and model lessons. Besides, the study focuses on the university's readiness factors for successful implementation of the software such as commitment to implementation, capacity for change, general resources, background level of teachers and leaders, and the learner's assessment for better outcomes.

Leaders, managers, and classroom teachers, all have a responsibility to promote learning and to ensure the implementation of curriculum. It is this aspect of management that clearly delineates the role of educational leaders and consequently of leaders and managers in other organisations. Organisational leaders are able to develop and implement creative plans. Because these plans incorporate the thinking and support of the majority of stakeholders, they can transform the organisational culture and align

it with changing realities (Morrison *et al.*, 1997). Educational leaders must change the existing culture and structure of their organisation by involving people throughout the organisation in a systematic and ongoing analysis to identify emerging or potential developments in the external environment that could affect their learning organisation's future. Educational managers have different visions of education. For some, helping each learner to fulfil his or her individual potential is the key. For other managers, helping learners to become productive members of society, with less stress on individuality, (Satow and Wang, 1994) is the aim. Whatever the differing goals, the environment should encourage learners to grow individually and to be equipped to take a place in society.

Given that schools and universities primarily sell tutors' skills and learning opportunities to students, and that the part of the process of providing education is delivered through the curriculum taught, one would expect that curriculum design and development be given a high priority amongst academics and managers at a university (Teale, 1998). Thus, the curriculum issues at universities are very similar to those at schools. One difference, however, is the market forces that have always influenced student choice and are becoming of greater importance due to the financial issues. All over the world, universities and institutions of higher learning are faced with the problem of creating curricula that will meet the technical needs of a dynamic and rapidly changing world market (Phukan *et al.*, 2002). Unfortunately, some educational institutions in Lebanon seem behind in their adoption of technology as a tool, due to cultural and social factors. Although the number of computers in Lebanon educational institutions multiplies and the culture is considered to be technically oriented, educational inequity remains evident in the area of technology. The socio-economically disadvantaged and the physically disabled have limited knowledge of, and experiences with, technology. Though the current ratio of students to computers is 20:1 (Coley *et al.*, 1997), educational institutions with high populations of poor and minority students continue to have more students per computer (Trotter, 1997).

In such an environment, leadership skills and ability must be refined and strengthened, particularly through training and professional development (Varghese, 2000). Leaders are regular classroom teachers, who may have had some of their teaching duties reduced. They help other teachers by providing information, mentoring, coaching, and

leading teacher professional development sessions. Teachers are classroom managers. They have the potential to encourage significant and rapid shifts in the role of students in classroom learning, as well as supporting broader improvements in teaching and learning. Thus, transformational leadership is needed in changing academic environment, and such leadership needs to be distributed in order to deal with the many diverse demands of higher education (Rizk and Busher, 2004). Given that higher education managers should have strong leadership skills to manage and sustain changes, higher education leaders and higher education managers are used interchangeably in this thesis.

Higher education leaders are required to support teachers' professional development by requesting the best and the most interesting software in order to enhance teachers' educational goals of teaching and learning. Moreover, when leaders decide to implement education technology in the curriculum, one of their overriding goals must be to create plans and policies for all members of the learning community to have equitable access and use in order to support learning for all students (Edmonds, 2004). Thus, the use of computer-based education (CBE) has new pedagogical dimensions that have the potential to provide improved criteria for understanding, describing, and evaluating CBE (Reeves, 2001).

On the other hand, this study integrates and extends previous research efforts and investigates the effects of influences of the instructional technology resources (Strauss and Frost, 1999) on learning outcomes and on recommendations on curriculum change to achieve specific student outcomes (Clarke *et al.*, 2001). The use of multiple outcome variables in an educational setting is recommended to help ensure that the multiple goals and the multiple dimensions of outcomes in the classroom environment are represented (Marks, 2000; Williams, 1992). Among many measures of learning outcomes which have been used in educational research, some researchers emphasize course grade (Brokaw and Merz, 2000; Devadoss and Foltz, 1996; Romer, 1993), while others discuss task performance and goal achievement (Deeter-Schmelz *et al.*, 2002) and overall course value perceptions (Marks, 2000). Thus, students' self-assessment of their overall knowledge gained, their skills and abilities developed, and the effort they expended in a particular class relative to other classes provide a combination of learning and performance called learning performance (Young *et al.*, 2003).

Thus, this study draws on experience from a cyber research that uses a web-based survey and virtual asynchronous interviews (email interviews) to collect data. The web-based survey is used to try and identify general effects of using technology in teaching and learning. More in-depth data is gathered through email semi-structured interviews that develop themes introduced in the web-bases survey such as the requirements needed to update the curriculum.

This thesis ends up by defining keys to sustainable development to ensure academic quality. These keys are achieving certain objectives such as determining whether using technology is essential to support an organisation's educational goals, defining what are people's attitudes to using information technology (IT) to manage curriculum, and deciding how the organisational teaching plan is to be constructed. Consequently, this thesis seeks to contribute to some technology-based knowledge such as delivering courses, identifying and using resources, communicating and conferencing, activities and assessment, collaborative work and student management and support (Ryan *et al.*, 2000). This study is timely as it offers students, teachers and leaders real chances for pursuing a range and variety of teaching and learning options that would not otherwise have been easily achievable.

2. Aims and significance of the thesis

The purpose of this study is to investigate whether integrating high-performance technologies such as software promotes engaged learning. Further, this study will look at whether, by using such electronic tools, teachers can create their own curricular models and curriculum development service. This study will also look at whether introducing technology improves teaching, learning and assessment through curriculum management.

Rizk and Busher (2004) identify three major characteristics of adopting change in HE institutions: hiring professional teachers to develop cultures in the classroom, developing collaborative relationships among teachers to develop updated-curricula and encouraging leaders to be transformational to deal with the change effectively. Toward this end, a realistic picture of how higher education typically functions, how its curricula are managed and how resistant it can be to any kind of technology

implementation and of process evaluation, can be summarized by the means of evaluating curriculum outcomes and effectiveness by using software.

The study's objectives are evaluating curriculum outcomes by collecting data from teachers, students and leaders through email interviews and online focus group interviews; by judging the effectiveness of curriculum planning and the effectiveness of the procedures; by collecting and analysing data simultaneously while preserving flexibility; implementing software as a tool that will assist universities to implement a data-driven curriculum reform by involving students, teachers and transformational leaders; and by evaluating the effectiveness of the software in managing curricula by using web questionnaires.

The main questions this study intends to answer focus on how universities should construct their curriculum to respond to the rapidly changing lifelong-learning environment. The curriculum is a dynamic element of change for an institution to shift from a traditional institution to a learning-focus institution (Cross, 1998). The development of software (the intervention of this study) is a new approach to curriculum integration where leaders, teachers and students are not yet aware of all the pros and cons of the methodology being followed. The process is time-consuming for all stakeholders (students, teachers and leaders).

There are two more purposes for this study. By collating and managing data on students' academic performance, this study helps managers develop mechanisms to efficiently and effectively improve the implementation of the curriculum while reinforcing fundamental concepts of the intended education. By presenting the findings in a format, which can be used by teachers for planning, this study allows the evaluation of the student outcomes and provides a framework for integrating advanced technologies and/or related courses such as laboratory courses to help students in achieving better results. In other words, the aim of this study is to provide a tool that underpins a reform by providing university communities with data they can use to make decisions.

So the main questions this study investigates are:

1. How do students perceive the use of information technology (specifically online software) as a tool that supports teaching?
2. What types of content do teachers and/or administrators perceive that they would need in online software that supports teaching?
3. How might online software implemented as a tool assist universities' academics (students, teachers and transformational leaders) in curriculum reform?
4. How do students, teachers, and leaders evaluate online software in managing curricula?

The study is conducted in a large English-language private Lebanese university. Data were collected through email interviews with students, and group interviews with both teachers and leaders before using the software. After using the software, all the stakeholders completed a follow-up survey to determine the flexibility and the effectiveness of the software as an aid to decision-makers.

The present study has significance for leaders, teachers and students. University administrators may benefit from this study. The results will provide them information regarding the maintenance and improvement of a curriculum. This study can throw insights on some related instructional concerns such as overviewing the curricula currently offered, identifying key factors for attracting students, and identifying future changes for strengthening the curricula.

3. Scope and approach of the thesis

This study is designed to provide information for a better understanding of how teachers and students are using educational technologies, of what factors influence these uses and of how these uses affect student learning. It may provide information regarding developmental needs of students and how those needs may be different according to academic level and gender of the student. In order to make this study feasible, the scope of the research is narrowed down to the academics of one university. The sample includes a broad range of academics (teachers, students and leaders) across undergraduate level. The sample size is restricted to around 90 academics. Although

this is a larger sample than has been used in any other comparable study, it is not possible to assess whether the research respondents are statistically representative of Lebanese universities. Given the absence of any reliable statistical data on the characteristics of universities' academics, it is not possible for this research to claim representativeness. However, the scope of this research can be broadened across universities.

This study was conducted at an English-language university in Lebanon. Lebanon is a small country, and the number of higher education graduates is increasing. The student population of the university of this study has increased by thirty percent the last decade. The number of private universities in Lebanon has jumped from ten to forty during the same period. The working opportunities are shrinking due to the various crises hitting the country, but the globalisation of the world economy opens new opportunities to the Lebanese graduates, either in the regional or international arena under one condition: they have to "be competitive". ICT plays a major role in both lifelong learning and E-learning and helps active people update their knowledge. Therefore, creating a clear framework for E-learning, through a combination of new and more efficient technologies and common and shared access, is one of many issues that need to be addressed in Lebanese higher education institutions. In Lebanon, technology is significantly improving and costs are decreasing, however, the access to information is not available to all segments of the population. The university of this study is one of the universities that have Internet and multimedia access for educational, training and research purposes. The results presented in this study are based only on the responses of participants in this university who had Internet access (at home or elsewhere). Data collection began in September 2005 and was completed in September 2006.

Grounded theory is the methodology used in this study, as it is a qualitative methodology that generates theory from observation (Glaser and Strauss, 1967) and from analyzing and interpreting interview data. What differentiates grounded theory from much other research is that it is emergent. It does not test a hypothesis. It sets out to find what theory accounts for the research situation as it is. Grounded theory is a relatively new phenomenon in educational research, especially in studies of classroom teaching (Kinach, 1996). Grounded theory has its own source of rigour. It is responsive to the situation in which the research is done. There is a continuing search for evidence

which refutes the emerging theory. It is driven by the data in such a way that the final shape of the theory is likely to provide a good fit to any situation. Glaser (1992) suggests two main criteria for judging the adequacy of the emerging theory: that it fits the situation; and that it works. So, it helps people in the situation to make sense of their experience and to manage the situation better.

The effect of technology in changing curricula is explored in many research papers (Knight and Chan, 2000; Cope *et al.*, 2002; Rizk and Busher, 2004). Moreover, Schacter (1999) provides a comprehensive review of research regarding the impact of integrating technology into the learning environment. Therefore, this research employs elements from both quantitative and qualitative research method to find out the positive and/or the negative consequences of integrating technology on student outcome and on curriculum change. The qualitative and quantitative methods both rely on the use of descriptive research in the form of email interviews and online questionnaire (Siragusa, 2001). These methods allow for the collection of data from leaders, teachers, and students. Although this study applies quantitative and qualitative research methods, this is predominately a qualitative research, due to the nature of the data collection process and the data analysis techniques.

Five analytic phases of grounded theory are identified: research design, data collection, data ordering, data analysis, and literature comparison (Corbin and Strauss, 1990; Pandit, 1996). This study uses these phases and steps to build theory. The aspects used in conjunction are the systematic and rigorous application of grounded theory by exploiting information from learners and teachers to capture the data needed by the leaders to explicate the interactions between curriculum and stakeholders (teachers, students, and managers), by the use of electronic mail interviews as a primary resource of data and by the use of a software package to help curriculum managers in the process of grounded theory building (Pandit, 1996).

4. Structure of the thesis

This thesis is organised in eight chapters. The first chapter provides an introduction to the topic under study, the purpose of the study, the research questions, and the significance to research. Chapter two reviews the recent and relevant literature

explaining how educational organisations are able to be responsive to their new ICT-context, sees the sights on managing ICT organisations, and emphasizes the choice of an appropriate leadership style by supporting the adaptive leadership. Finally, this chapter gives details concerning Information technology that is driving quite extraordinary change in higher education on both a national and global scale comparable to the restructuring of other economic sectors.

Chapter three continues by reviewing literatures concerning the internal processes affected by technology in higher education. It advocates the idea of reshaping the education system by exploiting the proper curriculum transformation, the assessment needed, and the required development for a university to succeed in the global arena. This is meant as an introduction to curriculum transformation and to show the information and communication technologies (ICT) integration influence on it.

The fourth chapter describes the grounded theory methodology used in the study, including sampling techniques and procedures used to collect and analyse the data.

Chapter five explains the need for the software, and how it is designed.

The findings are presented in chapter six. Chapter seven discusses the results and their implications for future research and practice.

Chapter eight discusses the different conclusions and clarifies that more studies should be incorporated into the application layer to improve the integration of technology in Higher Education.

Chapter 2

ICT-context and Higher education

While academic systems function in a national environment, the challenges play themselves out on a global scale (Altbach and Davis, 1999). Higher education has profoundly changed in the past two decades, and those involved in the academic enterprise have yet to grapple with the implications of these changes. Academic institutions and systems have faced pressures of increasing numbers of students and demographic changes, demands for accountability, reconsideration of the social and economic role of higher education, the rise of market forces and the impact of new technologies, among others (Light and Cox, 2001). Education, even wonderfully conceived, cannot solve all the problems of society. Nevertheless, without it the problems of society cannot be solved. It is an indispensable, but not sufficient, condition for positive change. Rather, it is the motor for the advancement of knowledge.

Educational institutions are influenced by the societal events constantly occurring around them (Hargreaves, 1995). The growth of knowledge in any field is rapidly outstripping any individual's ability to remain up-to-date. Knowing how to access information rather than memorizing information is central to coping with this rapid change. Access to the Internet allows learners to take courses virtually anywhere in the world (accreditation is still a major consideration). Geographic location is no longer relevant; people are in global competition with all other educational providers on the Net. Educational institutions that neglect to anticipate and plan for the future risk becoming outdated and will fail to prepare students for life after graduation (Young, 2004). Therefore, the most important challenge facing educational institutions is educational. Lifelong professional development is an important part of it.

This chapter constructs a conceptual framework through a review of recent and relevant literature to make sense of how educational organisations can be responsive to their new ICT-context, sets sights on managing an ICT organisation, and chooses adaptive leadership. Thus, the literature review of this study is divided into two chapters; this

chapter focuses on the relationships of Higher Education institutions to their national, social, political and technological contexts, while chapter three continues exploring the recent and relevant literature to reshape the education system by exploiting the proper curriculum transformation, the assessment needed, and the required development for a university to succeed in the global arena. The reason for dividing the conceptual framework into two chapters is taking out ambiguities and emphasising transparency in the impact of external context on Higher Education institutions on their internal processes.

1. Global and Economic Context

The changes occurring inside Higher Education institutions are directly linked to changes in society itself (Benjamin, 2003). Globalization requires that colleges and universities should prepare their students to be citizens of the world who understand the serious challenges of competitiveness and interdependence that come in its wake. The growth of knowledge imposes on institutions the need to adapt their teaching and research to keep pace with new developments in all fields of study. Advancements in technology recast the ways that institutions create, preserve, and disseminate knowledge (Lubbers, 1999). Thus, the information revolution is linked with the knowledge economy and globalization (Maier and Warren, 2000; Blight *et al.*, 2000). The knowledge economy is dependent on people's ability to adapt to new situations, update their knowledge, know where to find knowledge, and apply it to new situations. Globalization is emerging within the knowledge economy and is expanding in time. Knowledge economy and globalization are "catalysts for change in education throughout society" (Lubbers, 1999, p. 11). Knowledge workers, lifelong learning skills, and independent learning are the needs of a changing economic order that Higher Education should provide for (Maier and Warren, 2000).

"The global economy, the re-engineering organisation, and the new-knowledge worker impact technology and are, in turn, profoundly impacted by technology." (Marquardt and Kearsley, 1998, p. 6) Knowledge-management technologies have enabled organisations to learn and the knowledge economy to prosper and technology allows marketing and production to have a global reach but a local touch (Tapscott, 1995). Technology and globalisation have led to a global economy based on knowledge. With

the globalisation of the economy, the developed societies tend to impose their labor needs on the higher education systems of less-developed societies and to push the latter into the background (Chitni, 2000; Altbach and Peterson, 1999). In the information age, the market is a powerful force in making higher education relevant to employment.

Despite the positive trends and despite the important opportunities that knowledge economy offers for developing countries' growth and development, the gap between developed and developing countries' use of ICT remains wide (Habli, 2004). A number of countries in the Mediterranean region "suffer severe sanctions" on "importation of technological goods and knowledge". Not many countries in the region have managed to develop a clear and effective ICT policy with a plan of action that is put in place for implementation (Beirut Declaration, 2003).

Lebanon is a small country located on the eastern shore of the Mediterranean. Using technology in Lebanon's HEI aims at creating high-quality jobs in line with organisations such as universities in order to make Lebanon part of the worldwide movement towards a knowledge-based society. In 1992, universities considered technology as a luxury and in fact half of the private universities and all public universities had no technology (Yafi, 2004). Today a vision of dynamic Lebanon is taking over. The vision of dynamic Lebanon is using modern technologies to transform its society and economy, and its working and living environment (Saidi, 2003). The process of transformation into an information society should be sustainable and equitable. Therefore, several universities have launched ICT masters degrees and are starting to offer cooperative and internship programs to business students and not only to computer science students to insure proper transfer and application of educational expertise in the practical world. There are no virtual universities in Lebanon. In other words, there are no degrees given through online learning without being present at a university campus.

At the same time, the gap between university activities and industrial needs is large (CNRS, 2005). Despite the benefits of ICT, the development and adoption of ICT by developing countries such as Lebanon have so far been limited. Reasons for this include lack of awareness of what ICT can offer, insufficient telecommunications infrastructure and Internet connectivity, expensive Internet access, absence of adequate legal and

regulatory frameworks, shortage of requisite human capacity, failure to use local language and content, and lack of entrepreneurship and of a business culture open to change, and the low percentage of government expenditure on education (8.2 %) (Saidi, 2003).

Diversity in religious groups in the population resulted in diversity and richness in private educational activities and institutions. There are more than 40 private universities and colleges in Lebanon today. A wide discrepancy exists in these universities credibility quality of education, and consequently their ICT infrastructure. Basic Internet access infrastructure is available in most universities but few universities have their own Internet server. Speed and efficiency of connectivity varies among universities. The number of personal computers and computer labs compared to the students' number is different from one university to the other. This study focuses on one of the English-language medium universities in Lebanon.

2. Market forces

Higher education institutions are increasingly obliged to have direct contact with the market. Social expectations with respect to higher education have to be addressed in direct links between society and higher education (Maassen and Cloete, 2002). As with the transformation of the academic workforce, the ascent of market forces mirrors changes occurring in every facet of society. The increasing impact of market forces on the academy stands in sharpest relief when considered against the surroundings of Higher Education's social harmony. This harmony affirms that colleges and universities have a vital role in ensuring the economic strength and competitiveness of the nation through the production of skilled workers. Beyond this practical function, however, higher education serves the public interest by creating an educated citizenry, by preserving and advancing knowledge in all fields regardless of their market currency, and by fulfilling the public expectation that a higher education should be accessible to any student who exhibits a desire and commitment to learn (Gumport, 2000; Pratt, 2001).

Responding to this new environment, higher-education institutions have learned that entrepreneurial prowess and successful market performance are essential to fulfilling

their own objectives. The principal driver for changes in the nature of universities in the new millennium is the international growth in demand for higher education (Blight *et al.*, 2000). A study done by Steineke and Olsen (2001) on Norwegian higher educational institutions discusses the management of the interface between formal knowledge production and the skills requirements of the local labour market. HEI-industry relations may include technology transfer programmes, and research parks as well as consulting (Anderson, 2001).

The most important form of knowledge transposition from the HEIs to their local environment follows from their production of university college graduates. Thus, a learner is at the same time a consumer, where educational content is delivered to the learner, and a producer, where the learner is provided with the tools to engage (McLean, 2003). The student acts passively as a consumer of knowledge and actively as a constructor of meaning (Reid, 2003). Yet, information and communication technology (ICT)'s contribution is noticeable in personalizing productivity and modelling tools, in personalizing content sources and resources, in providing pathways through that content which can be personalized to the needs of each learner and easily or automatically modified to take account of progress, and in presenting a range of interfaces to the content which are appropriate to the level and ability of the individual learner.

The labour market has been interpreted in terms of demand and supply (Picot and Heisz, 2000; Fudge, 2006). From a perspective of quantity, "higher education has supplied ample labour forces, but, from a quality perspective, not all graduates are competent enough" (SUST, n.d.). What is more, the demands of the labour market have been rising and have become more diverse. Therefore, labour market development affects the curricula in universities. The demands of the labour market are becoming more fluctuating and more diverse, which requires higher education institutions to change their curricula accordingly. Some curricular elements are more vulnerable to labour market force than others. When universities have to pay attention to the labour market force, leadership role changes to initiate and support appropriate curriculum adaptations (Wallach, 2002; Blackmore, 2006).

Market forces impact both the nature and the outcome of decision-making in universities and colleges. And growing accountability demands compel institutions to demonstrate gains in organisational efficiency and quality as well as in student learning outcomes (Teese and Polesel, 2003; Beckett, 2004). A coherent vision specifies the particular values and beliefs that will guide policy and practice within the HE institution. Academics need to take part in the decision-making process and they should have a shared vision for creating an effective learning organisation (Sergiovanni, 2001; Urassa, 2005). The concept of the learning organisation is that the successful organisation must continually adapt and learn in order to respond to changes in environment and to grow (Senge *et al.*, 1994). According to Senge (1990), "great teams are learning organisations - groups of people who, over time, enhance their capacity to create what they truly desire to create." (p. 18). The significance of a well-trained, highly skilled employee population became a critical factor in the twenty-first century. A learning organisation is committed to providing opportunities for the staff to learn not only the skills they need to be effective in their jobs today, but to lay the groundwork for their future career paths. Thus learning, not training is the key for a learning organisation to achieve competitive advantage (Mason, 2006). However, competitive advantage at the individual level is based on "know-how", that is "knowledge is power". Therefore, a learning organisation knows how to process knowledge appreciates the value of shared collective knowledge and grows stronger and more knowledgeable with each activity it performs. So, to build a learning organisation, there is a need for architecture and a plan for achieving the organisation progress and for applying all of its knowledge toward achieving success. Thus, the ICT environment requires tagging on a strategy capable of ensuring the effectiveness of organisational restructuring and its adaptation to change. Such strategy should enable permanent self-redesigning of a learning organisation.

3. Organisational restructuring

Restructuring means giving new form to the organisation (Morin, 2005). The immense change in the social and economic environments caused by technology and globalisation have forced organisations worldwide to make irresistible changes relative to their purpose, strategies, and structures in order to adapt, survive and succeed in the 21st century (Marquardt and Kearsley, 1998). Technology is necessary to create the

appropriate learning organisation info-structure to enhance the speed and quality of learning and to manage the information and knowledge of the organisation. Technology serves as a foundation and key integrating system for building the learning organisations (Owens, 2004; Marquardt and Kearsley, 1998; Tapscott, 1995).

It is important to distinguish the positive as well as the negative effect of the ways in which technology is used in improving higher education (Laurillard, 2000). The full integration of technologies requires radical changes in organisational structure to support its use. However, the impact of new technologies and the pressure that they are placing on current organisational structure are slowly being recognized. Thus, radical change may not be necessary (Bates, 2000). Strategic planning strategy adopted by most universities is deficient in considering the technology factor. Thus, a technological plan allied to a strategic plan is then essential for any university that intends to integrate technology in its infrastructure or in technology-based methods of teaching and learning. Green (1999) found that only half of HE institutions have a strategic plan for technology. However, at the institutional level they deal with networks and hardware infrastructure.

The educational organisation "can and should be capable of changing" (Goodlad, 1997, p. 115). Organisational learning is facilitated in a climate of openness and mutual trust that allows people to embrace experimentation and change without feeling personally threatened. However, Goodman (1992) acknowledges the complexity and difficulty of change in universities which do not have good mechanisms to read and adapt to environmental change (Schirmer, 2001). The quality of work relationships in an education environment has a great deal to do with the institution's ability to improve (Adler, 1997). The degree of openness, trust, communication and support that staff share encourages not only learning but also work satisfaction and improved productivity and performance. Universities need to fulfil services in innovative ways for transformation, re-engineering, organisation change, and process improvement. Thus, ICT needs intelligent team leaders, for soft skills have hard consequences (Goleman, 2004; Batros, 2004).

The academic system has to learn, has to be able to respond to its environment, which is a hostile one in most countries now, and respond also to its internal changes, which

again in most countries are radical ones. If academe is to preserve what is good in its traditions and preserve its mission to develop knowledge and to educate, then the higher education system needs a more robustly adaptive mechanism than what it has developed thus far (Barajas, 2002). Like any organism adapting to its environment in order to survive, an organisation has to be capable of adaptive learning (Midgley, 2002): universities as learning organisations are best described in terms of the conversational framework for experiential learning, rather than mediated learning with respect to a university's strategy for learning and teaching (Dembo, 2004; p. 15).

An organisation's structure is largely determined by the variety one finds in its environment. For Mintzberg (1994), environmental complexity and the pace of change determine the organisation's environmental variety. Universities are responding to external forces to produce innovation. Internal forces can also affect innovation, but do so in the shape of evolving disciplinary and professional cultures, over which institutional leaders and managers have limited leverage (Puryear, 1999). Therefore, a new relationship between learning, teaching and technology will emerge in the future. The models are designed to create a competitive advantage in a rapidly changing and growing marketplace. With rapidly developing learning technologies creating new possibilities for organising learning for adults, these models are both competing with, and causing change in, the traditional residential model of higher education. Benefits of this new competitive environment include removing barriers to existing educational programs, responding more effectively and quickly to emerging educational needs, improving educational quality, and achieving long-term cost efficiencies.

New ways of thinking are required in a world that is dominated by change. Under these circumstances, educational institutions must become quick learners (Owens, 2004). Senge *et al.* (2000) have sought to clarify how system thinking is essential in helping an educational organisation to become a learning organisation. System thinking is made up of a conceptual framework, a body of knowledge and tools that have been developed over the past fifty years, to make the full patterns clearer, and to help people see how to change them effectively. They integrate personal mastery, mental models, team learning, and shared vision. In this complex environment, Senge *et al.* (1999) believe, people who have experience with system thinking can act with more leverage than a culture generally permits.

Educational institutions should manage change to take most advantage of the opportunity presented by technology (Taylor, 2002), to identify and overcome impediments, to minimize disruption to programmes and services, to maintain good relations with the environment, to achieve better results, and to achieve strategic goals. Consequently, the university's role has changed.

4. University's new role

Higher education has changed dramatically in terms of the students it serves, just as students' own purposes and paths through higher education have changed. The academic workforce has also been transformed to the extent that no one can presume to know who is teaching what to whom. Colleges and universities are extending their reach, for example, into a new strategy of course-offering with online courses (Lindh and Soames, 2004). The extent to which academic workforce (students, teachers and leaders) has taken advantage of the expanded horizons for communicating ideas with a new medium is the extent to which the material cannot then be reproduced in the older medium. Applying the idea to the teachers who move pedagogical resources to the Web, Fraser (1999) offers a corollary: The extent to which a student gains the same pedagogical benefit from a print out of the Web resources as from the resources themselves is the extent to which nothing of pedagogical value has been added by using the Web.

Moreover, a question concerning quality is raised. Most colleges and universities have not developed institutional definitions of educational quality (Parker, 2003). They do not have shared understandings of how to produce, measure, or calculate the cost of quality education for the diverse populations they serve. The growth in size and diversity of student populations, the increasing power of market forces to shape campus practices and priorities, the growing presence of new technology, linked with the expectation that institutions should do more to incorporate technology into their teaching and learning practices—all these factors make it incumbent on higher education to develop its own quality agenda (Biggs, 2003).

Access to higher education is now as much a necessity as it was once a privilege (Immerwahr, 2004). Thus there is a need to find a collaborative approach between

societal necessity and institutional inertia. Changes in perception become powerful drivers that are reshaping the dynamics of colleges and universities, affecting their capacity both to respond to the growing forces of markets and to fulfil the terms of the social charter that has historically linked local higher education to the nation it serves.

The role of the university in society is to enable society to maintain an independent understanding of itself and its world (Laurillard, 2000). Therefore, the university crosses national boundaries in teaching and becomes a creator of understanding and shapes a society to be a learning society. This role is used to modify the economic and technological pressures that societies are experiencing nowadays. Thus, instead of being driven by the new technologies in teaching and learning, universities must adopt some key drivers of change helping them to accomplish their mission. Key drivers such as the leaders' role, pedagogical concerns, curriculum needs, and the impact of ICT on learning and educational organisations greatly assist universities to operate, to respond to the technological integration, and to develop.

Leaders and the processes of change: The whole world, and particularly universities, is dominated by change. Therefore, educational institution leaders must be constantly sensitive to emerging changes in the external environment that call for nimble, deft, rapid responses by the organisation. One of the key concepts of organisational theory is the role of change and stability in the environment of the organisation in selecting a strategy for leadership (Kouzes and Posner, 1995). Such strategy should focus both on E-learning – using ICT to change how people learn and E-delivery – the mechanisms by which people provide electronic information and services.

Higher education reform has played a major role in developing the new quality of educational leadership so vital to the modernizing process (Yang, 2001). Creative and transformational leadership is needed to shape the necessary vision (McAlpine and Jackson, 2000). Senge *et al.* (1999) argue that leadership for deep change requires replacing the myth of the hero leader with the concept of leadership communities. These communities, he believes, enable the building of leadership capacity throughout the organisation so the organisation can continually adapt and re-invent itself. Teacher leadership can take many forms. It may include (1) advocating the vision for staff development, (2) participating in learning organisation and district improvement teams

to help determine goals and strategies, (3) conducting classroom and institution-wide action research to determine if changes are improving the learning of all students, (4) mentoring new teachers, serving on peer review panels to provide support and assistance to new and veteran teachers, and (5) working on special assignment as coaches or instructional guides to provide ongoing professional learning for their peers (Barth, 2004; Drath, 2001, Barker, 2000).

What is expected from leaders continues to increase (Sergiovanni, 2001). Leaders are expected today to create learning communities in their learning organisations and to engage the broader learning organisation community in creating and achieving a compelling vision for its learning organisations, while serving diverse student populations (Pennington, 2003). The leader's role changes from authoritarian style to instructional. Leaders must steep themselves in curricula, instruction, and assessment, while they preserve their role of being the key persons in determining whether a learning organisation succeeds. Leaders' responsibility for improvement lies in supervising, coaching teachers, and working with them on development plans that support real learning organisation improvement (Harris, 2000). In other words, leaders should encourage constructive changes.

Institutional leaders face equally compelling challenges while they seek to make their campuses academically successful and financially viable. Across the institutional diversity of higher education, they work to reconcile the values and cycles of academic cultures within an array of changing societal pressures: changes in who attends higher education institutions, in how students pursue their studies, in the composition of the academic workforce, in technology and methods of instruction, and in the sources and methods of funding institutions. Among the many issues that compete for their attention, one in particular stands out, namely how to balance the growing pressures of market forces with the institutional mission of fulfilling public purposes. Moreover, educational leaders have to strengthen higher education's role in improving the lives of students and the vitality of society as a whole. Priorities enable leaders to shape the enterprise in more purposeful ways (Sides, 2003). These priorities are: improving educational quality and institutional performance, balancing market forces with higher education's public purposes, and drawing new maps for a changing enterprise. The most pressing issues confronting higher education are the need for higher expectations,

the need for enhanced student involvement, and the need for the assessment of learning (Pratt, 2001).

The impact of the web on pedagogy: The teacher's role is not only transmission of information but also selecting the appropriate materials and guiding students in a way to develop their capabilities to the highest level (Cecez-Kecmanovic and Webb, 2000; Lambert and McCombs, 1998; Hooper and Rieber, 1995). In addition to the teacher's supportive guidance, a learning process needs a learner's cognitive activity. Both of them can be delivered through the learning technologies such as the availability of lectures on the Web (Ansorge and Cooley, 2000; Owston, 1997; Bonk *et al.*, 2000). This facilitates the transmission of information from teachers to students. Thus, Web access is important for updating and re-using the information.

The availability of resource-based learning materials, which are easily accessible due to the combination of the Internet, the Web and the CD-based materials assist in creating a more responsive curriculum. Thus, technology requires tools and teams and radical organisational change to achieve the positive solution of ICT integration. However, technology can also be a threat to the educational institutions (Cochrane, 1999; Laurillard, 2001). The technology enhancement raises the issue of the pedagogical effectiveness of the learning experience. Although there are some signs of growing interest in learner outcomes derived from E-learning environments, the enhancement of the learner experience has not been a key driver so far. Chen *et al.* (2002) identify the following pedagogical considerations to be taken into account while using E-learning: urgency of learning need, initiative of knowledge acquisition, mobility of learning setting, interactivity of the learning process, position of instructional activities, and integration of instructional content. Singh (2003) provides a most comprehensive explanation of the processes supporting effective pedagogy. The pedagogical processes are related to performance, business workflow, performance-based design, new forms of interactivity (voice), and collaboration.

The impact of ICT on learning and educational organisations : The ICT revolution is changing people's ways of thinking and learning, making knowledge much easier to access and restructure and ways of thinking more lateral, associative and visual (Negroponte, 1995; Rhinegold, 2002). ICT is a defining technology (i.e., a technology

that is changing the environment and the organisations in which it is being used and hence its users), and is having an enormous impact on all aspects of people's lives (Lyon, 2003). What has been created in the past decade is not just a series of new tools, but also a whole new virtual living environment that wraps up all the technological developments of the ICT revolutions of the past 150 years. It is obvious now that education systems cannot, and should not, isolate themselves from the ICT-based environment (Barajas, 2002). Computers and the Internet are both the expression and the medium of the new way of doing things in the post-industrial period, especially in educational institutions. Therefore, if they want to survive, educational institutions have no option but to adapt themselves to the era that they have to serve and in which they function (Aviram, 2000).

There is a need for a balanced attitude (Killian, 2000). The balanced attitude represents a real challenge because it requires educationalists, experts and decision-makers to understand the inevitably defining nature of ICT, to diagnose both its negative and positive aspects, and then to form strategies in order to integrate ICT into education in ways that will limit the negative potential while enhancing the positive potential (Aviram and Richardson, 1999). The real power of ICT appears when the change starts affecting the processes and the organisation of learning (McLean, 2003).

Moreover, many issues are to be discussed such as whether, on balance, ICT in education has led to meaningful increases in students' achievements or not; whether ICT in educational institutions has brought about changes in learning/teaching methods towards more research-oriented methods; whether educational institutions are now ICT-friendly and whether educational institutions have really become integrated within the emerging cyber-culture stemming from ICT (Ryan, 1999).

Effect of technological change on curriculum: The University must operate in a way responsive to the external pressures. Therefore, curricular changes are inevitable for maintaining the effectiveness of education by focusing on the development of both knowledge and skills. At the same time, teaching methodology and the curriculum content are used to create a compatible effect of technological change. Thus, in order to enhance teacher-student relationship to achieve their objectives, teachers should be

expert enough to better exploit the new technology and students should be motivated and actively engaged in the process of learning.

Moreover, dilemmas for educators are sharply focused in the area of the curriculum where calls for new learning (Tillema and Kremer-Hayon, 2005; Kapustka, 2002) jostle uneasily with demands for a more rigorous focus on the established disciplines and the old basics. In such an environment, a deep appreciation of the theoretical and practical aspects of curricula is needed to avoid superficial responses to the emerging challenges (Smith and Lovat, 2003). As a consequence, creating curricula should meet the technical needs of a dynamic and rapidly changing world market (Phukan *et al.*, 2002).

5. Implications for the university in its changing contexts

Higher education must be restructured to meet the needs of an increasingly technology-oriented economy; to deliver the requisite research, highly trained people, and knowledge to equip a developing society with the capacity to address national needs; and to participate in a rapidly changing and competitive global context. In other words, traditional models of education will coexist with new learning paradigms, providing a broader continuum of learning opportunities. Students will become active learners capable of selecting, designing and controlling their learning environments. Teachers will be factors as instructors, consultants and designers of their experiences (Duderstadt *et al.*, 2003; Marshall, 2006). Leaders can adopt several approaches to guarantee the creating of a winning strategy. A common practice is to push the technology into the class expecting that this by itself will make a difference in educational processes. The instructor will facilitate the integration of Interactive Digital Technology (IDT) to the class (Sams, 2004). Experience shows that, without the creation of an appropriate technology/pedagogy composite, no educational impact should be expected.

Another common approach is to attach the new technological means to existent pedagogical models. The result in most cases is that the added value of the technology can hardly be recognized in comparison with the previous situation. The implementation of ICT technologies within innovative pedagogical approaches can contribute to the emergence of novel pedagogical modes and learning collaboration patterns among the students. Thus, the change in economy leads to the change in

technology, which in turn shows the way to change in literacy (Webber and Johnston, 2000; Maybee, 2006). Armstrong and Hagel (1996) state Web thinking "may even represent the opening salvo in the transition from industrial-age to information-age thinking." The existence of complex economic webs or educational webs changes the way organisations must operate strategically if they are to survive in a turbulent, fast-changing environment (Kalyanam and McIntyre, 2002). Web strategy asserts that the two basic choices confronting leaders are firstly which webs to participate in (or to form) and secondly what role to play in them. In other words, organisations' strategy follows web strategy. Therefore, the skills needed for the 21st century are communication, web site development and digital learning (Visser and Visser, 2005). Furthermore, the virtual world may teach real-world skills only with support of adaptive pedagogical modes.

The educational system will become a resource for learners at all levels in formal and informal educational environments as well as for traditional classroom instructors who want to incorporate modern digitally-based information into their formal courses or to seek information for less formal reasons (Lagowski, 1999; Wingard, 2004). The new educational system shifts the education paradigm from the static, passive, and homogeneous environment to a new one with the following characteristics: individualization will be enhanced using networked personal work stations; team learning will be encouraged using collaborative software tools and E-mail; and teachers will become guides to student learning through the use of networked experts. As a result, universities may continue to focus on the traditional educational model, but they may be involved in the transformation by exploring many themes such as changing from teaching to learning organisations, from students to active learners, from teacher-centred to learner-centred, from classroom learning to learning communities, etc … (Duderstadt *et al.*, 2003; Dryden and Vos, 1999; Given, 2002).

This chapter has so far described the need to place learning in the much broader context of the emerging knowledge economy. In particular, the development of infrastructure embracing learning, information environments, and adaptive leadership is regarded as a key issue. The new paradigm E-learning has emerged as a wave of development based on the use of ICT combined with IDT. The pace of change in the educational area of growing technological convergence is unpredictable and beyond the control of E-

learning communities. The challenge is to develop incremental leadership strategies that can be sustained through times of rapid technological change. Some technical characteristics and factors need to be taken into account while developing such learning strategy. First, the identification of learning contexts and activities appropriate to ICT technologies, and the development of pilots to explore how technologies can best support life-long learning, symbolise the business perspective characteristic of the adopted strategy (O'Malley *et al.*, 2003; Abel, 2005). Second, pedagogical considerations are to be taken into consideration, such as the urgency of learning need and the interactivity of the learning process. The third characteristic of such strategy is to assist in addressing the host of concerns in the workplace by transforming the curriculum (Bastiaens *et al.*, 2004).

The next chapter is dedicated to describing the design and transformation of the curriculum while integrating ICT.

Chapter 3

ICT and the Curriculum

Higher education is richer with options for improving teaching and learning than ever before, and these options are changing ever more rapidly (Clarke, 1998). The variety and power of new kinds of information resources are increasing just as fast. New telecommunications and information technologies contribute both to the necessity and to the means for keeping up with these changes (Jones *et al.*, 2001). Enabling millions of citizens, including professional educators, to think, decide, and act differently is a task for which educators are still the best prepared and most needed. The reason behind this is that the education system is a social institution, which should be expected to change in this era of technology.

A successful educational system in the 21st century will be giving the consumers whatever they need, whenever and wherever they want it. Connick (1995) argues that education is acquiring knowledge, information, skills, abilities and personal development, but it does not have to happen at any certain place. The challenge facing education in the 21st century will be linking the learner with the programme by reinforcing the curriculum evolution rather than revolution (Kelly, 2004). The advantage of evolution over revolution is to acknowledge that the process of evolution can be more effective when implemented according to a well-premeditated strategy. The natural evolution of the curriculum reflects social, moral, and political changes as well as technological and economic development. Connick (1995) emphasises the need to use technological tools to address access, quality and productivity.

States and educational institutions must continue to focus on adopting a new model of learning for the 21st century. There is a need for a framework for action that enables educators and administrators to assess where their institutions stand in implementing 21st century skills and to identify specific strategies for improvement. For example, this framework can be software to help educators and administrators gauge their educational institution's effectiveness in integrating 21st century skills into the learning process.

Innovative thinking and new strategies are essential to future educational provision and practice (Ishumi, 1994). Such strategies include improvement of evaluation and accreditation systems, review of programs to make them more responsive to societal needs, informed management of higher education, enhancement of gender equity, promotion of university linkages with the private sector, and involvement in policy analysis through research. In addition, improvement of higher education will require more effective utilisation of new information and communication technologies (ICT) (Rosenberg, 2001). Universities need to review their missions and come up with specific strategic plans, based on each university's personal situation, as well as national and global issues affecting universities.

The purpose of this chapter is to explore the different learning environments and to discuss the need of using ICT in the curriculum. This chapter also addresses the issue that the learning process has changed and learners interact through the technology available (Internet, softwares, etc). Therefore the learning undertaken is differently mediated, managed and assessed. If planned and managed well, ICT can be used to facilitate the development of online communities in which all participants collaborate to discuss, reflect on, and deepen their understanding of their learning. This chapter discusses also the appropriate use of ICT in developing the curriculum and examines the impact of ICT on formal and hidden curricula by emphasising the teacher-student relationship.

1. The Curriculum

At one level, curriculum acts as a filtering mechanism, which allows some content to survive to be included in the instructional programs and other content to be eliminated. At another level, it functions as an ordering mechanism of learning experience. It refers to the decision-making process and products that focus on preparation and assessment of plans designed to influence students' development of insights related to specific knowledge and skills (Armstrong, 2003; Smith, 2001).

Ornstein and Hunkins (1998) specify five basic views or definitions of curriculum. The first two, the most popular, delineate two extremes: specific, prescriptive versus broad, and general. In the sense of specific and prescriptive, a curriculum can be defined as a

plan for action or a written document that includes strategies for achieving desired goals or ends, as well as a process (or means) so that the beginning can progress to an end. Curriculum can, however, be defined broadly as dealing with the experiences of the learner (Kolb and Kolb, 2003b). This view considers almost anything in the educational institution, even outside of the educational institution as part of the curriculum (Atherton, 2004). Kelly (2004) defines the curriculum as the totality of experiences the student has because of the provision made. Reid (2003) classifies all aspects of the curriculum based on two views, dominant and alternative. The dominant view describes the curriculum as content or syllabus or product while the alternative view expresses the curriculum as process and development. Moreover, it describes the purposes of education as acquisition of knowledge and as human development in and for a democratic society.

