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ICT Based Education in Pakistan

Master thesis, 15 ECTS, INFM02 in informatics

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Authors: Sheraz Abdul Majeed
Naqash Haidar

Supervisor: Lars Fernebro

Examiners: Odd Steen
Bo Andersson

Abstract

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Authors: Sheraz Abdul Majeed
Naqash Haidar

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Abstract

The use of ICT for education delivery has become a reality both in the developed and the developing world. The purpose of our research work is to find out use and support of Information and Communication Technology (ICT) in Virtual University of Pakistan to deliver distance education. A research framework was developed with the help of literature review of the different approaches of technology use in distance education, hybrid/blended approach and learning management system. By applying qualitative research methods, we conducted five semi-structured interviews on the basis of research framework with the employees of Virtual University of Pakistan to collect empirical data. From this research we came to a conclusion that the integration of ICT with the hybrid model has become a significant factor of the success of Virtual University of Pakistan. ICT supports Virtual University of Pakistan as a tool for enhancement of their teaching and learning process. It also supports as an administrative, interactive, and collaborative tool in the form of a learning management system. It provides the support in the expansion of the learning opportunities provided by Virtual University of Pakistan. And finally it supports to facilitate the students by providing self-directed and learner-centred approach.

Keywords: ICT in Education, Distance education, Hybrid Learning, Learning Management System, Virtual University, Blended learning

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I dedicate this thesis to my beloved family, especially to my elder brother Mr. Tahir Javed. They always encourage and support me in every step of my life.

Sheraz Abdul Majeed
Lund University, Sweden
18th June, 2010.

I dedicate this thesis to my beloved family, friends and all my well wishers. I am thankful to to my parents for their moral support, encouragement and faith to complete this task as well as their prayers for my success. My special thanks to our supervisor Lars Fernebro for his advices, support, valuable feedback and guidance. I believe without the support ofour families, supervisor, interviewees, and friends our research was impossible.

Naqash Haidar
Lund University, Sweden
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1. Introduction

1.1 Background

Education is the driving force for any country's economic and social development (UNESCO, 2009). Hence it is essential for any country to provide affordable, accessible and quality education to all its inhabitants by all means including modern technology like multimedia, streaming videos, intranet, extranet, and internet. ICT based education has gained worldwide acceptance and has been accepted as an important component towards modern learning environment. The use of Information and Communication Technologies has completely changed the meaning of distance education (Minguillon, 2009). This new educational channel has also provided an opportunity for underdevelopment countries like Pakistan to improve their education systems to a certain extent and use it to provide education to their inhabitants.

The revolutionary invention of computer has been successful in penetrating into every facet of our lives and has become a vital part. Therefore it is not possible to be ignorant of computers in educational field just like any other field. Computers and its related technologies have become most useful tools in the educational field. As Information and Communication Technology plays a significant role in field of education. Kim (2009, cited in Ngoma, 2010) defines ICT in education as: "*A comprehensive approach to innovate education systems, methods, and management through Information Communications Technology"* (p.4). Wagner et al. (2005, cited in Ngoma, 2010) described ICT as: *"....currently being used widely to aid education in many developing countries, and it appears that there is increasing demand for their use in education by policymakers and parents in developing countries…*" (p.vii). Being authors to this research essay, this study provides us an opportunity to explore a popular educational institute named as Virtual University of Pakistan that is an ICT based distance education institution.

From the above paragraph we can say that ICT is a powerful tool which need proper implementation to accelerate the improvement in the field of education. Tinio (2009) considers ICT as a tool that can extend the educational opportunities to those who are scattered and living in rural areas and have no access to education due to the following reasons: social, ethnic, gender, disabilities or due to cost or time restrictions. These capabilities of ICT make it of significant importance in the distance education.

1.2 Problem Area

Education has received a lot of attention with the passage of time such as the use of computer in education, teaching and learning matters (Demetriadis et al., 2003). The use of ICT for education delivery has become a reality both in the developed and the under developing countries. Wagner et al. (2005) says computer and technology provides the processing capability and vehicle to commute the instructions to the learner. ICT is currently being introduced as an advancing technology that can significantly improve the access to information and resources and can transform education in ways that were not previously possible. More specifically, ICT provides easy access to learning resources, individualized learning experiences and cover innovative learning tools and resources, which in turn enables learning.