Three other definitions fall in between these two common, almost extreme, definitions. Curriculum can be considered as a system for dealing with people and the processes or the organisation of personnel procedures for implementing that system (Drew, 2004; Cotter, 2003). Curriculum can also be viewed as a field of study, comprising its own foundations and domains of knowledge, as well as its own research, theory, and principles and its own specialists to interpret this knowledge. Finally, curriculum can be considered in terms of subject matter or content. These definitions cover in one way or another some aspects of curriculum. But Stark and Lattuca (1997) give a more comprehensive speculation on curriculum. They hold that in order to talk effectively about curriculum change in an abstract or a technical sense, researchers must define curricular terms in useful ways. "A vague definition of curriculum may suffice for the general population, but faculty and administrators have more specialised needs that require more precise definition"(*Ibid*, p. 9). They also argue that the common but incomplete definition of curriculum as a set of course offerings written down in a bulletin or catalogue must be rejected. In order to remedy the lack of a comprehensive definition of curriculum, they suggest defining the curriculum as an academic plan that includes purposes, activities, and ways of measuring success. The academic plan is "set in a context, including not only the institution, program, or course mission but also the goals and characteristics of a specific group of learners." "The plan also includes a set of process strategies, as well as an evaluation and feedback component". (*Ibid*, p. 2) Based on the context of Chinese higher education, curriculum has been defined as an

academic plan including five elements: purpose, content, organisational structure, instructional processes, and evaluation (SUST, n.d.; Stark and Lattuca, 1997; Smith, 2000)

The diversity of definitions of curriculum is summarised into two dimensions: means and ends, and existential-personal (Connelly and Lantz, 1994). In the dimension of means and ends, curriculum ends are often defined in terms of intended learning outcomes. Intended learning outcomes may be expressed in terms of goals, aims, and objectives. When curriculum is defined this way, the form of its content may be behavioural. When curriculum is defined existentially, it will refer to textbooks and materials of instruction and to their content such as concepts, theories, and facts. This kind of definition highlights the issue of teaching methodology and instruction since the problem of the students' interaction with the content is the main instructional concern. The existential perspective on the curriculum also emphasises learners' perspectives. As students learn, they concurrently use basic skills and higher level thinking skills. All students need to be able to interpret, analyze, solve problems, and make sense of what they are learning. Hence, relating new information to examples makes learning more meaningful. For example, online activities encourage students to use their advanced thinking skills.

Many aspects of educational curricula may satisfy the educational principles while other aspects do not (Kelly, 2004). The total aspect of the curriculum is the fact the curriculum should be planned as a whole in order to ensure that students experience coherence, continuity and progression in their learning relative to the problems of development within individual subjects areas (Short, 2002; Bolliger and Martindale, 2004). However, some values and attitudes can be learned without the awareness of the designer. This aspect is called a hidden curriculum which is a consequence of the planned and organised curriculum (Seaton, 2002). Another aspect is called an inner curriculum which refers to the kind of sense each person makes when finding oneself confronted with new information and new situations (Thomas and Brubaker, 2000). Thus, the received curriculum is the teacher's responsibility which may be far from the planned curriculum (Wachtler and Troein, 2003; Morrison, 2003). There are more aspects to curriculum such as formal and informal activities. The first type of activities is within the classroom while the informal activities which are separate from the

curriculum, sometimes called extracurricular activities happen outside the classroom. Students in a class differ in how they value the taught material in regard to their prior knowledge. Students bring widely divergent life experience with them. Students intercept the data embedded within the curriculum in highly individualised ways.

At the same time, the role of the human factor in the development process is very important (Adjibolosoo 2000, 1999; Chivaura and Mararike, 1998). There is a need to provide students with an environment conducive to the development of positive human factor traits (Cherif *et al.*, 2000, p. 91). Social attitudes towards education favouring an academic education rather than the one focusing on practical skills useful for everyday living can inhibit development (Anyanwu, 1998). A relevant and meaningful curriculum with a human factor content emphasis is needed. There is also the need to infuse and integrate positive traits from culture into educational programmes. Barnett (2001) considers a curriculum as an educational project forming identities founded in three domains: knowledge, action and self. Knowledge domain means that knowledge changes take three main forms: 1) the structure of the knowledge field might itself be taking new shape, 2) new topics emerge within knowledge fields, and 3) new techniques and new forms of realisation emerge within knowledge fields. The changes in action imply what skills are highly valued by employers. And the self domain means the formation of students' educational identities. Therefore, when developing curriculum strategies it is necessary to take account of the patterns of curriculum components, structure, and implementation.

2. Approaches to curriculum

Learning is an active process for which consideration must be given to the fact that learning activities need to be authentic, normal to the culture in question and involving tools and artefacts (Kearsley and Shneiderman, 1998). There are a lot of different learning theories that can be used to help guide a teaching-learning process. One of the key issues used in this study to look at some learning theories is that of the transfer of learning.

The experiential learning theory (ELT) defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from

the combination of grasping and transforming experience" (Kolb 1984, p. 41). Kolb *et al.* (1999) argue that "experiential" is used therefore to differentiate ELT both from cognitive learning theories, which tend to emphasise cognition over influence, and behavioural learning theories that deny any role for subjective experience in the learning process (Atherton, 2004). Kolb and Kolb (2003a) introduce the concept of learning space as a framework for understanding the interface between student learning styles and the institutional learning environment. They suggest that experiential learning can be applied throughout the educational environment by institutional development programmes, including longitudinal outcome assessment, curriculum development, student development and faculty development.

The second learning theory used to increase the transfer of learning is conversational learning. Conversational learning is an experiential approach to knowledge creation, which equally values the learner's emotional, sensual, and physical engagement in the learning process (Baker *et al.*, 2002). The evolution process is an attribute associated with experiential learning in conversation as learners in a given class move through the learning process of experiencing, reflecting, conceptualising, and acting to create new experiences.

Learning as it normally occurs is a function of the activity, context and culture in which it occurs (i.e. it is situated) (Lave and Wenger, 1990; Wenger, 1998; Lave, 1988). Situated learning has been applied in the context of technology-based learning activities that focus on problem-solving skills (Tomei, 2005).This contrasts with traditional classroom learning activities which involve knowledge which is often presented in an abstract form and out of context. Smith (2003) argues that social interaction is a critical component of situated learning--learners become involved in a "community of practice" which embodies certain beliefs and behaviours to be acquired (McLellan, 1995).

Social development theory is a learning theory where social interaction plays a fundamental role in the development of cognition (Vygotsky, 1978; Miller, 1956). The constructivism aspect will be expanded in later sections. At the same time, information processing theory uses the computer as a model for human learning and, teaching and learning strategies are developed to become learning and life-long learning strategies (Rogers and Frieberg, 1994). As a result, new learning process comes into view by

embedding cognitive learning, experiential learning, and collaborative and cooperative learning (Kolb and Kolb, 2003a; Maier and Warren, 2000). Thus a new philosophy of education has emerged; it is called transformative learning (Tylor, 1998; Longworth, 2003).

This new science of learning known as transformative learning is based on instrumental learning and communicative learning (Huffaker and Calvert, 2003). Instrumental learning is by doing practices such as exercises while communicative learning is by understanding others' values. The shift of learning and teaching models reflects the society changes. A learning society involves the development of knowledge base (content), the intellectual skills, the learning skills and the personal and interpersonal skills. Thus transformative learning holds promise for E-learning applications and for the educational purposes they serve (Cross, 1995; Rosenberg, 2001). Moreover, transformative learning embeds problem-based learning, which is learning by doing. The E-learning approach is learner-centred, and its design entails a system that is interactive, self-paced, repetitious and customisable (Twigg, 2002).

This open learning environment encourages the design of engaging curricula that apply to real-world situations, build local and global communities of practice, and most importantly, provide opportunities for students to learn both inside and outside the classroom (Bransford *et al.*, 1999; Reigeluth, 1999).

Moreover, another focal point is making learning distributed, which means learning at any time and anywhere with the support of the appropriate software and technologies; such a system being called Virtual Learning Environment (VLE) (Atherton, 2004). VLE is designed to act as a focus for students' learning activities and their management and facilitation, along with the provision of content and resources required to help make the activities successful. Milligan (1999) argues that VLE can be categorised as either content or learner-centred. It is fundamentally learner-centred in that it takes as its premise that a course consists of a group of people to whom learning opportunities are assigned. It is a content-centred system in which a course consists of an organised collection of learning content onto which learners are enrolled. Stiles (2000a) argues that without addressing the issues of effective learning, the use of VLE leaves the learner with a passive, unengaging experience leading to surface learning. Brown and

Duguid (2000) argue that the adoption of the view of learning as an information delivery process should be coupled with the practice of procedures to avoid educational errors such as failure to engage the learner, mistaking interactivity for engagement, focusing on content rather than outcomes, and mirroring traditional didactic approaches on the technology. Soloway *et al.* (n.d.) point out another educational problem, which is the failure to recognise the social nature of learning. Ignoring the social aspects of learning leads to less effective learning (Klemm and Snell, 1996). Individual and social learning have a complex and necessary interdependence (Salomon and Perkins, 1998). The inattention to the above-mentioned educational problems can result in mere transposition of traditional teaching approaches to the computer, and result in a poor and ineffective learning experience.

Bransford *et al.* (1999) discuss the design of learning environments from four perspectives that are related to the degree to which learning environments are learner-centred, knowledge-centred, assessment-centred, and community-centred. Learner-centred environments refer to the knowledge, skills, attitudes, and beliefs that learners bring to the educational setting. Learner-centred teachers also respect the experiences of their students because they provide a basis for further learning. Knowledge-centred environments are based on the need to help students become knowledgeable, and they also focus on the kinds of information and activities that help students develop an understanding of disciplines (Prawat, 1992; Dettmer, 2006). This focus requires a critical examination of existing curricula.

In addition to being learner-centred and knowledge-centred, effectively designed learning environments must also be assessment-centred. The key principles of assessment are that they should provide opportunities for feedback and revision and that what is assessed must be congruent with one's learning goals. Bransford *et al.* (1999) distinguish between two major uses of assessment. The first, formative assessment, involves the use of assessments as sources of feedback to improve teaching and learning. The second, summative assessment, measures what students have learned at the end of some set of learning activities. The fourth perspective on learning environments involves the degree to which they promote a sense of community. Ideally, students, teachers, and other interested participants share norms that value learning and high standards. Norms such as these increase people's opportunities to interact, receive

feedback, and learn. There are several aspects of community, including the community of the classroom, the educational institution, and the connections between the educational institution and the larger community.

All these various types of learning presented here are divided into two views essential but somehow contradictory. One advocates a classical approach that depends primarily on developing knowledge relevant to student learning whereas the other relies on developing learners relevant to the Virtual Learning Environment. There is a need for well-suited learning theory which facilitates active social models of learning such as cognitive apprenticeship encourages collaborative working which includes synthesis, and is not constrained to constructivist approaches but incorporates structure individual and behaviourist learning concerns. The learning theory needed should also integrate ICT as an effective tool of learning. For example, the use of the Internet is an effective tool of learning when the student experiences are integrated into their other learning experiences.

However, not all learners are predisposed to engage in such transformative learning (Taylor, 1998). For this purpose, the Bransford *et al.* (1999) views, based on the four perspectives learner-centred, knowledge-centred, assessment-centred, and community-centred, may be the more flexible theory to support teaching and learning with technology. So, giving different weights to each of these perspectives may be the best way to construct a balanced curriculum to face the future with confidence. A balanced curriculum is a mixture of teaching methodologies, and the learning-by-doing promoted by the use of online activities. However, using technology does not mean addressing learning goals. Therefore, the online activities that enhance the existing curricula are not limited to drill-and-practice activities (usually controlled by the programme developer rather than the learner) but cover activities that encourage exploration, collaboration, and problem-solving (Herrenkohl, 2002). Thus, the so-called teaching institutions must become more focused on learning and "that community college of the future will empower learners to direct and take control of their own learning." (Reynolds and Werner, 1998) "Learning must be a way of being – an ongoing set of attitudes and actions by individuals and groups that they employ to try to keep abreast of the surprising, novel, messy, obtrusive, recurring events…" (Vaill , 1996, p. 42).

This study takes on the views of Bransford *et al.* (1999) by mixing the face-to-face teaching with online learning activities, by providing learners with an effective learning experience, by providing teachers with an easy-to-navigate toolbox to create online courses, and by offering departmental leaders with an easy-to-access framework to construct ICT -curricula.

The next section discusses the different styles of learning, their weakness and strength.

3. Different Styles of Learning

Learning theories are commonly used to explain how learning occurs in people. Behaviourism, cognitivism, and constructivism are the known learning theories.

Behaviourism is a collection of theories that makes the observable behaviour more important than internal activities (Gredler, 2005). In behaviourism, knowledge is an external issue and the focus is on the learning process. It focuses on a new behavioural pattern being repeated until it becomes automatic. Behaviour theorists define learning as nothing more than the acquisition of new behaviour. The transmission of information from teacher to learner is essentially the transmission of response appropriate to a certain stimulus (Skinner, 1976). Behaviourism often is used by teachers, who reward or punish student behaviours (Phillips and Soltis, 2003; Hwang and Arbaugh, 2006). Thus, students must get a chance to observe and model the behaviour that leads to a positive reinforcement and teachers must encourage collaborative learning, since much of learning happens within important social and environmental contexts. Positive reinforcement is presentation of a stimulus that increases the probability to of a response. This type of reinforcement occurs frequently in the classroom. Teachers may provide positive reinforcement by smiling at students after a correct response, commending students for their work, selecting them for a special project, and praising students' ability.

Cognitivism explains how changes in behaviour are used as indicators as to what is happening inside the learner's mind. "Cognitive theorists recognize that much learning involves associations established through contiguity and repetition." (Good and Brophy, 1990, p. 187) "In cognitive theories, knowledge is viewed as symbolic mental

constructs in the learner's mind, and the learning process is the means by which these symbolic representations are committed to memory." (Buell, n.d; Siemens, 2005). The cognitive or information processing model becomes much more popular with the advent of computers. Moreover, the social cognition learning model asserts that culture is the prime determinant of learner's development. Students' learning difficulties can often be attributed to ineffective or inappropriate cognitive processes. So, teachers must become aware not only of what students learn, but also of how they attempt to learn it. Moreover, teachers should help students' learn by showing them how new ideas relate to old ones. When students are unable to relate new information to anything with which they are familiar, learning is likely to be slow and ineffective.

In constructivism, knowledge is internal. The learner builds new knowledge and skills with the support of experiences (Jonassen, 1991). Constructivism focuses on preparing the learner to problem solve in ambiguous situations. It builds upon behaviourism and cognitivism in the sense that it accepts multiple perspectives and maintains that learning is a personal interpretation of the world. Constructivism calls for the elimination of a standardized curriculum. Instead, it promotes using curricula customized to the students' prior knowledge. Since students learn much through interaction, curricula should be designed to emphasize interaction between learners and learning task (Doolittle, 1997; O'Reilly and Newton, 2002). The fundamental challenge of constructivism is in its changing the locus of control over learning from the teacher to the student. In other words, "learning involves constructing one's own knowledge from one's own experiences" (Ormrod, 2003, p. 227).

Depending on the learners and the situation, different learning theories may apply. The adopter of a theory must understand the strengths and weakness of each learning theory to optimise their use in an appropriate strategy. Jonassen (1991) points out that the difference between constructivist and objectivist (behavioural and cognitive) instructional design is that objective design has a predetermined outcome and intervenes in the learning process to map a pre-determined concept of reality into the learner's mind, while constructivism maintains that because learning outcomes are not always predictable, instruction should foster, not control, learning. In behaviourism, the learner is focused on a clear goal and can respond automatically to the cues of the goal. However, he/she may find himself/herself in a situation where the stimulus for the

correct response does not occur, so, the learner cannot respond. In cognitivism, the goal is to train learners to do a task in the same way to enable consistency. However, learners learn a way to accomplish a task, but it may not be the best way for the learner or for the situation. In constructivism, the learner is better able to deal with real-life situations because he/she is able to interpret multiple realities. However, in a situation where conformity is essential, divergent thinking and action may cause problems.

There are many additional learning theories related to the use of ICT in education materials and to users of such materials such as situated learning (Bransford *et al.*, 1999), experiential learning (Rogers, 2002) and cognitive Flexibility theory (Spiro *et al*., 1991). Connectivism is a learning theory for the digital age: "Connectivism is the integration of principles explored by chaos, network, and complexity and self-organisation theories." (Siemens, 2005, p. 5). Learning in a knowledge economy environment requires a capacity to form connections between sources of information, and thereby to create useful information patterns. Connectivism addresses the challenges of organisational knowledge and transference; these attributes cannot be correlated with the above-mentioned learning theories behaviourism, cognitivism, and constructivism.

An additional learning theory which is consistent with constructivist approaches is defined as an engagement theory (Shneiderman *et al.*, 1995). It emphasises collaboration among peers and a community of learners. In principle, engagement could occur without the use of technology (Shneiderman, 1994, 1998a; Kearsley, 1997). However, engagement theory is presented as a model for learning in technology-based environments, which synthesises many elements from past theories of learning (Kearsley and Shneiderman, 1998). The role of technology in the theory is to facilitate all aspects of engagement. The use of email, online conferencing, web databases, groupware, and audio/video conferencing significantly increases the extent and ease of interaction amongst all participants, as well as access to information (Greenlaw, 1995). Engaged learning is collaborative learning where instructors and students work together (Conrad and Donaldson, 2004). They establish a theoretical framework for thinking about engaged learning in an online environment. They further offer a useful model for phasing in levels of engagement, a progressive way for students to comfortably develop the confidence and skills needed for success.

Advancements in technology make connectivism and engagement approaches possible. They may be better strategies to be used in integrating ICT in a balanced curriculum capable of enforcing teaching while promoting learning. Through development of balanced curricula, universities and their teachers and students are brought closer to their communities. Therefore, the curriculum must optimise the chances for the students to more easily enter their chosen professions or meet their desired goals upon graduation from the university programme due to decreasing job markets and increasing competition among universities graduates across almost all fields of the study (Amacher and Meiners, 2001). Moreover, as the curriculum nowadays deals with non-traditional learners who are demanding more varied modes of learning, teachers need to provide learning opportunities and curricula to make learning more relevant for their students in a rapid-change technological environment. The effectiveness of such framework has to be coupled with appropriate assessment strategy.

The effectiveness of a successful curriculum is also dependent upon the involvement and support of the broader community. Within such an environment, teachers can take individual and collective responsibility for the success of their students and the success of teachers can be measured in ways consistent with adult learning. Preparation of teachers is considered to be one of the greatest needs in adult learning (Kutner, 1992). Adults learn more effectively by doing or experiencing. Kolb (1984) has described adult learning as a cycle in which the learner observes and reflects based on her or his own experience then generalizes and conceptualizes a framework to be tested and applied in different situations. Joyce and Showers (1988) developed one model for effective evaluation of professional development programmes which operates on three levels. The first level is measuring the programme's goals achievement; the second level is measuring the programme's service for the educational system; the third level is measuring teacher's learning and students' performance. Fullan and Steigelbauer (1991) link three key characteristics of a professional development programme: strategies, activities and outcomes. Strategies are commitment to goals accomplished by activities and the outcomes are the results of such strategies.

However, lack of technical assistance and other forms of teacher's development such as inadequate implementation of new skills acquired can be identified as barriers to

effective professional development programs and thus, a non-supportive environment of the creativity and dramatic effect on student performance (Joyce *et al.*, 1989).

Hence, "the information age has had a profound impact on the world around us; thus it is not unreasonable to posit that the information age should also affect the form and function of adult education" (Russell and Ginsburg, 1999, p. 45). The next section discusses the advantages and disadvantages of using technology in an educational environment.

4. Using technology appropriately in the curriculum

The challenge has been to integrate technology in curricula while preserving the learning goals and the ability to solve real world problems (Loepp, 1999). A curriculum model might be developed based on cognitive characteristics to be possessed by the graduate learner to design and function in an accessible world.

The International Federation for Information Processing (IFIP) in coordination with the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) has developed a framework within which educational institutions can develop an ICT curriculum (Mulder and vanWeert, 2000; Sweeney, 2003). A framework for successful model for integrating technology into the curriculum must focus on the familiarisation and utilisation issues before the integration (Comber *et al.*, 1998). The success, shortfalls and possible solutions of the technology implementation in several meetings help teachers integrate technology into the curriculum (Arthur, 2000). Therefore, getting acquainted with the Net and the computing environment, and the tool's relevancy to teaching and learning, must be identifiable by teachers and leaders (Bhattacharya *et al.*, 2005). This framework should also deal with avoiding Internet pitfalls such as computer viruses, copyright issues for educators, accessing site with inappropriate material and safety issues.

Each curriculum emphasises a different perspective of ICT. Some frameworks are based on learning outcomes and higher education qualifications (QAA, 2004). Stites *et al.* (1998, p. 1) argue that "to take advantage of technology's potential, adult educators, planners, and policy makers need to critically access the performance of the technology

and the quality of learning that technology supports." Other curriculum frameworks are based on educating ICT professionals. Model curricula have also been developed by other organisations, in particular the Software Engineering Institute (SET) and the Information Systems-Centric Committee (ISCC). These models convey themes, characteristics, theories, methods, techniques, and practices of the discipline. The goal in designing technology-enhanced curriculum is to use tools that are appropriate to the needs of the learning experience (Gynn, 2001; O'Brien, 2002).

Yet, technology cannot fulfil all the educational values. Feenberg (1999) among other researchers raise the question whether technology should or should not be used for teaching (Noble, 1997) and to what extent the strategy of using technology change would the values of a higher education institution. Thus, there is a growing consensus among teachers regarding the need for developing educational standards for student achievements and regarding the need to define new set of expectations of how educational technology can support meaningful, engaged learning for students. Universities must first assess their environments and their constituencies to define student needs and then develop curricula to meet those needs (Riposa, 2003). In addition, it is worth reconsidering technology's advantages and disadvantages so that the developed curricula will be well-matched with the environment.

Digital technology's advantages

Technology offers challenge and opportunity. The opportunity ahead lies in the capacity to use digital technology to transform learning in ways that capitalise on what has been known for a long time about powerful pedagogy that students learn more, more profoundly, and remember over a far longer period when they are actively engaged in a self-driven learning activity rather than when they are engaged only passively, sitting and listening (Collis and van der Wende, 2002). Students are better prepared to move forward with both their self-motivated learning and their incorporation of technology in their lives. In simulation-based learning, technology creates an emotional connection between knowledge and learning. Society increasingly values not just analysis but also synthesis, made possible by the extraordinary tools of the digital age. Digital technology is reshaping the university itself (Duderstadt, 2004).

Digital technology provides practical ways to engage students in active learning. For example, new software gives students hands-on experience in essentially any subject. Digital technology grants ways to connect learning with real life. For example, using E-mails enables the course to move at a much faster pace. Digital technology provides ready, rapid, and interest-generating access to massive amounts of information in ways that encourage students to search, explore, and combine information. It allows faculty to see, understand, and even exploit the different learning styles each student brings to the classroom. And it allows students to easily return to previously covered material (asynchronous learning). Digital technology encourages faculty to shift roles from being the source of information to becoming the supervisor or coach of the learning process. Another advantage is the digital technology ability to provide preliminary experience in a safe setting. The new digital technology simply makes learning much more interesting even more exciting. The use of the traditional modes of teaching will be less and less practical (Newman and Scurry, 2001a). As the unavoidable improvement of digital technology continues, and as people's understanding of how to employ it deepens, there will be further gains in capacity, reliability, cost-effectiveness, and ease of use (Newman and Scurry, 2001b).

Five categories of barriers to technology integration are identified: time, expertise, access, resources, and support (Leggett and Persichitte, 1998). The availability of a technology classroom accelerates the faculty involvement in making full use of ICT for instruction (Antonacci, 2002). However, many teachers simply are not using technology in their courses (Rice and Miller, 2001) but the investment in bringing E-technology to the classroom is worth it. Moreover, computer technology has improved the quality of instruction in the educational institutions (E-learning). Instructors must have the requisite skills in E-technology in order to take full advantage of the capabilities of the facility (Quimpo, 2002).

Technology's disadvantages and threats

While information technology has the capacity to enhance and enrich teaching, it also poses certain threats to universities (Duderstadt, 2004). These threats can be summarised in two issues. The first is the fact that technology is creating an open learning environment in which the student has evolved into an active learner and consumer of educational services. The second is the fact that the increasing demand for

advanced education and research from a knowledge-driven society, the appearance of new for-profit competitors, and technological innovations are stimulating the growth of powerful market forces that could dramatically reshape the higher education enterprise. A third threat can be the degree to which universities are being victimised by the effective monopolies created by providers such as Blackboard, and, of course, Microsoft. In fact, most Lebanese universities and colleges are sufferers from the above-mentioned providers.

Moreover, "education and outreach play an important role in making users and operators of cyberspace sensitive to security needs" (White House, 2003). With the dramatic increase in threats to information security and with the lack of formal curriculum models, many academic institutions are unprepared to implement the appropriate measures and strategies to handle these threats (Whitman and Mattord, 2004). So, more researches are needed to make sense of all aspects of cyber-security for higher education, with an emphasis on strategies, policies, and other tools that will assist institutions of higher education to prevent, detect, and respond to vulnerabilities that threaten college and university computers and networks.

While the growth of virtual education has been rapid, the change in the traditional classroom is, by comparison, moving more slowly, dependent as it is on acceptance by individual faculty (Shields, 2000). The change is moving more slowly than virtual education and more slowly than the impact of technology in many fields but still far more rapidly than change typically takes in higher education (Newman and Scurry, 2001a). In reality, students build their own learning environments that render possible interactive, collaborative learning. However, their tolerance for the traditional classroom and four-year curriculum model may not last long. Students will increasingly demand new learning paradigms more suited to their learning styles and more appropriate to preparing them for a lifetime of learning and change. The educational institution infrastructure is moving towards cyber infrastructure, however additional research is needed to decipher the efficacy of this move.

Cyber infrastructure

Technology can be used as a tutor; a tool to create, compose and analyze data; a means to explore; and a means to communicate with others (Ryan, 1999; Means, 1994; Hamza and Alhalabi, 1999). It is important to realise that digital technology drives a shift in

epistemology from learning about to learning to be. Therefore, universities need help to understand, explore, and develop the cyber-infrastructure necessary to support their educational and academic activities. Further, achieving the benefits of ICT investments will require the co-evolution of technology, human behaviour, and organisations.

The co-evolution of technology: Cyber-infrastructure is not only reshaping but actually creating new paradigms for research, training, and application. Educational institutions need to decide which hardware tools (laptops, desktops, tablets, PDAs, digital whiteboards, etc) will best deliver and allow the manipulation of these rich information and communication toolsets as well as the application software packages (Scrimshaw, 2004). In order to deliver a rich ICT environment it is necessary for every classroom to have access to infrastructure software, application software, and curriculum-based software as well as an effective hardware and cabling infrastructure. The necessity for educational institutions to have access to high speed Internet is now beyond doubt. High-speed Broadband Internet access must be both available and affordable for learning institutions. Intelligent courseware will emerge as a common means of learning, with educational institutions increasingly relying on software approaches, leaving human teachers to attend primarily to issues of motivation, psychological well-being, and socialisation (Kurzweil, 1999).

The co-evolution of human behaviour: Every learning process that involves teacher and learner conveys a message about the nature of the knowledge or skills imparted by the authority of the teacher, and the relationship between the two. Learning technologies entail a departure from the traditional modes of teaching at university level, which have always provided adequate opportunities for the teacher—student discussion that has been identified as so important for learning at this level. However, the introduction and the application of ICT into teaching and learning at all levels (hardware and/or software tools) allows institutions to overpass limitations associated with the lack of linkage between teachers and learners separated by time and place (Oh, 2003), and changes individuals' values and beliefs, enabling them to see the world from different perspectives (Mitchell and Hope, 2002).

The co-evolution of organisations: The focus in higher education is on developing an integrated and coordinated system, rather than a uniform one. The system is especially

based on curriculum transformation and its impact on pedagogy. There is a need for a strategy to manage the unpredictable impact of technology. Thus, "Even if a virtual university were to emerge, the management of teaching and learning will remain a critical strategic component of educational success." (Oh, 2003, p. 72) Academics must take responsibility for what and how their students learn. Higher education is evolving and adapting to new conditions while trying to preserve the traditional high standards of an academic education (Cohen, 2002).

Universities are experimenting with improving accessibility to existing programs, designing new programs to take advantage of the emerging technologies, and marketing their programs to new audiences and in new ways. Completely new models for universities are being formed around the promise of virtual environments (Gaissmaier, 2002). For example, Virtual Learning Organisation (VLO) is to facilitate and support a transformation of higher education from supply-driven to demand-driven education. In this new education students actively learn, with interest and motivation, taking responsibility for their own learning (Dutch Digital University, 2000). Besides, VLO distributes services to learners at the time, place, pace, and style that learners desire, with quality determined by the client and by a variety of approval and accrediting bodies (Ryan *et al.*, 2000; Rapp and Poertner, 1992).

Learning assessment techniques in the practice of teaching is essential (Wraga, 2002). So, adopting an assessment process is one of the basic goals of universities, in addition to giving high-quality education (teaching), contributing to the development of society, and adopting technological changes with respect to pure academic values, it is manageable and more meaningful for both the teacher and the learner (d'Orville, 2000; Burger, 2003). There are a variety of assessment tools available, some which are very rigorous and have the possibility of providing considerable informative data about student understanding while other assessment tools provide very limited feedback on what students understand. The use of online assessment is starting to become a viable and pedagogically acceptable part of the assessment process (Loveless and Ellis, 2001).

5. ICT's impact on curriculum

Institutions skilled in the use of technology to improve learning are more dynamic and effective when they adopt the positive impacts of ICT on curriculum construction and avoid the negative ones. An example of positive ICT impact is that pedagogies that integrate ICT can engage students in ways not previously possible, enhance achievement, create new learning possibilities and extend interaction with local and global communities (MCEETYA, 2005). The E-learning strategy focuses on fostering students' independent learning, self-reliance, self-motivation, critical abilities and creativity. Moreover, teachers have to identify and promote their development within the curriculum. E-learning is not simply a matter of turning a traditional course into an online or technology-supported course. It is using technology within courses in ways that add value to the learning experience as well as supporting new modes of learning and teaching. Dempster (2005) states that E-pedagogy might be defined as "learning design that incorporates educational quality, values and effectiveness of teaching, learning and assessment activities supported by technology." The models of learning and higher education experiences continue to diversify, and new models of pedagogy need to be tried, developed and evaluated (Barnett and Hallam, 1999). However, in addition to pedagogical practices O'Brien (2002) has raised epistemological issues for students' learning, teachers' beliefs and orientation and curriculum development. Moreover, some changes in the academic workforce have been occasioned by technology: faculty members, as content experts, find themselves working in conjunction with educational experiences of their students. Hence, students, teachers and leaders are the interface of education towards society. So, integrating ICT in education has a direct impact on students' qualifications, teacher's role and leader's skills. obviously, skilful leadership is needed to help faculty and administrators cope with change and move forward. For more information, the reader may refer back to the previous chapter. This chapter focuses on teachers' and students' roles.

Teacher's role

If a reasonable balance between ICT activities and non-ICT activities is achieved, teachers can remain leaders of learning rather than slaves of technology, free to engage in E-learning at pedagogical and disciplinary levels and to enhance their repertoire of teaching practices. However, the VLE requires the commitment of teachers to cope

with change by being technology's users and/or learning facilitators (learning consultants) so that the educational system keeps on transforming while being effective.

As information is increasingly found in electronic formats it becomes more and more necessary for the teacher to be able to use these integrated multi-media resources within their presentations of ideas and concepts (Cope *et al.*, 2002). The information revolution is changing teaching ways and knowledge delivery. So, one of the required teachers skills is the effective use of technology. It is also clear that those educational experiences that students consistently find most valuable have little to do with the delivery of knowledge (Beeman, 1998).

Moreover, a twenty-first century successful teacher has to spend less time polishing her/his skills as dispensers of knowledge and more time thinking about the ways in which s/he can facilitate the process by which students learn (Chisholm and Wetzel, 2001). Teachers are motivated to learn new ways which actively engage students in the construction of knowledge (Davidson, 1998). The development of teachers' professional competencies in technology-pedagogy integration usually passes through four stages: emerging, applying, infusing and transforming (Anderson and van Weert, 2002). Thus, teachers are challenged to design technology-rich experiences and environments based upon interactive and collaborative learning (Herrington *et al.*, 2005). Teachers will be left to provide things that technology cannot: personal one-on-one tutoring; teaching students how to work in a group to accomplish something; and teaching essential interpersonal relationship skills. Thus, the teacher's role changes from authority figure (Lim, 2003) to a comprehensive figure capable of building a good relationship with students in need of help and/or assistance. The teacher will be an advisor to the team, or a guide on an expedition (Behar and George, 1994).

Student's role

The teacher will facilitate the integration of interactive digital technology to the class and share with the learners the responsibility for developing new skills. The learner's role is to develop skills that are collegial, self-directed, self-disciplinary and professional. Moreover, learner controls the environment, constructs knowledge in collaboration with others. The Internet provides rich opportunities and an open invitation for active learning. Learners become involved within virtual community,

where they turn out to be agents of knowledge making as well as recipients of knowledge transmission (Ryder, 1994). The flexibility of collaborative environments provides scaffolding for learners in times of rapid change where standard instructional approaches can be less adequate.

Technology is changing how teachers deliver content, interact with students, and manage information. However, successful integration of technology in the curriculum requires that content drives the technology. So that learners can combine their current learning experiences with previously learned content to create new understanding and skills (Driscoll, 1994). Skills need to be assessed in order to ensure the teachers' role transparency as well as the effectiveness of the intended change. Furthermore, the effect of open learning environment makes students largely self-motivated and collaborative. The pedagogical emphasis has shifted from passive listening during lectures to active participation, from a passive learner's one to an active one. Moreover, students are well prepared for ICT industry with wide security knowledge (Kajava and Varonen, 2000).

As a result, the concepts of learning space and learning style have important implications for designing educational systems that promote learning (Mainemelis *et al.*, 2002; Boyatzis *et al.*, 1995). In the next section an appropriate curriculum construction is suggested.

6. Construction of ICT-curriculum

The importance of curriculum structure lies in selecting, prioritising and sequencing curriculum content which influence what students learn (Pasquale, 2004). At an institutional level, considerable change is taking place in relation to the curriculum, and this is being shaped, in part, by improving human resources development by promoting greater coherence between education and training and improving access to, and progression through, recognised qualifications for learners at all levels (Goodyear, 1998).

Consequently, there is transformation from a fixed curriculum to flexible and open curriculum. The new technological environment "opens access to study across sector, disciplinary, and cultural boundaries," and this "will quickly erode traditional ideas of the course of study." (Le Grew, 1995) Yet, curriculum is not an ideology-free process

(Smith and Lovat, 2003). It is the organisational context within which the pedagogical framework and educational settings are created and developed (Goodyear, 1998). Therefore, curriculum development needs to address not only content objectives, but the learning processes that are most effective for learning the content (Eickmann *et al.*, 2002). Moreover, the exponential growth of technology will impose to some degree the technological change (Hamza and Alhalabi, 1999; Woddward and Cuban, 2000). Universities must anticipate the information technology power, develop appropriate strategies, and make adequate investments if they are to be maintained and protected and to sustain their important values and roles. The integrated technology-supported learning model emphasises the ability to access, interpret, and synthesise information instead of rote memorisation and the acquisition of isolated skills (Honey *et al.*, 2005). Thus changing to ICT-curriculum requires using some characteristics to develop, enhance and integrate an ICT-curriculum (Loepp, 1999). The next section provides a set of abstractions for modelling and implementing ICT-curriculum.

6.1 ICT-curriculum characteristics

The ICT-curriculum characteristics include concepts useful for curriculum development such as transmitting the culture of society, learning process computerisation, balancing ICT and non-ICT activities, and ensuring good management.

The rapid social change and the need for people to cope with it require educational institutions to adapt to changes for the purpose of attaining targets set by curriculum designers. Meeting the needs of students, teachers and educational institutions is done by successful integration of technology into the curricula, and by addressing the social, legal and ethical issues associated with technology use (Laurillard, 2000). Thus, the curriculum should be aimed at transmitting the culture of society. The penetration of ICT in culture, pedagogy and the curriculum will provoke a variety of images of teachers, learners and knowledge (Loveless and Ellis, 2001). As other changes, curriculum innovation is not just a change of the curriculum. It changes the institutional culture, norms and habitual routines, and brings new values to the institution (ISTE, 1999; Schneider, 1999; Romer, 1990). Changes in the curriculum correlate with changes in other educational factors such as culture and pedagogy.

However, the change process is a challenging task (Fullan, 1993). Many frameworks are described to serve the educational system change (Cavallo, 2004). A framework may be based on teachers' perspectives. Babbitt (1998) describes a teacher-centred framework based on the reflections of the university professors who were pioneers in integrating assistive technology and related content into their courses and who continue to provide leadership in curricular change. Dawson (2005) expresses teacher inquiry as a strategy for systematically and intentionally merging experience and reflection for professional growth during curriculum-based, technology-enhanced field experiences (Posner, 2005). Summers (2003, p. 64) argues that "the only measure of a successful educational model is the students' experience of it", namely the curriculum model.

Given the new and constantly changing nature of the technological revolution, the new knowledge, researchers have reached the conclusion that an on-going rethinking process (Melamed, 1999) should accompany the systematic process of computerisation of education. Thus, learning, not teaching, will be the key to education in the 21st century (Claxton, 2003). Therefore, E-learning emerges. E-learning implies the adaptation process of education institutions to the changing environment, resulting in the swift move from in-house learning to learning on the Web (Rosenberg, 2001). Thus, E-learning affects traditional teacher-centred learning and promotes more student-centred learning (Liu and Fu, 2003; Sachs and Shipp, 2006). Even though, technology integration in instruction is the most important information technology related issue on campus (Durrant and Green, 2001), focusing on teaching methodology and learner-centred approach more than on the technology itself proved to be an effective approach of universities' technology-integration.

The learner-centred approach enables anyone to learn faster, better, smarter (Ziguras, 2001). If the delivery of material is successfully achieved, there will be an inevitable domino effect on the way young people learn in the education system, and on their ability to develop and maintain a personal culture of learning. Claxton (2003) describes a focus on the four R's - resilience, resourcefulness, reflection and relationships to give people the keys to successful lifelong learning. In spite of technology playing an essential role in everyone's life (Bates, 2000), these skills need to be taught in the classroom first because they give people the disposition to continue learning for the rest of their lives. Finding practical ways to cultivate these skills in educational institutions,

and thereby to encourage lifelong learning, is the most critical issue facing teachers today. Introducing technology-based learning into a university's structure should be supported with management arrangements to ensure the success of such intervention. An example of management arrangement is defining the balance needed between face-to-face and personalised teaching, and technology-based teaching. Teaching lifelong learning skills makes young people better equipped to face the challenges of modern society (Claxton, 2003). Learning can be enhanced not only by introducing technology but also when students are involved with active participation and when they work collaboratively under their teacher's supervision and support. Teachers, students, and managers form a collaborative and reliable curriculum pertinent to the changing situations (Busher, 2003). The reason for involving the students in a process of curricular reform is that students have frequent interaction and feedback, and connections to the real world (Schmoker, 1999). Finding different ways to engage students in learning is often difficult, especially when motivation for studying a particular topic is lacking. The use of software may develop a teaching-learning environment that would draw more heavily on the talents and preferred presentation styles of students. The students have a mixture of abilities and talents. Thus it seems right offering students an opportunity to help in designing a curriculum that is compatible with their needs.

Aligning the curriculum, the policies, the planning processes, the services, the infrastructure, and the institutional programmes with the learners' needs supports improving the learner environment and the learner's experience. A study done by Drew (2004) at Sheffield Hallam University supports the view that curriculum is a system composed of elements which need to be in balance, if the intended outcomes are to be achieved (Biggs, 2003). Kelly (2004) discerned three ideologies, curriculum as content and education as transmission, curriculum as product and education as instrumental, and curriculum as process and education as development. As a result, balancing a curriculum is complex (Drew, 2004). However, a learner-centred framework, with an ICT-infrastructure that support it and the services that make it work, can be a guide to design, to develop, and to deliver an online balanced-curriculum (Dolence, 2003).

Building a successful model for integrating technology into curriculum is based on the use of technology as media, media for inquiry, media for communication, media for construction and media for expression. Thus, the effectiveness of any software is

related to its ability to measure the familiarization, the utilization, and the integration of all the stakeholders involved in the process of constructing a successful curriculum. The use of the software approach as a tool to support ICT integration is based on integrating, supporting, complementing, and refining the teaching and learning process (Mitchell *et al.*, 2000). Integration is established by the use of ICT within the subject to enhance particular concepts and skills and improve students' attainment. Supporting is shown by the enhancement of the existing topic through some aspect of the lesson or task. Complementing means the use of ICT to empower by supporting or enabling the learning process (Gaynor, 2004).

The next section will discuss a tailored online curriculum framework based on the characteristics mentioned above.

6.2 OCF framework for curriculum redesign

The study's approach for curriculum configuration is to construct an online curriculum framework (OCF) that supports teaching methodology while promoting online activities. The approach itself is configured by a software implementation. Thus, throughout this thesis, the terms OCF or software or prototype or intervention, are used interchangeably to refer to this configured online curriculum framework.

Curriculum frameworks will need to be developed more sensibly with the promotion of student choice, organisational flexibility, and professional teachers and leaders (Scott and O'Sullivan, 2005). University curriculum reform and innovation have moved into priority in Lebanese higher education. Academics, policymakers, and university administrators are advocating the need for restructuring undergraduate curricula and are trying to reach consensus on what general education should be. Academics at the English-language private university (subject of this study) seem to be reluctant in using a general tool such as Blackboard, whether for developing an online course or for developing an updated curriculum. Thus, the intervention of this study is to develop software, similar to Blackboard but specific to the university of the study, where student learning in conjunction with support for high quality teaching is emphasized (Cross, 1998). The intervention can be used as a tool for curriculum change and as a refining tool of the changed curriculum in the future. Thus, a non-linear curriculum called cut-and paste curriculum will emerge in which students, teachers and leaders combine,

assemble, and reassemble to their own design and for their own purposes components of learning (Robertson, 2000a; 2000b). Therefore, the new curriculum structure will emerge by force (Robertson, 2000a; Cilliers, 1998).

OCF should enable the university to move towards an E-university (Garrett, 2004). Becoming an E-university does not mean becoming a university on the Net but increasing the complexity of learning and teaching. Thus the curriculum transformation needed model should have three dimensions. The first is related to the student's appreciation of the active learning and the student's support of the environment offered by technology's advances. The second is related to the university's adaptation to technological change by providing academic development programs for teachers and administrators, and by moving its infrastructure to cyber-infrastructure. The third dimension is related to the safety of transformation by assessing the learning outcomes as well as having the technological supports team to solve drawbacks which may result from using technology. Therefore, the technology is changing the way teachers teach and students learn (Chisholm, 1998; Wetzel and Chisholm, 1998; Comber *et al.*, 1998). However, it is important to keep a balance between the ICT and the non-ICT learning processes.

This study seeks to ascertain student perception of the virtual learning environment (VLE) as a learning tool and to identify the determinants of this perception. This study is undertaken at an English-language Lebanese University. The purposes of the study are dual. The first purpose is to identify students, teachers and leaders perceptions of an online curriculum framework prototype so as to support decision making with regard as to whether to adopt it as an online teaching resource or not. This focus may help leaders and teachers determine whether to pursue this solution in improving online curriculum. Assuming an online curriculum framework is worth pursuing, the second purpose of this study is to generate a set of high-level design guidelines for future development work in the similar context and a methodology on how to develop an OCF.

The next chapter discusses the methodology used to implement new approaches to technology-based education of software use; new strategies and paradigms will be emerging for Lebanese institutions to look at general education and to manage curriculum innovation.

Chapter 4

Research Design and Methodology

The methodology of this study consists of three components: development research, software prototyping, and qualitative methods. Development research (Reeves *et al.*, 2004; Nieveen, 1997) and software prototyping (Dorsey *et al*., 1997; Fleischmann *et al.*, 1998) provided a framework for this study. Qualitative methods (Beyer and Holtzblatt, 1998; LeCompte and Schensul, 1999; Mason, 2002; Miles and Huberman, 1994; Patton, 2002) guided data gathering and analysis. This chapter starts with a discussion of the rationale for selecting the methodology, and then presents the first two stages of the study development process: conceptualization and development. Finally, the research section of the chapter describes the procedure for conducting the study and discusses various research issues.

The intention of this study is to provide insight into the perceptions of students, teachers and leaders regarding the combination of face-to-face teaching and online learning activities. In order to cover academic stakeholders' perceptions (students, teachers and leaders), the research is conducted from a constructivist and discoverer perspective using qualitative research design methods. The use of the grounded theory approach permits the discovering of knowledge (Glaser, 1978). Thus, grounded theory's main thrust is in the generation of open theory that may stand alone, or contribute to updating an already existing theory.

1. Research Goals

Different goals or purposes of research call for different research methods (Reeves and Hedberg, 2003). Clarifying the research goals of the study helps determine the appropriate methodology. Reeves and Hedberg (2003) identify six major types of research goals in the field of educational technology: theoretical goals, predictive goals, interpretivist goals, post-modern goals, development goals and action goals. Theory construction is the major activity for researchers with theoretical goals, whereas predictive goals aim to determine or predict the effects of technological innovations

under controlled conditions. Studies with interpretivist goals portray education-related phenomena, and researchers with post-modern goals are interested in examining assumptions, "revealing hidden agendas and/or empowering disenfranchised minorities" (Reeves and Hedberg, 2003, p. 267). Development goals and action goals are at the practice end of the theory *vs.* practice continuum. Development goals focus on developing creative approaches to problem-solving and at the same time generating design principles. Action goals are similar to development goals, but they have less emphasis on theory and principle development. Action goals aim to solve "a particular problem in a specific place within a relatively short timeframe" (Reeves and Hedberg, 2003, p. 268). This study uses grounded theory development method to generate an online framework to fulfil action goals for designing an ICT-curriculum (p. 85). Hence, the combination of the development goals and action goals fit with these research goals.

This study is undertaken at an English-language Lebanese university which offers, among others, a Bachelor degree of Computer Communication Engineer, a Bachelor degree of Computer Science, and a Bachelor degree of Education. This study seeks to ascertain academics' perceptions of the virtual learning environment (VLE) as a learning tool and to identify the determinants of these perceptions. The following questions guided the direction of this study.

1. How do students perceive the use of information technology (specifically online software) as a tool that supports teaching?
2. What types of content do teachers and/or administrators perceive that they would need in online software that supports teaching?
3. How might online software implemented as a tool assist universities' academics (students, teachers and transformational leaders) in curriculum reform?
4. How do students, teachers, and leaders evaluate online software in managing curricula?

The first research question investigates students' overall perceptions of an OCF that supports teaching. Question two examines two important concepts in developing the user interface of an OCF: tasks and objects/data (Chandler, 1994; Ludolph, 1998; Stary, 2000). The term content was adopted to replace objects/data in this study, because, as concepts from the software development community, object and data may not be

meaningful for readers in the field of instructional technology. Content is a more familiar term in this context. Once the study determines what tasks teachers would perform in OCF and what types of content should be provided to help them accomplish the tasks, the next logical step is to identify system features (the intervention) that would enable teachers to complete the tasks and access the content, so the third research question is the implementation of the intervention. Finally, the fourth research question assesses the effectiveness of the implemented system by designing an online questionnaire which evaluates the online activities as well as the intervention itself.

In other words, the purpose of the study is dual. The first purpose is to identify students', teachers' and leaders' perceptions of an online curriculum framework prototype, which is described in chapter 5, so as to support decision-making about whether to adopt it as an online teaching resource or not. This focus may help leaders and teachers determine whether to pursue this solution for improving online curriculum. Once an online curriculum framework (OCF) is assumed as worth pursuing, the second purpose of this study is to generate a set of high-level design guidelines for future development work in the similar context and a methodology on how to develop an OCF. These are development goals, which have the dual purpose of solving problems and constructing design principles (Reeves and Hedberg, 2003). Development goals can be achieved with development research (Reeves *et al.*, 2004; Nieveen, 1997). The following provides an overview of development research.

2. Development Research

Traditional empirical studies are inadequate for producing usable knowledge to guide the practice in the field of instructional technology (Reeves, 1995; Richey, 1998). These studies focus on comparing different instructional media or methods to identify which one(s) work better (Reigeluth, 2003). However, in practice, there usually exist many ways of achieving a design goal; it is rare that the same instructional methods are recommended in the same way for all situations (Reigeluth, 2003). What practitioners need are design theories or design knowledge (Kelly, 2003) which provide detailed guidance on choosing and implementing instructional methods under specific situations. Traditional empirical research has largely failed to develop such theories.

Development or developmental research is appropriate for generating design knowledge. Multiple terms have been used to refer to this type of research. For example, in addition to developmental research, Reigeluth (2003) listed several other methods, including grounded theory development method, design experiment, and formative research methods. Van den Akker (1999) suggested still more, such as design studies, design research, formative inquiry, formative experiment, formative evaluation, action research, and engineering research. There has been an increased interest in this type of studies. Leaders in the field of instructional technology have conducted a comprehensive and detailed review of this type of research (Nieveen, 1997) and provided a development research agenda for online collaborative learning (Reeves *et al.*, 2004).

The grounded theory guidelines used in this research flow from Glaser and Strauss's original work, The discovery of Grounded Theory (1967), and from Glaser's subsequent research methodological refinement, Theoretical Sensitivity (1978). The grounded theory approach tackles the individual in society, and the relationships between individual perceptions, collective action and society (Urquhart, 2001). Further, grounded theory focuses on the meaning of events to people and the symbols they use to convey meanings, meanings which are developed through experience or interaction and are shared through common language and socialization, and which constantly change in social interactions (Kirkwood and Price, 2005). This study applies the grounded theory approach particularly the way Strauss and Glaser (1967) develop it. The method consists of a set of steps (or phases) whose careful execution is thought to guarantee a good theory as the outcome. Then, the quality of a theory can be evaluated by the process by which a theory is constructed. In this study, each step represents one of the research questions (p. 9; p. 57).

The study is structured in many phases (Figure 4.1). The first phase is one of conducting preliminary online interviews about the competencies and skills expected of both teachers and students for an online curriculum. Interpreting the results of such online interviews gives a clear answer to the first key research question about students' perceptions of using ICT in teaching and learning. The next phase (second key research question p. 9; p. 57) is conducting online group interviews with teachers and leaders to specify the content needed of an online course and an ICT-curriculum. The systematic

analysis of data from phase 1 and 2 induces the discovery of an online curriculum theory which is the implementation of academics' perceptions of online curriculum framework software. In addition that the theory is inductively derived from data, it is subjected to theoretical elaboration (p. 56) and it is judged adequate to using technology in education (p. 126) with respect to a number of evaluative criteria. Thus in this study, the grounded theory approach and constructivism are extremely useful in developing context-based, process-oriented descriptions and explanations of the phenomenon (Orlikowski, 1993). This research has studied the phenomenon "integrating ICT in teaching and learning", thus integrating ICT in curricula, from students, teachers, and leaders perspectives within a virtual learning environment.

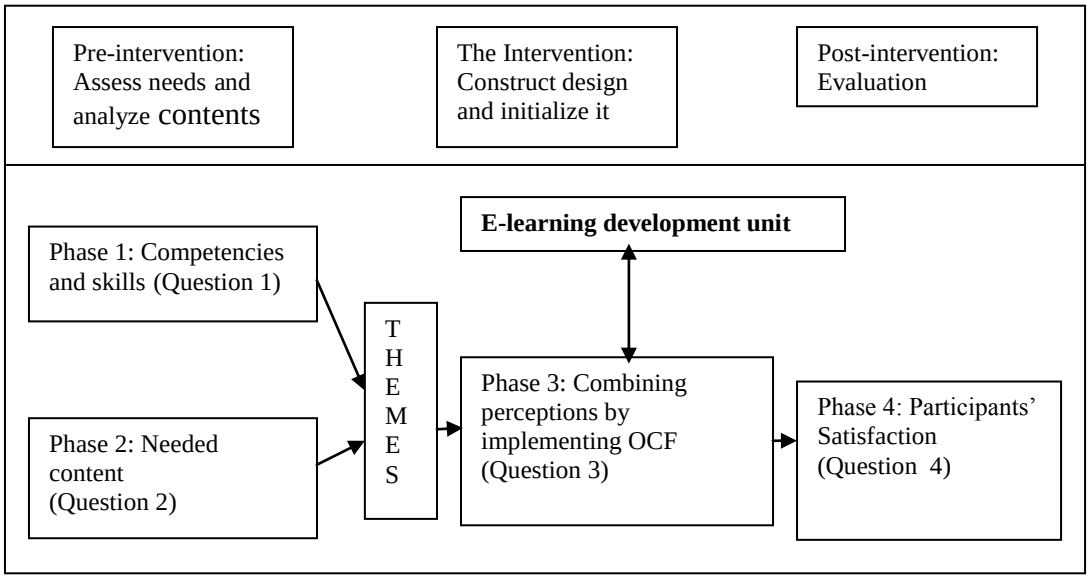


Figure 4.1 Development phases of the study

Consequently, the third phase is the intervention described in chapter four which is used to improve the curriculum at an English-language private Lebanese university by helping managers develop mechanisms to efficiently and effectively improve the implementation of the curriculum while reinforcing fundamental concepts of the intended education; and by allowing the evaluation of the academics' performance and by providing a framework for integrating advanced technologies and/or related courses such as laboratory courses to help students in achieving better results. The third phase is accomplished under the supervision of the E-learning Development Unit (EDU) team. The E-learning Development Unit team (in this study EDU is represented only by leaders) ensures the balance between the learning objectives using ICT and the

pedagogical concerns. The fourth phase uses online questionnaire to test the adequacy of such intervention. The researcher of this study has designed instruments (online interviews, online group interview and online questionnaire) which are directly linked to the use of ICT in education. The frequency of answers may serve as a signal for how engaged participants are with the use of technology. The terms *managers*, *leaders* and *department heads* are used interchangeably in this thesis.

3. Rationale for choosing qualitative method

Due to the phenomenological nature of this research, qualitative methods are most appropriate for the research questions raised in the current study. Qualitative research uses many different methods (interviews, cases studies, etc.) to study a particular phenomenon (Bennett, 2002). Qualitative researchers believe that there are no constants and results are typically not generalizable (Morse, 1999). This study attempts to study the effect using online activities with face-to-face teaching as particular phenomena in an English-language private Lebanese university. To ensure the accuracy of the findings, the study focuses on one university where all participants share the same VLE environment. Data are gathered through online interviews, group interviews and online questionnaires. These methods of data collection and their reliability will be described later in this chapter (p. 66).

The present study has used both qualitative and quantitative methods of research. The qualitative approach used is the grounded theory approach which is based on collecting a corpus of data and discovering categories, concepts and properties and their interrelationships (p. 60). Qualitative research, broadly defined, means “any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification” (Strauss and Corbin, 1998, p. 17). Where quantitative researchers seek causal determination, prediction, and generalization of findings, qualitative researchers seek instead illumination, understanding, and extrapolation to similar situations. Qualitative analysis results in a different type of knowledge than does quantitative inquiry (Hoepfl, 1997). Within the qualitative context of this study (grounded theory) and as a solid finding support, a quantitative approach is used to emphasise the OCF accountability and its practical use so that the research findings are rigorous and trustworthy, especially for organisational researchers who see truth in

numbers (Barley, 1990). The graphical representation of online questionnaire answers helps emphasise the trustworthiness of the evaluation (p. 93). Therefore, it would appear that in fusing the essences of qualitative and quantitative methods a two-fold advantage might be realised in finding natural solutions to problems under study.

In regard to qualitative research, many researchers (Mason, 2005; Bryman, 2001) recommend that qualitative researchers carefully develop their research questions in such a way that they can generate meaningful and useful data. To achieve this objective, a comprehensive interview guide with open-ended questions is used (James and Busher, 2004; Appendices A, B and C). One qualitative element of the study is the email interviews that students participate in, and the group interview their teachers and leaders participate in. The open-ended nature of the question provides opportunities for the interviewer to follow up interesting but unexpected responses and to show his/her potential for eliciting more complete responses, both by recording nonverbal aspects of responses and by probing superficial or incomplete responses (Fitzgerald, 2000). The researcher used the data obtained from interviews to determine emerging themes and categories used during the data analysis process of the study. In the same way, teachers' and leaders' data are analysed after using online group interviews.

Quantitative research uses statistical analysis to show significant differences between groups and results, which are based on numbers and may be used when analysing closed questions. After the data are categorized using grounded theory methods, the data are analysed using interpretive methods and statistical methods. To decipher the meaning of data, the information is gathered into spreadsheet software and many kinds of analyses are performed using charts (Fink, 2002; p. 127). Statistical tests are used to determine any new predictions representing differences among the types of topics raised by students, teacher, and leaders according to their academic level, gender, teachers' experiences and students' background.

4. Sample selection

The research sets out to discover how effective the use of technology is in teaching by providing the opportunity for collaboration between students, teachers and leaders. The data collection of the students' pre-intervention was completed in the Fall semester of

2005, then the data collection of the teachers' and leaders' pre-intervention was completed in the Spring semester of 2006, and the data collection of the evaluation was completed in the Summer semester of 2006.

The researcher evaluated an OCF in an English-language private Lebanese university. There are six faculties within the university that provide about 85 degree programmes in more than 20 fields of study (departments). Each department has diversity in its curricula. For example, the Computer Science Department offers five degree programmes (Computer Science, Computer Information System, Graphics Animation, Business Computing and Geographic Information System). The university has an enrolment of more than 4,000 undergraduate and graduate students. The university adopted Blackboard in 1998, and it is only rarely used, WebCT is being used on an individual basis. Consequently, there is no online course delivery application for the university. The instructional support to teachers is not available but can be fulfilled in a limited manner from the computer centre staff.

Since the purpose of qualitative research focuses on in-depth exploration rather than statistical generalization about a population, purposeful sampling strategies should be used to select information-rich cases (Mason, 2002; Patton, 2002). The objective of representative sampling is to ensure that a sample or a group of samples accurately characterizes site conditions (Benedetto and Ferreira, 2000). It will assist in evaluating the possibility of generating a compatible theory for integrating ICT in education. Representative sampling within the objectives of integrating ICT is used to: (1) promote awareness of technology and technological issues, (2) define the parameters of concern and the data quality objectives, (3) identify and collect suitable quality assurance samples, and (4) interpret and present the data from the participants supposedly more familiar with technology. In this study, representative sampling offers excellent technology-use performance with fewer participants and thus can reduce efforts to construct a theory. The sample corresponds to 3 % of the whole university academics. A small, but carefully chosen sample is used to represent the population.

The participants were chosen according to criteria derived from the research objective. In this study, the criterion is based on the participants' ability to use ICT. Online participants need Internet access, literacy in computers, in the language of

communication and the ability to type. So students and tutors were chosen from computer communication engineering, computer science, and education departments because they were more likely to answer. Academics with different levels of familiarity with technology may have different perceptions of an OCF.

The sample will consist of around 70 undergraduate students. All sophomores, juniors and seniors cycle students will be included in the study. In addition, teachers and leaders from the different departments are included in the study. Thus, it is necessary to identify three samples. First, it is essential to select faculties and departments participating in the study. Next, teachers and/or leaders from the faculties and departments are selected to participate. Finally, students from these departments are selected.

Table 4.1: Table showing details of the numbers of participants involved in the research and their representation percentage

Department / Participant	CCE	Represent % CCE	CS	Represent % CS	Edu	Represent % Education	Total
Students	31	10%	30	11.5%	10	80.5%	71
Teacher	7	63%	7	77%	5	84%	19
Leaders	1	100%	1	100 %	1	100%	3

Selection of faculties and departments

The faculties and departments asked to participate in the study were the Faculty of Engineering, the Faculty of Humanities, the Faculty of Natural and Applied Sciences, the Departments of Computer and Communication Engineering, the Department of Education and the Department of Computer Science. The departments and faculties are purposefully selected because they provide technology services for undergraduate students at all levels. They also provide access to a large number (Table 4.1) of undergraduate students and are the ones more likely to have a steady flow of students motivated to use technology. These faculties and departments also utilize a variety of instructional technology delivery methods including softwares and laboratories, in addition to PowerPoint presentations.

Selection of teachers/ leaders

The three leaders from the three departments are selected. They represent 16 % of department heads. For the purpose of this study, leaders are defined as individuals whose main job responsibility is leading. This includes teacher leaders whose main job is leading in addition to teaching. Thus, in this study leaders and teachers are members of the same group relative to their departments. Consequently, the leader's perceptions can be discussed with teachers to define a new strategy for E-Learning and curriculum reform. Most of the teachers of each faculty are in the group interview. Five (5/6) teachers from the education department represent 84 % of education department teachers. Seven (7/9) teachers from the computer science department represent 77 % of computer science department. Seven (7/11) teachers from the computer communicating engineering department represent 63 % of the computer communicating engineering department. These faculties are to some extent good representatives of the university as all the other departments suffer from the lack of a good strategy to assess their ICT needs and to implement a fast and effective curriculum change. The group interview schedule focused on three areas: programme details, learner support and general evaluation. A number of common (identified by most of the interviewees), and thus significant, themes were identified during analysis of the interviews. These highlight some of the strengths of the curriculum and also recognise a need for change in some areas.

Selection of Students

The samples are comprised of students of different levels, and are purposefully selected. In keeping with its aim of illuminating the richness of individual experience, the sample size is kept relatively small (Morse *et al.*, 2002). Ten students from each level (sophomore, junior, senior) of computer communicating engineering department are selected. Similarly, ten students from each level of computer science are surveyed. However, due to the small number of students in the education department, only 3 senior students, 3 juniors and 4 sophomores of education department participated. The total number of participants is 71 students, however, the number may be extended when it comes to measuring the participants' satisfaction with the developed intervention (p. 83), and so many departments may be involved in using OCF. The study intends to use a purposeful students' selection so genders are equally represented at each level. However, due to the Lebanese culture the percentage of male students in CCE and CS

is 80 percent while the percentage of female students in education department is 96 percent. In this case, the imbalance in results due to the number of participants of each gender is unavoidable. The interviewing process is spread over the weeks of the semester to reach students who may present a broad range of topics.

5. Data collection procedures

Data are collected in several stages. First, the department heads are sent an E-mail providing them with information about the study and asking if it would be acceptable for the researcher to interview students and teachers in their faculty or department. Deans and department heads are also asked to identify teachers who may be willing to participate in the study. Appointments are fixed with the department heads and teachers for group interviewing. In the next step, data are collected at interviewing sessions. The data collection took place during several weeks of the spring semester. The researcher attempted to choose times that would not be skewed because of typical academic problems during those times. Those times included the end of a semester in which discussions would mostly focus on graduation, exams, and possible failed classes. The first three days of the semester were also avoided because during this time most topics discussed would centre on changing class schedules.

Instrumentation

Three instruments are used in this study. The first is the email interviews with students (Appendix A). This instrument is intended to explore the ways students deal with the changed environment, and their impressions of the value of the various learning environment with ICT, and to provide feedback to enable the success of the environment to be judged. It collects the data that address the first research question. Students are asked to provide information on their academic level, gender, and department. This information is used to ensure representation from all groups so the data collected can be sorted according to demographic variables. The wording of the questions that appeared in the final online interview is modified to relate to the students' understanding.

The second instrument used is the teacher/leader group interview (Appendix B). The researcher had planned to use the MSN messenger to create teachers and leaders virtual

groups. However, at the university of this study, this option was not available (for security reason the MSN port is blocked). Therefore the focus groups were conducted each via specially created email lists. To make the email conversations synchronous of time, the researcher set a fixed time for meetings (once a week for the Spring semester at 12:00 pm). This instrument presents the data that address the second research question. It describes teachers and leaders overall perceptions of ICT. At the beginning teachers are asked to identify content that they believe is needed. Then, they are asked to identify the type of assessment needed to make the learning more attractive to students. Additional questions are also raised to reveal the overall teachers'/leaders' perceptions of online activities.

The third instrument is an online questionnaire to be administrated by teachers, leaders and students to evaluate the content, the assessment methods, and the OCF framework (Appendix C). This instrument enables the researcher to collect data to better evaluate the effectiveness of the design and its usability. These data are related to the third and fourth research key questions. Respondents are asked to evaluate the usefulness of the VLE for the provision of lecture notes, discussion forums, formative self-testing, announcements and other tools. The user, after completing the questionnaire, will then click on the *Submit* button, which will pass on the responses to OCF. The responses will then be sorted and analysed.

Pre-intervention online interviews

Throughout the 1990s, due to its relative simplicity and effectiveness, E-mail became quickly integrated into business and commerce as well as being widely adopted by individuals and, indeed, the academic community. Yet, given its growing importance as a medium of communication, discussion of E-mail as an academic research tool has, to date, been scarce (Selwyn and Robson 1998). This study successfully implements the E-mail as an electronic method of collecting data to the semi-structured asynchronous interviews. Capitalizing on the technological background of most higher education students makes this method of data collection a viable option (Flowers and Moore, 2003) which can bring exciting possibilities and originality to research design (Arksey and Knight, 1999). Furthermore, the potential of asynchronous communication that E-mail offers is an attractive feature when considering its use as a research tool (Thach 1995).

The email interview's questions focused on the student's learning experience and their perceptions on how to integrate ICT in learning and teaching. The email interview schedule was piloted with known students selected randomly from the classes the researcher was teaching. The evaluation of the piloting exercise helps the researcher to gain confidence in the use of the interview schedule and the self-assurance in having a considerable response rate.

The general advantages of conducting this study via email in a higher education institution are the low cost, time-efficiency and access to a large and/or diverse population of teachers. Besides, some issues such as sample bias and lack of research control, which may threaten data validity, do not pose a major problem for email interview in such institutions since all participants (teachers) are identifiable (Selwyn and Robson, 1998). Moreover, the type of data that can be collected and the range of procedures that can be put into practice are carefully considered and effectively implemented by using email interviews (Coombes, 2001). Further, many criteria are examined before choosing email interviews. The most important criterion is that first, the level of access of students to information technology should be good enough, almost all students have a satisfactory level of computer literacy (Dillman and Bowker, 2001) and the majority of them should be eager to undertake an online task (Cummings and Ballantyne, 2000; Ballantyne, 2000).

At the same time, email interviewing higher education students and learning at first hand their background, which is related to their life and education inside or outside the educational environment (the university), can be informative. Moreover, using email can provide valuable information for the researcher when the respondent's answers are used as a research diary and saved in memory. Consequently, using email may not be the optimum method for conducting Internet surveys, but it is suitable for respondents to tell their stories.

Further, the email interviews provide the opportunity for analyzing the structure of talk, negotiating meaning and identity, developing relationships and communities, and constructing social structures. The issue of authenticity is not considered as problematic in this study, as the participants are known (Mann and Stewart, 2000; James and Busher, 2006). The email interview allows the researcher and the students to participate

at their convenience. Beyond this convenience, conversations can extend over long periods so that teachers can answer with greater ease than if asked face-to-face when they are overloaded with exams and/or corrections. Besides, the conversations can be accurately archived so that the archived text aids in the reconstruction of prior events (Danet, 2001) and that extensive archiving of interactions gives an immense and enormously rich set of data to work with (Kendall, 2002). This availability of the persistent textual record of the conversation helps participants to cognitively manage the interaction in a way that overcomes spoken incoherence. Herring (1999) considers this to be one reason why email has become a popular medium of communication. Furthermore, the email interviews provide the researcher and participant with the opportunity to reflect on and revise their statement before actually uttering them (James and Busher, 2006). Careful reflection is necessary to make sense of how a researcher is engaging in, or observing, these interactions.

All interviews are conducted by email. In this study, demographic questions were used to classify the difference between ICT users and non-users. The effective use of ICT in HEI showed that parameters related to computer skills and increase of using ICT resources have an important impact on the choice of adequate technological tools. Other parameters with significant impact concerned gender, age, online experience, and Internet access. Indeed, the relationship between age, and online teaching in the current study varied depending on the technological facilities used in each department. Furthermore, women reported different perceptions of role of technology in teaching and learning, this is directly linked to the Lebanese culture which encourages men to be technological users and not women.

The questions should measure the stakeholders' attitude towards technology integration and curriculum reform (Dunkin, 2002; McAlpine and Weston, 2000; Schmertzing and Schmertzing, 2001). One question is sent at a time to the participant, who can then answer it simply by posting back a reply email. This interaction can be ongoing and thus allow for follow-up questions to clarify ambiguities if ever there are any. Compared with traditional interview methods the email interview may be less spontaneous and flowing (Hewson *et al.*, 2003), but it allows respondents to answer in their own time, as and when it is convenient for them. This may encourage more detailed and carefully considered answers. Further, respondents may be more accurate

in answering factual questions since they are able to go and check information, and this may enhance the validity and quality of data obtained. The whole process in this case has taken sixteen weeks. The study was explained to each student and the student used informed consent forms as an email reply. After informed consent was obtained, students were asked to answer questions, one at a time. The researcher sent one email weekly until all the entire interviews of the desired sample of students were finished. If answers were unclear, the researcher asked the student to clarify his or her answer. After the data were collected, the researcher recorded these topics in a file. The researcher grouped the lines of the file according to similarity of the topics raised.

Pre-intervention online group interviews

"Interviewing is a paramount part of sociology, because interviewing is interaction, and sociology is the study of interaction" (Fontana and Frey, 1998, p. 361). In addition to online interviews, online group interviews are designed as an introductory exercise to socialise and to interact in order to set the scene. The group interviews focused on the teachers' evaluation of the use of an expected intervention to design an ICT-curriculum with the leader's suggestion for change (p. 85).

There are many definitions of a focus group in the literature, but features like organised discussion (Kitzinger, 1994), collective activity (Powell *et al.*, 1996), social events (Goss and Leinbach, 1996) and interaction (Kitzinger, 1995) identify the contribution that focus groups make to social research. As the participants' number of this study is relatively small in each department (7 teachers and 1 leader), focus groups is selected as a way of interviewing (MacIntosh, 1993; Mclaferty, 2004). Moreover, as cyberspace is the information centre and social playground of people of similar interests, online focus group interviews are selected because they produce lot of information far more quickly and at less cost than individual interviews; they are excellent for obtaining information from novice online participants; and because the questioning is so flexible, the interviewer may discover attitudes and opinions that might not be revealed in a survey questionnaire. In this study, relatively to the number of departments, three online group interviews are conducted. The construction of an online group interview is relatively easy as all the stakeholders are from one university and sharing the same network.

In an online group interview, all the principles of good interviewing still apply, with a few additional guidelines (Stewart and Shamdasani, 1990; Cohen *et al.*, 2001). This method gathers together academics from similar backgrounds or experiences to discuss integrating ICT in education. The group of participants is guided by a moderator, who introduces topics for discussion and helps the group to participate in a lively and natural discussion amongst them. The moderator is aided by a pre-prepared question guide (Appendix B). The question guide is flexible enough to allow the group to take the discussion in any way it chooses, while providing enough structure and direction to stop the discussion moving away from the original topic to be studied. For example, in questions 6 and 7, there are predetermined responses to ensure that all the pertinent points are covered, and an additional option "Other, please specify" to ensure the open-ended nature of the questions (additional responses can be probed and explored). Moreover, to get at depth and to get beyond "I do not know" answers, the researcher used the projection technique. For example, question 8 (Appendix B; Appendix A questions 8 and 9) uses stimulation "If you were a chairperson, what would you do?" (Spontaneous opinions can be gathered).

The participants are able to talk to each other (not only to the moderator) using asynchronous messages exchanged over time (Baym, 1998). Asynchronous messages may be more appropriate for online communities because they allow more time for reflection (Preece, 2001) and do not require all members of the community to gather at the same time (Blanchard, 2004; Wise *et al.*, 2006). Each participant starts by introducing himself/herself to the group. The moderator points out questions that are not well explored, questions missed, or s/he suggests areas that could be investigated (such as topics raised by students). Online group interviews concentrate on showing clearly the nature and quality of teacher understanding in using ICT in teaching and learning. Online group interviews have another goal, is to start from the participants' own experiences of using technology and from there to proceed to their conceptions, motives and strategies. However, given the importance of the value of teacher knowledge and the authority of experience (Munby and Russell, 1994), the aim of this study is not to encourage teachers to place more faith in their own experience and knowledge to meet the demands of teaching but to understand their use of technology knowledge in teaching.

The online group discussion method helps in exploring teachers' and leaders' beliefs, attitudes and opinions and it is especially valuable for gaining baseline information for integrating ICT in education. Moreover, it provides extra information about a community's ideas about curriculum effectiveness. The online focus group participants are systematically and purposefully selected so that the intent (understanding and making insights about how teachers and leaders perceive the integration of ICT) of this online discussion is fulfilled. From my experience, the online group interview is successful and easier to handle than the email interview. Compared to individual interviews, which aim to obtain individual attitudes, beliefs and feelings, online focus groups are able to elicit a multiplicity of views and emotional processes within academics. In one semester (Spring 2006), the moderator in this study succeeded in exploring the degree of consensus between the teachers and leaders on integrating ICT in education as did Morgan and Kreuger (1993).

The use of computer-mediated interaction systems worldwide has created not only a culture of usage, but also an entirely new mode of social interaction and thought. Moss and Shank (2002) demonstrate that fundamental qualitative procedures are required to capture critical changes in both student and teacher beliefs over time. The data collected from online interviews and online group interviews generate recommendations for the maintenance and improvement (defined as effectiveness and scalability) of the online courses with a prototype software OCF. The study's objectives are to overview the current offerings of the programme, to identify key factors attracting students to, and retaining students in the programme, to identify the level of interest or disinterest among departments heads, to identify future changes for strengthening the programme, and to identify any untapped potential market (Rickinson *et al.*, 2003).

Post-intervention online questionnaire

The World Wide Web is rapidly becoming part of everyday life (Kaye and Johnson, 1999) and part of this growth is the increasing use of online surveys to collect a variety of information (Dillman and Bowker, 2001). Electronic surveys can take many forms. They can be distributed as electronic mail messages sent to potential respondents or/and they can be posted as World Wide Web forms on the Internet. Among the potential advantages of online surveys are low-cost delivery and return; wide potential coverage; ease of completion, submission and data capture; appropriateness to particular

populations; high respondent acceptance for some groups; and even novelty (Dillman, 2000). Therefore, it is less expensive to send questionnaires online than to pay for postage or for interviewers and it is easier to make changes to questionnaires and to copy and sort data. Due to the speed of online networks, participants can answer in minutes or hours, and coverage can be global. Thus, a higher response rate is expected (Kaye and Johnson, 1999). In this study, the online questionnaire response rate is relatively high (over 50 %) (Baruch, 1999; Sheehan, 2001). There are 30 teaching staff across the three departments and the interviewer received 22 completed online questionnaires. This translates into a response rate of 73.3 %.

The data from the online questionnaire shed more light on the conformity of curricula change with industry reform. Industry reform and the devaluing of university professional qualifications have made it much harder to market university courses. In these circumstances, the university has certainly needed to review the courses and see what can be done to make them more attractive to the market for which they were designed. Virtually all the literature on curriculum development emphasises the importance of evaluation as part of the course development process. The purpose of this study's evaluation is to find out the worth or value of the curriculum in a changing environment. Curriculum reformers need to find out how good their courses and materials are and whether they continue to work in practice, or whether parts have to be changed or adapted. Data is collected on the method of grounded and highlighted a number of issues and problems which have to be faced in articulating different kinds of online activities.

Piloting the online questionnaire is the easiest piloting task in this study. Some students and colleagues of the researcher filled in this online questionnaire from the Net and with the *submit* button saved the data on the hard disk. Some questions are rephrased, as some students did not understand some questions related to learning while questions related to the use of the intervention were obvious and reliable for them. The resulting information helps in assessing the depth into which the workplace had been explored and the level at which they had been achieved.

The role of the researcher

The credibility of this study relies heavily on the confidence participants have in the researcher's ability to be sensitive to the data and to make appropriate decisions in the field (Eisner, 1991; Patton, 1990). Given my role as teacher, my background and experiences with online teaching prepared me with the knowledge to develop an online curriculum framework programme and to investigate academics' perceptions of this tool. All participants would have confidence in my competence to carry out the study, which made my role to engage participants in in-depth online interviews effortless. However, participants would not give answers that met my preferences presumably because they are eager to give their own opinions. Moreover, while interviewing, I used my personal sympathy to make the respondents feel more at ease and therefore more willing to tell "their story". My role of researcher included conducting the interviews, analyzing, and reporting the data. However, there were also sources of biases that I had to address such as introducing an idea into the conversation unwittingly, which might in turn bias the discussion. I probed beneath the surface of a subject to challenge and figure out the contradictions. As each interviewee had his/her own communication style (such as using emoticons), I had to adapt the personal communication style online accordingly. Another type of problem that I had to face was that some interviewees waited sometimes for days or weeks before he/she answers the questions. This does not only lead to the risk that the interviewee will lose interest in the research, but also to the risk that the interviewee may forget to reply to questions (Kivits, 2005). Therefore, I had to send reminders at an appropriate time to the interviewee to reduce this problem. Finally, the reception of messages in a non-chronological sequence disrupts the flow of topic discussion but it was somehow manageable (Opdenakker, 2006).

6. Data analysis procedures

The analysis of data helps to get a feel for the rigour, or lack of rigour, in the course and the standards reached. Glaser (1978) observes that although one talks about grounded theory as a series of methodological steps from data collection to producing a finished product, it is important to understand that data collection and informal analysis occur simultaneously (Simpson and Tuson, 1995). Although the stages of analysis are described here in a linear fashion, in practice they may occur simultaneously and

repeatedly. During axial coding the researcher may determine that the initial categories identified must be revised, leading to re-examination of the raw data. Additional data collection may occur at any point if the researcher uncovers gaps in the data. Once all of the interviews and questionnaires are completed, the researcher analyses the data. The data should be analyzed in several steps. In the first step, each separate online-learning topic mentioned by the student during the interview is to be written in an Excel file on a computer along with the student's grade level, gender, and department. Online-learning themes are identified as they emerge from the answers given by the students.

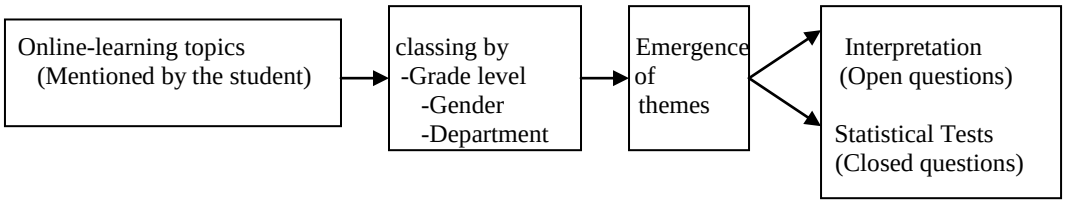


Figure 4.2: Phase1 - data analysis procedure of the email interview

In the next step, the results are sorted according to grade level. Next, subjects are divided according to the online-learning themes that have emerged. Then, the researcher counts and records the number of times each theme occurred in each grade level. After these counts are completed, the same procedure is completed for gender. The department is considered as a variable only if there is a major difference that has emerged based on department. By counting the frequency of the emergent themes, the researcher reviews and refines the data collected from each participant so that the distortion caused by repeating the same theme many times by one participant will be avoided. After the counts are made, the researcher classifies the themes by the most commonly-cited (supposed to be the most important) to the least commonly-cited. Descriptive statistics are used to describe the basic features of the data in the study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis (p. 127), they form the basis of virtually every quantitative analysis of data. Such tests are completed to determine any significant differences in topics according to academic level or gender (Figures 4.1, 4.2).

The next phase is to analyze the data from the group interview. Each topic raised by the teachers is entered in an Excel file on a computer along with the particular teacher's experience, gender, and department. The data are analyzed using the same procedures as were used to analyse the data from the student interviews. The same procedure is

repeated to analyze the data in which the teachers are asked to identify types of contents and types of assessment required online (Figures 4.1, 4.3).

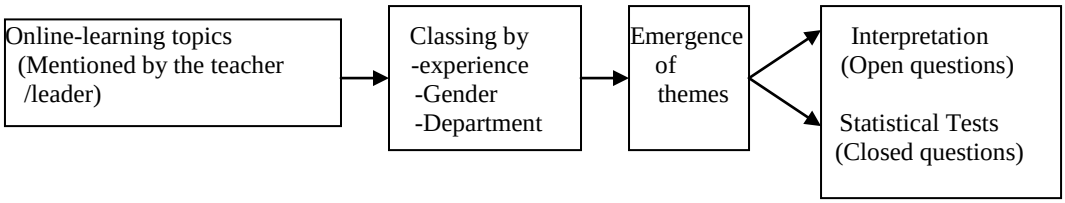


Figure 4.3: Phase 2 - data analysis procedure of the group interview

The last phase is to analyze the data from the online questionnaire. The online questionnaire focuses on three areas: content, learner support and general evaluation of OCF. A number of significant themes are identified during analysis of the interviews. The web form began with some general questions about the current participant level, and some questions related to the effectiveness, efficiency and usability of the intervention (OCF). After the filling the web form a *submit* button has to be pressed to send data to be analyzed internally by OCF. Another menu leads the user to see the statistical results (Figures 4.1, 4.4).

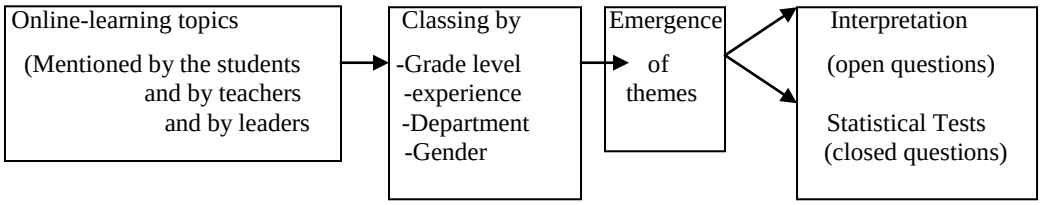


Figure 4.4: Phase 3 - data analysis procedure of the online questionnaire

Access and equity are highlighted for the positive benefits of on-line delivery in terms of improving access and equality of opportunity for students, and also for its potential in terms of re-formatting material for students with a visual impairment. However this is balanced by a consciousness of access problems if the Internet is not easily available. Interviewers are also aware that attitudes to computers and preferred learning modes can also influence these considerations either positively or negatively with regard to individuals.

In other studies, students experienced difficulties with computers and the Internet in general, which created a barrier to embracing the VLE. The students in this study did not experience these difficulties. There has been little research, which examines

whether VLEs hold novelty value, and if so whether interest and support for these learning aids will decline as student exposure to them is increased. Thus, the study can be considered exploratory because there is a lack of previous research on the particular phenomenon being investigated. In particular, very little research has been conducted that examines the effect of combining online activities and face-to-face teaching. Because of this, this study is not conducted to prove or disprove a hypothesis; it is used to build a theory and to construct the theory's appropriate evaluation process.

7. Constructing the evaluation instruments

Three types of surveys designed to gather feedback from students, teachers, and leaders are used to assess how curricula, teaching and learner's needs are changing in an English-language private Lebanese higher education institution and to support the foundation for the ICT-based curriculum model presented in figure 4.5.

The first online survey is done before the development of the software through email interviews with students. Its purpose is to assess students' skills and motivation towards ICT integration in curriculum. Some recent studies have reported that students may lack the required computer skills and/or Internet literacy levels (Breen *et al.*, 2003; Lindner and Murphy, 2001; Siragusa, 2002) and that access to the sites and staying connected is problematic (Beard and Harper, 2002). It has also been found that students are reluctant participants in discussion forums and other two-way communications (Breen *et al.*, 2003) and that they prefer using the VLE primarily to access information such as lecture notes, study guides, suggested solutions and announcements (Kenny, 2003; Lindner and Murphy, 2001).

The second survey is done as online group interviews with teachers/leaders to assess teachers' ability and willingness to use ICT in classroom and to use online courses and online activities. Curricular changes in higher education have rendered teachers' instructional design activities increasingly important (Sharvashidze, 2001). While teachers are actively seeking to develop VLEs in an effort to make their courses more flexible, these are not without difficulties.

Information gathered via the email interviews and group interviews provides an ICT skills inventory and identifies where each occurs in the curriculum. The content and skills presented in information technology courses are changing much faster than the rest of the curriculum courses (Alavi *et al.*, 1995). This makes it essential to have a curriculum design strategy that acknowledges the dynamic nature and the role of ICT skills in teaching. Moreover, an E-Learning development unit is needed to ensure the effective implementation of the strategy adopted. For example, one of the E-learning development unit goals can be creating plans and policies for all members of the learning community to have equitable access and use in a most secure environment such as having a log-in name and a password (Bogen *et al.*, 1997; UCISA, 2004).

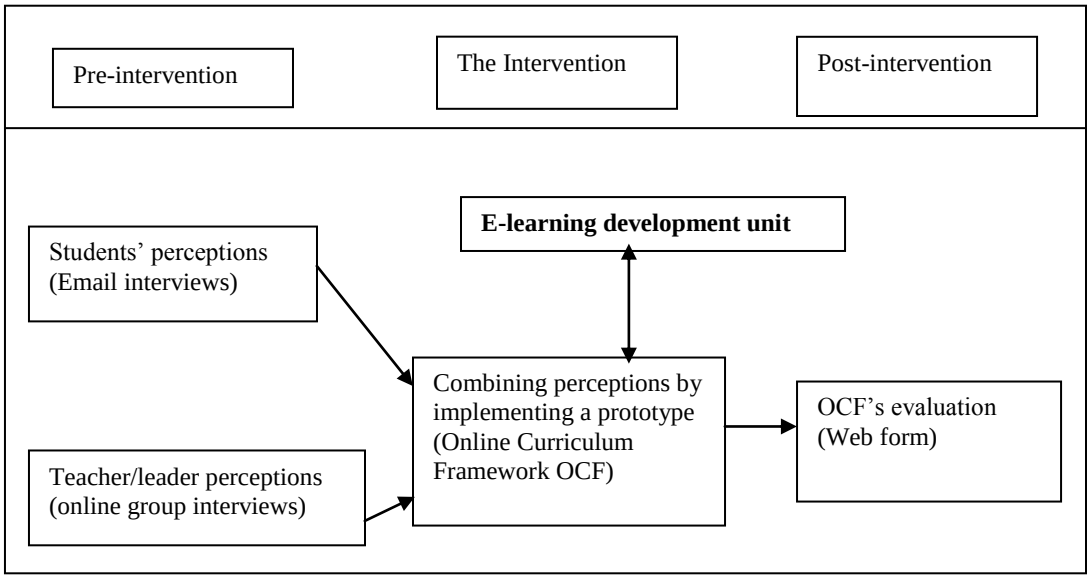


Figure 4.5: Global Online Curriculum Framework Model

The third online survey is done through the software developed in the form of web-based survey documents (webforms) used to gather academics' input related to the effectiveness of the intervention. Several criteria may be used for evaluating the findings. The traditional criteria reliability and validity will be discussed in the next section.