The developing countries are adopting the ICT based distance education systems because of its capabilities of providing very economical education and also its flexibility. Unfortunately, Pakistan was not able to take benefit from ICT in the field of education due to the reasons like poor infrastructure, cultural resistance, and low level of computer literacy. The Government of Pakistan took an initiative in the form of Virtual University of Pakistan which is yet one and only ICT based educational institute in Pakistan. Virtual University of Pakistan has become a popular institute of the country and approached more than sixty cities (Vu.edu.pk, 2010) to provide infrastructural support to the students. The growing number of students in Virtual University of Pakistan become a proving factor of its success and prompts us to make a research. Inspired by the popularity of ICT in educational field, we want to make a research to develop understanding about the use Information and communication technology (ICT) particularly in the field of distance education. In many institutes, delivery of education by using ICT has become popular method in order to deliver education (Siritongthaworn & Krairit, 2006). So we want to see how this technology is improving access to the information and resources in order to transform education in Pakistan. The concept of distance education is not new in Pakistan as institution like Allama Iqbal Open University is there since 1974 (Siddiqui, undated). The only new thing is the methodology adopted by Virtual University of Pakistan to use ICT for more convenient, interactive, efficient distance education. Therefore we like to develop understanding on the subject of ICT use in distance education in Pakistan.

1.3 Research question

By keeping in view the above mentioned problem area, the research question for this study is: How does ICT support the institutions in order to deliver distance education in developing countries?

1.4 Research Objectives

This research is about ICT based distance education delivered by Virtual University of Pakistan. Our objective for this research is to gain specific knowledge about the use of ICT in Virtual University of Pakistan. We want to identify factors with regard to ICT support in Virtual University of Pakistan. Additionally this research can present the overall impact of ICT in distance education to the informatics students and researchers.

1.5 Delimitations

The focus of this study will be on how ICT is used in distance education i.e. specifically in Virtual University of Pakistan and the conceivable benefits of these technologies towards the students will also be discussed. The drawbacks and challenges of ICT based distance education will not be discussed because it will widen the research area and will be difficult to handle this research in the given time and there are possibilities of loosing focus on the main issue that is the support provided by these technologies.

2. Literature Review

In this chapter we start by introducing the paradigm shift in distance education n and then different possibilities and implications of ICT in the field of education will be presented to develop a general understanding about the role of ICT in education. Then different approaches of technology use in education and the hybrid/blended approach from literature review will be discussed in detail. The purpose and the tools provided by learning management system with regard to literature review will also be explained. At the end, on the basis of this literature review we will make a research framework that will guide and help us to complete this research.

2.1 Paradigm shift in distance education (Virtual education)

The defined aim of distance education like any other education is the attainment of knowledge, competency, and skill. The distance education is facing a paradigm shift from guided to interactive education. In the new paradigm the distance education is relying on the use of ICT (Kirschner et al., 1999 cited in Hussain, 2007). Hussain (2007) gives this new paradigm a name of "*Virtual Education*". He states it as a teaching and learning process that is grounded on the active pedagogical principles but have the features of distance education. He states that virtual education is dependent on ICT and is a possible replacement of the conventional systems as it is capable of handling large number of students and provides flexibility and experience with the modern technologies. So this paradigm has become a form of distance education which can deliver education to the lengths and breadth of a country with the help of ICT. In many institutes, delivery of education by using ICT has become popular method in order to deliver education (Siritongthaworn & Krairit, 2006). As mentioned before in Section 1.2, many higher education institutes are delivering ICT based education and argued that it is a flexible approach in enhancing learning effectiveness (Bose, 2003).

2.2 ICT in Education

Tinio (2009, p.4) describes ICT as a "*diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. These technologies include computers, the Internet, broadcasting technologies, and telephony*." ICT encompass all forms of technologies used to handle information and assist its communication in a digital format. ICT is not only enhancing efficiency, effectiveness, and accuracy when it comes to task performance, but also eliminate barriers of communication between students and teachers. ICT facilitate to submit assignments, receive and respond to feedbacks, be notified of due dates by emails, attend virtual meetings and lectures, as well as participate in interactive discussions, to name a few advantages as the ICT benefits are countless in this

regard.