8. Trustworthiness and Authenticity

In general, given the subjective nature of qualitative research, the question always arises whether the research is truthful and to what degree it describes what it has set out to describe, and grounded theory is not immune to these concerns. A study is deemed trustworthy if it is found to have credibility, to be dependable, and to be confirmable (Seale, 2002). The researcher took several steps to enhance the trustworthiness of the study. One way trustworthiness is enhanced is through the interview process. The researcher is able to have the student clarify any information he/she did not understand. A pilot study is also conducted on a small number of students and teachers to ensure that the instruments are usable and that they will elicit the kind of data that will be useful.

Authenticity is the degree to which the study is found to be fair or accurate and reliable (Lipson *et al.*, 1999). The authenticity of this study has been enhanced by a review of the survey and methodology by a panel of experts in the field of academics. These experts included my advisor, an administrator in academic support programs, and a researcher and author in the areas of Academics. The panel provided the researcher with recommendations for revision of the protocols.

To enhance the trustworthiness and rigor of this study, the researcher addressed the validity issue. The fact that the majority of the participants are computer science or engineering students weakens the external validity; however, the internal validity is maximized. For example, some questions in the pre-intervention student questionnaire (Appendix A, Part 2) are related to the constructed validity of the use of technology in education such as answering the question to what extent teacher enthusiasm motivates students to use technology. The belief systems of teachers strongly affect how they teach (Marsh and Willis, 2003). Teachers' beliefs may change but teachers need opportunities to explicitly discuss, elaborate, and construct their own beliefs (Tillema, 2000).

The use of multiple sources of data (different departments) enhances construct validity and reliability. However, some security measures have to be taken when collecting data (email) and when analysing data. Fisch and White (2000) point out that a good security

system provides confidentiality and integrity by confirming the identity of the people who are attempting to access the computer or network, and protects against inappropriate access by users, while providing availability for those that need to be able to access the systems to use them in an authorized manner. In this study, the university's computer centre staff carries out security measures.

9. Ethical issues

Four basic ethical issues are considered in these online surveys (Markham, 2004): confidentiality, representativity of the sample, data analysis, and responsible quotation. Therefore, According to Goree and Marszalek (1995), researchers are ethically required to guard the confidentiality of their respondents and to assure respondents that they will do so. Moreover, Jones (1997) emphasizes that ensuring confidentiality and security of information provided by the participant is essential. In this study, anonymity is never truly preserved, since the teachers' email addresses are already known. Furthermore, the confidentiality is assured to a certain level because the internet may provide more scope than traditional methods for data being viewed by a third party. For example, it is easier in an email study to send responses to the wrong address by making a minor typing error.

Besides, the researcher has an ethical obligation to use samples that are inclusive of gender and educational level. Thus, the teachers interrogated in these online surveys belong to the same university but they are of different gender and faculties. Thus, the samples are representative of a university teacher community.

Researchers are also faced with the problem of casual language use common to electronic communication. Casual language responses may be difficult to report within the formal language used in journal articles. In this study, it is considered acceptable for researchers to correct typographical or grammatical errors before quoting respondents.

In the belief, that the privacy of all participants should be protected, this research addresses the ethical issue in a systematic and rigorous manner. Students, teachers, and leader managers are informed about the research procedure, including its purposes, risks, and potential benefits, and are given the opportunity to ask questions and to

withdraw from the research at any time. The ethics of conducting research into online communities requires physical access and skills to use the technologies and involves accuracy and reliability of information obtained from online sources and the changed chronology of interaction resulting from asynchronous communication (Hewson *et al.*, 2003). Thus, defining and learning the aspects of privacy has never been more challenging. For example, even though identities in the digital medium may not be identical, however they may remain related to the same bodily existence (same person) (Capurro and Pingel, 2002). In this study, the email address is supposed to represent the physical identity of the participant.

10. Conclusion

The research set out to discover how effective the use of technology is in teaching. The research provides a method of monitoring the effectiveness of using technology-based software (OCF) as a standalone online framework or as a support to face-to-face teaching such as blackboard and Web-CT. This model suggested a three-phase process to carry out this study: pre-intervention, intervention, and post-intervention.

At the pre-intervention phase, conceptual models to asses needs and to analyze content were developed. These models describe the types of tasks students would request in this OCF, the types content and features that teachers would accomplish to design a course or an online activity, and the types of features that would be available for leaders to design and/or modify a curriculum. These three models correspond to the first two research questions. The pre-intervention process constantly simulates new ideas. Then, qualitative methods guided data gathering and analysis. With a purposeful sampling technique, the data collection procedure is done through two stages: online interviews and online group interviews. The online interviews examined student background and their readiness to follow an online course or activity. The online group interviews examined teachers and leaders' experiences with online teaching and especially examined the ability of leaders to design an ICT -curriculum.

In the development phase, a prototype of an OCF was built to represent the conceptual models. This prototype primarily includes a teacher toolbox to design an online course or activities and a leader toolbox to design an ICT-curriculum. OCF explains the

phenomenon integrating ICT in teaching and is used to ascertain the degree of relevance of the theoretical framework conceptualised in the pre-intervention. Participants performed the tasks in the intervention. The final online questionnaire investigated students, teachers and leaders overall perceptions of an OCF after their interactions with it. The researcher followed the grounded theory data analysis. The study is able to generate categories and their theoretical properties and to recognize the relationship among the different categories. Thus, an emergent theory can be induced from perceptions of the social phenomenon integrating ICT in teaching. Glaser (1978, 1998) acknowledges that this is part of the evolution of grounded theory, and that the researchers should form hypothesis. The online questionnaire (post-intervention) is needed to determine the credibility of the theory, by ascertaining its "fit, grab and workability" (Glaser and Strauss, 1967).

With the current redesign and further development of the study, it is expected that using a software as a support for curriculum planning and reform will become a preferred pathway in the future. It is therefore essential that the university's authorities can retain their professional integrity and ensure that students, teachers and leaders do not fail to keep up to date with advances of technology but move forward in their professionalism and in updating their critical skills. Moreover, the recent developments of the worldwide web, digital satellite technology, and new applications of virtual reality to build simulated learning environments are predicted to have particularly dramatic effects upon learning environments at all levels (Goodman, 1992). Universities are experimenting with improving accessibility to existing programs, designing new programs to take advantage of these emerging technologies, and marketing their programs to new audiences in new ways. Completely new models for universities are being formed around the promise of virtual environments. Virtual Learning Organisation is an initiative of many institutions of higher education (traditional universities and universities for professional development) to be ICT-supported universities. One of the aims of this initiative is to facilitate and support a transformation of higher education from supply-driven to demand-driven education.

Based on the literature, this study proposes an Online Curriculum Framework (OCF) as an alternative or additional curriculum development programme. The following chapter focuses on this solution.

Chapter 5

The Intervention

1. Introduction

Curriculum change has been seen in many countries (Watzman, 2000). In developing countries, the problems facing universities are in crucial respects different from those in developed countries (Michaelowa, 2000). For example, India, with the second largest higher education system in the world, epitomises the crisis of the universities of the poor: they have problems of continued expansion, deteriorating standards and limited resources, and the political complexities involved in achieving systemic reform (Ensor, 2002; Van den Bor and Shutte, 1991). In Lebanon, the higher education arena has changed dramatically as institutions have expanded in student diversification, in institutional types and mission. Instructional strategies change is necessary in the classroom to facilitate newly created curricula (Wang, 2003). Therefore, change to the global education curriculum requires the philosophical and fundamental paradigm shift among policymakers, faculty members, students and the society.

Changes can be introduced one by one, without any overall plan; or by adopting various curricular improvements without regard for the relationship between a proposed change and the existing curriculum; or by careful planning of all aspects of the curriculum, namely called "systems approach" (Pfnister, 1976). Based on this last approach, the purpose of the software is to provide academic leaders and planners a framework through comparative perspectives in an English-language private Lebanese University and to give organisation an opportunity to change and to implement approaches to meet the current and future needs of learners (Fulton, 1998; Fullan, 1999).

The aim of this chapter is to explain the practical enactment of the curriculum model (OCF), which this study evaluates through the development of software that provides a flexible framework, guiding principles and strategic approach to developing and implementing learning-centred curricula that assist academic developers. The following sections describe the OCF's purposes, design, effectiveness and reliability in an English- language private Lebanese university.

2. OCF's Purposes

The aim of the online curriculum framework (OCF) is to promote students' lifelong learning, to help leaders in designing web-based curriculum and to encourage the use of online learning among teachers by supporting their professional development in designing online courses. OCF is a software tool with dual purposes. The first purpose is to provide students with online courses to support their face-to-face learning, to provide teachers with resources to design online courses and to provide leaders with resources and courses to design online curriculum. The second purpose of OCF is evaluating course design and content, and learning and teaching processes by managing appropriate surveys.

3. OCF's Design

The main objective of the intervention is to describe both designing an online course using a toolbox of assessment provided for teachers as course designers and creating an online curriculum using a toolbox of generated online courses provided for leaders as curriculum designers. The students' contribution to the above-mentioned designs is by answering surveys and by using the online materials. Therefore, the implementation of OCF consists of using the online features and of managing surveys.

3.1 Using the online features

The following chart in Figure 5.1 summarizes the implementation of OCF. The study starts with a Login web page (Appendix H-L).

Once the user fills the login page with his/her name and password assigned by the system administrator and/or a chairperson, a welcome page will be displayed indicating the user name and his/her identification number. All users are at the same level (no hierarchy). However different tasks are assigned relatively to different users: students, teachers and chairpersons.

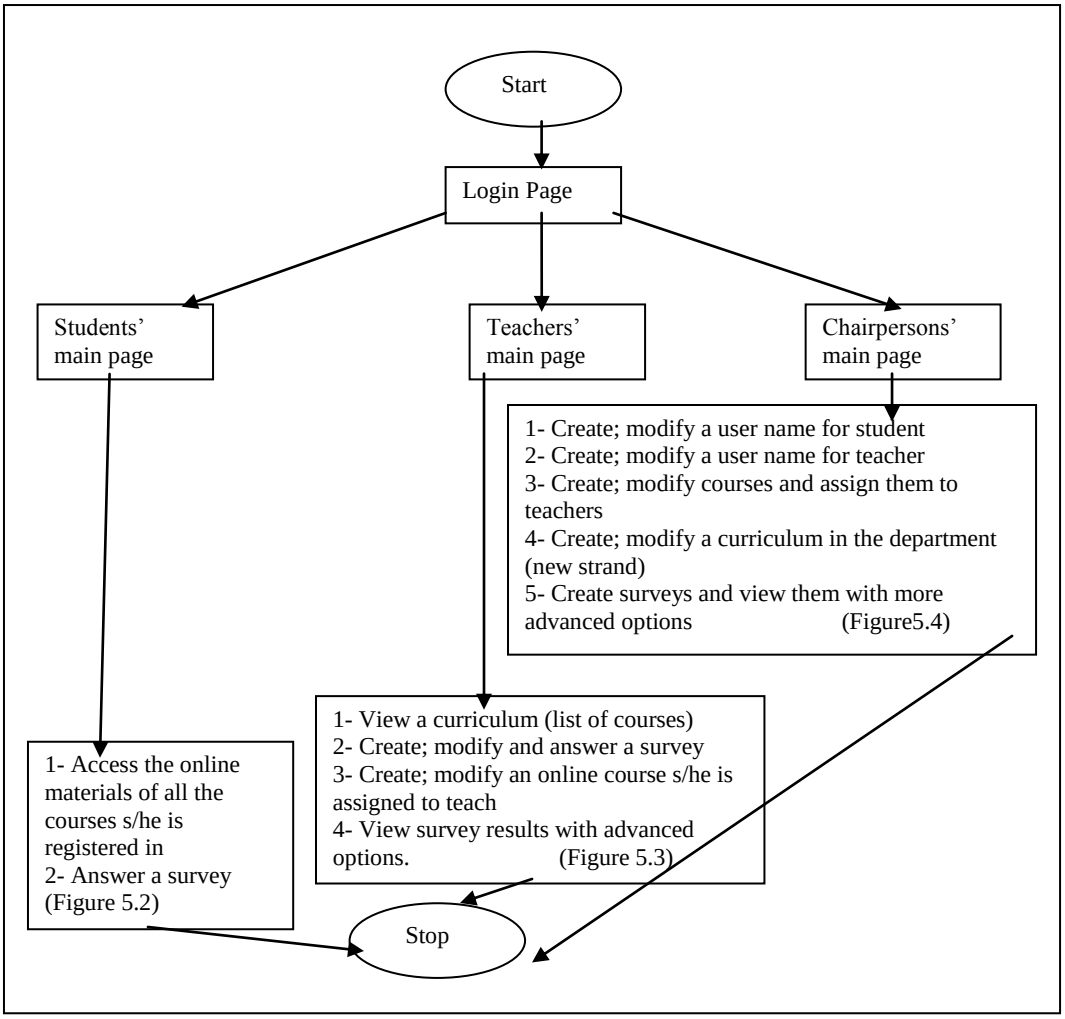


Figure 5.1: Flow chart of OCF implementation

Students' tasks

One of objective of the OCF is to provide students with a tool to analyse online learning and to use this tool. Students are expected to accomplish the following jobs (Figure 5.2): (1) ability to use the course material posted by teachers and to identify the materials that motivate them to learn, and (2) ability to suggest additional features that may help them to learn after using the online course, by answering surveys (web-forms) created by teachers and/or leaders. This task enables students to contribute to managing change (Appendix H-S).

Figure 5.2: Students' main page

In all this intervention's menus, the option "view curriculum" is a simple listing of courses by department. In student's menu, "View courses" option enables students to use the online course in which they are registered (Appendix H-S). Moreover, a student can select a survey from the student's main menu page (Figure 5.2), and answer it (Appendix H-S). Each student, or teacher or leader submits only one survey. Multiple submissions per respondents are forbidden as they would jeopardize the reliability of the results and therefore question the validity of the survey. However, different types of surveys can be posted such as surveys to discover the collaborative concept of leadership at a university (distributed leadership) and surveys to discover the extent to which the university is a learning not a teaching organization.

Teachers' tasks

Another objective of the OCF is to provide teachers with a tool to help them developing their online skills. Teachers are expected to accomplish the following jobs (Figure 5.3): (1) ability to suggest examples of course material for the web that stimulates the learning process of the learner. The material can be for example: web pages, sound, PowerPoint-presentations, video and animations (Create online courses), (2) ability to suggest and justify appropriate methods, tools, layout and structure for an online course

(Manage surveys), and (3) ability to identify the main approaches to the current use of online learning in his/her own organisation (View surveys' results). (Appendix H-T).

Figure 5.3: Teachers' main page

The course materials to be added consist of written texts, supplemented with examples of existing online learning materials, links to resources on the web, video samples and PowerPoint presentations. Course materials are not published in the format of one linear textbook. In order to increase flexibility and support for truly constructivist learning, supporting content has been broken down to four different modules: course overview, syllabus format, lecture notes, and assignment presentation. Each of these modules can be written directly in the web form or loaded via a file. A teacher can at any time modify, add or delete online components of a course (Appendix H-T).

In addition, a teacher can create, modify, and answer a survey. A teacher can also view the results by gender, and/or by department, and/or by level and/or by grade point average (GPA). A teacher can view the courses in a curriculum but has no permission to manipulate any of these courses. The interface is user-friendly so that novice online teachers can use it (Appendix H-T).

Leaders' tasks

At the university of this study a leader is a teacher with more administrative jobs and less teaching load. Thus, in OCF a leader has a toolbox similar to that of the teacher but with additional modules to manage students, teachers, courses and curriculum (Figure 5.4).

Figure 5.4: Chairpersons' main page

The term "manage" means creating, modifying, deleting. For example, a chairperson can create a curriculum for a new strand in the department, such as Business Computing in the Computer Science Department.

Moreover, a chairperson can add, modify or remove a student and or a teacher from the department. The creation of any new item can be typed directly in the form or used by loading a file previously prepared in CSV format (Appendix H-C). (Comma Separated Values text file format is converted into a database record). The use of CSV file is effective whenever a lot of addition is needed. For example, a CSV student file consists of information related to many students (name, major, etc.), but one student's data per line. In order to help in decision making, the management of surveys is advanced in the sense that one can view the surveys results by students only, by teachers only or by both

students and teachers. In one word, the traditional chairperson becomes a technology-expert chairperson.

3.2 Managing surveys

OCF serves also as an evaluation tool (p. 84). The methodological framework for the formative evaluation of an online course is defined as a method of judging the worth of a software tool while the tool activities are being used by academics. Through the evaluation, the evaluator (teacher/leader) aims to inform course designers about possible problems with regard to course design or implementation and suggest solutions. The main evaluation criteria of interest are acceptance, effectiveness, impact and learners' satisfaction with organisation of developed courses (Arbaugh and Duray, 2002). The secondary goal is to evaluate to what extent teachers are using technology in their teaching. Before implementing OCF the main methods for collecting empirical data for evaluation were email interviews with students and group focus interviews with teachers and leaders. After the development of OCF, the evaluation is drawn from online questionnaire for both teachers and students.

The surveys address following topics: pedagogical issues concerning online learning and learning in general, communication and collaboration, online learning environments and evaluation of the learning process and the structure of the course. Surveys can be dedicated to students only, to teachers only, to both students and teachers, or to all academics (students, teachers and leaders) (Figure 5.5). For example, a teacher survey may be about finding out the key factors related to teacher's subject knowledge, the pedagogical knowledge, and the ability to integrate ICT that supports, enhances and exploits teaching and learning opportunities of the teacher. Another survey may be used to show the curriculum and innovative leadership skills that teachers have in order to enhance teaching and learning opportunities and planning. A student's survey may show students' needs and ability to use and evaluate online activities as well as their active engagement and their ability to help in managing change. Finally a common survey may be about deciding key factors related to the access to resources by the teacher and student, and their attitude, awareness and confidence towards the use of technology (Chapman, 2003), as well as the use of collaborative work practices. Another common survey can be used to identify curricula weaknesses and strengths.

Figure 5.5: Survey's management

The surveys' results (Figure 5.6) help in improving curriculum that is appropriate for the institution and reflects the technological changing needs of the society within which it is taught. Such results also assist in constructing a best-fit ICT-curriculum. Best-fit ICT-curriculum is a curriculum which is compatible with the current skills and ability of the academics, and the optimized use of technology in education.

Leaders would be engaged in discovering potential issues when leading a department. Moreover, while using OCF, chairpersons may identify problem solutions for the smooth transition of the university from teaching to learning organization. Leaders will have the opportunity to explore the major outcomes of the explored research and identify a range of techniques, strategies, ideas and activities that could assist in the successful adoption and integration of ICT into the curriculum by engaging students' background and professional teachers' expertise in the process of curricular change. Teachers need to be supported in their efforts to use technology, as students cannot benefit from using technology if their teachers are neither familiar nor comfortable with it (Whitesel, 1998; Rosen, 1999). Thus, teachers must be offered training in using

computers (Sulla, 1999), and they need sustained assistance in their efforts to integrate technology into the curriculum. Consequently, leaders need an assistant team to determine the key factors of successful technology integration.

Figure 5.6: Survey's result

This study suggests an E-learning Development Unit (EDU) which helps in developing a clear set of goals, expectations, and criteria for student learning and in determining the type of technology that will best support efforts to meet those goals. The members of this unit may be course designers, leaders, teachers and technologists. In this study, leaders have responsibility for the evaluation to ensure that the procedures of integrating technology are adequately designed and carried out by teachers. Thus in this case, the EDU consists of only leaders.

OCF's effectiveness

Online curriculum framework (OCF) can be a curriculum support and/or an online teaching-learning resource. This framework also enables auto-enhancement of the online curriculum by using web forms instead of email and group interviews and so the pre-intervention phase is a pre-enhancement phase which can be done by OCF to collect academics' perceptions for enhancing OCF (Figure 5.7). Webforms are a

convenient medium for identifying technology skills for students. In order to emphasis the implementation of distributed leadership within the university and to accent its role as learning organization, all stakeholders in the curriculum can use web forms to describe their needs for distributed leadership and/or for learning organization, and contribute to a collaborative design of the information technology curriculum. Teachers, students, and leaders are invited to submit web forms at their convenience. All stakeholders' input is stored in a relational database via the web form and is immediately and permanently available for processing. Web forms are used to learn through survey what entry-level ICT skills are currently required, what ICT skills are currently used, what ICT skills should be added to the overall curriculum and what are the ICT skill levels and habits of faculty, students, and leaders.

With the current redesign and further development of the research, it is expected that using software as a support for curriculum planning and reform will become a preferred pathway in the future. It is therefore essential that universities should be able to retain their professional integrity and ensure that students, teachers and leaders do not stay behind technology's advances but move forward in their professionalism and in updating their critical skills.

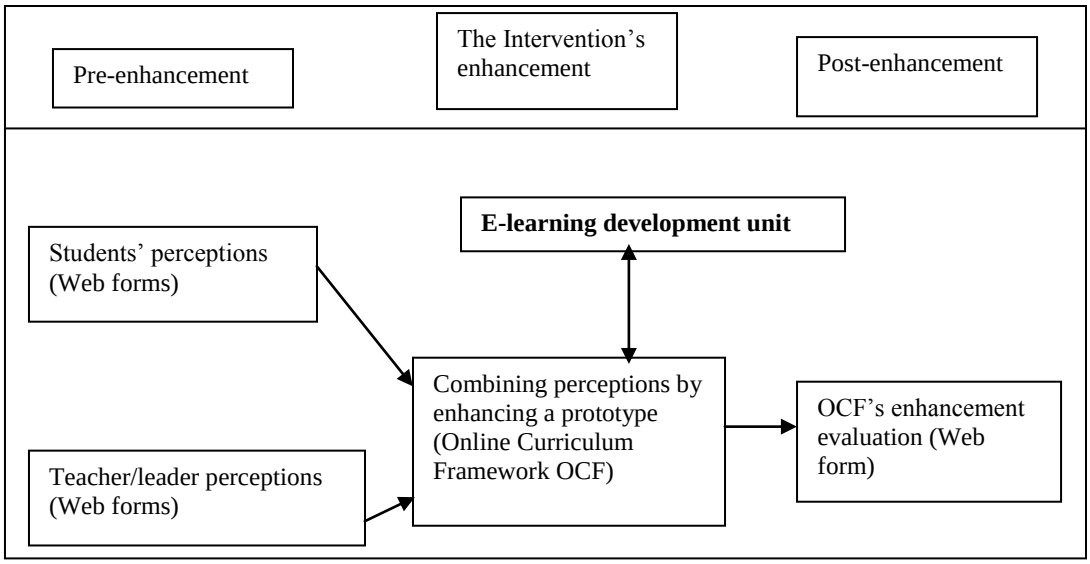


Figure 5.7: Enhanced Global Online Curriculum Framework Model

OCF's reliability

While the use of Blackboard as an E-learning tool is widespread across the university in the study, it may fall into a number of traps. OCF avoids such traps. Thus, E-Learning is focussing overmuch on content and not on the learning experience; OCF avoids the content trap by taking into consideration the academic level of students and the teacher/leader's experience. In the E-learning environment, teachers are seeing their developmental needs as technological rather than educational. OCF avoids the technology trap by focusing on face-to-face teaching. In an E-learning environment the assessments are somehow imposed, while in OCF, the accountability is preserved as teachers can carry out assessment in their own intended spirit. Finally, OCF encourages collaboration by enabling the spreading of good practice and learning from one to the other, while E-learning focuses on isolated development, as it can be seen as just one instrument in providing appropriate learning experiences in the context of lifelong learning, where the roles of all those involved is both fast-changing and increasingly blurred (Stiles and Yorke, 2004).

OCF serves as a good example of virtual collaboration among academics. However, successful curriculum reform needs not only careful planning of necessary changes of curriculum itself, but also needs research and change management techniques. The success of OCF depends on many things: leadership, coordination, communications, resource allocation, committee-building, change management, and project assessment and evaluation (Wang, 2003). Moreover, funding is one of the major obstacles related to movement to technology-based (general) education in developing countries (Watson *et al.*, 2003).

4. Summary

To summarise, the online curriculum framework (OCF) intervenes in students' and teachers' learning and teaching processes to find out their familiarity with and attitudes to online learning. The software will explore the outcomes from surveys on the role of leaders, teachers and students where ICT has been integrated into classrooms and therefore will help leaders in choosing the pertinent solution in designing flexible curricula of changes. In particular, there will be a focus on what were the successful strategies and activities that were employed by teachers when using ICT, within a range

of curriculum areas, year levels and contexts. Moreover, having explained the methodology used and developed the OCF, the findings will be explored by evaluating people's responses to OCF (Appendix C).

The interpretation of data in the next chapter attempts to ensure the effectiveness of such an approach model from the perspective of students, teachers, and leaders.

Chapter 6

Findings

The methodology described in the previous chapter has laid the foundation of what will be described in this chapter. The data that is presented here is the culmination of students email interviews, teachers/leaders group interviews and online questionnaires (Appendices A, B and C) to test the effectiveness of an online curriculum framework that supports decision-making in a changing teaching and learning environment. This framework consists of two main parts, students overall perceptions of ICT, teachers' and leaders' perceptions of ICT (pre-intervention: ideas and suggestions), and all academic stakeholders' perceptions of the effectiveness of an online curriculum framework (post-intervention: prototype evaluation).

The sample of students who participated in the study is shown in Table 6.1. The average age of the students is 20.5 years. All of the students participants ranged in age from 17 to 23. The student participants represent three different departments. The students are from computer communication department (n=31, 43.66% (31/71)), computer science (n=30, 42.25% (30/71)), and education (n=10, 14.09% (10/71)).

Table 6.1: Number of Student participants (N=71)

	Computer communication (CCE)			Computer science (CS)			Education (EDU)		
	Male	**Female**	***Total***	**Male**	**Female**	***Total***	**Male**	**Female**	***Total***
Sophomore	10	2	12	10	5	15	1	3	4
Junior	5	2	7	3	3	6	0	3	3
Senior	10	2	12	7	2	9	0	3	3
Total	25	6	31	20	10	30	1	9	10

Note: Total male participants 46 (64.78%) and female 25 (35.22%). Total CCE participants 31 (43.66%), total CS participants (42.25%), and total Education participants 10 (14.09%).

The sample of teachers who participated in this study is shown in Table 6.2. The average age of teachers' participants is 40.5 years, their ages ranging from 36 to 47. The teacher participation represents three different departments. The teachers and

leaders are from computer communication department (n=8, 36.36% (8/22)), computer science (n=8, 36.36% (8/22)), and education (n= 6, 27.28% (6/22)).

Table 6.2: Number of teacher participants (N=22)

	Computer communication			Computer science			Education		
	Male	**Female**	***Total***	**Male**	**Female**	***Total***	**Male**	**Female**	***Total***
Novice	1	1	2	2	1	3	0	0	0
Experienced	4	1	5	1	3	4	0	5	5
Leader	1	0	1	0	1	1	0	1	1
Total	6	2	8	3	5	8	0	6	6

Note: Total male participants 9 (40.9%) and female 13 (59.1%). Total CCE participants 8 (36.36%), total CS participants 8 (36.36 %), and total Education participants 6 (27.28 %).

Like any university, there is only one leader per department. Moreover, in this study novice online instructors are defined by combining less-than-three-years' experience of teaching with enough basic skills of technology intertwined with an average percentage of their use of the ICT in their classroom practice and their professional development (Appendix B: Part I, Appendix D)

1. Students overall perceptions of ICT

This part presents the data that addresses the first research question (p. 9; p. 57). It describes students' overall perceptions of ICT. It is intended to explore the ways students deal with the changed environment and their impressions of the value of the various learning environment with ICT and to provide feedback to enable the success of the environment to be judged (Baker *et al.*, 2004; p. 26). Data are gathered from students by using email interviews (Appendix A).

Students suggest ideas about knowledge of appropriate information sources that will allow them to remain current in the theory and practice of using ICT. According to Bruer (1993), learners must rise above the rote, factual level to begin to think critically and creatively (Casazza, 1998). Different topics emerged from the analysis of the generated data through grounded theory methodology. The topics raised by students will be discussed by academic level, gender and department.

Topics raised by students using email interviews: The 71 students raised a total of 36 different topics (Tables 6.3, 6.4, 6.5). The researcher categorized the topics under three main headings (categories) containing eight subtopics. Topics and subtopics emerged from the analysis of the collected data through grounded theory approach. A student could raise more than one issue in any same category. Most of the topics identified by students immediately prior to developing the prototype OCF dealt with collaboration through communication. Students insist on continuous relationship with teachers and they request the availability of a virtual teacher round the clock to communicate with. Information pertaining to online activities was the largest main topic (n=16, 44.44%) included in information pertaining to online activities are such topics as online exams, access facility, and specific virtual requirements such as using videoconferencing. The main topics were determined using surveys and lists of ICT topics found in the ICT literature (Laga and Elen, 2001; Littlejohn, 2002; p. 42).

Teacher's expertise was the second largest topic (n=10, 27.77%). It includes information on their abilities to design online activities or an online course. The sub-topic information on alternative abilities included information on practical expertise and teacher's adaptation to new environment. These included apprenticeship, ability and motivation. When two categories of topics (online activities and teacher's expertise) are added together (n=26, 72.22%) around three-fourths of the topics raised by students dealt with technology-based facilities for student (Table 6.3). Only a small number of topics raised by students dealt with matters related to their capacity to learn. Topics related to student's skills represented an unexpectedly small category. Only 10.56% of the topics raised by students dealt with skills issues.

Academic level: Table 6.3 provides a breakdown of the difference between the topics raised by students by academic level (sophomore, junior and senior). Academic level is the classification of students by the number of courses/credits completed. No statistically significant differences were found in the types of topics raised by students according to their academic level. The researcher felt it was important to perform the test using all three academic levels because most literature on academic outcomes focuses on needs of students at each level.

The average number of topics raised by each student is 0.5. The average number of topics raised per student consistently declines across the academic levels. Sophomores, on average, raised 0.5 topics, juniors raised 0.2 topics, and seniors raised 0.1 topics. This is due to the reluctance of students to answer the questions related to new suggestions. By comparing the average number of times per week students use technology and the average number of topics raised, some interesting observations emerge. Sophomores reported using technology in assignments an average of two times per week, less than students from any of the other two academic levels did. Sophomores, on average, however raised more topics than did juniors or seniors (Table 6.3). There may be a link between the number of topics raised by students and the number of times he or she uses technology each week. It is possible that because sophomores on average use technology only two times per week they raise more topics. On average, juniors reported using technology more often than students from any other academic level. This is interesting when one considers that juniors make up the smallest percentage of participants.

Juniors were more likely than students at other academic levels to raise topics pertaining to online activities. Juniors were less likely than students at other academic levels to raise topics pertaining to teacher's expertise and teachers' skills. The lack of teachers' skills topics raised by juniors may be due to the fact that most of the data gathered on juniors were acquired during the week prior to final exams for the semester (In Table 6.3 the topics related to teachers' skills raised by junior are zero). So, they focus more on the exams facilities such as exams online.

Table 6.3: Number of topics raised by students by academic level (N=71)

Academic Level				
Topics raised by students	SO (31)	JR (16)	SR (30)	Total (71)
Online activities (online exams, videoconferencing, virtual teacher, …)	8	6	2	16
Teachers' skills (ability, motivation, communication, willingness to use ICT, ...)	7	0	1	10
Students' skills (learning, collaborating, using software application, …)	3	2	1	4
Total	18	8	4	31
Average / student (18/31; 8/16;4/30)	0.5	0.2	0.1	

Note: SO is an abbreviation for sophomore student with number of credits completed < 30.
JR is an abbreviation for junior student with number of credits completed < 60.
SR is an abbreviation for senior student with number of credits completed > 60.
(18 topics proposed by 31 sophomore students, 8 topics proposed by 16 Junior, etc ..).

Table 6.4: Number of topics raised by male and female students (N=71)

Gender			
Topics raised by students	Male (46)	Female (25)	Total (71)
Online activities (online exams, videoconferencing, virtual teacher, …)	10	6	16 (44.44%)
Teachers' skills (ability, motivation, communication, willingness to use ICT, …)	6	4	10 (27.77%)
Students' skills (learning, collaborating, using software application, …)	1	3	4 (11.11%)
Others (Interface design, leader's decision, career)	4	2	6 (16. 6%)
Total	21 (57.8%)	15 (42.2%)	36 (100)
Average / student (21/46;15/25)	0.46	0.6	0.5

Note: 21 topics proposed by 46 male students. 15 topics proposed by 25 female students.

Gender: The differences between the topics raised by students according to gender are presented in Table 6.4. There were no statistically significant differences in the type of topics raised by gender. Female students raised an average of 0.6 topics while male students raised an average of 0.46 topics. Although female students raised more topics than male students, they reported on average using technology fewer times per week than did male students. The majority of the topics discussed by both male and female students pertained to academic issues, including questions related to online courses. Female students raised fewer topics than males did in every category except for students' skills (Appendix A, Part I; Appendix E). The small number of the female students in the study may explain this.

Table 6.5: Number of topics raised by students by department (N=71)

Department				
Topics raised by students	CCE (31)	CS (30)	EDU (10)	Total (71)
Online activities (online exams, videoconferencing, virtual teacher, …)	3	8	5	16
Teachers' skills (ability, motivation, communication and willingness to use ICT)	1	7	2	10
Students' skills (learning, collaborating and using software application)	0	2	2	4
Others (Interface design, leader's decision, career)	1	2	3	6
Total	5	19	12	36
Average / student (5/31;19/30; 12/10)	0.16	0.63	1.2	0.5

Note: CCE is an abbreviation for the Computer Communication Department.
(5 topics proposed by 31 CCE students).
CS is an abbreviation for the Computer Science Department.
(19 topics proposed by 30 CS students).
EDU is an abbreviation for the Education Department.
(12 topics proposed by 10 EDU students - one student has raised more than one topic -)

Department: The differences in topics raised by computer-communication, computer-science and education students are summarized in Table 6.5. On average, computer-science students raised more topics than did students of the two other departments. Education students raised an average of 1.2 topics per student while both computer-communication and computer-science students raised an average of 0.79 topics per student. Computer-science students reported using technology more often per week than other students. Although education students raised an average of 0.41 topics more per student than other students, substantially fewer education students raised topics pertaining to career and professional development than did other students. In particular, education students never raised topics pertaining to teacher training. Most computer-communication students and some computer-science students raised this topic. Even though the number of topics raised by students is fairly consistent by department there appears to be less diversity in the categories of topics, so the three departments' needs

are approximately the same. The decline in the number of topics raised by students may be due to the limited technology facilities existing in Lebanese universities. Moreover, the limited cooperation with external universities has a negative effect on the academic awareness of the different opportunities that technology offers in education.

Learning through the use of technology takes more than mastery of a software programme or comfort with the hardware being used. It takes an awareness of the impact that this form of learning has on the learning process itself. Students' perceptions assume that if online courses and programs are offered, teachers will know how to teach in that environment, and more importantly, students need to know how to learn or engage with the material (Hagner, 2000). Teachers must have skills and knowledge that will prepare them to meet new challenges resulting from developments in technology integration. The following sections discuss the impact of teachers' enthusiasm, application softwares and effective use of technology on learning.

1.1 Teachers' enthusiasm

Trained teachers became significantly more enthusiastic than untrained teachers (Bettencourt *et al.*, 1983). The teacher's enthusiasm for teaching, learning, and for the subject matter has been shown to be an important part of effective teaching, both in supporting positive relationships with students and in encouraging student achievement (Stronge, 2007). The email interview student's guide (Appendix A, Part 2) uses a scaled response question to evaluate the teacher's enthusiasm for ICT and to measure to what extent it affects student's learning (in assignments, to find resources, in collaborating with others). The use of a scaled question makes the question easy to understand and makes the answers more accurate to explore students' responses about their teachers' attitudes towards ICT. This section uses quantitative analysis to support the interpretive results mentioned above.

In analysing this data using the value and rank parameters, it is important to consider the meaning carried by the different scores in this table. Scores greater than 2.5 indicate that teacher's enthusiasm is rated on average as providing a great deal of communicating. A score between 1.5 and 2.5 shows that enthusiasm of a teacher whose influence is judged on average to be between "to some extent" and "a great deal". A

score less than 1.5 represents that teacher's enthusiasm is judged to have had a little or no influence on collaboration.

Table 6.6: Teachers' enthusiasm affecting relationships

	Computer communication		Educational technology		Computer science	
Teacher's enthusiasm	**Value**	**Rank**	**Value**	**Rank**	**Value**	**Rank**
Communicating with student and teacher in working on assignments (teacher-student)	2.5	1	1.3	2	2.7	1
Ability to use technology to work collaboratively with other student (student-student)	2.0	2	2.4	1	2.3	2

Note: *Value* is a the ratio between the total answers and the number of students (Appendix F)
Rank is the classification the impact of teachers' enthusiasm on teacher-student and student-student relationships

Therefore, teachers' skills, knowledge and new technologies are already having an impact on the way teachers assess students (Branigan, 2000). This finding considers that teachers' enthusiasm for ICT has an impact on the way teacher and student communicate and on the way student and student collaborate. Moreover, most of the students (60%) believe that teacher's enthusiasm for ICT increases their overall ability to use technology with their assignments (Table 6.7; Appendix A, Part II).

Table 6.7: Teachers' enthusiasm affecting students' ability

	Computer communication		Educational technology		Computer science	
Teacher's enthusiasm	**Value**	**Rank**	**Value**	**Rank**	**Value**	**Rank**
Overall ability to use technology with assignments	2.5	2	2.3	1	2.8	1
Ability to find resources for references	2.9	1	2.0	2	2.4	2

Student motivation is one of the important issues in building up towards an E-learning environment in a higher education institution (McNaught *et al.*, 1999; Nelson, 2005). In this study, over 70 % of the computer communication students and computer science students believe that the teacher's enthusiasm increases to some extent their motivation

in using computers for assignments. Therefore, the match between students' preferred orientation to learning and the nature of the learning task could be positive, which would be likely to motivate students. However, the mismatching is obvious in the Education Department. Educational technology students believe that teacher's enthusiasm has no influence on their motivation.

1.2 Application softwares

Learners engaged in learner-centred instruction proactively engage with various sources of potential information (such as technology) to gain insights into a problem and its possible solution (Gjedde and Ingemann, 2001). The meaningful integration of technology demands knowledge of when, why, and how specific tools should be used to facilitate learning (d'Eça, 2002; Su, 2005; p. 24). It requires the ability to both plan and select the optimal tools, as well as the knowledge and skill to implement and evaluate their effectiveness. This study is interested in exploring the degree to which students are using applications software such as word processing programmes and spreadsheet programmes in their assignments or lessons (Appendix A, Part III). The results are almost the same for all levels, sophomores, juniors and seniors. All of them rarely use software applications. Twenty percent (20%) of computer-communication students only use some applications daily. Thirty percent (30%) of computer students use some applications daily. Twenty-five percent (25%) of education students use such applications. However, 90 % education and computer-communication students do not use database programmes while 60 % of computer-science students use such programmes.

The social curriculum is enhanced by the way in which HEI encourages a wider look on the world through extra-curriculum activities using application software is one of them (Burr and Morton-Allen, 2001; p. 45). Most of the computer-communication and computer-science students (85%) are well prepared to use Internet for their assignments (Appendix A, Part III). However, the educational technology students are somewhat or moderately prepared to use Internet. This may be due to the fact that most education student refers to their teachers if they have problems with technology while doing their assignment. However, CCE and CS students find that Internet is the most helpful source to solve their technology-related questions.

1.3 Effective use of technology in learning

The technology itself is not the reason a course is offered, but rather an important supportive factor in its success (p. 24). What attracts individual students to the online environment is the ability to work at their own paces using asynchronous communication (Bartolic-Zlomislic and Bates, 1999). What is often a surprise is the ability to engage with the material and the instructor in a different way (Barab and Duffy, 2000). Students function both more independently and collaboratively at the same time, and they need to become good managers of their own time given the demands of online activities. Technology offers multiple opportunities for teamwork and collaboration that will reinforce the sense of common purpose and provide opportunities for students to take charge of their learning as described in chapter 3. This too increases the likelihood that students will want to stay involved. Using the same instrument of collecting data (email interviews) and ignoring the parameters of students classification (academic level, gender and department) Table 6.8 and Table 6.9 emphasize the positive implication that technology has on the student particularly in this study. The disadvantages mentioned by them when using technology in teaching and learning may be decreased by their own perceptions such as organizing training sessions and by investing in using technology.

Table 6.8: Responses received from students on using technology in teaching

	Advantages	**Respondents**
A	Save time	33
B	New ways of teaching	19
C	Access more resources	14
D	Can miss lectures	5
	Disadvantages	
A	No personal interaction	25
B	Bad use of technology when there is no assistance	24
C	Students are too reliant on technology	22

Note: 33 out of 71 students believe that the use of technology in teaching saves time.

Students ask for performing activities that help them generate their own knowledge by participating in certain web-practices (Ma and Harmon, 2004). Thus the constructivist model appears to be more useful than the objectivist model as with new technologies learning is rather a constructed knowledge than a transmitted knowledge as described in

chapter 3. At the same time students need to do their tests in the computer laboratory so they want to show what they have learned in different ways, not just on written tests. However, as students need to acquire skills as quickly and efficiently as possible these skills must be assessed with traditional tests prior to using them when they are constructing their own knowledge. Finding a way to merge the two approaches, objectivist and constructivist, is the future of technology integration in education where the benefit of learners and teachers is optimized as explained in chapter 3. For example, technology-integrating strategy based on both approaches generates students' motivation to learn and to develop information literacy and visual literacy skills.

From the data analysis many themes, represented by three factors, are identified for the role of students' perceptions in a higher education curriculum change.

Table 6.9: Responses received from students on using technology in learning

	Advantages	**Respondents**
A	Flexible learning environment	26
B	Catch-up with missed lectures	23
C	Increase motivation to search and explore new exercises	22
	Disadvantages	
A	Need for a continuous Internet connection	30
B	Bad presentation leads to some misunderstanding	24
C	Lack of human interaction left slow students behind	17

Note: 26 out of 71 students believe that the use of technology in learning makes the learning environment flexible.

2. Pre-intervention students' results

In the pre-intervention phase, the instrument used to collect data from students is the email interview. When the data are collected, they are analysed concurrently by looking for all possible interpretations. The researcher engages in a process of gathering data, sorting it into categories, collecting additional information, comparing the new information with merging categories, and classifying data by department, by gender and by academic level (Table 6.1). This involves employing particular coding procedures such as CCE female sophomore. Throughout the analysis of an interview, for example,

the researcher becomes conscious that the interviewee is using words and phrases that highlight an issue (topic) of importance or interest to the use of ICT in education. The coding of the students overall perceptions of ICT recognises, develops and relates the concepts that represent the first phase of developing the theory of integrating ICT in education (p. 9; p. 57). Consequently, the three factors that may impact students overall perceptions of ICT are: (a) general perceptions of technology and how they use technology in learning, (b) perceptions concerning teachers' attitudes to computers and their preferred learning modes that can influence students' learning, and (c) perceptions of how the use of online activities would support the way students learn.

2.1 The use of technology

The first factor (Figure 6.1), which contributes to participants' overall perception of ICT, is the belief that ICT could support participants' apprenticeship approach toward learning. One senior male CCE student said that the use of the Blackboard system could serve as an alternative to classroom but it needs teacher's help in the first couple of times to better understand the learning approach. A junior female CS student suggested enhancing the student information system already available at the university so that students can exchange data and problem solutions through interactive sessions, outside the classroom such as using chatting. A sophomore female education student stated that the advances in technology, especially the Internet, motivate her to learn more by accessing a variety of resources. She said "whenever I am not able to understand the materials given by the instructor, I usually use any search engine to access more useful links". Figure 6.1 presents several themes related to this perception.

Theme 1: Apprenticeship

Many participants took an apprenticeship approach by learning from trial and error, their own experiences as students in the online environment. A junior female education student stated that video conferencing support her way of learning. She added that usually students are very positive about learning benefits gained by being required to spend time on practising online and therefore apprenticing. A sophomore male CCE student stated that technology "makes learning more fun". A sophomore female education student mentioned that using technology in teaching makes the materials more understandable and less boring. A senior male CCE student said that the Internet helps him to learn anytime at his convenience. This explains why the students generally

reported positive perceptions about using technology in learning and teaching (Hartman *et al.*, 2005; p. 104).

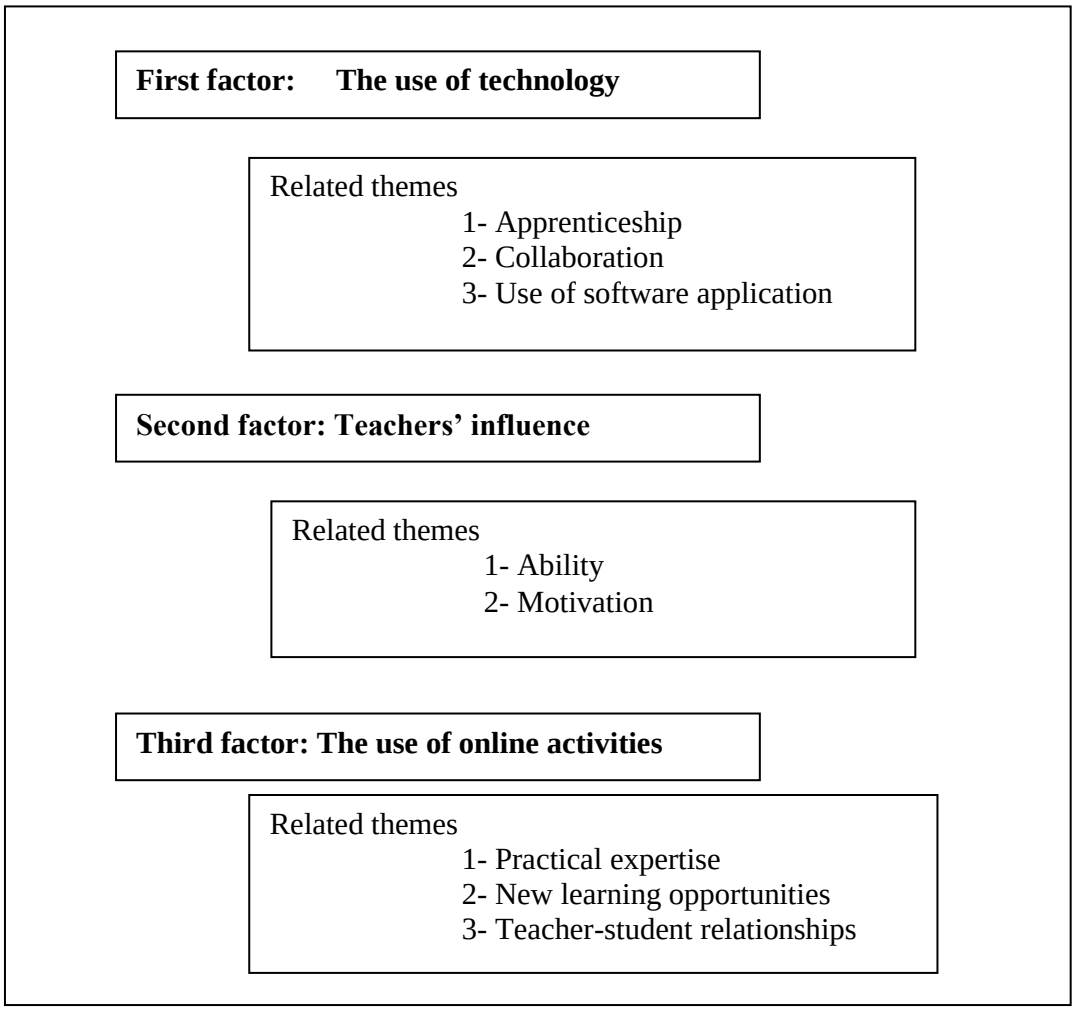


Figure 6.1: Students' findings: factors and their related themes

Theme 2: Collaboration

Students in this study distinguish two types of collaborations teacher-student and student-student (p. 102). Teachers have new ways to provide every student with a platform of knowledge and skills that allow effective learning and they may organize the classroom so that the effective learning can then happen. A senior female education student suggested the organisation of orientation to emphasize the importance of technology in teaching and learning. One senior male CS student declared that he owed his skills in programming to his teacher's way of doing the test on computers directly. This method allows collaboration to enhance learning and to strengthen student-teacher

relationship. Students insist on the good impact of a continuous collaboration with their teacher and adapt themselves to change (p. 24). One junior male CCE student stated that having all the materials and lectures notes and online exams was not enough for him; a face-to-face meeting with the teacher at least weekly or in the worst case monthly should be scheduled. A junior male CS student said that teachers should collaborate together. He added that when different teachers give a multi-section course, the learning process is easier and more effective if teachers collaborate and exchange their technical skills (p. 96). When teachers work as a team, they act differently and then students learn more (Reisman *et al.*, 2003).

At the same time, the teacher's behaviour enhances student-student collaboration. The students are asked to provide feedback on their perceptions of the impact of the teacher's enthusiasm on their learning. One student mentioned that he was obliged sometimes to collaborate with his colleague to help him in getting used to a new technological environment. A senior male CCE student declared that a senior project suggested by his teacher requires collaboration with a CS student for the programming tasks to be completed

Theme 3: Use of software applications

Students are reluctant about using software applications (p. 103). A junior female education student stated that during this academic year she used spreadsheet software only once for an assignment, which is not enough to expand her understanding of such software. A sophomore male CS student mentioned that the use of application software is more effective for children in schools rather for than students in higher education institutions. A junior female CCE student mentioned that online tutorials are easily mastered and efficient to use if the interface is easy to navigate. Many other students stated that the use of software in learning is sometimes complicated due to unprofessional interface design. One senior male CS student stated that the modularity of the software should be built in a highly modular manner, so that most of it can be reused for related courses that might eventually be built, and it allows its users to tailor it to their personal needs. Therefore, the software's value resides in its clear operability (Lesgold, 2003).

2.2 Teachers' influence

The second factor (Figure 6.1) that contributes to participants' overall perception of ICT is the belief that teachers' positive attitudes towards technology could motivate that of the participants toward learning and consequently change their roles (p. 21). Teachers' enthusiasm increases the students' overall ability to utilize technology with their assignments as well as their motivation to use computers in general. The two dimensions related to teacher's influence on students are ability and motivation.

Theme 1: Ability

Students are cued in advance to select and retrieve the existing knowledge they will need to make sense of new inputs (Morrow, 2002). One sophomore female education student said that she did not know if she is able to use ICT in learning until her teacher asked her to complete an assignment with ICT requirements. However, some students are not confident in their capacity to use new technologies or to use technological tools with which they are not familiar. A senior male CCE student stated that even though he possesses technical skills, he felt uneasy about using programming languages in his final project.

Theme 2: Motivation

The curriculum should encourage high aspirations and ambitions for all. Most teachers hope that their students develop a commitment to the subject that they teach and that students incorporate its values into their thinking and actions (p. 21). A junior female education student said that the practical use of computers in her keyboarding class provides the opportunity for using her skills of typing in all her assignments. One sophomore male CCE student mentioned that the teacher's professional attitude towards using technology in an efficient way motivates him to do more practical work so that he masters the subject and develops new thinking skills (p. 34; p. 96). For this student using technology efficiently means using it correctly when needed. Teachers may consider ways of making practical work more efficient and more effective in their own courses by using new technologies (Brown and Akins, 1993).

2.3 The use of online activities

The third factor (Figure 6.1) that contributes to participants' overall perception of ICT is the idea that the use of online activities would support the way students learn (p. 104).

Theme 1: Practical expertise

One sophomore female CS student mentioned that the use of online assignments helped her to practice her understanding of the material in a new way; moreover, she preferred that the assignments' degree of difficulties be somehow related to the students' ability to use technology. A junior male CS student mentioned that plenty of examples and step-by-step tutorial help him to be proficient in the field. Therefore, online activities facilitate the enhancement of the learner's practical expertise by linking learner's new knowledge with prior experience (p. 105).

Theme 2: New learning opportunities

One senior female CS student mentioned that forums on subjects would create new horizons for learning. Most of the female education students emphasized the use of chat-rooms and required the availability of a virtual teacher round the clock to communicate with in case of any problem. Electronic communication is new mode of communication which offers new learning opportunities in education as communication is a fundamental process in education (p. 25; p. 102). One sophomore female CCE student states that all new ICT innovations should be added to curricula with respect to the curricula goals. A junior female CS student mentioned that the curricula effectiveness is based on the explicitness of goals such as implementing an ICT-curriculum without general requirement courses. The curriculum should embed opportunities for students to develop their full capacity for different types of thinking and learning (Stein *et al.*, 2002; p. 35; p. 105).

Theme 3: Teacher-student relationship

One senior male CCE student prefers to discuss understanding issues and assignment face-to-face in classroom. A senior female education student emphasizes the importance of teacher-student relationship because teachers know the student's capacity and help in nurturing her/his knowledge. Effective learning occurs when teachers diagnose what the students already know and how that knowledge is organized (Apple,

2000). A sophomore male CS student stated that in E-learning environment students still need adequate access and lines of communications with their teachers. One junior male CS student says that although ICT tools may lead to a radical restructuring of the education system itself (p. 19), the relationship student-teacher is always needed for many reasons, the most important reason being the human interaction between teacher's knowledge and students' need to learn, to fulfil the curricula requirements. Thus, teacher behaviour has a sound effect on student's learning process (Harris, 1994; p. 46).

3. Teachers' and leaders' overall perceptions of ICT

This part presents the data that answer the second research question (p. 9; p. 57). It describes teachers and leaders overall perceptions of ICT. It is intended to explore teachers' and leaders' perceptions about using an online curriculum framework as a tool that supports curriculum design. The role of leader in the university of the study is similar to the teachers' role. In this chapter, the word "teachers" refers to both teachers and leaders unless there is any difference. Therefore, teachers were asked to identify topics to help implement ICT in education and especially in teaching. The teachers were also asked to identify contents they thought it was suitable for online teaching and learning. Data are gathered from the contribution of teachers and leaders to a group interview schedule (Appendix B).

Topics raised by teachers using focus group interviews: The teachers raised a total of 121 topics in addition to those raised by students. The same main topics were used to categorize the topics raised by the teachers as were used for topics raised by students. Information pertaining to enhancing cyber infrastructure was the largest main topic (n=51.24%), followed by curriculum and course information (n=31.41%), learner's outcomes (n= 8.26 %), and other (n=9.09%). Over three-quarters of the topics (n=82.65%) raised by teachers dealt directly with technology issues. Topics concerning career issues were included in the other main topic. On average, teachers raised 2.36 topics per teacher. Differences by academic experience, gender, and department are discussed in the following sections.

Academic experience: The number of topics raised by teachers according to their years of experience is reported in Table 6.10. No statistically significant differences were found in the types of topics teachers raise according to academic level. The majority of

topics raised by teachers fall into three categories: information pertaining to enhancing cyber infrastructure, curriculum issues and course information, and learner's outcomes. When comparing the average number of topics raised by teachers by academic level, a similar pattern emerges as with topics raised by students.

On average, teachers with experience less than three years raised nearly twice the number of issues raised by teachers with considerable experience. Novice teachers raised 9.8 while experienced teachers raised 4.23 topics (Table 6.10). One would expect that experienced teachers might suggest more topics. Since the majority of topics raised by novice teachers pertain to facilities, technology and academic issues, this may offer some explanation as to why the average number of topics raised by novice teachers is larger than the number of topics raised by experienced teachers.

Student development theory (Evans *et al.*, 1998; Hamrick *et al.*, 2002) and the developmental model postulate that as students progress through their four years of university, they require less information pertaining to their degree and more information pertaining to career and life goals as explained in chapter 2 (p. 16). Unexpectedly, teachers did not raise more career and professional topics. Leaders raised more topics related to curriculum issues and course information (such as adding a new course to a curriculum) and unexpectedly they raised fewer topics of enhancing cyber infrastructure (Navarro, 2000). The computer-science leader only mentioned the need to have an independent fully equipped laboratory for each department where suitable software should be installed. With the exception of one leader, there was little indication of the development of a personal relationship between students and the teachers, despite on-going interactions. These findings are one indication that a relatively traditional, prescriptive, information-giving model of curriculum is the predominant model in the context studied

Gender: A breakdown of the topics raised by teachers according to gender is provided in Table 6.11. No statistically significant differences were found when comparing the topics teachers raised with males and with females. There is very little difference in the number of topics raised by male teachers and of those raised by females especially relatively to infrastructure topic. "Studying technology is not just identifying different pieces of hardware. It understands what is available, when and why it should be used,

how it is effectively adapted, integrated, evaluated, and adjusted" (Newby *et al.*, 2006, p. 51). On average, male teachers raised 5.44 different topics and female teachers raised 5.54 topics.

Table 6.10: Number of topics raised by teachers by academic experience (N=22)

Academic experience			
Topics raised by teachers	Novice (5)	Experienced (17)	Total (22)
Enhancing cyber Infrastructure (people, hardware, software)	26	36	62 (51.24%)
Curriculum issues and course information (adding a course, adding lab features, changing of course syllabus)	15	23	38 (31.41%)
Learner' outcomes (more practical courses, training, …	3	7	10 (8.26%)
Others (career, work experience, development of teacher-student relationship...)	5	6	11 (9.09%)
Total	49(40.5%)	72 (59.5 %)	121(100)
Average / teacher (49/5; 72/17)	9.8	4.23	5.5

Note: *Novice* refers to teachers with less than 3 years of teaching online or of using technology in teaching and having a limited knowledge of technology.
(49 topics proposed by 5 novice online teachers).
Experienced refers to teachers with more than 3 years of teaching online or of using technology in teaching and having a more advanced knowledge of technology. (Appendix D). (72 topics proposed by 17 experienced online teachers).

Department: When discussing the topics raised according to department (Table 6.12), it is important to note that on average, computer science teachers raised 7.125 topics per teacher compared to 8.66 topics per computer-communication and education teachers. However, there is very little difference in the average number of topics raised by leaders according to majors.

Table 6.11: Number of topics raised by male and female teachers (N=22)

Gender			
Topics raised by teachers	Male (9)	Female (13)	Total (22)
Enhancing cyber Infrastructure (people, hardware, software)	28	30	58 (47.93%)
Curriculum issues and course information (adding a course, adding lab features, changing of course syllabus)	12	28	40 (33.06%)
Learner' outcomes (more practical courses, training, …	6	8	14 (11.57%)
Others (career, work experience, development of teacher-student relationship...)	3	6	9 (7.44%)
Total	49(40.5%)	72 (59.5 %)	121(100)
Average / teacher (49/9; 72/13)	5.44	5.54	

Note: (49 topics proposed by 9 male teachers).
(72 topics proposed by 13 female teachers).

Teachers choose technology-based methods over other methods when they see the relative advantage, that is to say, when the new method offers enough benefits to convince them to use it instead of the old one (INTIME, 2003). Teachers with different amounts of online teaching experience varied in their overall perceptions of online software. The experienced online instructors in this study are promoters of online teaching and learning excellence in the university. However, the teacher's positive attitude towards online teaching may be restricted by the lack of training. To the question related to whether they were interested in developing their knowledge and skills in ICT, most of the answers were positive which explains their positive attitudes towards integrating ICT in learning, but the non-implementation is due to the lack of opportunities to follow training sessions either because they do not exist or because with the overloaded courses the teacher has no time. The following sections discuss the teachers' attitudes towards ICT and the effective use of technology in teaching.

Table 6.12: Number of topics raised by teachers by department (N=22)

Department				
Topics raised by teachers	CCE (8)	CS (8)	EDU (6)	Total (22)
Enhancing cyber Infrastructure (people, hardware, software)	10	23	10	43 (35.53 %)
Curriculum issues and course information (adding a course, adding lab features, changing of course syllabus)	8	29	5	42 (34.71%)
Learner' outcomes (more practical courses, training, …	9	9	12	30 (24.79%)
Others (career, work experience, development of teacher-student relationship...)	5	0	1	6 (4.97%)
Total	32 (26.45%)	61 (50.41 %)	28 (23.14 %)	121(100)
Average / teacher (32/8;61/8; 28/6)	4	7.125	4.66	

Note: (32 topics proposed by 8 CCE teachers).
(61 topics proposed by 8 CS teachers).
(28 topics proposed by 6 EDU teachers).

3.1 Teachers' attitudes

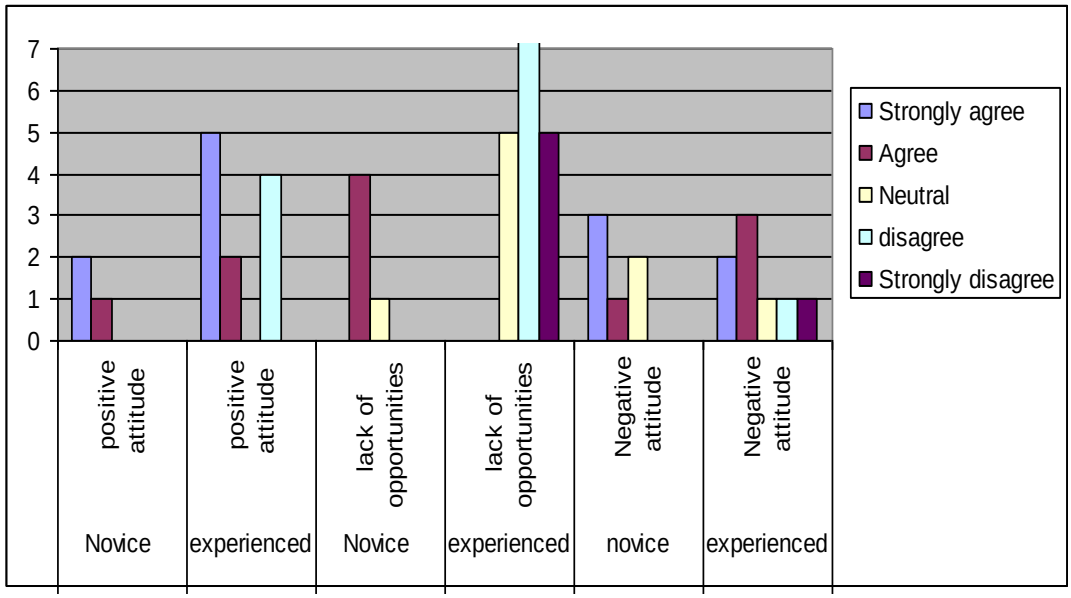
Teachers' and leaders' attitudes about using ICT were evaluated with three items using a Likert-type scale. The evaluation criteria were:

• Positive attitudes: teachers are interested in using ICT
• Lack of opportunities: teachers are interested in using ICT but they do not have time or access.
• Negative attitudes: teachers are not interested in using ICT

Table 6.13: Distribution of responses regarding the teacher's attitudes toward ICT

	Positive Attitude		**Lack of opportunities**		**Negative Attitude**	
	Novice	Experienced	Novice	Experienced	Novice	Experienced
Strongly agree	2	5	1	6	1	2
Agree	1	2	2	3	1	3
Neutral	0	0	0	3	1	3
Disagree	0	4	2	6	0	1
Strongly disagree	0	0	0	5	0	0

Table 6.13 shows only minor differences between the responses given by novice and experienced teacher. Novice teachers do not seem to be satisfied with the existence of opportunities (Table 6.13: 3 negative responses out of 5 for novices (representing 60 % of novice teachers) against 12 negative responses from 17 experienced teachers (representing 70.5 % of experienced teachers). Moreover, experienced teachers seem to seek for availability of time and access. The researcher uses quantitative analysis for a clear representation of teachers' attitudes (Graph 6.1, Table 6.13). The Y axis in graph 6.1 represents the number of teachers.



Graph 6.1: Representation of responses regarding the teacher's attitudes toward ICT

3.2 Effective use of technology in teaching

Participants with different amounts of online teaching experience had different perceptions of the tasks. Novice online instructors tended to focus on contributing to online software in ways such as preparing template files using issues in online teaching, whereas more experienced instructors preferred to use template solutions to design online activities or an online course. Similarly to what chapter 3 discussed, that there is a need to use technological tools to address access, quality and course content. Contrarily to what previous literature expected (Phipps *et al.*, 2000), namely that experienced online instructors might be more interested in using free format to design their course, this study shows that using template format of content such as filling a grid of lectures and assignments is a priority for experienced teachers. In addition, experienced teachers support the view that curricula should meet the technical needs of

a dynamic and rapidly changing world market. Thus, to expand the development and adoption of ICT by the university of this study, contribution to online software may raise the teachers' awareness of what ICT can offer in a learning environment.

This finding is consistent with the fact that professional development expands the understandings of faculty development by practicing and reflecting on their experiences (Shulman and Hutchings, 2004, Shulman and Shulman, 2004; McAlpine and Weston, 2000, Table 6.14). This focus on the role of community in curriculum design is reflected in the increasing number of faculty communities (Cox and Richlin, 2004) in Lebanese universities, which have been developed to foster knowledge sharing and construction among professors (Table 6.15). In this way, teachers assist in creating a more responsive curriculum.

From the data analysis many themes, represented by three factors, are identified for the role of teachers' and leaders' perceptions in a higher education curriculum change.

Table 6.14: Responses received from teachers on using technology in teaching

	Advantages	**Respondents**
A	Enhancement of teacher's expertise	10
B	New experience with e-pedagogy	6
C	University's coping with change	6
	Disadvantages	
A	Lack of needed resources	16
B	No clear method of how to use electronic tools	6

Note: 10 out of 22 teachers believe that the use of technology in teaching enhances teacher's expertise.

Table 6.15: Responses received from teachers on using technology in learning

	Advantages	**Respondents**
A	Knowledge sharing	14
B	Enhanced cooperation through communication	8
	Disadvantages	
A	Cost of education	15
B	Slow adaptation of students/teachers	5
C	More expertise in using technology rather than in learning materials	2

Note: 14 out of 22 teachers believe that the use of technology in learning allows knowledge sharing.

4. Pre-intervention teachers' and leaders' results

In the pre-intervention phase, the instrument used to collect data from teachers and leaders is the online group interview. When the data are collected, they are analysed concurrently by looking for all possible interpretations. The researcher engages in a process of gathering data, sorting it into categories, collecting additional information, comparing the new information with merging categories, and classifying data by department, by gender and by online academic experience (Table 6.2). This involves employing particular coding procedures such as experienced male CS teacher. Throughout the analysis of an online group interview, for example, the researcher becomes conscious that the interviewees are suggesting new features for a successful online teaching and learning process. The coding of the teachers' and leaders' overall perceptions of ICT relates the concepts that represent the second phase of developing the theory of integrating ICT in education (p. 9; p. 57).

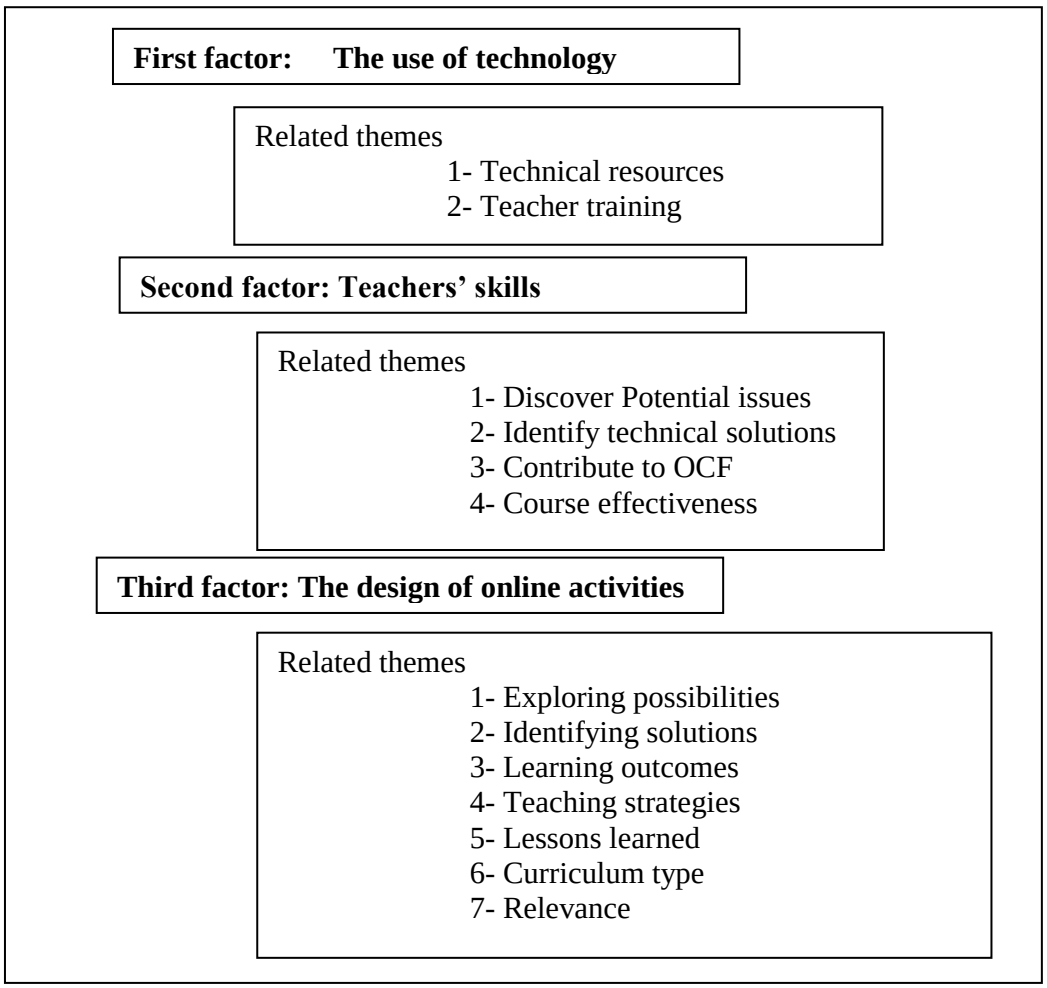


Figure 6.2: Teachers'/leaders' findings: factors and their related themes

Consequently, the three factors that may impact teachers' and leaders' overall perceptions of ICT are: (a) general perceptions of technology and how they use technology in teaching, (b) perceptions towards teachers interest in using ICT in classroom practice and in their professional development and (c) perceptions of how to design an online course that would support the way students learn (Figure 6.2).

4.1 The use of technology

The first factor (Figure 6.2) that contributes to teachers' general perceptions of technology is the belief that they should be supplied with all the technical resources needed as well as training sessions on how to use these resources. An experienced male CS teacher mentioned that his priorities are to verify the effective use of technology and to determine the capabilities of resources available at a given time. A novice female education teacher said that the evolution of technology necessitates teacher-teacher collaboration. The following presents several themes related to this issue.

Theme1: Technical resources

A higher education institution aims to continually provide relevant ICT structure at a level that will effectively support the proper integration of ICT into teaching and learning (Chickering and Ehrmann, 1996; Gomes, 2005). The important content type teacher would need is technical resources. One experienced male CCE teacher states that there is a need for looking out for new ICT with the intention of identifying possible applications in teaching and learning and for exploring the possible uses of the various emerging technologies (p. 109). Selected ICT will then be pilot-tested by professional-ICT teachers and verify that teachers with less experience can easily create and modify learning units with the selected ICT. A novice male CS teacher mentions that there is a need to use Wireless Application Protocol (WAP) and to define ICT-enriched teaching and learning environments of the future.

Theme 2: Teacher training

Technological infrastructure refers to factors in a higher educational institution's readiness to use technology, including the character of the available hardware and software but also the extent of network connectivity, the level of maintenance arrangements, and the level of investment in teacher training (Ko and Rosen, 2001; Phipps, 1998; p. 111). One novice female CS teacher says that higher education in

Lebanon is facing the challenges of having to respond to the increasing use of ICT in education and the need for lifelong learning to stay competitive and to effectively infuse ICT into education teacher training as an essential need. One experienced female education teacher stated that the usefulness of a teacher's assistant framework depends on whether she can easily adapt something to meet her needs. "It will have to have the components that tell me exactly what to do" she added, "It wouldn't help me just to see what someone has done and then have to try to figure out what technology can make it happen." Another experienced female education teacher gave emphasis to the lack of time to try technology and hoped that higher education institutions in Lebanon invest more in teacher training. In order to achieve institutional transformation and appropriate integration of E-learning in the curriculum, teachers must have both the capability and support for content development (p. 110).

4.2 Teachers' skills

The second factor (Figure 6.2) suggests additional tasks to help teachers in enhancing their classroom practice and their professional development.

Theme 1: Discover Potential Issues

Three participants pointed out the need for identifying potential issues when teaching with ICT or even when teaching online. One experienced male CS teacher believed that for those who are just starting to teach a course online, it would be important for them to understand the types of challenges they might face. Another experienced female education teacher provided the reason for performing this task early in teaching. She stated that instructors would need to look at potential issues so that they could avoid problems that others have encountered. A third experienced female CS teacher shared a similar view. She talked about looking at the problems other people had so that she could include related information in her courses.

Theme 2: Identify Technical Solutions

Identifying technical solutions seems to be a task significant for both new and experienced online instructors (Hetzner, 2003; p. 113). A novice male CCE teacher said that the technical aspect of online activities as support for teaching would be especially important for people like her, who had never prepared an activity or a course online before. An experienced female CS teacher agrees. She commented that it is one thing to

hear about someone's experience, and it is another thing to actually set up online activities or an online course from building towards E-learning environment in a higher education institution in Lebanon. One experienced female education teacher stated that technical issues were a point of frustration that she had to resolve, and another experienced female teacher from the same department wanted to have specific and easy-to follow technical advice. A novice male CCE teacher used an example to demonstrate this requirement. He said that if he was reviewing the information on how to facilitate a chat session, he would want to know, "How do I do that on my computer?"

Theme 3: Contribute to online software

Another secondary task participants identified is making contributions to online software. This task is not in the original conceptual model. The experienced female education department's chairperson explicitly stated that this should be added. She identified two reasons for including this task. First, contributing to online software may increase faculty reflection. Second, user contributions would make this tool a living document that supports sharing of multiple perspectives among faculty. She used her knowledge of Blackboard to support this suggestion. An experienced male CS teacher said that nowadays contributing to an online curriculum framework is a necessity. A novice male CCE leader mentioned that teachers experience has a positive impact on curriculum development.

Theme 4: Course effectiveness

An experienced female CS teacher provided the reason for including this component. She believed that the purpose of a course was to share what other professors had learned from teaching certain courses. She wanted to know what worked and what did not work for them. Information on course effectiveness could provide this information. Other participants emphasized that they wanted specific and measurable descriptions of class effectiveness. For example, one novice female CS teacher is interested in finding out the percentage of students who achieved certain goals, the projects they delivered, and the national criteria of the course met.

4.3 The design of online activities

The third factor (Figure 6.2) contributes to perceptions of how to design an online course that would support the way students learn with or without classroom support (Beatty, 2004).

Theme 1: Exploring Possibilities

Participants reported that they might use online software to help them explore the different possibilities of online teaching while designing a new course. One novice female CS teacher mentioned that at the beginning of the academic year, she might need resources to help her set things up for a new course. She would explore all the possibilities to find out what other faculty were doing in their class and what instructional components worked for them. She had just assumed a new job and was switching from Blackboard to WebCT. She wanted to review examples of online courses delivered in WebCT to see what the possibilities were. An experienced online computer science teacher also mentioned that he would explore case examples if he was beginning to teach online. This task could also be appropriate for someone who was contemplating alternative ways of online teaching. Most computer-communicating teachers are applicable examples. One experienced teacher of them stated that his use of online tools has been limited to document sharing and storage. He is interested in exploring ways to incorporate group projects and discussions in his online courses. An experienced female education teacher talked about the third type of situation where exploring the possibilities presented in an online software may help her developing her needed ideas for new and different approaches to teaching.

Theme 2: Identifying solutions to specific problems

Solution identification was another important task that participants discussed. A novice male computer science teacher would like to know how other professors' embedded critical-thinking-related writing assignments in online courses, and a novice female education teacher was interested in finding out how to communicate more efficiently with students in the online environment.

Theme 3: Learning outcomes

A theme that is consistent throughout the novice male CS chairperson's interview was the emphasis on learning outcomes. In several instances during the prototype

exploration, he stated that he wanted to see specific learning outcomes that indicated exactly what students did in the class. For example, if the goal of a course was for students to learn about class design, then learning outcomes should have active verbs stating what students were expected to do, such as evaluating courses or designing courses. An experienced female education teacher's background in education and her work on faculty teaching improvement may explain her detailed comments on learning outcomes. All other participants believed that the learning outcome was an important component in online software, but their comments were not as specific as the experienced education teachers' were.

The computer communication male chairperson made several suggestions to structure this component in the prototype (p. 121). First, he suggested that more details about the solution should be provided. He explained that he would need more details to understand how the solution led to the outcome. Second, outcomes should be measurable (Hernon and Altman, 1998). A novice male CS teacher and a novice female education teacher talked about the importance of including measurable outcomes. The business-computing teacher held that it was not useful to "have things that you can't measure, or assess, or work with." This comment is consistent with their observation that the description of course effectiveness should be measurable. Third, it would be important to discuss both the positive and negative aspects of the outcomes and what the instructor planned to do in the future (Osters and Simone, 2003). An experienced female education teacher pointed out that a solution usually had both positive and negative outcomes. It is important to know what both outcomes were and what the instructor would want to do in the future. I think it would also help to have what it is planned to try next, because I think the person who has had the experience may also have an idea for the next thing to try. And it could also make it more interactive because then other people could get their feedback on what they would try next and about whether they had the same problem.

Theme 4: Teaching strategies

The teaching strategy was another component emphasized by all participants (Rose and Meyer, 2002; p. 48). They wanted to have detailed and specific information related to the teaching strategies employed by the instructor described in an OCF. They provided three reasons for including this component. First, teaching strategies, as well as the

related assignments and activities students were engaged in during the class, were part of what computer science's chairperson had been trying to help faculty to focus on. Second, participants wanted to see how other professors designed assignments and activities to carry out their teaching strategies because these were not easy tasks. A novice female computer science teacher stated that designing an effective assignment is one of the most complicated tasks. She gave an example to show the importance of designing unambiguous assignments. If you worked really hard at it and if you had a good fit, students would do it perfectly because they would do more than what the assignment actually required. But they still needed to know what the assignment was.

Another difficult aspect related to designing assignments and activities is to assess the amount of time it will take to set up and complete them. Two experienced male CCE wanted to see time estimates in other professors' courses, because they sometimes overloaded their students without realizing it. Third, faculty participants needed the details and specifics about teaching strategies in order to understand how they were implemented. While reviewing the synopsis of a problem-solving activity in this OCF, a novice female education teacher stated that she wanted to see what problems the instructor used, what documents and questions s/he posted, how the activity was set up, and what the discussion forum looked like.

In addition to assignments and activities, student assessment is another component critical for understanding someone's teaching strategies. Several participants talked about it. For example, one experienced male CS teacher wanted the student evaluation component to be included in assignment descriptions. Another experienced male CCE teacher had more explicit suggestions on this issue. He recommended that online software show the types of assessments and evaluation rubrics used by professors.

Theme 5: Lessons Learned (or frequently asked questions)

Teachers were very interested in writing what they have learned from designing online activities or online courses. They suggested several reasons for including this component in an online software. First, the lessons that professors learned from teaching online courses would provide other faculty with certainty in online teaching. A novice female education teacher stated that online software would give the user support and awareness. Similarly, a novice male CS teacher maintained, "learning what others

have gone through definitely mitigates the uncertainty surrounding the course." Second, three experienced participants from different departments mentioned that the lessons-learned section would be one of the most useful components in an OCF, because it could help the instructors take advantage of somebody else's experience. Third, sharing lessons learned among faculty is an area that has been ignored. The education department chairperson stated that she thought it would be really helpful to have this component. A novice male CS teacher stated that the lessons learned section had only the instructors' perspectives, and it would be interesting for him to see students' perspectives of the issue too.

Theme 6: Curriculum Type

An experienced male CS teacher explained that the theoretical aspect would assist him to determine how to help people learn, whereas the practical examples would implement theory by practicing and preparing students for the workplace. A curriculum type can be theoretical, practical or balanced that contains enough courses to support the market without being vocational curriculum. These components have been confirmed in the data. Many teachers stated that it would be important to include both types (theoretical and practical) while changing and/or designing curriculum (Jones, 2002; p. 121).

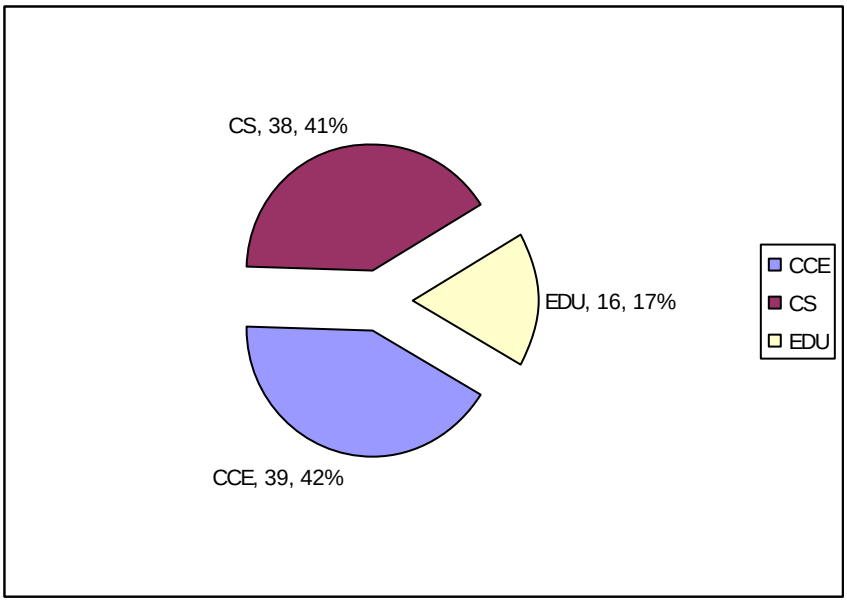
Theme 7: Relevance

An experienced female education teacher stated that for this tool to be relevant, it should provide the users with all the resources that could be readily adapted in completing their tasks. Relevance is a key user requirement for an online software (Marzano, 2001). An experienced female education teacher stated that online software should offer the type of content to help professors reach their goals and to help students understand the purposes of their activities and the activities' relevance to their lives.

5. OCF evaluation (Post-intervention results)

This part presents the data that deal with the third research question of implementing OCF as a tool that assists universities' leaders to put into action a data-driven curriculum reform by involving academics (p. 9; p. 57). It also describes students', teachers' and leaders' overall perceptions of the effectiveness of using OCF in managing curricula, in a way that addresses the fourth research question of evaluating

the software as described in Chapter 5. The same sample used in the pre-intervention phase is used in the post-intervention phase (p. 95-96). 93 respondents filled an online questionnaire: 22 teachers and 71 students. Graph 6.2 illustrates the distribution of respondents by departments.



Graph 6.2: Distribution of respondents by departments.

After the specification of context in which OCF is to be implemented (p. 83), OCF is integrated by the different ways different teachers, students and leaders use this tool. One of the most important features to measure the OCF success is the degree of implementation that is assessed through teacher/student online questionnaire (Appendix C). The findings expanded the expectation of an OCF from a tool for curriculum design to an electronic environment (E-environment) that supports a learning community of online instructors and thus enhances E-learning (effective learning) and E-pedagogy (effective teaching---E-pedagogy enhance hidden curriculum) of a higher educational institution (p. 48).

5.1 Evaluation of OCF as a tool

Reviewing the software prototype's use considers many characteristics depending on the quality of management, learning environment, and goal achievement.

5.1.1 Quality of management

The quality of management was evaluated against three criteria using a Likert-type scale (Appendix C, Part I). These criteria are:

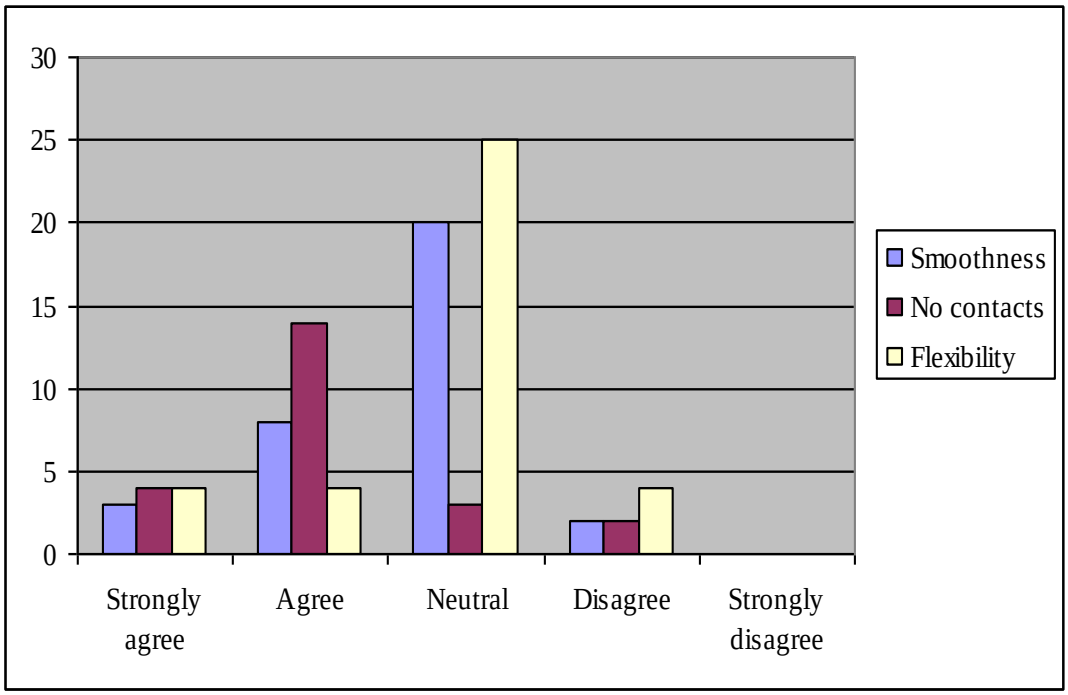
- Smoothness: The OCF was smoothly managed (easy computer interface to navigate).
- No contacts: I did not need any contacts with management
- Flexibility: Management was flexible, considering different needs of teachers and students

Graph 6.3 and Table 6.16 below show the distribution of responses. More than half of the respondents did not have any contacts with the management, which could be the reason for the large number of neutral responses related with the smoothness and flexibility criteria. In this phase of evaluation, all participants are software's users; this explains the combination of students', teachers' and leaders' opinions. The Y-axis in Graph 6.3 represents the number of students, teachers and leaders. For example, fourteen respondents agree that while using OCF they did not need any contacts with management.