ICT supported education is illustrated by Robertson (2003, p. 284-85) as: "*Information technology promises to deliver more learning for every student accomplished in less time; to ensure 'individualization' no matter how large and diverse the class; to wipe out the differences and disadvantages associated with race, gender, and class; to vary and yet standardize the curriculum; to remove subjectivity from student evaluation; to make reporting and record keeping a snap; to keep discipline problems to a minimum; to enhance professional learning and discourse; and to transform the discredited teacher-centred classroom into that paean of pedagogy: the constructivist, student-centred classroom*". ICT resources, tools and applications provide flexible learning, focusing interaction among teachers, students, online environment and collaborative learning. Kim (2009, cited in Ngoma, 2010) suggests that the role of ICT in the field of education is multifaceted. He identifies the following roles of ICT in the field of education:

- *Subject*: ICT can be taught as subject in computer sciences.
- *Tool for teaching and learning process*: ICT is a tool that introduces new practices for the teaching and learning process like, multimedia, digital content, etcetera.
- *Administrative tool*: ICT is used an administrative tool in the field of education (e.g. education management information systems, LMS)
- *Expansion of learning opportunity*: It really expands the opportunities of education in the form of distance education and e-learning. This expansion includes the anytime and anywhere access to the remote learning resources.
- *Facilitator*: It facilitates advanced thinking skill. As it supports the learner-centred approach and self-directed learning i.e. students have access to the educational resources at anytime from anywhere and hence they can learn and educate themselves according to their convenience.

ICT overcome inequalities between urban and rural communities by providing teaching tools which are accessible by learners through electronic media (Unwin, 2009, p.214). It increases computing resources like web technologies, encouraging auxiliary instructional activities; access of educational resources online, administrative services provided through networked resources, ICT effects organisational and social changes in policies and approaches for example growth in demand of lifelong learning, and enhance the quality of teaching and learning process (Nikolov, 2008). In the next section we will present the different approaches to the technology use of distance education.

2.3 ICT based distance education

The availability of computer and the internet have given more concentration to the discussion of distance education. Distance education described by Calder (2000, cited in Waddoups & Howell, 2002) is the use of media and technology to permit time and geographical separation

of the processes of teaching and learning. These technologies have enabled a high quality interaction between the teachers and students. It will be constructive for this research to have an understanding about the different approaches to distance education.

The first focus point for distance education is the communication relationship between teachers and students. This communication relationship supported by technology is mainly of following two types (Waddoups & Howell, 2002):

- *Synchronous*

  The relationship between a teacher and students in this approach is spatial and temporal. This approach points out different ways to use technologies to overcome this distance. But this type of education requires teacher and student to be together at the same time facilitated by technology. Interactive video conferencing, online chat, whiteboard features are example of this approach. This approach is useful to increase the contact between teacher and student but at the same time it can be a reason for the decrease of the efficiency and flexibility of distance education as the teacher become the centre of instructional interaction same like the traditional classroom setting (Waddoups & Howell, 2002).

- *Asynchronous*

  This approach allows the students to be separated by both time and space from the teachers. It potentially decreases the contact but the level of flexibility is increased. The internet and communication technologies have improved the interaction level within the perspective of asynchronous distance education. Discussion boards and email are good examples of it (Waddoups & Howell, 2002).

Waddoups & Howell (2002, p.3) states that "*focusing on the communicative relationship between teacher and students does not fully account for important issues such as the pedagogical methods and instructional design of the learning environment*". So identification of pedagogical methods and instructional design models is an important approach to the discussion of distance education. There are two broad approaches that include the focus on the "*transmission of information*" and "*interactivity and connectivity*". Some details about them with respect to our research are following:

- *Transmissive Approach*

  According to Bourne (1998, cited in Waddoups & Howell, 2002, p.3) "*the focus of this approach is on the delivery of information whether in a synchronous or asynchronous mode*". Technology is used to improve the effectiveness of this form which includes television and internet.

- *Asynchronous transmissive approach*

  This approach focuses on the delivery of information to students through the Internet, videocassettes, or educational television and radio programs. (Waddoups & Howell, 2002, p.3).

- *Synchronous transmissive approach*

  "*This approach duplicates the traditional classroom lecture primarily through the use of two-way video technology*" (Waddoups & Howell, 2002, p.4). The focus of both these approaches is on the delivery of education but not on the connectivity and interactivity.