Table 6.16 Distribution of responses regarding the quality of management by students and teachers

	Smoothness	**No contacts**	**Flexibility**
Strongly agree	3	4	4
Agree	8	14	4
Neutral	20	3	25
Disagree	2	2	4
Strongly disagree			
Total	33	23	37

Another way the distribution of responses and their representation (table 6.16 and graph 6.3) can be analysed is by illustrating the differences between the responses given by teachers and students to the questions (smoothness, no contact, flexibility) related with the quality of management. Teachers are much less positive regarding the smoothness of OCF (Table 6.17).



Graph 6.3: Representation of responses regarding the quality of management

The reason for mainly neutral responses to this question given by teachers can be explained with their online professional activities: teachers do not feel themselves qualified enough to estimate the smoothness of the software: situation is opposite for flexibility: twenty-five students (and no teachers) have expressed their dissatisfaction at this point. With regard to no contacts needed, there are no significant differences between the responses given by students and teachers.

Table 6.17 (a) Distribution of smoothness responses by teacher and student

Smoothness	**Teacher**	**Student**	**Total**
Strongly agree	2	1	3
Agree	4	4	8
Neutral	10	10	20
Disagree	2	0	2
Strongly disagree			
Total	18	15	33

Table 6.17 (b) Distribution of no contact responses by teacher and student

No contact	Teacher	Student	Total
Strongly agree	2	2	4
Agree	8	6	14
Neutral	1	2	3
Disagree	2	0	2
Strongly disagree			
Total	13	10	23

Table 6.17 (c) Distribution of flexibility responses by teacher and student

Flexibility	Teacher	Student	Total
Strongly agree	2	2	4
Agree	3	1	4
Neutral	0	25	25
Disagree	1	3	4
Strongly disagree			
Total	6	31	37

Another way the distribution of responses and their representation (Table 6.16 and graph 6.3) can be analysed is by comparing the differences between departments (Table 6.18) related to the perceived quality of management. Students and teachers in the CCE department expressed more satisfaction with the smoothness of management, compared to other departments. However, the flexibility and the need of contact show no difference.

Table 6.18 (a) Distribution of smoothness responses by departments

Smoothness	CCE	CS	EDU	Total
Strongly agree	3	0	0	3
Agree	7	1	0	8
Neutral	3	12	5	20
Disagree	0	1	1	2
Strongly disagree	0	0	0	0
Total	13	14	6	33

Table 6.18 (b) Distribution of no contact responses by departments

No contact	CCE	CS	EDU	Total
Strongly agree	2	1	1	4
Agree	5	5	4	14
Neutral	1	1	1	3
Disagree	0	1	1	2
Strongly disagree	0	0	0	0
Total	8	8	7	23

Table 6.18 (c) Distribution of flexibility responses by departments

Flexibility	CCE	CS	EDU	Total
Strongly agree	3	0	1	4
Agree	1	0	3	4
Neutral	8	12	5	25
Disagree	0	3	1	4
Strongly disagree	0	0	0	0
Total	12	15	10	37

The above mentioned different ways of analysis are very interesting and lead to further research and enhancement (p. 93). Thus the assert that OCF is a self-enhancement software is true as it takes into consideration such different ways of analysis by providing the leader (or the EDU unit) with different options to view survey's results (Appendix H-C5). Therefore based on the analysis of the responses, some improvements can be done to easily integrate ICT in education.

5.1.2 Learning environment

People are becoming more comfortable with Internet technology as an everyday tool. Thus, using the Internet for learning is nowadays a normal extension (visualization). Learning environment (Appendix C, Part II) was evaluated against three specific criteria using a Likert-type scale. The evaluation criteria are:

• Aesthetic look: The environment is aesthetically pleasant

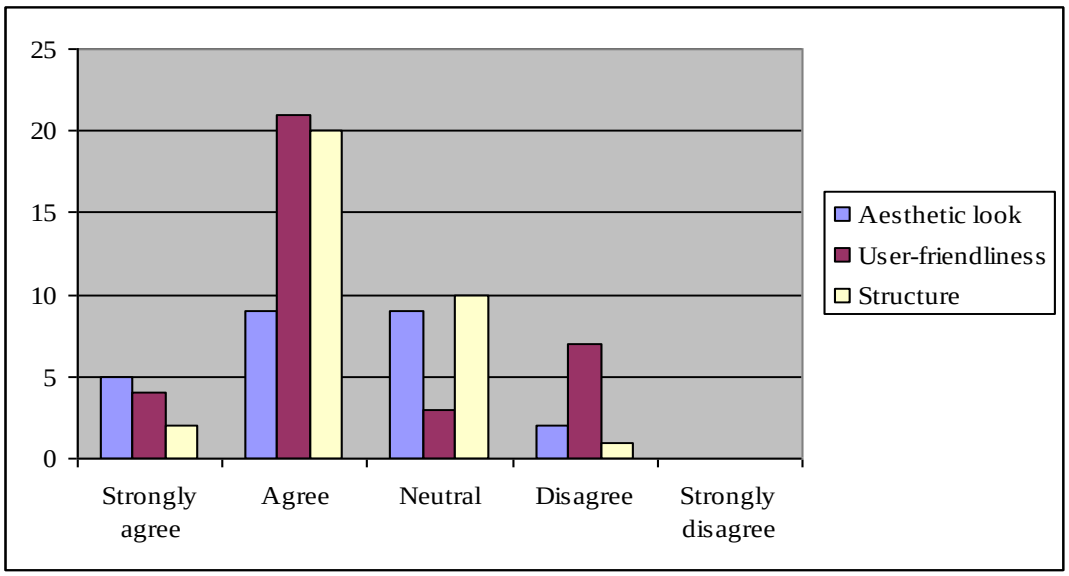
• User-friendliness: The environment is user-friendly

• Structure: The learning environment is well structured

Graph 6.4 shows a certain degree of difference: participants are a bit more satisfied with user-friendliness characteristics of the learning environment and less with aesthetic look and structure of it. For example, only seven respondents do not agree with the fact that the environment is user-friendly. The researcher noticed that ten students did not answer this question.

Table 6.19 Distribution of responses regarding the learning environment by students and teachers

	Aesthetic look	**User-friendliness**	**Structure**
Strongly agree	5	4	2
Agree	9	21	20
Neutral	9	3	10
Disagree	2	7	1
Strongly disagree			
Total	25	35	33



Graph 6.4: Representation of responses regarding the learning environment

Another way the distribution of responses and their representation (Table 6.19 and graph 6.4) can be analysed is by illustrating the differences between the responses given by teachers and students to the questions (aesthetic look, user-friendliness, structure) related with the learning environment (Table 6.20). Teachers are equally satisfied with aesthetic design and user-friendliness of the learning environment; the students have expressed significantly lower satisfaction with user-friendliness. This phenomenon can

be explained with the fact that unlike the students, all teachers have been using WebCT before; they do not encounter the usability problems that frustrate the novice WebCT users. Teachers attitudes towards structure are more dispersed.

Table 6.20 (a) Distribution of aesthetic design responses by teacher and student

Aesthetic design	**Teacher**	**Student**	**Total**
Strongly agree	4	1	5
Agree	7	2	9
Neutral	1	8	9
Disagree	0	2	2
Strongly disagree			
Total	12	13	25

Table 6.20 (b) Distribution of user-friendliness responses by teacher and student

User-friendliness	**Teacher**	**Student**	**Total**
Strongly agree	2	2	4
Agree	15	6	21
Neutral		3	3
Disagree	2	5	7
Strongly disagree			
Total	19	16	35

Table 6.20 (c) Distribution of structure responses by teacher and student

Structure	**Teacher**	**Student**	**Total**
Strongly agree	1	1	2
Agree	13	7	20
Neutral	6	4	10
Disagree	1		1
Strongly disagree			
Total	21	12	33

Another way the distribution of responses and their representation (Table 6.19 and graph 6.4) can be analysed is by comparing the differences between departments (Table 6.21) related to the learning environment. Students and teachers in the EDU department expressed more satisfaction with the user-friendliness of OCF, compared to other departments. The CCE and the CS departments appreciate the aesthetic look and the structure characteristics of the learning environment.

Table 6.21 (a) Distribution of aesthetic design responses by departments

Aesthetic design	**CCE**	**CS**	**EDU**	**Total**
Strongly agree	2	2	1	5
Agree	4	3	2	9
Neutral	3	3	3	9
Disagree	1	1	0	2
Strongly disagree	0	0	0	0
Total	10	9	6	25

Table 6.21 (b) Distribution of user-friendliness responses by departments

User-friendliness	**CCE**	**CS**	**EDU**	**Total**
Strongly agree	0	1	3	4
Agree	4	5	12	21
Neutral	1	2	0	3
Disagree	4	3	0	7
Strongly disagree	0	0	0	0
Total	9	11	15	35

Table 6.21 (c) Distribution of structure responses by departments

Structure	**CCE**	**CS**	**EDU**	**Total**
Strongly agree	2	0	0	2
Agree	15	4	1	20
Neutral	2	7	1	10
Disagree	0	1	0	1
Strongly disagree	0	0	0	0
Total	19	12	2	33

5.1.3 Goals achievement

Participants are asked what they liked about OCF. Teachers liked most the pedagogical approach, quality of materials, and good management. Students liked most the opportunity to engage with other people and exchange ideas and the interactive communication between teachers and students, and they found the learning environment very nice, and rich in interesting communications. Teachers and students opinions are alike in all the three departments of this study.

To the question relating to what they did not like about OCF, teachers replied that they did not like the structure of assignments, and they suggested that the course guide could be improved too. Learners stated that in the beginning there was so much information and it was a bit hard for them to use OCF. Carnevale (2000) indicated that students find nothing more boring than reading screen after screen of text when an instructor is attempting to re-create a lecture online. Only one novice male CS respondent expressed his dissatisfaction with the design. Respondents suggested adding some topics to course materials such as tutorials for teacher to help them in designing multimedia materials and adding more security such as not being able to print files in pdf format to minimize copyright issues.

The participants are also asked whether they feel that the goals of OCF are achieved. Teachers and students of all the three departments (CCE, CS, EDU) were mostly positive about the achievement of the goals of OCF. One experienced male CCE teacher stated that he thought the educational goals were achieved. He added that in this way teachers learned to consider all the goals they wanted their students to gain beyond just mastery of the actual material. A novice female CS teacher stated this environment helped her viewing her teaching from a different perspective, outside of the traditional models he has experienced. One novice female education teacher mentioned that OCF is a first step towards building an E-learning environment. One experienced female CS teacher had an opportunity to compare: “I am using blackboard and its features are too wide sometimes misleading while OCF is well-prepared enough.” She added that teachers wanted to be involved in choosing software that served pedagogical needs and OCF achieve this goal.

5.2 Evaluation of OCF as an E-environment

In the post-intervention phase, the instrument used to collect data from students, teachers and leaders is the online questionnaire. Consequently, the three factors that may impact academics' and stakeholders' overall perceptions of OCF, which is their perceived decision to use this tool: (a) perceptions on how an OCF would support the way leaders carry on a curriculum change, (b) perceived usefulness, and (c) perceived usability of an OCF (Figure 6.3).

5.2.1 The support of curriculum change

The first factor (Figure 6.3; p. 50) that contributes to participants' overall perception of an OCF is the belief that an OCF could support participants' apprenticeship approach toward carrying on an effective curriculum change. It supports communicating and sharing among professors, offering multiple perspectives on online teaching, and providing timely support. The following presents several themes related to this perception.

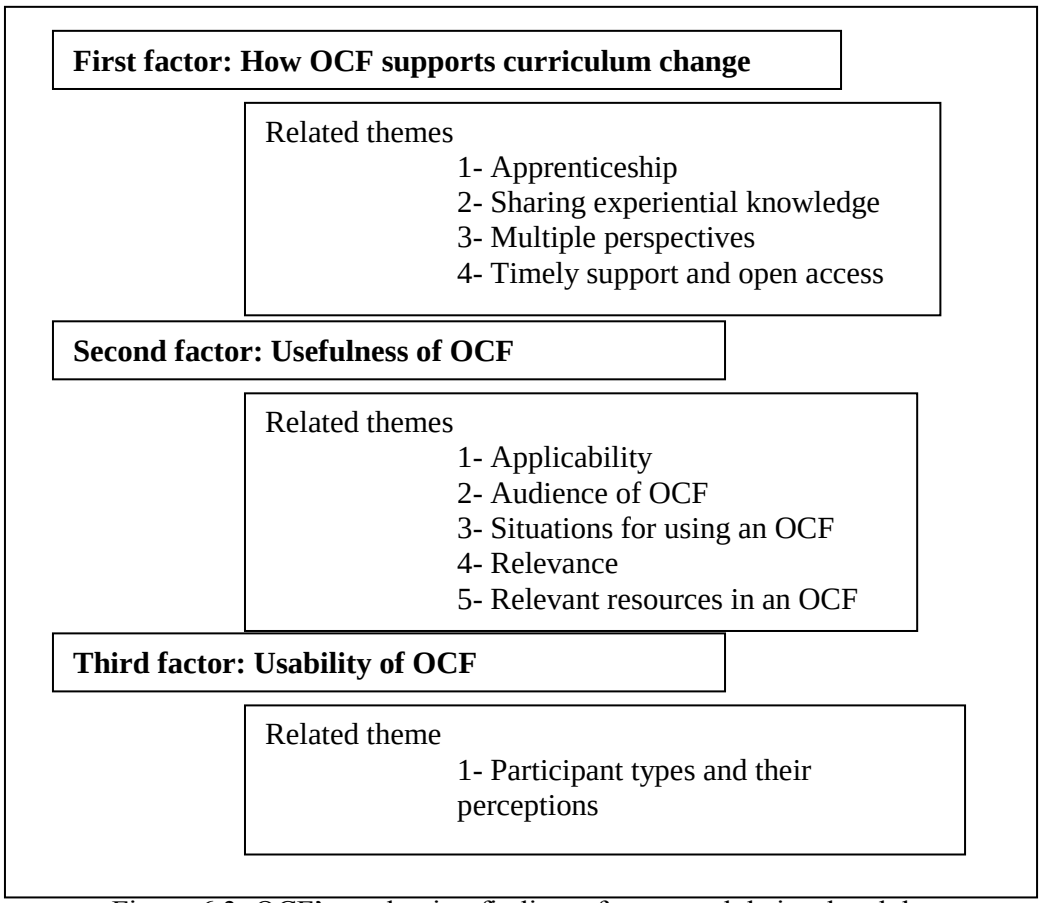


Figure 6.3: OCF's evaluation findings: factors and their related themes

Theme 1: Apprenticeship

One experienced male CCE teacher stated that an OCF could support his way of managing curriculum, he added, “I think this will save a lot of time”. Another experienced male CS teacher stated that the strength of OCF was that it was based on evidence from the real world, he added that OCF is “One of the real ways that I think faculty members improve their use of ICT.” An experienced female CS teacher stated that this tool provided an alternative where faculty members in their own office could learn from others to enhance the teaching strategy. Many participants took an apprenticeship approach to online teaching (Murray *et al.,* 2003).

Theme 2: Sharing Experiential Knowledge

Some participants had a general view of using an OCF as a tool to facilitate sharing among academics; some others had specific ideas about what this tool could help them achieve (p. 122). One novice female CS teacher states that the strength of the tool was that it could provide a framework for instructors to communicate with each other. Similarly, an experienced female education teacher thought that an OCF could become a collaboration environment where the users could all share their experiences. An experienced female CS teacher had a more detailed picture of how sharing could improve teaching in a community of instructors. She envisioned that the tool had the potential of building a cohort of people who could develop teaching models that faculty might modify to meet their own needs. An experienced male CCE teacher believed that sharing could be made possible with Internet technologies. In the online courses he may put video clips of teaching practice online so that students and teachers could view how someone taught a class.

Theme 3: Multiple Perspectives

Some participants perceived that an OCF could allow faculty to share multiple perspectives on teaching. A novice male CS teacher emphasized that one of the strengths of OCF was that from this tool, a professor “was not learning from one person, (he) was learning from multiple persons.” This is important because some participants believed that there are many different approaches to teaching, and instructors need a variety of examples so that they could choose the ones that match their situations. An experienced female education teacher used a story to point out that a teaching style that worked for one person might not work for another. Other teachers

stated that they would need to have multiple cases so that they could choose the ones that would work best for them.

Theme 4: Timely Support and open access

Some researchers find that all universities are employing the web to some extent for teaching and learning purposes (Hamilton-Pennell, 2002; Kreiser, 2002). OCF's strength is that it could support sharing the information relevant to their needs in a timely manner with a mandatory access policy. An experienced male CS teacher stated that unlike a human mentor, an OCF could allow dialogue and sharing 24 hours a day, provided that access is available and not assumed available. Another experienced female education teacher pointed out that, compared to traditional workshops, an OCF could provide the resources related to her needs whenever she needed it. She would need such timely and relevant resources, because she envisioned that if she were not to use an OCF, it would probably be an uncomfortable situation where she encounters a problem and needs to find out what other people have done to solve the problem.

5.2.2 Usefulness of OCF

The second factor (Figure 6.3; p. 43) that contributes to participants' overall perception of an OCF is the usefulness of an OCF. For an OCF to be useful, it needs to be applicable and relevant to the user. These are the dimensions related to the usefulness factor.

Theme 1: Applicability

Applicability refers to the need for an OCF to support the tasks that faculty would be engaged in while using this tool. Participants commented that they would not use an OCF unless it was applicable to fulfil their needs in teaching. A novice female education teacher stated that she typically would not use resources unless she absolutely needs to look for specific information. Similarly, a novice male CCE teacher wanted information to be provided at the time it could help her. Participants' need for applicability requires that an OCF be applicable to professors with various needs in multiple situations.

Theme 2: Audience of an OCF

Participants in the study believed that an OCF could be useful for faculty with different needs. An experienced male CCE teacher stated that the tool could be helpful for two types of faculty. It could help someone get started on online teaching or improve the effectiveness of instructors who were already teaching online. An experienced female education teacher emphasized the use of the tool for the first type of faculty. She said that, if the instructors are forced to teach online and are anxious by the whole situation, it would be good for them to have the tool so that they could see what potential pitfalls may exist, what others have tried and what techniques have worked. However, a novice male CCE teacher only uses Web technologies to post course materials. He believed that this tool could help him expand his teaching from lectures and presentations to group projects and discussions. Similarly, a novice female CS teacher stated that the tool would be most useful for someone who has some experience in teaching and who is willing to try new things to improve their teaching. An OCF should be applicable to both novice and experienced online instructors.

Theme 3: Situations for Using an OCF

Participants identified two major situations in which they would use an OCF. One was during course design and another was during course delivery. For example, one experienced female education teacher said she would use this tool to identify the possibilities for course design. Likewise, another teacher mentioned that she would use an OCF at the beginning of the semester while she was putting together her syllabus and lesson plans. She would also use it when she was modifying lesson plans throughout the semester. An experienced female CS teacher provided a more detailed description of the two situations. She would review the courses in the tool and design her own course. Then, she would come back to the tool to see the potential pitfalls and revise her course in order to avoid the problems. She would repeat the cycle a couple of times during her course development. During course delivery, if problems came up or things failed to work, she would come back to the tool to see whether she had missed anything.

Theme 4: Relevance

Relevance, a dimension closely related to applicability, means having resources that can be readily adapted and implemented in fulfilling faculty tasks. A novice male CS said

"usefulness means that I will be able to adapt it to my need," and "if I start reading something and I don't see how it can be applied, I really lose interest pretty quickly." Other professors concurred and emphasized the importance of accessing information on how to implement something in their situations. In their opinion professors' need for relevant resources requires that an OCF provide access to multiple types of content. The next section presents faculty perceptions of the relevant resources that they would need in an OCF.

Theme 5: Relevant Resources in an OCF

An experienced female education teacher envisioned that the strength of the OCF was that it was a focused environment, where all the information related to online teaching was at one location, which could eliminate the need for faculty to search different tools. An OCF was intended to assist professors with pedagogical issues in online teaching. However, many participants liked this tool because they thought it had the potential to serve as a gateway to all the resources relevant to their online teaching. A novice male CCE teacher wanted to find out from an OCF the topics other universities covered in similar courses, the textbooks they used, and the expectations they had for students so that he could "make sure the students who go through our programs get the same out of the course." Faculty would need resources related not only to pedagogical issues, but also to content and technological issues.

5.2.3 Usability of OCF

The third factor (Figure 6.3; p. 43) that contributes to participants' overall perception of an OCF is usability. Usability has three dimensions: effectiveness, efficiency, and satisfaction (ISO 9241-11 as cited in Frojkaer *et al.*, 2000). Effectiveness refers to the accuracy and completeness with which users complete certain tasks. Efficiency is usually measured by the amount of time it takes to learn to use a tool and complete the tasks. Satisfaction is defined as the users' comfort with and attitude toward the use of a system. In this study, only the first two dimensions are apparent. This may be explained by the fact that this OCF is an initial prototype, and participants were probably more concerned with how to make it work for them, rather with than indicating their level of satisfaction toward this tool. A novice female education teacher believed that an OCF might be a useful tool as long as professors knew how to access the relevant information. Similarly, a novice male CS teacher was concerned about how easy and

fast one could retrieve the pertinent content. He stated that if it took a long time for him to get the information he needed, he would not use it. However, it was easy and quick to use. An experienced male CS teacher mentioned that OCF may help less developed countries in their struggle to reduce the gap between them and the more developed countries (Kazmer, 2001).

Theme 1: Participant Types and Their Perceptions

Although all faculty participants expressed positive perceptions of an OCF, experienced online instructors seemed to have different perceptions as compared to novice online instructors. First, experienced online instructors better perceived the match between an OCF and professors' apprenticeship approach to learning to teach (p. 122). Two experienced CCE online instructors clearly pointed out this connection. Second, experienced instructors had a more detailed and complete perception of how an OCF could help them teach. They thought of an OCF as a tool that provided timely support to faculty by enabling them to share online teaching experiences and multiple perspectives on online teaching. Novice online instructors only had a vague view of an OCF as an experience-sharing tool. Third, novice online instructors were more explicit than experienced online instructors in stating that the usefulness and usability of an OCF would influence their decision to use an OCF. For example, two novice female online instructors from the computer science department stated that they wished OCF had existed earlier; it would have saved a lot of time searching for information to design and build an E-learning environment.

6. Conclusion

In summary, integrating ICT into curricula appears to be a difficult task that is multi-focal in nature. First, the researcher reviews all data collected from all participants (students, teachers and managers) and generates overarching themes that depict the students' needs and other factors related to curriculum development. Second, data from each of the groups are further distilled and categorized. Third, researcher analyzes figures of speech created by participants. Upon completion of the interviews, the participants are asked to describe their experience by emphasizing the advantages and disadvantages of technology in education. The data are then examined to determine a general dimension of curriculum development framework (Stefani and Simpson, 2000).

As a researcher develops a grounded theory, she repeatedly returns to the data to ensure that the theory has been fully saturated in the search for categories and their properties. These categories and attributes of the phenomenon of integrating ICT into curriculum not only provide the theoretical elements of the framework, but also aid to conceptualise the phenomenon in context (Strauss, 1987; p. 13).

The next chapter interprets the information provided from the data and begins to explain what is happening in the substantive area under study. Thus, a saturated theory is defined (McCarthy, 2001).

Chapter 7

Analysis, Synthesis and Discussions

The previous chapter presented the themes that have emerged from the data. This chapter synthesizes the findings to answer the research questions (shown on p. 9; p. 57). The purpose of this thesis is to offer programmes that advance the use of technology in curricula through examination of classroom life relatively to the conceptual framework established earlier in Chapter 2. Students in these programmes are expected to develop a working knowledge of ICT that relates to the practices of teaching and learning. For example, most of the courses in the Geographic Information System (GIS) curriculum in the Computer Science Department of the university in this study are based on application softwares used in the Lebanese workplace. Another purpose of this study is to develop advanced curricula for lifelong learners and workers that broaden and deepen the knowledge base that supports academic fields, and from that base, build upon strategies and practices that facilitate human growth and learning. Just as different learning needs call for different teaching methods, effective technology integration depends on a well planned match of needs with resources and teaching strategies, along with classroom conditions that support them (Shannon and Doube, 2004). Additional purpose of this thesis is to investigate virtual collaboration among all academic stakeholders (students, teachers and leaders) (Busher, 2003). It is hoped that it might encourage lifelong learning among students (Van Horn and Pierson-Balik, 2005), endorse the use of online learning among teachers by supporting their professional development (Ebbutt and Elliott, 1998), and move forward the effective curricula reform among transformational leaders (Bates, 2000).

The curriculum reform explored through this thesis focuses on collaboration among academics, training and development of all stakeholders. The OCF aims to help curriculum reformers assessing and planning the effective integration of ICT in higher education (Hubball and Burt, 2004; Fulton *et al.*, 2005). The aim of this chapter is to compare OCF to other course management tools, to discuss the OCF's contribution to curricular reform practical problems and to emphasis OCF's role in producing design knowledge.

1. OCF: A course management system tool

Course management systems (CMS) have become the most common means of designing and delivering web-based courses. The OCF model shares common features of all CMS softwares such as helping teachers create quality online courses and facilitating communications (Graham *et al.*, 1999). Moodle is a CMS, a free, open source software package designed using sound pedagogical principles, to help teachers to create effective online communities (Dougiamas and Taylor, 2003). Blackboard is a CMS licensed and partially owned by Microsoft, popular software used around the world (Dougiamas, 2003). Blackboard like all CMS has common characteristics: effective course structure and design, engaging learning activities, interactive learning communities, and effective assessment strategies. As well, many teachers are familiar with WebCT; they have almost no complaints about the learning environment. The familiarity and the well-structured environment make WebCT a high standard environment.

The OCF supports the use of online learning activities as an alternative to and supplement for face-to-face learning. Free softwares may not satisfactorily meet the needs of students, teachers, leaders and technologists for online teaching and learning in a specific university. The English-language Lebanese private university of this study buys a license for Blackboard, but it needs to be customized to the university's learning requirements. For example, to make uploading and downloading grades from spreadsheet applications and text files into Blackboard useful, teachers should be trained on how to use this feature, otherwise it will be a hectic procedure. There is a need to explore the requirements of each university and tailor a learning management system according to the particular conditions so that the web-based resources are effectively used as learning tools and academic's satisfaction is somehow ensured. OCF is implemented based on the explored needs and capacities of all stakeholders of the English-language Lebanese university.

At the university in study, three course management tools (Blackboard, WebCT and Moodle) are used as Virtual Learning Environment (VLE) tools but in a limited way. In fact, Blackboard is implemented but using it is not imposed by the administration. In spite of the training sessions organized by the computer centre to motivate teachers to

use it, unfortunately twenty percent of the faculty members are satisfied with only a limited use of Blackboard. The reason for this is that teachers do not have time to practice what they have learned. Moreover, regardless of the fact that nowadays computers are taken for granted and that every day is marked by E-mail and Web searches for students and teachers, WebCT is used rarely and only on an individual basis. Likewise, regardless of the fact that Moodle is a free course management tool downloadable from the Internet, it is not used at the university in study. To my knowledge one teacher is using it by simply posting his lectures.

In addition to the above-mentioned similarities between OCF and the other CMS softwares (Blackboard, WEBCT, and Moodle), OCF has two additional features: involving students in the design by evaluating the online courses and/or activities, and having teachers' and leaders' toolboxes. The leader's toolbox is to design a curriculum compatible to the specific situation of each university, whereas the teacher's toolbox is to construct a free design or a template design for a course online or activities online (p. 87). Web-based activities have great potential to enhance learning, but are time-consuming (Picciano, 2002). Template design helping minimizing the time needed to develop and implement activities in ways that have substantial and positive impact on students' learning (Coulter *et al.*, 2000; Bascia and Hargreaves, 2000; Fabos and Young, 1999). Harris (1998) pointed out that websites can perform several functions to support online learning activities. The OCF website support functions are based on Harris's description to introduce the goals and purpose of the website and gives participants a place to sign up (p. 85); to serve as deliverer of instruction and information; to add and to exchange data among students; to serve as a virtual meeting place to support students' communications as they work together at distant locations; and to invite teachers around the world to benefit from these pre-described features. Using OCF teachers can evaluate the quality of given activities and select those that will work best for their students by using an online questionnaire as an assessment instrument for students to evaluate a given activity (Giannini-Gachago and Seleka, 2005).

Compared to other models, the OCF model has three features giving it originality. First, it emerged from the data, and it provides a context specific view of the important factors that would impact academics' perceived decision to use the model. Second, it

links students' perceptions of usefulness and usability directly with the task, content, and feature models, which provide a base for developing an online curriculum framework. Third, it is an emergent and self-updating model. Thus academics' perceptions change according to the emergence of new technology in the future, as a result additional enhancements to OCF emerge (such as adding new options to teachers and leaders toolboxes).

The next section discusses the OCF's contribution to curricular reform practical problems.

2. OCF: A technology-supported approach for curriculum development

To further develop the use of course management tools, Breen *et al*. (2003) argue that transformation rather than adaptation of unit material better suited to the online environment is required. Facilitating the transformation of unit materials requires greater institutional support and ongoing professional development for teaching staff. Therefore, universities still have trouble integrating ICT and standardizing computing platforms within their institutions (p. 44). This study has encouraged teachers and leaders as well as students to use OCF as a course management tool (p. 106) and to enhance their technology expertise by learning by doing as mentioned in the literature review (p. 49).

The change process from traditional course management to software-based (web-based) course management tool requires long-lasting collaboration. In this study, the change process is prearranged in many phases (p. 60). Each phase involves strategies to be adapted for academics' use to facilitate ICT integration in the education system.

Phase I: The first phase defines the situation. Students of this study are encouraged to contribute to their own learning through interaction not only with the course materials, but also with their peers and their teachers (Creese and Kemelfield, 2002). This study has reported that improved learning outcomes result from heightened motivation and extended mental effort (p. 106; p. 110).

Moreover, the adoption of technology to facilitate flexible learning systems encourages student-centred learning (Smith and Burr, 2005; Oliver, 2000); this actively involves the student in the learning process which in turn facilitates deep learning and is more likely to result in quality learning outcomes (Adler *et al.*, 2000; Booth *et al.*, 1999). In this phase of the study, students are involved in defining their needs as well as their ability of using ICT.

Even though the impact and use of technology on learning outcomes for students and teachers are not well understood (Bryant and Hunton, 2000; Cheah and Koh, 2002; Kozma, 1991; Ramsey, 2003), three strategies are used for defining the competencies and skills expected of both teachers and students for an online curriculum: (1) engaging stakeholders by generating academic acceptance of curricular change (p. 98; p. 113), (2) identifying curricular issues by addressing lack of satisfaction with learning outcomes and teaching approaches (p. 104-105), and (3) confronting organisational issues by developing one committee (EDU) to develop goals and expectations, and to determine the type of technology that is needed (p. 61).

Phase II: This phase defines a curricular plan. Teachers have focused on the equity in access in the classroom and the equity in outcomes through the development of academic programmes pertinent to today's technology (p. 24). The findings of this study give emphasis to teaching strategies and learning outcomes while creating a more responsive curriculum (p. 123). Moreover, the findings confirm that teachers' expertise and enthusiasm facilitate the maximisation of the pedagogical benefit of incorporating new technologies into the subject delivery (p. 116; Salmon, 2000; Brace-Govan and Clulow, 2000; Reeves, 1997; Smeaton and Keogh, 1999).

In this study, teachers and leaders are eager to revivify the institution (p. 115-116), using information technologies in the classroom and building intellectual integrity to create a post-industrial university that will be capable of reaching both new heights of academic excellence and new breadths of community access and social utility (Adams, 2005). Moreover, the leaders as innovative reformers have focused on the enhancement of teaching quality (p. 117) to restructure the whole curriculum (p. 49).

The OCF provides opportunities for both teachers and students to learn how to function effectively in an increasingly diverse, multi-cultural global environment (Morrisson, 2003; p. 17). The classroom's adoption of ICT is the key for the transformation of a higher education institution to contribute effectively and efficiently to meet the human resource needs of a country in an era of change (Smith, 2002; p. 44). Thus, the use of the Internet and course management software tools such as OCF developed to facilitate student learning outside of the physical classroom (p. 31) is revolutionising the way educators teach and students learn (Bryant and Hunton, 2000; Reeves, 1997).

Therefore in this phase of the study, strategies are defined for developing an online curricular plan. One strategy is for generating a vision of an online curriculum goal such as shift emphasis toward practice through designing online activities (p. 110). Another set of strategies is for generating a concrete curriculum plan such as the promotion of learning opportunities for novice online teachers (p. 119).

Phase III: This phase represents the implementation of a web-based course management tool. This study has addressed the link between society and Higher Education (p. 14) by providing new learning opportunities through the use of online activities (p. 110). Thus, this study backed up the idea of a combined approach (online and face-to-face learning) that may be more beneficial than online delivery only, especially for large undergraduate classes and for part-time postgraduate students (p. 108). For example, the School of Education at the University of Leicester offers a successful study school across different countries. Teachers provide face-to-face tutorials and courses to support research, while they correct assignments and give guidelines through E-mails. The OCF as a web-based course management tool provides additional opportunities of collaboration among stakeholders (such as posting assignment on the web).

Phase IV: This phase defines the viability of the curricular plan's implementation. The findings (p. 111) assist university teachers in keeping abreast of this new teaching medium as it evolves. That will allow them to keep pace with the expectations of their students. Without such faculty skills, it will be difficult for traditional universities to participate in an expanding education market that may be dominated by hybrid education-business (Green, 2000). The biggest constraint to integrate technology in

education is not technical resources, but staff development (Ramsey, 2003, Salmon, 2000). Thus, OCF assists teachers in their efforts to integrate technology into instruction (p. 134).

This research shows that students are motivated to learn when they learn in new and novel ways (Siragusa, 2002), and the Internet has provided this opportunity. The extent to which young adults have embraced surfing the Internet (De Lange *et al.*, 2003), student demand and practical necessity have seen most universities embrace a VLE as a tool to facilitate learning in their programmes of study. The OCF's evaluation process investigates the usability of the approach used (phase III). After conducting the initial experiments of usability, strategies for seeking closure are identified such as reporting surveys' results and making a decision to enhance the curricular plan developed in the previous phase. OCF is a VLE which uses Internet technology for communication and disseminating information with the aim of enhancing learning (Basioudis and De Lange, 2004; Seale and Mence, 2001).

Besides the above-mentioned phases (key research questions), the findings have tried to answer questions such as:

- Do the academics have the expertise to design an ICT-supported University?
- Do they have the capacity to develop ICT-supported courses?
- Do they have the infrastructure to support an ICT-supported environment?
- Do they have the business model and support system to market and deliver ICT-supported curricula?

This study points to the lack of academics with appropriate ICT expertise, in the three departments investigated -partly because the lack of advanced technology, but also because of the shortage of teachers and leaders with ICT skills (p. 96). To meet university's future needs OCF performs an academic function, which is helping academics to develop their technical expertise in the design and application of ICT. Thus instead of appointing new staff with appropriate skills, OCF help training existing staff in a web-based area of expertise.

In this study, the existence of novice online teachers in technology-based departments (CCE, CS) is a sign of lack of capacity to develop ICT-supported course (p. 96). OCF intensifies the teachers' and leaders' capacity building efforts to develop ICT-supported course by offering them a well-defined user interface. Capacity building is a process by which academics and educational institutions improve their ability to carry out their functions and achieve desired results over time. In other words, it refers to improving the ability of academics and institutions to carefully design, plan, execute, manage, and assess online courses.

Technologies have been seen to offer promise and hope for increased access, greater flexibility and more learner-centred education. The university in this study uses various technologies often with inadequate planning (p. 143-144). Most of the time these technologies were found either rejected or sidelined (e.g. the use of the Blackboard at the university in the study). The purpose of this study is to provide a general infrastructure that enables the utilization of ICT to support ICT-supported environments. The OCF provides a common underlying framework for the design of future learning systems. OCF is reliable web-based software; it is reusable, adaptable and scalable software system. These features will be explained later (p. 166).

The lack of institutional strategy or a well-defined ICT-supported business model has been seen as a major barrier to progressing E-Learning (Smith, 2002; p. 20). In this study, enhancing cyber-infrastructure (p. 114), and exploring possibilities and identifying solutions to specific problems (p. 120) such as staff development, ensure that policy is effectively used to ensure that institutional processes interrelate effectively to provide a coherent and supportive context for the development of E-Learning. All this is considered from three perspectives: the place of E-Learning in learning and teaching; how appropriate expertise can be developed across the organisation (p. 20); and how E-Learning can be used as a protagonist for changing learning and teaching practice. The developed OCF fulfils the need for an integrated technology-supported approach to emphasize the ability to access, interpret, and synthesize information instead of rote decision and the random change of curriculum. The developed OCF responds to researchers' concerns of configuring a reliable ICT-curriculum to support a specific programme to a specific population (Dolence, 2003; Sinn, 2001). The architecture of an OCF-based curriculum describes the style, method

of design, basic construction, key components, and underlying approach used to build the modules, courses and programmes that make up an institution's curriculum. The next section discusses some key components to which this study has contributed.

3. OCF's contribution to knowledge

On one hand, this study addresses practical problems; on the other hand, it produces design knowledge. This study has not only attained these two goals, but also contributed to the following overlapping areas of theories and research: challenges of developing online community, of preparing a flexible learning environment, of encouraging curriculum evolution rather than revolution, of minimizing technology' disadvantages and threats, and of promoting collaboration for efficient online curriculum.

Challenges of developing online community: This study has identified strategies for promoting community building and managing the virtual learning tool (OCF) (p. 83). There are two concerns associated with this issue. The first problem relates to the motivation for the user to contribute to the curriculum reform. For example, Vaughan (2004) found that the biggest challenge to supporting a faculty learning community was getting faculty to participate in the online discussions. The next problem was teachers' ability in applying contents in the OCF to help them with their own teaching and as well, leaders' ability in applying contents in the OCF to help them with their own managing and teaching (p. 135). Online instructors were faced with both technical and non-technical issues while teaching online. Technical issues focused on the ability to use electronic tools (p. 55; p. 119). The major non-technical issues include lack of interactivity, requirement for clear instructions, optimal use of online course materials, as well as students' frustration and lack of comfort with the online learning environment sometimes due to technical problems such as slow Internet connection. These just-mentioned issues backed up the literature reviewed in Chapter 2 (p. 24) which indicates that developing online community is a complex task (DiPaolo, 1999).

Challenges of preparing a flexible learning environment: This study provides some contradictory findings. Some teachers in this study have used the online tools only to post course materials or to provide students with drill and practice opportunities. Online teaching had no impact on their teacher-centred teaching (p. 118). However, several

others have employed the Web to facilitate student collaboration and discussions or organize problem-solving activities (Taufer *et al.*, 2006; Bravo *et al.*, 2004; p. 107). They have adopted innovative and more student-centred approaches to online teaching. This finding is encouraging and contrasts with the literature presented in Chapter 3 (p. 49) which shows that teachers usually have limited applications of online tools and they have failed to move efficiently from teacher-centred approach to student-centred approach.

Moreover, this study encapsulates the four perspectives of learning environment mentioned in the literature reviewed in Chapter 3 (p. 38). Thus, the learner-centred approach is supported by the fact that OCF focuses on the content more than on technology. The knowledge-centred approach is backed up by the fact that students may use extracurricular activities and may explore others on the Net; the assessment-centred approach is supported by the fact that in OCF (p. 91) many online tests can be used by academics to ensure the quality and efficiency of online teaching (p. 130); and the community-centred approach is endorsed by the fact that all academics are involved in building the online community.

This research also supports the new global E-learning business. The proposed model assists educational institutions in offering new kinds of learning experiences and courses such as the combination of teaching strategies, goals and means to change the schemas of thought in the learner (p. 120). The significance of the learning environment for the learning process has become a topical issue with the advent of social cognitivism and constructivist learning research in particular (p. 38). This study helps out in the shift of education system from teaching to learning. As Morrison and Goldberg (1996) put it, "… the existing set of cultural practices and beliefs that so strongly determine our collective behaviour … is more powerful than the capacity of the new tools to catalyze change in the system" (p. 126).

Challenges of encouraging curriculum evolution: This study endorses the use of ICT in the development of education systems and is trying to cope with technological changes and sometimes trying to lead the change (Smith and Smythe, 2002). In this study, the curriculum evolution is based on the evolution of three pillars students, teachers, and technology. The design of the suggested model allows integration of

unlimited number of technological tools in education. For example, if mobile technology or Tablet PCs are to be implemented in the education system, a new evaluation process (p. 126) is needed to relatively identify student's and teacher's roles. Computers equipped with a sensitive screen designed to interact with a complementary pen, are called Tablet PCs. Using the Tablet PC, teachers and students can create, capture, and collaborate in new and unique ways. Students are engaged by writing directly on teachers' PowerPoint slides during lecture. Teachers can easily distribute hand drawn diagrams to their students via e-mail or network share. Thus to explore the suitability of these technologies for courses in curricula, the EDU team designs an online questionnaire (through OCF) for leaders, teachers and students. The aim of the questionnaire is to assess their perceptions, their capacities and their motivation towards using mobile technology and Tablet PCs in teaching and learning. Then, the EDU team analyzes the results (through OCF's surveys' results) and tries to find new ways of explaining these technologies and demonstrating them visually and interactively to academics. Therefore one of the teachers' tasks is to encourage better interaction and more support to the students in the class by providing interactive practical sessions. In this way, students will be more interested and motivated in learning. After the integration of these technologies, the EDU team can measure the impact of such integration (for example on student motivation and interest in the class) using online questionnaire (through OCF). Hence the evolutionary nature of integrating ICT in the curriculum is fulfilled through the use of OCF. In addition, virtual organizing of education, as suggested in this study, would be a beneficial approach for the research and development of ICT integration in education globally. An OCF promises to provide a virtual space for a community of online instructors to share course materials and the practical lessons that they have learned from their online teaching experience (p. 123). This finding has backed up the literature reviewed in Chapter 3 (p. 45) which emphasizes the curriculum evolution rather than revolution for integrating ICT in curriculum.

Challenges of minimizing technology's disadvantages and threats: This study gives confidence to the higher education institution to move forward after removing barriers or at least minimizing the probability of threats' occurrence by the E-learning development unit (p. 61). The literature presented in Chapter 3 (p. 45) shows many barriers to integrate technology in curriculum such as time, access, socio-economic

status, students'/teachers' inability to assist in designing a responsive curriculum, and conflicts in the learning community (Jackson, 2004; Di Benedetto, 2005).