- *Interactive approach*

The focus of this approach is on connection, interaction and exploration, rather than only on the transmission. The main centre of attention of this model is to create rich learning environment. Rich learning environment means offering students flexible range of resources that may include audio, video and text in both modes i.e. synchronous and asynchronous. The interactive model combines the best about distance education and campus-based education through the use asynchronous and synchronous technologies (Waddoups & Howell, 2002). This convergence is known as hybridization. It means the hybridization is removing traditional and institutional boundaries to meet the modern age educational needs. The interactive approach becomes the base for the hybrid / blended/ mixed learning systems. These learning systems are of great importance for our research. In the next section we will have a detailed discussion about the hybrid or blended mode of education.

2.4 Hybrid/Blended Approach

Bonk & Graham (2006) states that blended or hybrid approach is a combination of instruction from two models of teaching and learning. These two models are traditional face to face learning systems and distributed learning systems (see figure 2.1). According to him computer-based technologies play a vital role in hybrid learning. Anastasiades & Retalis (2001) also argue that the electronic technologies assist different kinds of learning i.e. completely online, mixed or hybrid, or web supported, but apart from the method of delivery, the efficient use of these technologies transform not only the teaching roles but also the learning procedures.

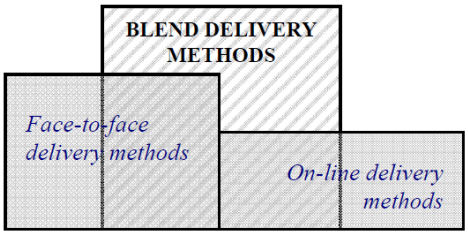

Figure 2.1: Defining the blend (Georgouli, et al., 2008, p.228)

The overall acceptance and availability of digital learning technologies has really increased the levels of integration of computer-mediated instructional elements into the blended learning systems (Bonk & Graham, 2006). The figure 2.2 shows the speedy growth of distributed learning and its merger with the face to face learning. The overlap of these two represent the emergence of blended/hybrid learning systems. Allen and Seaman (2003) also think that hybrid model was given very less attention than the other modes in the past but now its growth rate is higher than the others. They also argue that hybrid/blended learning signifies the future of learning in the digital age and it will force a paradigm shift especially in the higher education

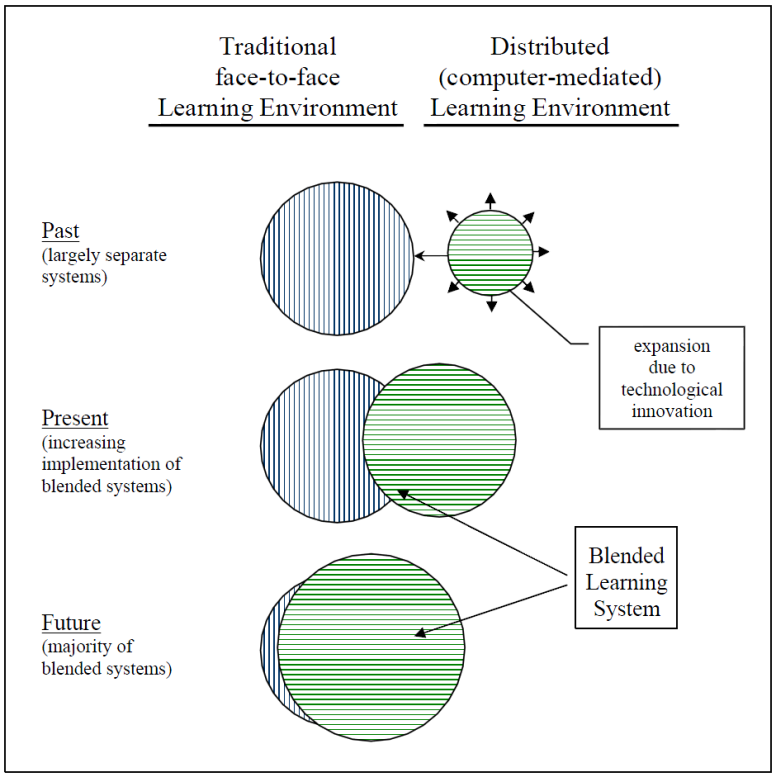

Figure 2.2: Progressive convergence of traditional F2F and distributed environments allowing development of blended learning systems (Bonk & Graham, 2006).

Graham et al. (2005, cited in Bonk & Graham, 2006) have identified three main reasons for designing and using hybrid/blended learning systems which are following:

1. *Improved pedagogy*

   Development of effective pedagogical practices is considered as the main reason for blending. It is evident that many current teaching and learning practices are still

focusing on transmissive rather than interactive strategies. So the blending learning approaches raise the level of learning strategies by blending or mixing of different approaches.