Challenges of promoting collaboration: This study confirms that combining face-to-face teaching with online learning emphasizes the role of cooperation in teacher learning as well as the importance of learning from students (p. 122). Moreover, this study has the following contributions to the understanding of such combination. First, teachers should ask for a technical and pedagogical training to help them with online teaching (p. 119). This finding is in contrast to my original intention to design a tool that solely focuses on providing technical support. Second, students would need a tool that allows them to contribute their own experiences. This has expanded my original vision of this tool from a resource that provides students with vivid online learning experiences to a tool that evolves and grows when users share and add to the knowledge base over time. Consequently, the new conception of this tool is involving students in curriculum management by promoting students' choices, promoting E-pedagogy by hiring more technology-based experienced teachers, and by encouraging leaders to focus more on managing change rather than managing teachers and courses by making sure that the E-learning development unit's tasks are safely accomplished. This study has backed up the literature reviewed in Chapter 3 which shows (p. 45; p. 49) collaboration is multifaceted.

Despite the fact that modern ICT has many new qualities such as networking and communication, the main interest of this research approach has not changed: it still aims to increase the human performance and learning by means of technology. OCF can not only provide guidance for researchers and developers interested in integration ICT in curricula; it may also be of value to other audiences. For example, OCF may be interesting to those concerned with teachers' course management in teaching or online teaching. OCF can be useful for researchers investigating the use of ICT to support teaching or online teaching. OCF's features may benefit those interested in course information seeking implementation and Website design guidelines.

4. Conclusion

Technological advances and computing capacity with improved access to the Internet have provided a viable support and/or alternative to face-to-face teaching and learning.

Technology is changing rapidly and offers a vast number of opportunities and resources; student achievement and improvements in thinking skills are difficult to measure; and universities integrating technology are changing in a multitude of ways all at once (Culp *et al.*, 2003).

The aim of this study is to design a model which is of assistance to universities for their efficient integration in a fast-change era. During the research, the emergent categories began to form patterns and interrelations which led to the design and the implementation of OCF. The pre-intervention students' results (p. 105) summarize the students' perceptions in three categories (p. 106). This finding represents one of the three essential parts of the suggested model. The second part of the new model comes from the pre-intervention teachers' results which summarize the teachers' perceptions in three categories (p. 118). The post-intervention results' of all respondents (students, teachers and leaders) designate the third part of the model (p. 135). Moreover, to minimize the disadvantages mentioned by the respondents (p. 104-105; p. 117) a development team (EDU) is needed (p. 61). In other words, this study promotes collaboration at all levels, between learning and teaching (p. 136), between in-classroom and online activities (p. 106), between theory and practice (p. 116), between student and teacher (p. 107; p. 110), between teacher and leader (p. 111), and between business and education (p. 134). Despite concerns about the threats of integration technology in the development of borderless education, these findings point to the positive benefit of increased collaboration for quality assurance. Thus, sharing is the key issue for leading-edge educational institutions to transform themselves from traditional university (physical campus) to E-university (Robson *et al.*, 2003).

This study has also developed a cohesive comprehensive technology integration framework that is designed to plan for technology integration through the students', teachers' and leaders' perceptions, and give them numerous opportunities to practice technology skills and technology integration through the use of online curriculum framework prototype (OCF). Besides, this model avoids dictating theoretical perspectives but rather reflects a constructivist approach to teaching and learning toward a socially based or situated approach as explained in chapter 3 (Salomon and Almog, 1998; Bonk and Cunningham, 1998; Ravitz *et al.*, 2000; p. 49). In this study, the curriculum construction is based on three principles: technology-based methods

should be based in both learning theory and teaching practice; uses of technology should match specific teaching and learning needs; and that new integration strategy should be effective enough to be good.

The next chapter discusses some recommendations for future development, research and practice for smoothly integrating ICT in a Higher Educational Institution.

Chapter 8

Conclusions and future recommendations

The research objectives of this thesis, as formulated in Chapter 1, are to investigate whether integrating technologies such as software promotes engaged learning, enhances curriculum development service and improves teaching and learning through curriculum management (p. 2). This chapter reviews the extent to which this thesis has provided evidence that supports the research objectives. It describes the contributions made by this thesis to help universities to fit better in their environment. It further discusses the limitations of this study. Finally, the discussion focuses on the main conclusions, recommendations and proposals for future research.

1. Main findings

The aims of this thesis are to build rather than test theory, to provide researchers with analytic tools for handling masses of raw data, to help the analysts to consider alternative meanings of phenomenon (integrating ICT in teaching and learning), to be systematic and creative simultaneously, and to identify, to develop, and to relate the concepts that are the building blocks of theory (Strauss and Corbin, 1998). The theory building process depended on the following:

Students' perceptions concerning the use of OCF as tool that supports teaching (p. 9; p. 57; p. 145). This study indicates that if students engaged in curriculum change then leader and teacher both need to take steps to provide opportunities for students to be motivated to use ICT (p. 110). The thesis identifies that because most teaching and learning changes tend to be a teacher's and/or leader's task. It also develops a mechanism to identify students' opinions and establish forums that facilitate teacher-student communication. In this way, students will feel less isolated and more engaged to sustain effective ICT integration in teaching and learning (p. 107). The measure that was developed in this thesis shows that students' engagement in decision making does make a difference for an efficient ICT integration in education. Moreover, students at the university of this study are more involved with technology than teachers and leaders. Thus students' perceptions are in favour of using technological tools in teaching and learning.

Teachers' and leaders' perceptions concerning the type of contents that best support online teaching (p. 57; p. 145). A question must be raised concerning the extent to which this thesis adds to teachers' knowledge of ICT integration in HE. Teaching is a profession, and a profession requires professional attitudes. Teachers need to be able to teach online successfully. The thesis' results show that in online teaching, more than in face-to-face teaching, teacher accountability for positive attitude towards using ICT in teaching plays a major role (p. 150). Moreover, this study focuses on training and teacher development in order to increase interactivity in online classes, to build a learning community among the learners, to deliver course content in new and creative ways, to incorporate collaboration into the learning process, to empower learners, and to evaluate learners and learning outcomes in ways that make sense in the online arena. Consequently, OCF prepares teachers to teach successfully online and to be responsive to the changes that are sure to come. Overall, teachers reported frequent use and a high level of confidence in designing online activities that best support teaching and learning.

The use of OCF as a tool that assists academics in curriculum reform (p. 57; p. 146). Transformational leaders are able to use and apply the integration of ICT through OCF and to provide both teachers and students with needed resources to a fruitful collaboration. In sociology researchers propose that the roles of theory are to enable prediction and explanation of behaviour; to be useful in theoretical advance; useable in practical applications; and guide research on behaviour (Koschmann, 1996). Therefore, OCF explores the academics' behaviour towards using ICT in teaching and learning and assists leaders to better apply technology in curriculum. This study has identified both support and challenges for developing and implementing an OCF. This could help decision-makers (leaders) evaluate the feasibility of choosing an OCF as a resource to assist teacher with online teaching and evaluate the effectiveness of OCF in curriculum reform.

The effectiveness of OCF's role in managing curricula (p. 57; p. 147). In order to examine the extent to which this thesis can support curriculum change, the role of ICT in HE is assessed by evaluating the developed online curriculum framework. The results show that it is important to build in mechanisms and activities to ensure that all

stakeholders (students, teachers and leaders) actually take part at each level of the online opportunities. Therefore OCF is a promising mechanism to manage curricula.

The next section discusses three original contributions to knowledge that this study makes.

2. Original contributions

This study suggests that grounded theory is a practical and effective methodology for promoting effective, long-term use of ICT in education. Such an inquiry-based approach ensures that teachers, students and leaders do not merely give in to the command to use computers and fall into habits of using them as tutors or neutral tools, but collaborate together to deve1op their use as cognitive tools (Palloff and Pratt, 1999; Simonson *et al.*, 2003; Shibley, 2001). Therefore, the first contribution of this study is that this study changes the learners' habit from being passive to combining knowledge, skills and motivation to fulfil their learning needs. Students as learners shift from traditional students to online researchers of knowledge, teachers as learners shifts from traditional educators to online assistant of teaching and learning process, and organisations as learners shift from traditional education institutes to E-universities. In other words, learning by doing behaviour is effectively reinforced (p. 20; Dembo, 2004).

The second contribution of this study is that it generates design knowledge to guide the development of curricula reform in similar contexts (p. 9; p. 42). Two types of design knowledge have been generated, including a set of high-level design guidelines and a methodology for developing similar tools. This section presents these two types of design knowledge.

High-Level design guidelines: this study developed the following design guidelines from the research findings: enhancing the perception that an OCF supports the way academics learn, enhancing perceived usefulness of an OCF, and enhancing the perceived usability of an OCF. Therefore, the goal of constructivist teaching to develop self-directed yet interdependent learners (p. 35; Maier and Warren, 2000) is strengthened. As a result, learners can access and use a wide range of cognitive structures in order to transfer learning to contexts they have yet to encounter (p. 39;

Jonassen, 1991). Participants in this study perceived that an OCF could enable their apprenticeship approach toward teaching, learning and management improvement (p. 107). They envisioned that an OCF could help academics share their experiential knowledge, which could be available anytime anywhere and most importantly through easy-to-navigate interface (Appendix H). Hence, OCF creates a new competitive environment to respond effectively to emerging needs. For example, a toolbox was incorporated into the design to facilitate the navigation of the tool and to augment the perception of an online learning community (Barab *et al.*, 2001).

A methodology for developing an online curriculum framework: A methodology for developing an online curriculum framework has evolved from this study. This methodology consists of three components: development research, rapid prototyping, and qualitative methods. Development research describes the nature of this methodology (Reeves *et al.*, 2004); rapid prototyping frames the development and research process (Fisher and Jeong, 2003); qualitative methods may guide data gathering and analysis.

At the conceptualization stage, the researcher identified the research problem and research questions (p. 9). Then, the researcher of this study synthesized a problem solution from the literature and developed this solution into the conceptual models of task, content, and the needed features to allow academics adapt themselves to the continuous change in the knowledge economy and globalization (p. 14). During the development phase, the researcher implemented the conceptual models in a prototype (OCF) and addressed a variety of issues involved in prototype development (p. 83). At the research phase, the researcher conducted a pilot and then a formal study to answer the research questions (p. 57) and identify future research and development issues. The effective implementation of the grounded theory approach is reinforced through the formation of OCF (p. 10; Corbin and Strauss, 1990). This study may serve as a working model to guide prototype development and research in future efforts to build up online curriculum framework. This study shows that quantitative methods may also be appropriate in development research depending on the research issues addressed in individual studies. For example, the qualitative findings from this study may need to be quantified, and quantitative methods may be needed in future research (Van den Akker, 1999).

The third contribution of this study is that it is combined with the theories and research in several related areas, including challenges of using technology and software, changes in curriculum development and professional development, and changes in the relationship between students and teachers, and supports additional research into online education.

Implications for decision makers: The first purpose of this study is to identify the initial support for or evidence against an OCF so that researchers and stakeholders of curriculum designer may use the findings to help them determine whether to pursue an OCF as a curriculum development and assessment solution. This purpose has been fulfilled. Students, teachers and leaders enthusiastically use this tool. They believed that OCF gave them the opportunity to offer fresh insights into university leadership (p. 127; Spillane *et al.*, 2006). Within this context, leadership is distributed across different academics (p. 7; p. 22; Mangin, 2004; McAlpine and Jackson, 2000). Moreover, teachers and leaders, like decision makers, are also concerned to take a holistic approach to curriculum improvement by the development of informed practice (Dimmock, 2000).

Support for an OCF: The results of the study provide support for an OCF. The underlying concept of an OCF appealed to all academic participants (students, teacher, and leaders), because it matches teacher's apprenticeship approach to learning how to teach online, it encourages students to become lifelong learners, and it goes with leaders' approach to managing how to design. Compared to traditional curriculum development, OCF has the following advantages. First, an OCF provides an environment for curriculum designers to share online teaching experiences, and learning needs. Second, as a Web resource, an OCF is available anytime anywhere. This would be helpful for academic stakeholders who run into a problem and need solutions right at the moment. Third, teacher participants perceived that an OCF could serve as a condensed Blackboard to provide them with all the relevant resources. Rather than going to different tools for different purposes, teacher may come to an OCF to address the different aspects of their needs for online teaching. Therefore, the communication aspect of OCF underpins the importance of connectivism in E-learning environment (p. 40; Siemens, 2005).

Technology and software: As computer hardware becomes increasingly affordable, and as access and quality in remote areas improve, it is likely that some of the tools that are currently difficult to use in an online classroom setting, such as chat, audio, and video, will become more accessible and therefore more usable in an online class (Grabe and Grabe, 2004). Finally, in the area of course and programme development, the gap between higher education and the corporate sector is narrowing as OCF develops degree programmes to encourage the development of the knowledge workers by involving students. Consequently, students' competence is reinforced by their commitment (p. 40; Shneiderman *et al.*, 1995), since it is easier to commit to a cause if one feels that he/she can make a real contribution.

Professional development: How does an instructor successfully make the transition required to teach an online course so that students become empowered learners and take charge of the learning process? There will still be room for those who choose to teach in the classroom along with those who choose to teach online. However, Posner (2005, p. 21) states that if you merely "do [a] field experience without thinking deeply about it, if you merely allow your experiences to wash over you without savouring and examining them for their significance, then your growth will be greatly limited." Thus, while the majority of technology uses were not transformational in nature, teachers' experiences of using OCF enabled them to use technology in efficient ways (Garrison and Anderson, 2003) before implementing their experiences into their own classrooms. As a result, teachers' professional development fortifies the effective implementation of the constructivist approach (p. 20; p. 39; Kolb and Kolb, 2003a; Ormrod, 2003). Thus, in this study, professional development for teachers requires building understanding and ability for lifelong learning and developing activities to provide opportunities to learn and to use the skills of research to generate new knowledge.

How teacher and students interact: During this study, the researcher observed that the changed relationship between teacher and student in the online classroom is spilling over into the face-to-face classroom as teacher discover that active learning techniques work well there. Similarly, teachers who have historically made good use of active learning techniques face-to-face are finding that their transition to online learning is eased using those techniques. Thus, teachers succeeded in involving students in meaningful ways both in and beyond the classroom. So, student leadership development

is emphasized. It is providing opportunities for students to demonstrate their talents, skills, and interests while continuing to develop new skills (Sacerdote, 2003). It is also about giving students more ownership of the programs they attend. At the same time, OCF cultivates leadership among teachers. Teachers' leadership is revealed when a teacher has an online expertise to bring that can help other teachers- help their students achieve (p. 35; Gronn, 2000).

Research into online education: This OCF tries to avoid major weaknesses noted in previous research such as failure to consider how or if technology integration influenced student learning. An increased focus on student learning through teacher inquiry is the most noticeable improvement from the data presented in this study. This process enabled students to explore, rather than focus on, logistics and classroom management issues while simultaneously considering the complexities of teaching. Therefore, technology raises a new research trend that is research in online education (Duderstadt, 1999).

3. Limitations of this study

As with all research, there are several limitations to this study. These include sampling limitations and limitations on how far we can generalize from these findings. In terms of sampling, all of the respondents in the study were from one institution. Students were ranged in age from 17 to 23 and teachers and leaders were ranged in age from 36 to 47. It is likely that participants at other types of institutions would present a different, possibly broader, range of topics concerning integrating ICT in HE's curricula. Moreover, the results might have been different if participants had been selected from other departments of the university. All participants were either technology-interested (educational technology), or belonged to a technology-based department (CCE, CS). Thus, this sample was one of convenience and is representative as it represents different perspectives of the university student population. However, this sample of participants may not be representative of all academics at other institutions. The sample participants are confident in using electronic surveys. However sampling concerns pertained to the restricted nature of such samples in that respondents must have access to and be comfortable using technology and that such sample would not accurately represent the general population. These sampling limitations also limit generalizability (Beyea, 1997; Lee and Baskerville, 2003). There are also other generalizability limitations. One is that

the data are collected at one large, public, research institution. Therefore, the results are not generalizable to other large, public, research institutions or to other types of institutions.

Computer mediated communications; including electronic mail, the World Wide Web, and interactive programmes will play an ever increasing part in the future of social science research (Rhodes *et al.*, 2003). However, potential limitations are to be taking into considerations to make better use of the online surveys and to ensure credibility of the results (Andrews *et al.*, 2003). Among many potential limitations this study identifies the following: (1) low response rate, (2) the expense of going online, (3) trust, security, confidentiality and authentication, (4) lack of body language, and (5) human limitations.

Online surveys often result in low response rates, thereby creating the risk of drawing conclusions based on inadequate sample sizes. In this study, the researcher had faced difficulty with following up with interviewees. A reminder mail is used to increase responses to mail surveys. This approach of improving responses rate is beneficial in this study as all participants have full access to the Internet. However, participant access to and use of university e-mail services is varied and uneven. Some participants frequently use university-based online services for e-mail; others do not use it at all; and others are not interested in the study.

There are usually cost and expertise limitations to collect information. A number of online tools and services exist to make it easier and less costly to do surveys (Couper, 2000; Llieva *et al.*, 2002). In this study, the technology provides an inexpensive mechanism for conducting surveys online. All the participants have free access to the Internet which may be expensive in different environment (i.e. universities with limited budget). Moreover, the flexibility of the Internet and the ease with which false identities are created on the Internet intensify trust and confidentiality issues according to Cho and LaRose (1999) and can make survey results unreliable. In this study, the interviewer introduces herself, provides brief information about her professional status/credentials and she uses her university e-mail and accesses participants' university email. The lack of anonymity helps the interviewer to establish trust. The

interviewer guarantees confidentiality by confirming to participants that no one will see their personal data or know they were subjects in the study.

The greatest challenge that online communicators report is construction of what they consider to be a satisfactory or authentic identity in cyberspace. Even though sample is clearly defined and authenticated, the researcher had used a login name and a password to control for sampling error (i.e a student may pretend being a teacher) and establish credible samples (Bowers, 1999; Bradley, 1999; Dillman, 2000). Besides, a researcher does not know for certain whether the recipient of the mailed survey is the person who actually completes and returns it (Schmidt, 1997; Shannon *et al.*, 2002).

In this study the researcher informed the participants that a secure server is used for the research with no additional protection (such as encryption methods) of participants' privacy. Therefore, ensuring privacy and security of information in research conducted online is a difficult and complex issue (Wright, 2005). For mitigating privacy issues that may help build a trusting, quality relationship between the participants and the researcher, the researcher sent email message accompanied information regarding: the purpose of the study, a request for their participation, the limited confidentiality levels that are available for electronic media, informed consent, and issues of debriefing. The researcher follows-up to obtain consent.

In e-mail interviews, the interviewer will not be able to read facial expressions and body language, to make eye contact, or to hear voice tones of the participants. As a result, it is possible that some important visual or nonverbal cues are missed online that would be observed during face-to-face data collection (Selwyn and Robson, 1998). The appropriate body language and facial expression do not only aid in understanding meaning but are part of the message itself. The researcher uses follow-up emails to clarify some issues in participants' answers.

The online survey may contain human limitations. Such limitations can be improved by removing obstacles to comprehension, OCF usability testing shows that user-interface design can be improved by paying attention to human limitations and expectations and that with the availability of web surveys, an e-mail survey is outdated. The features of the web survey (cost, speed, no interviewer bias) make it a better mode than e-mail

interview for self-administered surveys in e-mail interviews, the researcher has faced some difficulties of following a discussion thread. Some participants' emails were not always sequenced chronologically (Palme, 1999; An and Frick, 2006).

The long-term success of online research in the end will ultimately depend on the quality and credibility of the information that it generates (Bampton and Cowton, 2002). Illingworth (2001) suggests that researchers should avoid the use of the Internet as an "easy option" and "…encourage a more developed focus on …who is being researched, what is being researched and why." Despite these limitations, Comley (1996) and Coomber (1997) have suggested that the Internet is most suitable as a methodological tool in cases such as this, when researching a particular group of Internet users. This model (OCF) is defined at the conceptual level and it has been selected based on one university in Lebanon. Therefore, current discussions on the similarities and differences between the current model and existing models are based on specific value. Further research may be needed to validate this model and to understand its relationship with other models.

4. Recommendations

This study provides the initial evidence to support the use of an OCF as an online teaching resource and lists many challenges involved in developing and implementing this solution. It presents a set of high-level design guidelines and a methodology on how to develop such a tool. However, as discussed in the limitations of this study, the findings from this study are not generalizable due to the fact that one university is studied. Therefore, a larger investigation needs to be undertaken across different universities to determine whether the findings of this study do, in fact, hold. Specific recommendations for further research, development and practice are discussed below.

4.1 Recommendations for future research

It appears from the findings of this study that students' role is efficient at the organisational level with teaching and learning with ICT. Moreover, it appears that the aim of teachers is to design and develop an online course that will continually evolve and never become institutionalized. In the discussion of findings in this study, I have alluded to the possibility that teaching and learning with ICT eventually become integrated within the individual student. However, since this notion is based on the

perceptions of only twenty-two teachers it needs to be explored with a wider range of participants at different levels of ICT integration in order to determine whether a similar phenomenon occurs.

For the teachers in this study sustainability of ICT integration implies that ICT integration is not stagnant, but instead is continually evolving. While this notion was consistently referred to by all of the teachers in this study, it is something that also needs to be explored with a larger number of participants in all types of higher educational institutions. This notion of continual evolution may be time dependent as well. That is, teaching and learning using technology that have been recently implemented may initially go through more evolution than those that have been in place for a longer period. Therefore, an investigation that is not only focused on the teachers but the technologies tools themselves needs to be undertaken.

Finally, there were issues that surfaced during this research that were beyond the scope of the study and do require further investigation. These recurrent themes included: Issues of ICT adoption such as building the user interface and determining the strategies for building the community and managing the tool; frequency of occurrence of teaching and learning technology's tools; organisational structure; and the differences between ICT integration and change. I believe that each one of these themes presents a study in itself in order to not only, better understand teaching and learning in higher education but also, to aid universities and technologies' units in developing mechanisms to support students, teachers and leaders in their endeavours.

4.2 Recommendations for future development

There is a need for a model that draws on the views of students, teachers and leaders. The model is built upon the assumption that OCF is used as a starting model to assess students' needs and teachers' ability to integrate technology into the curriculum such as having both technology skills and pedagogical strategies. These assessments can be done manually but OCF is fast and easy. It attempts to evaluate teachers' professional experience, insights, and beliefs, and build upon them while adding their own knowledge and skills in the particular arena of technology infusion.

A model of the relationship between conceptual elements and processes of integrating ICT in curriculum using OCF is suggested to use technology wisely is based on three

dimensions (Figure 8.2). The first dimension in developing a learner-centred system of web-based instruction is to determine the teachers' needs to select appropriate technology and instructional strategies to develop an online learning environment that is appropriate, responsive, and beneficial for the learner, the teacher, and the leader. Knowing the teachers' needs based on the findings in chapter 6 (p. 104-105; p. 117) is of the same importance as knowing student needs. Then, the teacher and/or leader is required to be committed to adapting and modifying instructional strategies to match the needs of both the learner and the teacher. Therefore, the co-evolution process is supported through the engagement (p. 40; p. 46; Kearsley and Shneiderman, 1998). Anderson (2004) suggests, "developing quality education systems requires that educators have a deep understanding of how individuals and groups of students learn" (p. 239). Thus, the first dimension is related to teachers' skills for enhancement.

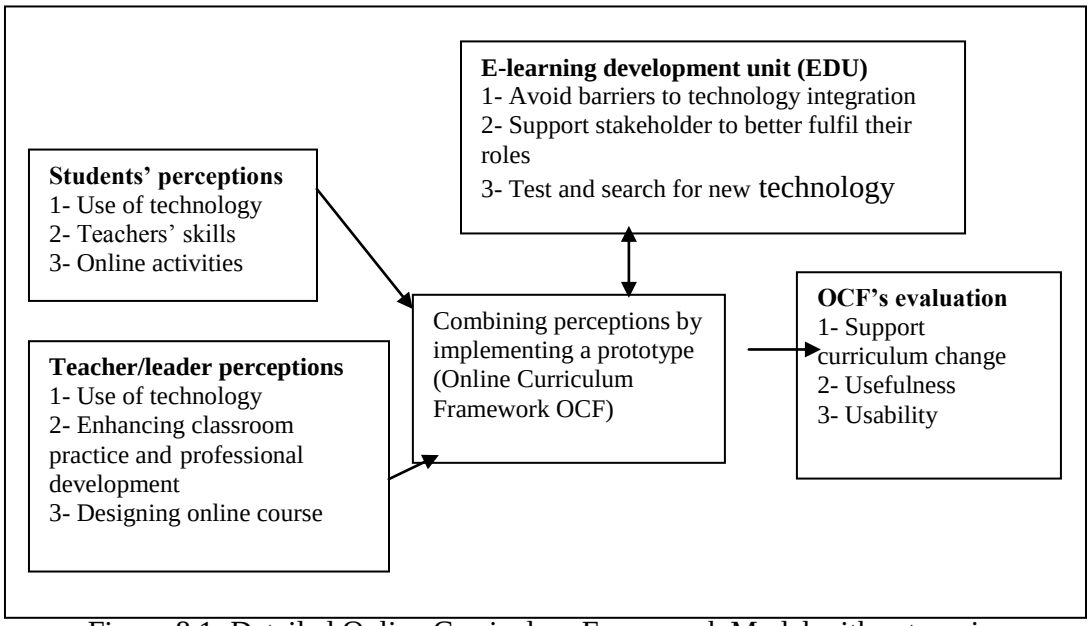


Figure 8.1: Detailed Online Curriculum Framework Model with categories

To become fully literate in today's world, students must become proficient in the literacies of ICT (Sutherland-Smith, 2002). The second dimension, represented by students' perceptions (Figure 8.1), is related to students' adaptation to technology-based environment (p. 19) by identifying necessary online activities and outlining a process for assessing student needs. Assessing student learning styles can be a valuable tool in planning course activities that complement student learning needs based on the findings in chapter 6 (p. 106). The engagement theory is imposed as students are meaningfully engaged in learning activities through interaction with others and worthwhile tasks (p.

40; Kearsley and Ben Shneiderman, 1998). Understanding of the student's learning style, enabling the student to perceive the curriculum as relevant to their learning needs, developing students' independence and interdependence as efficient as motivated learners represent the student's dimension in integrating ICT in the curriculum (p. 45).

The third dimension depends on the changing role of technology throughout the development of the model. Since technology is just one ingredient within educational institution reform efforts, it must be integrated into larger instructional and curricular frameworks (Yoder, 1999). Core principles of technology integration included viewing technology as a tool for reengaging students and teachers in the learning process by helping in making it relevant. The role of technology in the theory is to facilitate all aspects of engagement (p. 40; Anderson, 2004). In addition, technology is deemed most powerful when utilized to support student inquiry, collaboration, composition, and communication. Thus, technology plays positive role in human interaction and evolution (p. 46; Siemens, 2005).

4.2.1 The 3D-E-learning model

The factors and their relative categories discussed in chapter 6 lead to the three dimensions (students, teachers, and technology) discussed in the previous section. Therefore, a three dimensional E-learning model capable of integrating ICT into HE at a slow pace but in a secure way, is generated. In fact, based on their own perceptions, leaders need a certain period of time to develop their transformational skills such as collaboration, self-knowledge, and empathy, teachers need time to enhance their leadership and online teaching skills (p. 112) and students need time to improve their lifelong learning skills (p. 101). In this context, the constructivist approach ensures the smoothness of the transitions by helping academics in building their knowledge. As a result, the 3D-E-learning model is developed based on the students' engagement, teachers' competencies, and on the suitability and appropriateness of the technology for achieving a good quality of the learning experience through collaborative activities. The 3D-E-learning model provides a stimulating of leadership-centred learning activities. It allows the participant to engage in active learning and enquiry through a process of problem solving, implementation, evaluation and feedback.

3D-E-learning model assumes that before that can be achieved, three prior goals have to be met: teachers' knowledge, skill, confidence, motivation, and beliefs regarding technology integration must be heightened; university-level capacity to carry out this integration must be enhanced by the administration providing effective technology; and teachers adding value to instruction through the thoughtful integration of technology in the classroom.

In the 3D-E-learning model, there is a need for an E-learning development unit (EDU) (Figure 8.2),which meets the technological infrastructure by creating an inclusive team to develop policies and plans for the institution regarding online courses and programs, by making incentives available to faculty for course development, including release time, reduced teaching load, and grants, by providing adequate technical support and training to faculty and students. The EDU team (leaders, teachers, technologists and decision makers) can sustain improvement by generating the capacity for development through distributing leadership throughout the university and by equipping teachers to lead innovation and development (Gonn, 2000; Harris and Muijs, 2002; p 35). Moreover, the EDU team can shape culture (the ways of thinking, speaking and interacting) by reshaping the culture of the university. Consequently, the skill, determination and tenure of the EDU team, and increasingly, the recognized urgency for the university, or the EDU team, to change in order to thrive or survive influence the power of the culture to change the EDU team and vice versa.

Teachers not only need to know how to use the technology but also need to be able to explore new teaching methods and techniques (Bruening *et al.*, 2001). Students need to understand the technology in use and how to learn in the online environment. Plans should be fluid enough to allow for inclusion of technological developments as they occur and not just limited to what is available at the time the plan is conceived. One of the tasks that the E-learning development unit fulfils is the cycle of continuous improvement through continuous evaluation of the model's effectiveness at each level of implementation. The evaluation contributes to identifying areas of the content that are unclear, confusing, or otherwise not helpful; areas of the content that have the highest priority for revision because they are most critical aspects, or most difficult to learn, or likely to have the greatest impact on learning; and to providing a rationale and evidence in support of making specific revisions.

Level I: 3D-E-learning model

The practical implementation of the 3D-E-learning model has to be achieved in three levels expandable in the future. The first level of the 3D-E-learning starts by implementing OCF, then by defining the emergent themes of the university in the study, and by identifying the E-learning development unit. At this level the student's role is assumed to be passive, the teacher's role is authoritarian (teacher-centred approach) and the technology resources to be somehow limited. This level (Figure 8.3) is involved in establishing a preliminary relationship between students, teachers and technology. In this study, the students' engagement and teachers' positive attitude towards technology as well as choosing the suitable technology to enhance teaching and learning are the basic pillars of this level. Students' themes found in chapter 6 emphasize collaboration, use of technology and most importantly teachers' attitudes which influence students' engagement. Teachers' themes found in chapter 6 (p. 112) emphasize that technical resources availability and teachers' training can enhance teachers' attitudes towards using ICT in teaching.

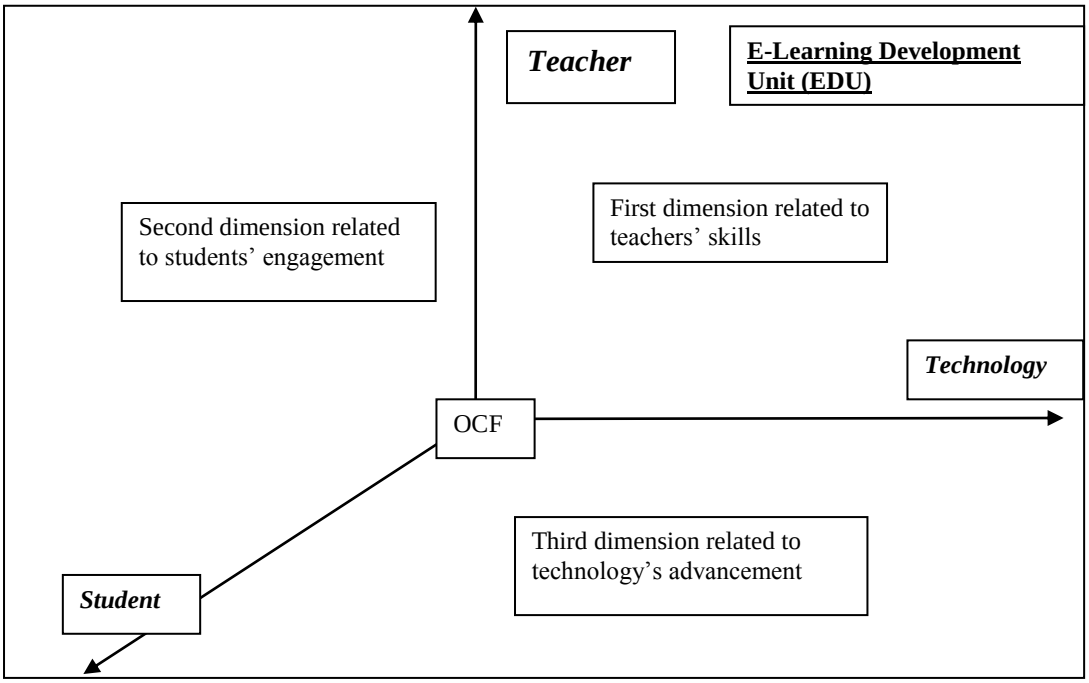


Figure 8.2: 3D-E-learning model – Dimensions

Note: The arrows represent the possibility of a continuous expansion of each dimension (more than 3 levels).

Teachers are likely to view the potential of technology for their classrooms very differently. Some "educators may be making more progress in providing access to

technology than in figuring out how to use it as a learning tool" (Doherty and Orlofsky, 2001, p. 45). Other teachers as advocators for education reform provide one perspective on how technology should be used and on what technology skills should be developed. It is important to recognize that the availability of equipment does not determine whether students actually work with the equipment (Meyer and Avery, 2001).

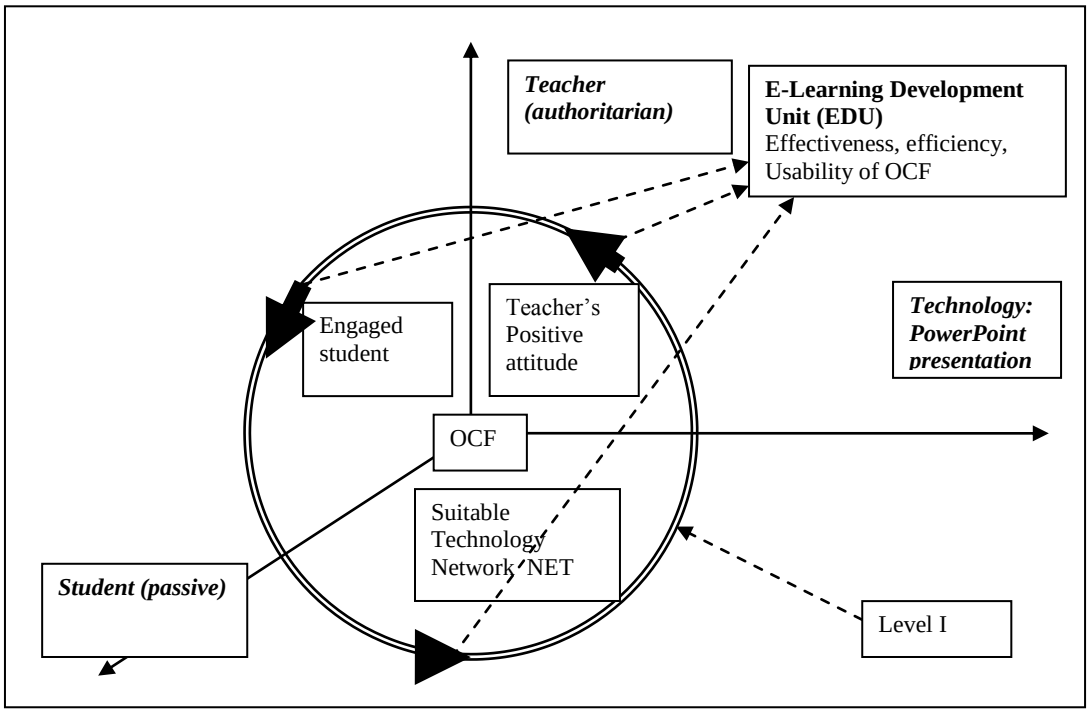


Figure 8.3: 3D-E-learning model – Level I

Note: The bold arrows on the level (circle) mean that E-learning development unit keeps on using assessment to ensure the security of the transformation of the 3D-E-learning model.

Activities are consistent with the goal of developing learners who have the need to store information, but who must also be more capable of processing information to construct useful, personal knowledge. Thus, teachers will need new skills to help students achieve this goal. There will be due emphasis on presenting information, but also a greater need to model and encourage skills involved in decision-making and problem-solving. Cuban (2001) states that the use of technology will gradually increase. However, the applications that will become common will be consistent with long-standing methods of teaching and learning. Technology makes some traditional educational goals obsolete, and teachers will move towards more constructivist practices, emphasizing active learning and students' construction of personal meaning.

In brief, engagement theory, with its roots in situated learning and social constructivism (p. 39; Jonassen, 1991), offers a useful framework for designing the first level of the 3D-E-learning model.

Level II: 3D-E-learning model

At this level the student's role is assumed to be active, the teacher's role is more consultant that of than of deliverer of knowledge and the technology resources are assumed to be more useful. This level (Figure 8.4) is involved in establishing an average-based relationship between students, teachers and technology. In this study, the students' motivation and ability and teachers' professional development and enhancement of their classroom practices in using technology (p. 107) represent the pillars of this level.

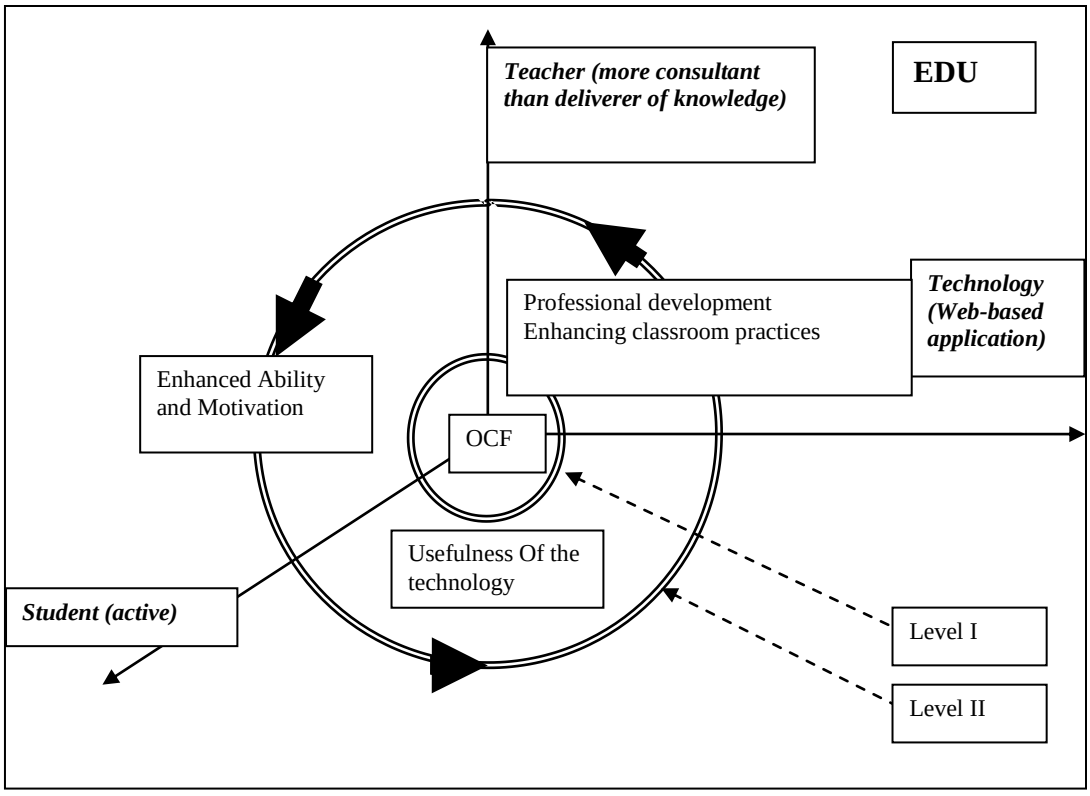


Figure 8.4: 3D-E-learning model – Level II

A learner-centred approach is shifting the focus on university campuses from teaching to learning (Huba and Freed, 2000; Barr and Tagg, 1995). In effect, knowledge is no longer transmitted, but is constructed by students through inquiry, synthesis, critical thinking, problem solving, and communication (Jonassen, 2000). Stated another way, the goal is to use, communicate and construct knowledge, not simply acquire it. The

information to be learned was not presented to students in some kind of final, distilled form. Students had to dig for what they learned. They had to pull together bits and pieces of information from several sources, gather data, generate personal interpretations and summaries, and make decisions. At the same time, the teacher's role shifts from deliverer of knowledge to consultant of learning. Instructors no longer are providers or evaluators of all knowledge, but are coaches within the learning environment. For example, they assist their students with challenging projects in which the students themselves gather information and develop the concepts needed to complete the task. Computer tools are most effective when used directly by students in their learning processes, not in the hands of the teachers who "do technology" for their students (Dodgson *et al.*, 2005). Students need to realize that the online learning process occurs, for the most part, through the formation of a learning community and is reflective in nature.

Teachers' professional development programs generally emphasize contextualized learning to their classroom needs. Without assistance and preplanning, many teachers would waste valuable time (Stein *et al.*, 1999). As Brown (2001) points out, instructors in technology training workshops usually have little patience for theory and find those that focus solely on unique aspects of particular application software too trivial. Instead, he has found most success when focusing on common factors underlying teaching strategies and methods related to technology integration proven effective by other instructors (Brown, 2000).

The technology tools available to the instructor to enhance and create interactivity are varied (Liaw and Huang, 2000). Boettcher and Conrad (1999) have determined that there are two types of courseware packages available: those designed only for web-based instruction and those that are considered course-management tools. The packages designed for instruction offer the ability to design, develop, and deliver a web-based course. Course management packages make it possible to link to the university's administrative functions. In this study, OCF is currently being developed through levels that would link any instructional tool to administrative functions.

In brief, connectivism and distributed leadership, with emphasis on actuating known knowledge at the point of application (p. 35; p. 40) forward a structure for designing the second level of the 3D-E-learning model.

Level III: 3D-E-learning model

At this level the student's role is assumed to be that of lifelong learner, the teacher's role becomes online that of facilitator of learning and the technology resources are assumed to be more web-based than simple use of power point applications. This level (Figure 8.5) is involved in establishing a professional-based relationship between students, teachers and technology. In this study, the students' practical expertise and teachers' ability to design online courses represent the pillars of this level whereas equity in access and security are somehow ensured (p. 76; p. 145). In this study teachers take on facilitative roles to guide student inquiry (p. 48). Student knowledge building is balanced with guided practice and direct instruction. From this learning perspective, new competencies include the ability to recognize problems, collaborate, acquire and use large amounts of information (Quinn, 2005). Reflection, as other professional venues, helps teachers gain insights into the professional development process, thereby improving effectiveness of practice in the classroom (Hawkes and Romiszowski, 2001). The teacher's role changes to one of guide and facilitator who assists learners in achieving their learning goals (Newby *et al.*, 2006) and helping them implement thoughtful and effective ways to use technology in learning activities.

Technology is partially responsible for some of the need for educational institutions' re-form (Smith *et al.*, 2004). Information and communication technologies have helped to create new types of jobs and demands for new skills, which have led educational critics to ask how educational institutions can be more effective in meeting these needs (Earle, 2002). This level (Figure 8.5) implicates new issues such as equity, access and security (Skilbeck and Connell, 2000; Thornhill, 2002; p. 76). Unfortunately, in Lebanon socioeconomic differences create a gap between those who have access to technology and those who do not. Even though most of the students have computers at home, poorer students cannot afford to pay for an Internet connection. They have fewer opportunities to use computers in creative and open-ended ways; they have access to Internet only at their university. In Lebanon, inequities persist. Wealthier institutions still offer some advantages such as high-speed wireless Internet connection. Moreover,

there are missed opportunities for students needing positive experiences. Even when universities are poor and wealthy neighbourhoods offer the same experiences, the universities are not compensating for large differences in technology opportunities that exist in students' homes. In Lebanon, there is also gender inequity. Boys tended to be more involved with computers, both in university and out, than girls, and girls tended to exhibit less confidence with computers than boys. The evidence is clear from the fact that the number of males is much higher in CCE and CS than in education, where the number of females is 90 % of the students in education. However, teachers and leaders guard against other biases in access to technology, they took care to provide equitable access to all students. Adequate access to these technologies must be provided (Fullan, 1993; Goldenberg and Outsen, 2002; p. 119).