2. *Increased access/flexibility*

   According to Bonk et al. (2002, cited in Bonk & Graham, 2006) one of the key aspects that persuade the expansion of distributed learning environments is the access to learning. Learner flexibility and their convenience is also very important factor as some learners with other commitments like job or family also need additional education. So hybrid/blended learning system assisted with the modern information and a communication technology is the best possible solution. Especially for those students who need the handiness offered by distributed environment, and concurrently, are not ready to give up their social relations that they are accustomed to in a face to face classroom.

3. *Increased cost effectiveness*

   Bonk & Graham (2006) states that the cost effectiveness is a third main ambition for hybrid/blended learning systems. So these systems are capable of reaching large, worldwide scattered learners in short span of time with consistent content delivery. But at the same time there is a possibility of that it may require more time and resources to develop and manage such systems.

The benefits of hybrid/blended learning systems have made it successful and now its growth rate is equal to, or sometimes even higher than its counterparts i.e. totally online or face-to-face modes (Dziuban & Moskal, 2001). Inspired by its benefits Virtual University of Pakistan adopted Hybrid Model of Learning for the delivery ICT based distance education all over the country (Siddiqui, undated).

2.4.1 Components of Hybrid/Blended learning model

Masood (2006, cited in Siddiqui, undated) that the Hybrid/Blended model of learning basically consists of following three components.

- Physical campuses and computer laboratories
- Lecture delivery through television broadcasts or video recordings
- Student interactions with faculty members and learning resources via the Internet

These components are connected with each other and with the integration of information and communication technologies have become a popular model of instruction. This type of environment enhances the quality of the instruction and learning process. As mentioned

before the physical campus are of great importance for those students who need the handiness offered by distributed environment, and concurrently, are not ready to give up their social relations that they are accustomed to in a face to face classroom and they can have the facility of computer laboratories in those campuses. Incorporation of the broadcasting technology like television and the electronic mail system in the education field can smooth the progress resulting in better communication between students and teacher (Wallace, 1991). According to Bates (1998) the ability to present information to the students is the characteristic specialty of television and hence provides opportunity for those students who are incapable of studying at educational institutions. Research shows that television catches the attention of the learners and increases their interest in learning process (Sherry, 1996). As Lecture delivery through television broadcasts or video recordings is asynchronous so students have the flexibility and it permit time and geographical separation of the students and teachers. Student interaction with faculty members and learning resources via the internet is an important component of Hybrid/Blended approach.

2.5 Learning Management System

ICT is not only capable of delivering high quality data i.e. voice and video all over the world but also these technologies offer a platform for using different learning tools and hence have become valuable for distance learning. Learning system that provides these learning tools is known as Learning Management Systems (LMS). Learning Management System makes it possible for institutions to allow the students to have electronic access to course materials, upload or submit assignments; view assessments made, and also facilitate an online interaction between faculty and students (OECD, 2005).

"*LMSs offer a number of administrative tools to facilitate the management of courses and student accounts, grade books, usage statistics, content authoring, timed release of materials, calendars, personal information and integration with other administrative systems. LMSs help to solve the problem of delivering quality teaching and learning programs to large numbers of students in on-campus and distance education modes of teaching*" (Petrovic & Kennedy, 2005, p.535). According to many researchers (Petrovic & Kennedy, 2005; Georgouli et al., 2008; Coates et al., 2005) Learning Management Systems are used in academic environment mainly for four purposes: resource/content provision, communication, assessment and administration.

2.5.1 Resource/Content provision

"*The starting point for ICT based education is providing information. Once that point has been established, it becomes possible to explore new innovative approaches, relying on technology, to go deeper and transform information into knowledge*" (Georgouli et al., 2008, p.228). Harris et al. (undated, p.4) states that "*LMS support students to have independent study by having access to downloadable resources, reading lists, and/or other information sources. These sources include lists of required readings, links to specific library resources,*

downloadable materials such as lecture notes and audio recordings, additional readings and other audio/video materials". Petrovic & Kennedy (2005) thinks the course materials on LMS may include interactive media elements (like images, movies, shockwave, and flash) and other general resources in the form of useful links.