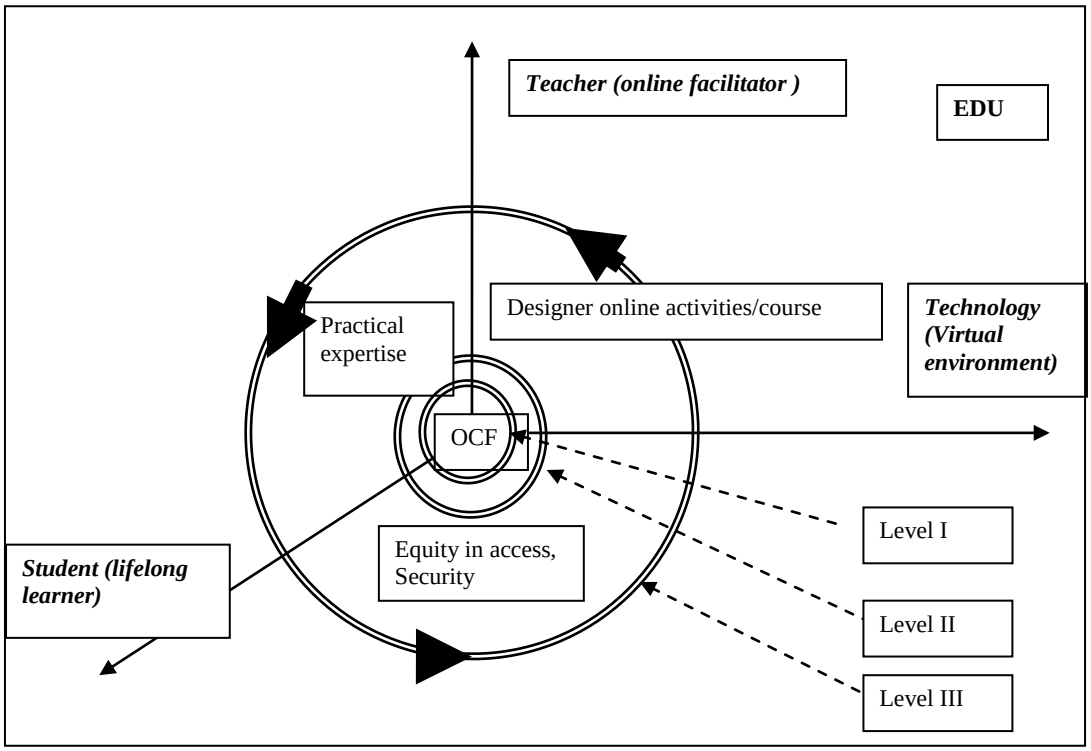


Figure 8.5: 3D-E-learning model – Level III

A good way to ensure accessibility by all students is to keep the design as simple as possible, keep the screen relatively uncluttered, and use consistent page layouts (Casey, 1999; p. 146). To do so, it means to engage in thoughtful planning, keeping learning objectives in mind. My experience continues to tell me that simple course designs making minimal use of technological bells and whistles allow the largest number of users to access and get the most from a course. A course can be aesthetically pleasing even if it does not have complex graphics; learners can and do meet learning objectives

through the use of discussion. I state once again that technology needs to be treated as just another learning tool. Technology is only a vehicle to meet learning objectives. When viewed in this way the needs of the learners are kept primary—which is as it should be in the learner-centred online classroom.

Leaders and teachers are concerned with security issues over the Net. They should control how students access information and what information they access on campus. So, they are urged to develop and implement acceptable use policies regarding the Internet. Unluckily, in Lebanon there is no cyber law to control the use of information on the Net but it is underway. Leaders and teachers have a responsibility to model proper use of instructional technology within the confines of copyright. Teachers must educate their students about illegal software copying. Unfortunately teachers have often been guilty of illegally copying software, often rationalizing that limited university budgets and high software costs make it justified. Most copied softwares are antivirus software. McCullen (2002) addresses another ethical issue related to intellectual property and plagiarism; he said that teachers should show examples to students of intentional and unintentional plagiarism such as copying and pasting data from a website to submit a paper assignment. In OCF, teachers are encouraged to refer to use other colleagues' work as a guide, not as a source of information to be copied and pasted.

To help students in their transition to the online classroom, teachers may provide an online orientation course. It certainly can help to give them a "leg-up" and a clearer understanding of the differences in the type of educational experience they are about to undertake. Some students take to the online classroom easily and successfully. For others, it is a struggle. Some students feel that the online classroom more closely supports their learning style than the face-to-face classroom, particularly if they need time to think and reflect before responding to questions and ideas. Moreover, teachers allows learner to choose from a rich and varied set of choices or possibilities (McKenzie, 2001). Thus, the adult learner takes responsibility for planning, nurturing, and directing his or her own learning experiences. Students and adult learner may enter an online course expecting to be educated by a content expert, just as in a traditional classroom. When they discover that the most profound

learning in an online course comes through interacting with others, they may become confused. The Lebanese culture has led students to believe that education happens through the traditional academic face-to-face lecturing. Nowadays, in the online environment, the teacher acts as a facilitator enabling students to learn collaboratively from one another. For many students, this is a significant shift, and one for which they need to be adequately prepared.

In brief, experiential learning theory and collaboration, with the support of connectivism (p. 20; p. 40) and the latest Internet-related security technology developed so far, propose a frame for designing the third level of the 3D-E-learning model.

Additional levels: 3D-E-learning model

The 3D-E-learning model develops the relationship between the integrative curriculum and the teaching-learning continuum (Lees and Moore, 2003).

The American Association of Higher Education in 1987 published Principles of Good Practice in Undergraduate Education and they are reproduced at the conclusion of the Phipps and Merisotis report (1999, p. 32) as a guide. OCF respects these guidelines by encouraging contact between students and faculty; developing reciprocity and cooperation among students; using active learning techniques; giving prompt feedback; emphasizing time-on-task; communicating high expectations; and respecting diverse talents and ways of learning. These principles encourage interactivity, active learning techniques, and the expectation that the instructor will be present and involved but not controlling the process. With the Principles of Good Practice in mind, OCF draw policy makers' attention to the important topic of faculty training.

The prototype OCF was used as a proof of concepts and to obtain feedback about user (student, teacher, and leader) preferences for content presentation and interface (Shneiderman, 1998b; Ludolph, 1998). This prototype was tested in use with a group of participants drawn from the university under study and data was gathered using online questionnaire. Users were very positive about the overall concept, though not about all aspects of the implementation. Such comments may be used to inform subsequent development. Thus, more levels are likely to emerge in the future, depending on the

changing learning environment, advancement in technology, changing needs and consequently new students', teachers' and leaders' perceptions. The additional levels should also ensure the model's trustworthiness.

4.2.2 The 3D-E-learning model's properties

The 3D-E-Learning model is suggested to be based on a curriculum framework that specifies and organizes the knowledge and skills to be acquired and relates these goals to general instructional processes and assessment techniques (Teitel, 2003; Campoy, 2000). The net result of this analysis is a multi-type indication pertaining to the suitability of the method with respect to the research context. The simplistic structure of the framework permits both extensibility and transferability (p. 83). Additional properties can be derived for the chosen context. In terms of transferability, when viewed from a meta-perspective the framework can be utilised with any qualitative method in any context. In this regard, it is likely that the properties presented in this paper may be applicable to many contexts. It is hoped that development of frameworks of this nature will make qualitative research methods more accessible to the E-learning community at large where the possibilities for stimulating and illuminative qualitative research are endless (Dunican, 2005).

The design is of assistance to academic excellence in a student-centred environment and working together to facilitate the personal growth and professional development of learners, to be on the cutting edge in the use of technologies in teaching and learning, and to that end, to engage in professional development activities to develop academics' skills in integrating 21st century technology into the classroom, to model effective use of technology in their teaching in an effort to provide meaningful, accessible, and realistic learning opportunities for learners, to encourage leaders to assess continuously both their own and others' actions and decisions in teaching and service provision, and to encourage participation in active, exploratory learning. Thus it seems reasonable to conclude that the 3D-E-learning model does qualify as a valid interpretation of problems related to curriculum change.

The 3D-E-learning model uses technology to enhance a learning experience in a meaningful manner and to establish a virtual university; technology integration follows a three-step process: planning the integration, implementing the integration, and

evaluating the integration. Planning is the process of determining the optimal technology to produce an enhanced learning experience based on the specific content, learner, and learning environment. This is the phase that determines what elements should be enhanced, this phase being illustrated in this study by the pre-intervention to determine the content that learners need to learn and teachers can teach and to determine whether the learners are motivated to use technology in learning and whether the teacher's enthusiasm help in increasing learners' motivation and whether students and teachers have background knowledge and experience to go ahead in the change process.

Implementing focuses on the selection and use of one or more types of technology that enhance the manner in which learning occurs. Based on the information about the learners, the teachers and the learning environment, the second phase determines the potential of implementing software to support academic in stepping towards E-learning environment. However, to be able to identify better ways for future implementation, an evaluation process is used to determine the effectiveness of using such an OCF environment as a starting point in a 3-D model of E-learning. This is done in the post-intervention phase in this study. The value of feedback in a desirable tool (OCF) is used for facilitating improvement in curriculum. Evaluation is the way this study uses to illustrate the effectiveness of the tool in decision-making and in stepping towards the virtual university.

The 3D-E-learning model leads to some implications of becoming virtual. From students perspectives the model improves chances to participate in learning activities with other students and improves contacts with teachers. From teacher perspectives the model improves opportunities for collaboration and improves opportunities for research. From institutional perspectives the model increases efficiency in information dissemination and curriculum management. From technologists' perspectives, the model offers new markets, new research questions and new creative opportunities.

The 3D-E-learning model implementers need to be aware of issues related to the use of Internet in the classroom. Copyright laws, security and information privacy are of concern when using the Internet. The 3D-E-learning model respects the security issues as it uses intranet (local network), so information sources are supposed to be accurate

and non-biased. However, participants still need to understand how to judge the quality of websites referred to by the 3D-E-learning model (Herring, 2004; Heide and Stilborne, 2004; p. 127).

Finally, a new effective online learning theory (EOLT) has emerged from this study, which represents the 3D-E-learning model. EOLT presents a modernized model that includes a set of steps (levels) to deal with the multiplicity of learning theories, the online educational tools and the culture change. In short, the implementation of the EOLT theory can best be achieved through a combination of some dominant features over an extended timeframe (Table 8.1).

The EOLT learning theory reinforces a culture-change process by increasing academics' involvement, collaboration, knowledge sharing, and continuous professional development.

Table 8.1 The effective online learning theory

Effective Online Learning Theory	
Level III	Experiential learning theory – Collaboration
Level II	Connectivism – Distributed leadership - Motivation
Level I	Engagement theory - Situated learning - Constructivism

Note: In each level, features are listed from the most dominant factor to the least.

4.3 Recommendations for practice

In addition, this study recommends the use of software to facilitate ICT integration in higher education through the following steps:

1. Establishing E-learning development unit.
2. Focusing on interactivity, not on the content.
3. Changing teachers' and students' roles.
4. Organizing training for both teachers and students.
5. Continuous collecting data process.

The first step is the establishment of an E-learning development unit responsible for choosing a committee to develop a technological infrastructure, of developing a strategic plan of implementation, and of organizing training sessions for all

stakeholders. The E-learning unit tasks are the inclusion in the decision-making process around the adoption and use of technology which can greatly assist faculty in buying into the development and delivery of online courses and programmes; developing clear policies in this area that recognize this work as scholarship and providing compensations or release time can help; providing both administrative and technical support for students and teachers in order to teach and learn online effectively; minimizing teachers fears and resistance by providing good training that focuses on pedagogy and the delivery of courses; developing strategic plan that is focused on technology as well as policies related to course and curriculum development; conducting a realistic market assessment; and supporting faculty teaching online in dealing with course and student issues.

In addition to the E-learning development unit, course development needs to focus on interactivity not on content. When content is delivered in multiple ways, it also addresses different student learning styles and creates a more interesting course overall. However, it is the interaction and connections made in the course that students should remember as the keys to learning in an online course. It is pedagogy and not technology that is critical to the success of an online course.

Moreover, teacher and student roles need to change. Students need to be oriented to their new role and the ways in which learning occurs online. Moreover, what is most important is to encourage teachers to move away from the lecture mode of teaching and toward the use of more active learning approaches.

Thus, teachers and students need training. In order to understand the key lessons of the need for interactivity and the changes in teacher and student roles, both teacher and students need training. Training for both currently focuses on technology. However, that needs to change to a focus on what it takes to teach and learn online successfully.

Finally, this study indicates that academics may have diverse needs and may look for both discipline dependent and independent resources. This would require gathering lot of information to make a 3D-E-learning model more useful. The content gathering may be a complex process but essential to figure out how this tool should be enhanced to

stimulate stakeholders to use this tool and be able to retrieve relevant content to support them in completing their tasks efficiently (Wang *et al.*, 2003a; Wang *et al.*, 2003b).

5. Concluding reflections

5.1 Relevance of Approach

The proportion of Lebanese universities connected to the Internet and expenditure on ICT by universities and the number of computers per classroom are still low. Lebanese government and universities are trying to take the challenge by supporting for the development of new technologies. However, the use of computers is not yet integral into classrooms. How teachers are using the technology depends on their experience and their attitudes. Some teachers are far less comfortable with computers and the Internet than other teachers simply because of the generational transition (Cole, 2004; Quah, 2002). Even for teachers in this study as young as 42 years old, the Internet seems a novelty, whereas for a 10-year-old is a fact of life. High-technology knowledge economy is based on the constant advances in innovation. When Lebanon is compared with many countries, business's ability to stay on the technological frontier is limited but in the process of improvement. This gives some cause for optimism; Lebanon is investing in ICT and in telecommunications. The Internet allows companies opportunities to reach and serve customers more efficiently. Relative to the size of economy, Lebanese companies have been more likely to move forward with technology, and so the researcher notices the formation of new high-tech companies. Future employment growth is likely to increase demand for both higher-skilled and lower-skilled labor. Consequently, the number of graduates in general is of interest, but the number of engineering graduates and science graduates is a good indicator of Lebanon's future potential to innovate at a time of technological and structural change.

More fundamental questions remain: if we had the power to change instructional practice through the introduction of new technologies, what sorts of changes would we really like to see? What can institutions and their faculties expect to see over the next few years, as online learning becomes an even greater part of the academy? Although there are no certain answers to such questions, this study succeeds in exploring the effect of using the technology in learning, from the students' perspective and the effect of using technology in teaching from the teachers' perspectives. This study contributes

to the body of literature in several areas especially concerning the effect of Web supported learning and teaching activities on students', teachers' and leaders' learning adaptability. These effects need to be invested and evaluated in other educational settings.

5.2 Personal reflections

As a computer scientist, I have learned that it is not easy to step into new territory. It is humbling to be new, unsure and a bit on the outside looking in. The fear of failure is greater than anticipated. However, when I was able to understand the importance of the research in which I am engaged, I felt at ease with the pleasure, beauty and responsibility of my thesis, of the contribution to educational knowledge. Consequently, on a personal basis this thesis helped me to become a more sociable person, I used to interact with computers; this thesis enhances my human performance to interact with people. I have learned to behave as an inquirer, not as programmer. I have learned that I can achieve more through and with others than by myself. My research has helped me improve, be accountable for my actions, and shape a professional identity (Connelly and Clandinin, 2000). I have learned to encourage and provide sustained support for the creation of the professional identity of my students. I have increased my influence by allowing people in my world to see how much I care for them and openly articulating my faith in their capacities.

As a teacher, this research has helped me learn new approaches to teaching and learning that benefit every one involved. This research has shown me the value of the close student-teacher interaction from the teacher side and has made me even more exited about my aspirations of being a teacher. I always knew that the individual teacher-student interaction helped me as a student, but I never know how much a teacher can learn and grow and get personally invested in the success of students. I believe that my research is contributing to the development of educational theory. I believe that the curriculum can be a co-creation between students, teachers and leaders as they engage with the wider curriculum and that ICT is a way of bringing them closer to the meanings of their embodied values.

Finally, I have learned much about empowering others, and creating conditions for multiple, reinforcing, sustainable, successes. So what I have learned from all of this is that it is really never too late to realize one's dream.

Appendix A

Online interview schedule (students)

Dear student,

Thank you for participating in this online interview. The aim of this study is to identify the student ICT background and his/her preferred activity for learning a course online.

For the purposes of this survey, ICT (Information and Communications Technology) is defined as:

Any computer-based and communication technologies, networked or standing alone, including both hardware and software, which can be used as teaching, learning and information resources.

Gender	
Department	
Class	

I. General Technology Questions

1- Do you have access AT HOME to

Type of access	Yes	No
Any type of computer	O	O
Access to the Internet	O	O

2- Please provide a general assessment of your basic technology skills. **Choose one for each item.**

Basic skills: You just know how to open a file and close it; you are aware of the possibilities, but you do not know how to use them.
Advanced skills: you are familiar with a variety of uses of this.

	I have advanced skills	**I have basic skills**	**I do not have basic skills**
Computer in general	O	O	O
Word processing program (Word)	O	O	O
Spreadsheet programs (Excel)	O	O	O
Multimedia programs (Power Points)	O	O	O
Database programs (Access)	O	O	O
Graphing Editing programs (Paint, Photoshop, etc)	O	O	O
Internet browsers (e.g., Netscape)	O	O	O
Email programs	O	O	O

3. Please indicate where you go if you have questions regarding using educational technology for your assignment. **Choose all that apply.**

Where do you go whenever you have problems with technology-related questions?	**Choose All you have used**
Instructor who assigned the computer work	O
Friend at university	O
Computer science instructor	O
Other instructors in university who can help	O
Computer Centre of your university	O
Sources outside the university setting (parents, friends)	O
Other , please specify_____	O

4. Of the sources listed in question 3, please indicate the one that has been the most helpful.
Most helpful _____

II- Question about your technology use

5. How your teachers' enthusiasm for Information communications technology (ICT) affects your use of technology in your learning? **Choose one per item.**

Did your teacher's enthusiasm increase…	**To what extent increased?**			
	Not at all or very little	**To some extent**	**A great deal**	**Don't know**
…your overall ability to utilize technology with your assignments	O	O	O	O
…assistance with using computers in general	O	O	O	O
…your motivation in using computers for assignments	O	O	O	O
…your use of computers for communicating with student and/or teachers in working on assignments	O	O	O	O
…your ability to use technology to work collaboratively with other student	O	O	O	O
…your ability to find resources for references	O	O	O	O
…Other, please specify and rate:_____	O	O	O	O

III- Questions about your technology use in learning

6. In your opinion, how well prepared are you to use the Internet for classroom assignments? **Choose one.**

O Not at all prepared
O Somewhat prepared
O Moderately prepared
O Well prepared

7. How often have you used each of these applications as part of assignments or lessons during this university year?
Choose one for each item.

Do you use the following applications to complete assignments?	**How often?**						
	Never	**1-2 times per university year**	**3-5 times per university year**	**About once a month**	**About twice a month**	**About once a week**	**Daily**
Word processing programs (Word)	O	O	O	O	O	O	O
Spreadsheet programs (Excel)	O	O	O	O	O	O	O
Database programs (Access, SQL,Oracle...)	O	O	O	O	O	O	O
Drawing or painting programs	O	O	O	O	O	O	O

IV- Open Questions

8. If you were a chairperson, what would you do to increase the use of technology in each course in the whole major?

_____

9. Give two (or more) ideas

a- On how to **teach** any course online and elaborate on how each point helps you in understanding better the given material?

_____

b- On how to **learn** any course online and elaborate on how each point helps you in understanding better the given material?

_____

10. In your opinion,

a- what are the advantages and disadvantages of using technology in **teaching**?

_____

b- What are the advantages and disadvantages of using technology in **learning**?

_____

Appendix B

Focus group interview schedule (teachers/ leaders)

Dear Colleague,

Thank you for your co-operation in this study. The aim of this study is to identify the needs and priorities of teachers in relation to the use of Information and Communication Technology (ICT).

It is anticipated that the outcomes of this study will influence future policy and teacher's development of online activities to support classroom teaching, particularly curricular design. Ultimately it is hoped that the information gathered in this study will ensure that ICT is used effectively to enhance the teaching and learning experience of students in an English-language private Lebanese university.

Your support in this study is appreciated. Completing this survey will help in identifying the issues which teachers themselves consider important in making the best educational use of ICT. All responses will be treated as confidential and no individual will be named in the reporting of results.

For the purposes of this survey, ICT (Information and Communications Technology) is defined as:

Any computer-based and communication technologies, networked or standing alone, including both hardware and software, which can be used as teaching, learning and information resources.

The survey is based on teacher's experience of ICT in two different contexts:
1. **Classroom practice,** e.g using ICT to support teaching in the classroom
2. **Professional development,** e.g networking with other teachers; using software packages for developing professional skills.

Gender	
Department	
Are you head of a Department?	
Age Range	O 25 - 35 O 35 - 45 O 45 - 55 O 55 - 65 O over 65
Experience in teaching	O <= 3 years O > 3 years

1- Do you have access AT HOME to

Type of access	Yes	No
Any type of computer	O	O
Access to the Internet	O	O

2. Please provide a general assessment of your basis technology skills. **Choose one for each item.**

Basic skills: You just know how to open a file and close it; you are aware of the possibilities, but you do not know how to use them.
Advanced skills: you are familiar with a variety of uses of this.

	I have advanced skills	**I have basic skills**	**I do not have basic skills**
Computer in general	O	O	O
Word processing program (Word)	O	O	O
Spreadsheet programs (Excel)	O	O	O
Multimedia programs (Power Points)	O	O	O
Database programs (Access)	O	O	O
Graphing Editing programs (Paint, Photoshop ,etc)	O	O	O
Internet browsers (e.g., Netscape)	O	O	O
Email programs	O	O	O

3. How often do you use the following ICT resources in each of the contexts: classroom practice, professional development?

Please code as follows: **D=Daily W=Weekly M=Monthly T=Termly N=Never**

	Classroom practice				**Professional development**			
	D	**W**	**M**	**T**	**D**	**W**	**M**	**T**
Internet and World Wide Web (WWW)								
E-mail								
Network computer conferencing								
Word-processing								
Databases								
Spreadsheets								
Desk Top Publishing (DTP)								
Digital Scanner								
Educational software packages (externally produced)								
Educational software packages (internally produced)								
CD-ROM information sources e.g Encarta								
On-Line information								

4. a) Are you interested in developing your skills and knowledge in ICT ?

O Yes
O No

b) Please indicate whether you agree or disagree with the following statements

	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Positive					
I am interested in learning more about using ICT.					
I feel I should develop my skills to keep up to date with developments in teaching.					
I really want to know more about developing my skills in ICT.					
Lack of opportunities					
I'm interested but training doesn't seem to be available.					
I'm interested but don't have time.					
I'm interested but don't have access.					
Negative					
I feel ICT training isn't appropriate to my teaching.					
I don't see the need to learn ICT.					
I feel my skills and knowledge in ICT are adequate.					

5. What are your priorities for developing your skills and knowledge in ICT in each of the context below?

Classroom practice	1. 2. 3.
Professional development	1. 2. 3.

6. In your opinion, which content should be in a course online and in which format. **Choose all that apply.**

a-Overview /objectives /goals

O Typed as a text
O PDF file
O Other, please specify_____

b-Syllabus Format

O choose from a template
O Free form
O Other, please specify_____

c-Lecture notes

O List of titles with pdf files
O Grid joined with syllabus
O Other, please specify_____

d-Assignments presentation

O Homework text
O Projects definition with resources and links
O Questions in a pdf files and solution online accessible by a password
O Online test as a multiple choice to assess the student learning
O Other, please specify_____

e- Return Assignments

O By hand
O by email
O by using a submitting online form
O Other, please specify_____

f- Handouts and supports forms

O Tutorial links

O Software and/or pdf files
O Links to other universities' support
O Other, please specify_____

g- Forum

O on chapters' topics
O one forum for the whole material
O the use of Forum is useless
O Other, please specify_____

h- Design

O Simple on one page, easy to access and easy to navigate
O With video and animating using software such as flash…
O Other, please specify_____

7- Teacher's role while using online activities to support teaching in classroom is

O facilitator only (help manipulating the online activities)
O deliverer of material in classroom still very important
O Other, please specify_____

8. If you were a chairperson, what would you do to increase the use of technology in each course in the whole major?

_____

9. Give two (or more) ideas on how to teach any course online and elaborate on how each point helps learners understanding?

_____

10. In your opinion, what are the advantages and disadvantages of using technology in teaching and learning?

_____

Appendix C

Post on-line questionnaire (OCF Evaluation)

Dear Participant,

Thank you for participating in this online questionnaire. The aim of this questionnaire is to evaluate the effectiveness, the efficiency, the usefulness and the usability of the online curriculum framework.

Part one: how this tool supports curriculum change

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1-The OCF is smoothly managed.	O	O	O	O	O
2- I do not need any contacts with management.	O	O	O	O	O
3- Management is flexible, considering different needs of teachers and leaders.	O	O	O	O	O

Part two: usefulness

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
4-The OCF is applicable to students/ teachers/ leaders with various needs in multiple situations.	O	O	O	O	O
5- The OCF is useful for novice users.	O	O	O	O	O
6- The OCF is useful for professional users.	O	O	O	O	O
7- The materials satisfy learner's need.	O	O	O	O	O
8- The materials are compatible with different teachers' capacity.	O	O	O	O	O
9- The materials are relevant to users (students teachers and leaders).	O	O	O	O	O

10- Rate the following from 1 to 4 regarding the situations where OCF is best used

☐ Designing a curriculum

☐ Designing a course

☐ Course delivery

☐ Curriculum change

Part three: usability

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
11- The environment is aesthetically pleasant.	O	O	O	O	O
12- The environment is user friendly.	O	O	O	O	O
13-The OCF is well structured.	O	O	O	O	O
14- I do not need any technical support during the use of OCF.	O	O	O	O	O
15- The ease of access to OCF improves the leaning process by engaging the user.	O	O	O	O	O
16- The ease of navigation of OCF enhances the user's motivation.	O	O	O	O	O
17- The safety over the net is very important in online learning.	O	O	O	O	O

Part four: general perceptions

18- What did you like about the framework?

_____

19- What did you dislike about the framework?

_____

20- Did you feel that the goals of the framework are achieved?

_____

21- Describe the most frustrating problems encountered during the use of OCF.

_____

Appendix D

Novice and experienced online teachers

	Experience		Basic Skills	
	< 3 years	**>=3 years**	**< 1.0**	**>= 1.0**
Novice online teachers	N1		N2	
Experienced online teachers		E1		E2

Online instructors are defined by combining a less-than-three-years' experience of teaching with enough basic skills of technology.

An instructor is a novice online instructor when his/her years of experience are less than three years and the average basic skill is < 1.0 (N1 and N2).

An instructor is an experienced online instructor is when his/her years of experience are greater than three years and the average basic skill is > 1.0 (E1 and E2).

1.0 is the ratio for the sum of "I have advanced skills and basic skills" and "do not have skills"

For example:

	I have advanced skills	**I have basic skills**	**I do not have basic skills**
Computer in general	O	O	**O selected**
Word processing program (Word)	**O selected**	O	O
Spreadsheet programs (Excel)	O	O	**O selected**
Multimedia programs (Power Points)	**O selected**	O	O
Database programs (Access)	O	O	**O selected**
Graphing Editing programs (Paint, Photoshop, etc)	O	**O selected**	O
Internet browsers (e.g., Netscape)	O	O	**O selected**
Email programs	O	O	**O selected**
Total =	**2**	**1**	**5**

Average = (2+1) / 5 =3/5 =0.6 <1.0. This teacher is novice online teacher

Appendix E

Number of sub-topics raised by male and female students (N=71)

Gender			
Topics	Male (46)	Female (25)	Total (71)
Online activities	**10**	**6**	**16 (44.44%)**
Online exams	4	3	7
Virtual teacher	2	0	2
Video conferencing	1	0	1
Tutorials	0	2	2
Wizard exercises	3	1	4
Teachers' skills	**6**	**4**	**10 (27.77%)**
Positive attitudes towards ICT	1	1	2
Ability to online design	2	0	2
Motivation to use ICT	2	2	4
Teachers' training	1	0	1
Collaboration and communications	0	1	1
Students' skills	**1**	**3**	**4 (11.11%)**
Use of software	1	0	1
Apprenticeship	0	2	2
Collaboration and communications	0	1	1
Others (Interface design, leader's decision, career)	**4**	**2**	**6 (16. 6%)**
Easy to navigate /use	1	2	3
Up-to-date decision	1	0	1
Support career	1	0	1
Different level of students	1	0	1
Total	**21 (57.8%)**	**15 (42.2%)**	**36 (100)**
Average / student (21/46)	0.46	0.6	0.5

Appendix F

Computation of value

	Not at all or very little	**To some extent**	**A great deal**	**Don't know**
(Weight for each choice)	***4***	***3***	***2***	***1***
Students' ability	17	2	10	4

A weight of 4 ,3, 2 and 1 is assigned consequently to each choice.

17 is the number of students who selected the choice "not at all or very little" for the students' ability

17+2+10+4 = 33 is the total number of students who answered

Value = (17*4 + 2*3 + 10*2 + 4*1)/33 = 2.97

Appendix G

Distribution of responses regarding the smoothness of OCF

Smoothness	**Students**	**Teachers**	**Totals**
Strongly agree	10	1	11
Agree	30	15	45
Neutral	26	3	29
Disagree	5	3	8
Strongly disagree			
Total	71	22	93

Appendix H

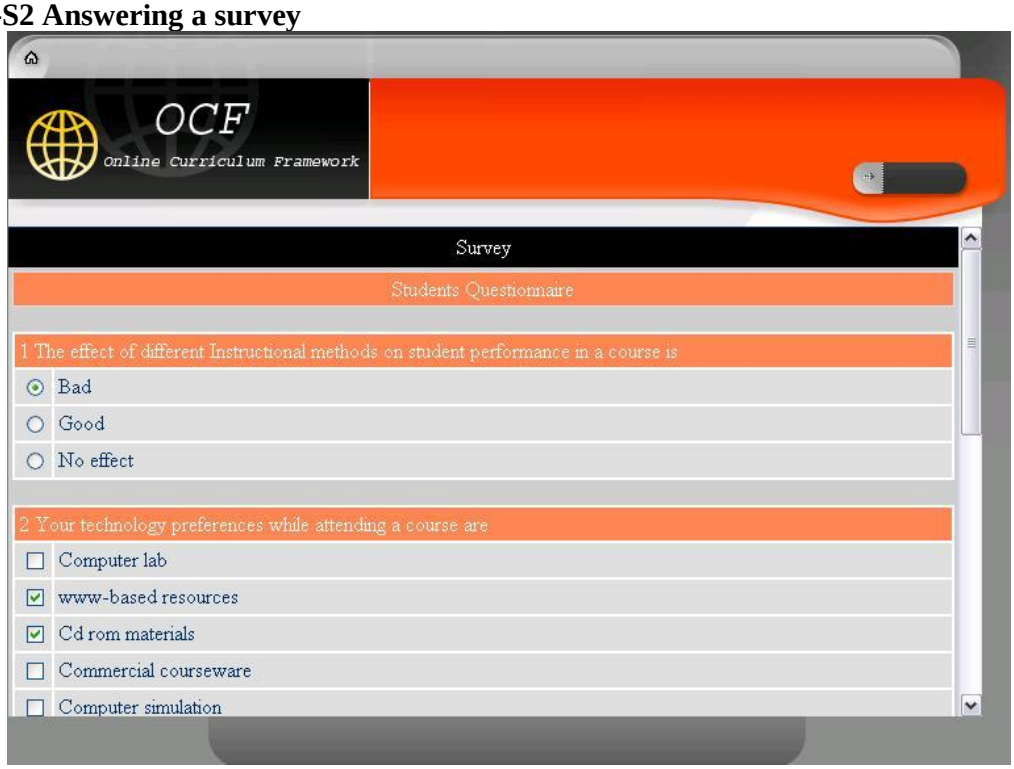
Screen shots

H-L Login screen shot

H-S Students screen shots

H-S1 Accessing online materials

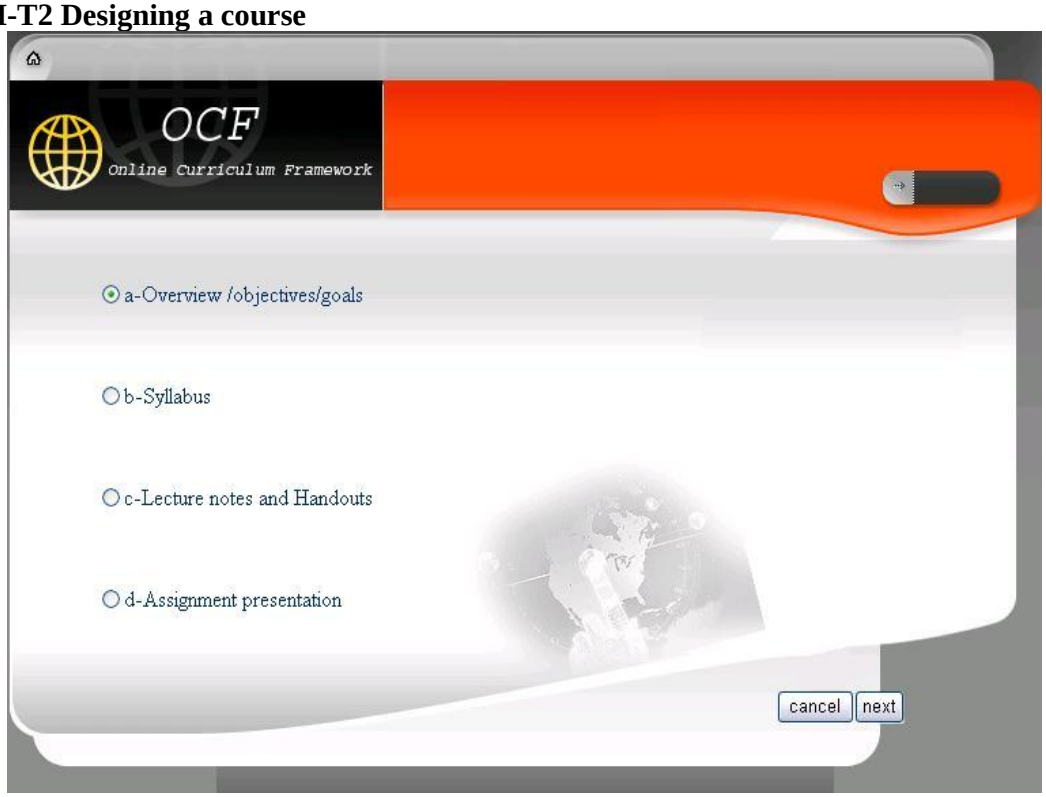
H-S2 Answering a survey



H-T Teachers' screen shots

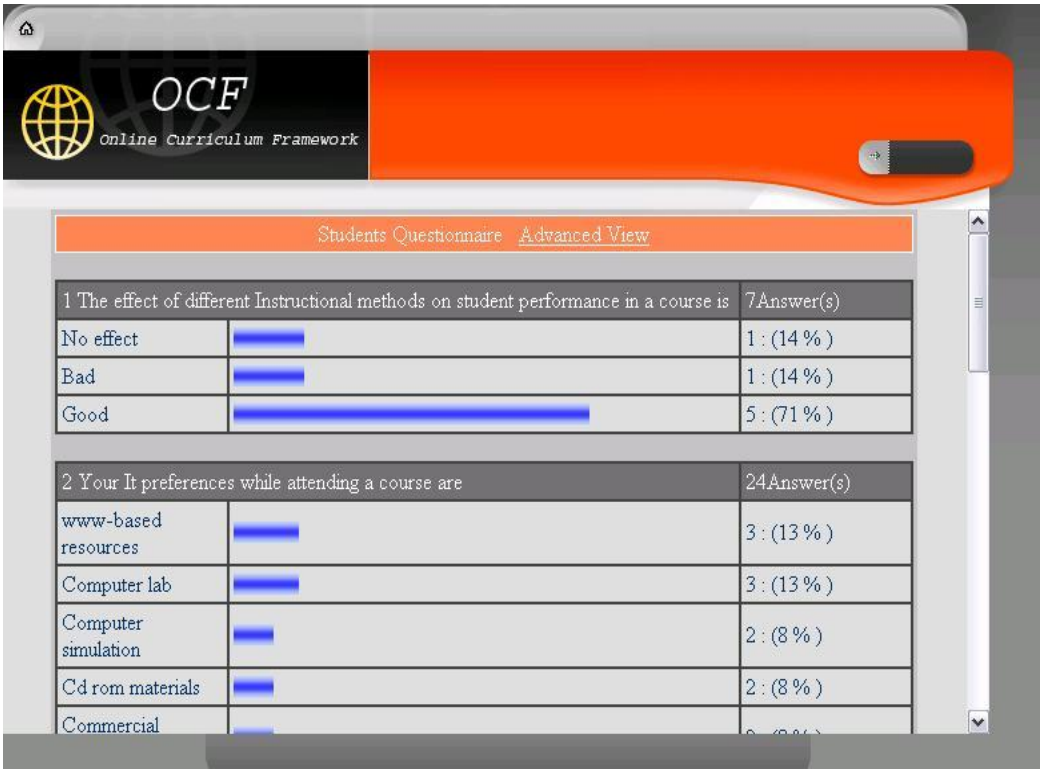
H-T1 Managing courses

H-T2 Designing a course



H-T3 Filling content modules (overview, syllabus, lecture notes..)

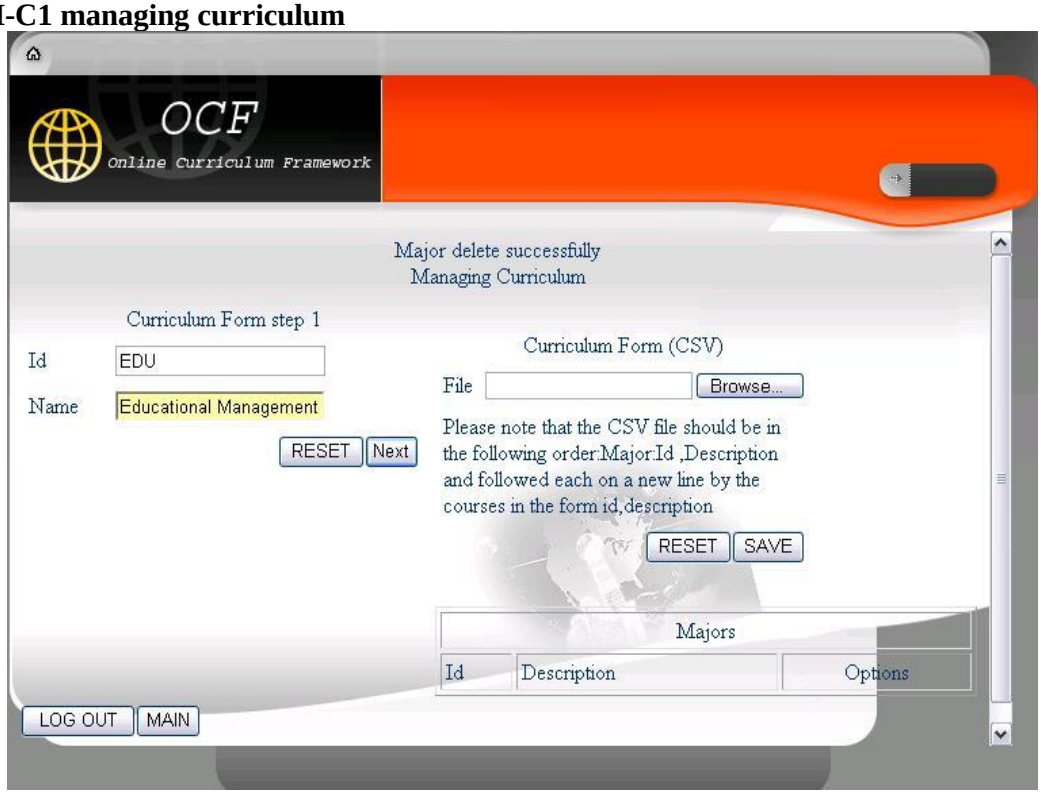
H-T4 View results



H-T5 View results options

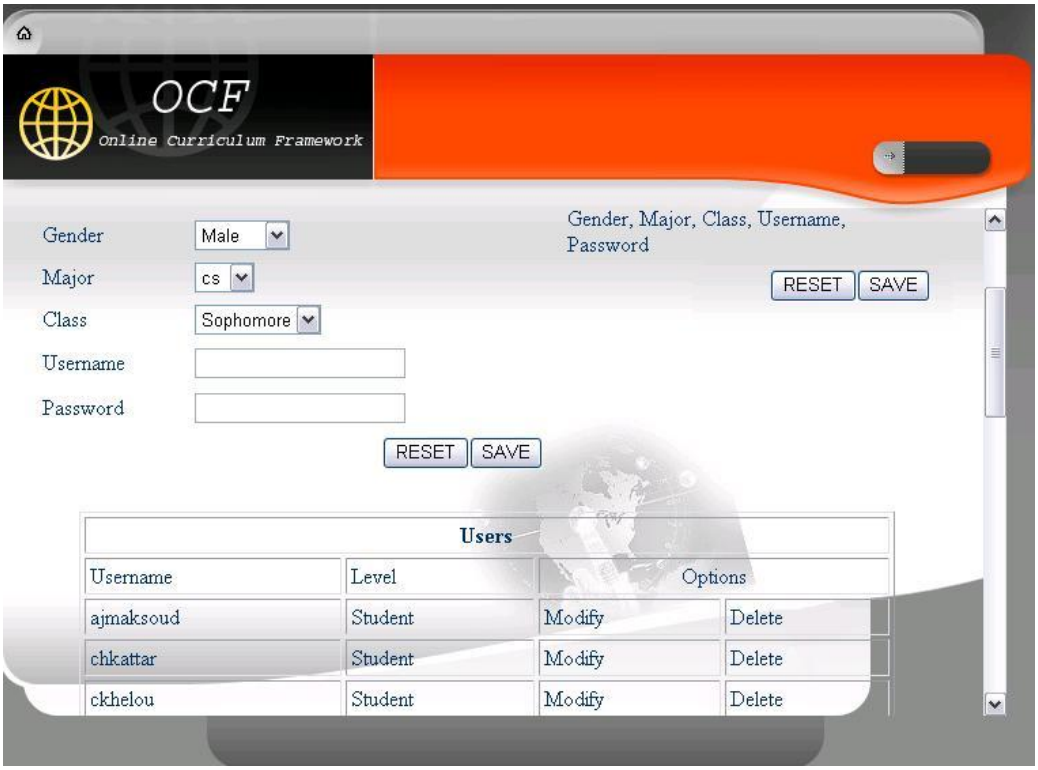
H-C Chairpersons' screen shots

H-C1 managing curriculum



H-C2 managing courses

H-C3 managing students



H-C4 managing surveys

H-C5 managing survey advanced features

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