2.5.2 Communication

According to Georgouli et al. (2008) in ICT based distance learning environments there is great need to create a sense of working as community. This demands a serious attention to make effective ways of communication for collaborative working and also for distribution and gathering of information. So he thinks that the students must be facilitated and be sure that their instructors and fellows are paying attention to their recommendations and expectations. The LMS provide tools like forums, groups, chat, announcements, news and wiki to provide novel ways of communication. Petrovic & Kennedy (2005) suggests that LMS supports communication through the use of email, messaging system and announcement features. He thinks by using these features the faculty staffs inform large number of students about various courses related, social, and technical and assessment related issues. Coates et al. (2005) says LMS supports both synchronous and asynchronous communication by using the tools like e-mail, chat, announcement areas, instant messaging and discussion forums. The different tools of LMS for interactive communication and collaboration are explained below:

- *Chat*

  It is synchronous tool for online communication based on the exchange of text. The text is visible to all of the participants of the chat. The text of each of the sessions can be recorded and accessed during several days in other form of communication (Harris et al., undated; Bucko et al., 2005).

- *Announcements*

  It is a handy form of communication. It can include text, images, media content, and links to other websites and other files. The announcements can also be conveyed by email (Harris et al., undated).

- *Audio conference*

  It is also synchronous tool for online communication using computer network as a telephone. This tool is appropriate for complex and emotional discussions.
  (Bucko et al., 2005)

- *Video conference*

  It is a synchronous tool for distant interactive communication between two or more distant participants in real time. This tool enables detailed discussions with higher touch interactions. But it has high requirements for hardware and network speed for transferring video. It is always important to assure the speed rate through the whole video conferencing session (Bucko et al., 2005).

- *White boards*

  White board is an alternate to the conventional blackboards. This is the representation of shared area of monitor for drawing. It works as a paint utility and the drawings made are available to all the participants. This is useful synchronous tool for co-development of ideas. (Bucko et al., 2005)

- *Electronic mail*

  This tool is most well-known Internet service. Initially it was mainly intended to send text messages but today different types of files can be sent as an email. This asynchronous tool allows selective communication with several combinations of student and staff users. (Bucko et al., 2005)

- *Blogs*

  This tool provides an interface for thoughtful writing and comments for a specific topic. Blogs are available for selected group of users. This asynchronous tool is useful of sharing ideas and commenting on them. But sometime it takes longer to come to a conclusion. (Harris et al., undated).

- *Discussion forums*

  It is an asynchronous communication tool that allows messages to be posted and read and any time. It is organized into threads i.e. discussion within a topic. This tool in LMS also permits online communication with other participants (Harris et al., undated). Bucko et al. (2005) identifies the following advantages of discussion forums:

  - Time and place independent
  - Any time discussion
  - Every student has chance to speak

- It can also be a part of assessment
- It makes students active and they can help each other in doing common tasks.

- *News groups*

  This tool is also known as network news or a server of messages. These groups accept messages of distinct topic and then send this message to every participant of the group. Their benefit is the fact that answers are matched straight away after the message. (Bucko et al., 2005)

2.5.3 Assessment

LMS provides educational institutes the ability of electronic marking, and generate student's reports and transcripts along with notifications (Mahdizadeh et al., 2008). According to Coates et al. (2005) the LMS supports formative and summative assessment. He says LMS can have tools for assignment submissions, multiple choice testing and feedback. Harris et al. (undated) is of the view that LMS allow online assignment submission which facilitates assessment administration for students and teachers. It has tools like quizzes and online interactive tutorials that provide opening for students to self-assess and test their knowledge and ideas through these tools. He also says that the LMS have a tool of grade book that present students with information about their individual progress. These different assessment tools also support the timely and explanatory feedback from the faculty to the students.

2.5.4 Administration

LMS is an infrastructure which supports educational institutions by managing learner data, and generating reports to maximize the effectiveness of the entire learning organization (Ellis, 2009). Class and user management is done through LMS which involves registration, enrolment, displaying timetables, managing student activities and electronic office hours. Harris et al. (undated) suggests that the LMS endow students with complete description of the subject administrative processes. This information may include:

- Contact details of the faculty staff
- Academic calendar
- List of assessment tasks and deadlines
- Information about the use of LMS

2.6 Framework for our study

We started this chapter with a description of ICT and Education in order to develop understanding about the use of ICT in education. Then we focused on different approaches of communication and interaction and the use of technology in these approaches in distance

education. To understand the role of ICT in the success of Virtual University of Pakistan, it is necessary to understand its working i.e. how this university is availing benefits of ICT to deliver education. By keeping this in view we have decided to make this Hybrid model as a base for our research framework. Because we consider it will make things clear for us to make a research and understand the working of this hybrid mode of learning to avail maximum benefits of the ICT.

Considering Hybrid Model as a base our research framework for this research has three major components: lecture delivery through television broadcasts or video recordings, physical campuses and computer laboratories and student interactions with faculty members and learning resources via the Internet through LMS and mail system (see figure 2.3). The role and support provided by ICT for each component will be explored in this research. We have developed this framework because we consider the components of this model represent the communication and interaction approaches of distance education.

For the first component i.e. lecture delivery through television broadcasts or video recordings we will make a research about how Virtual University of Pakistan is developing content of world recognized curriculum and how they are using television to deliver this content. This component is representing the transmission approach and is used as channel for delivery of contents. The second component is physical campuses and computer laboratories. The role of ICT for this component will also be investigated. This component represents the communication as well as interaction as it is a support hub for students.

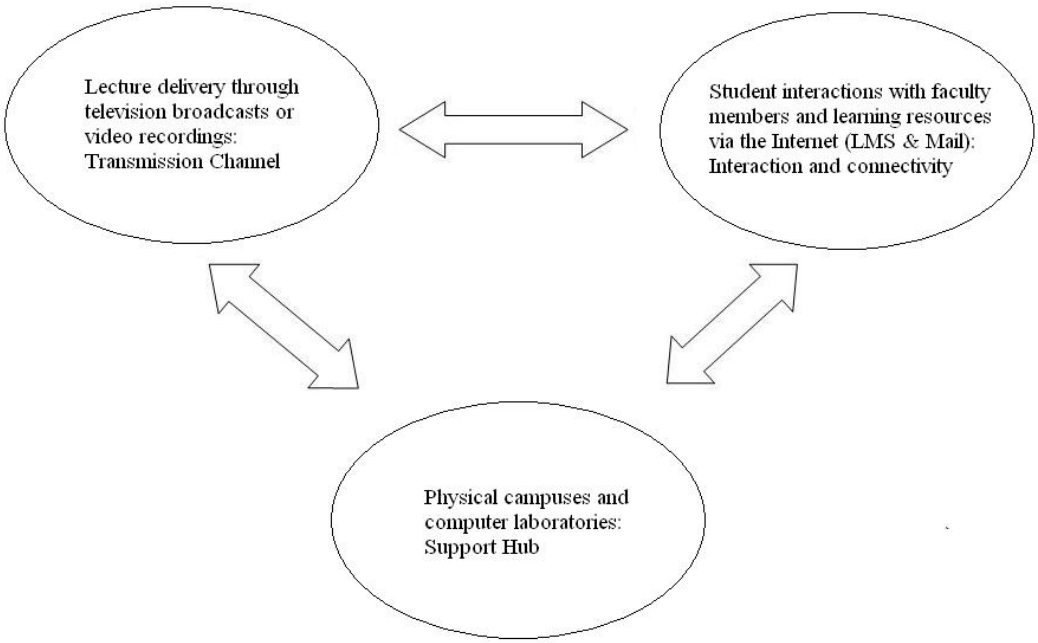

Figure 2.3: Framework for our study

The third component student interactions with faculty members and learning resources via the internet through LMS and mail system is the most important component of our research framework. As from the literature in the previous section we have developed an

understanding that learning management system is key element of an e-learning environment which is responsible for an interaction between the learning processes and also enables a collaborative learning. In this research we will try to explore the features of the Virtual University's LMS and how these features are working and enabling the students to perform the required activities. Hence the complete understanding of this component will be useful for us to have the required objectives of this research.

3. Method

3.1 Research Methodology

Our research study is about the use and support provided by ICT in distance education. By keeping in view that we formulated our research question as: How does ICT support the Virtual University of Pakistan in order to deliver distance education. As our focus is on ICT based distance education, so it was necessary to develop a theoretical understanding about the different approaches of technology use in distance education. The literature review provide context to research and tell about work done by others researchers previously in the concerned area of study (Dawson, 2005). Therefore we started our research to carry out literature review and preferred those articles which are mostly cited or referenced by other authors in their research. The literature review was very helpful for us to develop our research framework. We found that we need a detailed deep study about the support provided by technologies in distance education. Hence that aspect strengthens our choice to conduct a qualitative research. As Creswell (2007) mentioned that qualitative study is useful approach to get deep understanding of research area. We conducted semi-structured interview to get deeper understanding of our research issue. Interview guides were generated on the basis of the research framework. Then the empirical findings were presented and discussed in view of the literature in section 4 and 5. The conclusion was made on the basis of this discussion to complete this study. The figure 3.1 represents the research methodology adopted by us for this research:

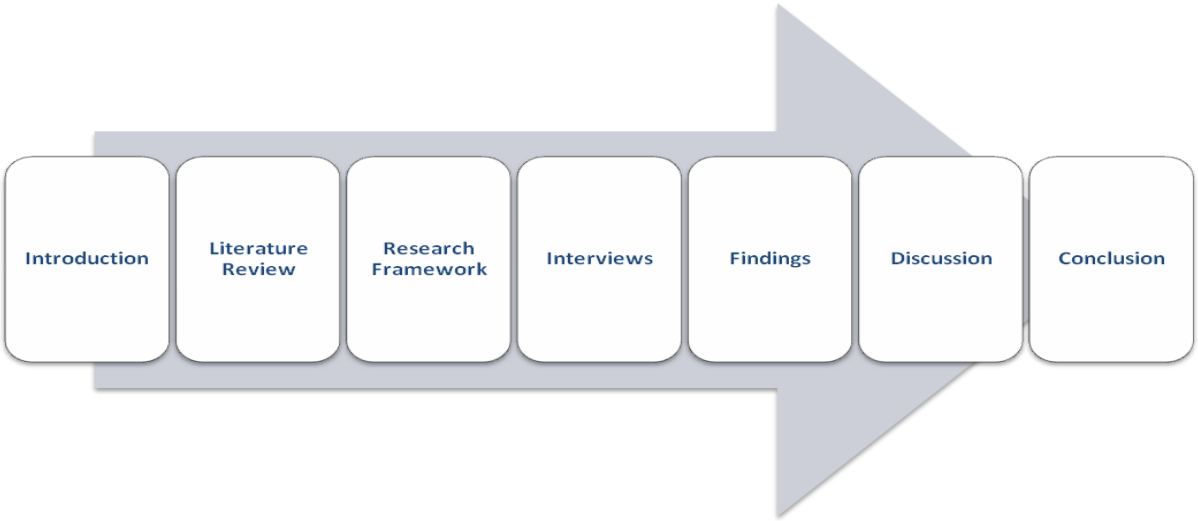

Figure 3.1: Our research methodology

3.2 Interviews

We selected interviews as our data collection method. We decided to conduct semi-structured interviews since we need deeper understanding of ICT based distance education and overall understanding of the interviewees' experiences. A Semi-structured interview is a non

sequenced and flexible set of questions in which the questions can be added or reduced if needed (Bryman & Bell, 2007). It also makes us more comfortable to conduct interviews as we can adapt ourselves to ask questions according to the given answers and to maintain coordination between respondents' answers.

3.2.1 Interview Guide

An interview guide indicates the topics and sequence of these topics in the interview, which should be prepared before conducting the interview (Kvale, 1996). We followed our research framework to develop interview guides. On the basis of our framework we decided to design different interview guide for each of the interview to get specific knowledge about the support provided by ICT for each of the department. These interview guides were having some same question like the introductory and concluding questions. The basic idea for different interview guides was to get detailed information from different departments. The interview questions were also selected by keeping in view our research framework.

3.2.2 Selection of interviewees

For the insight of the inside working orientation i.e. use of ICT in their working model, technical staff and faculty will be most appropriate and we decided to approach them for the interviews to get desired information. To get in contact with the right persons we started to get detailed information like designations, roles and duties of employees from different departments of Virtual University of Pakistan from their website. We selected IT Manger as our first contact person as he must be having the complete knowledge about the ICT use and support for this university. Then we asked him to suggest some experienced employees of different departments. By keeping in view his recommendations, we decided to select Network Engineer, Earth Station Incharge, Deputy Controller Examination, and a Lecturer for interview. The names of these employees will be kept confidential according to their wishes. The details of the interviewees who participated voluntarily in this research are following:

- *IT Manager*

  He is working as an IT Manager since the launching of Virtual University of Pakistan. He is one of the senior most employees of this university. In fact he is the person who is responsible for the implementation of ICTs in Virtual University of Pakistan. We were really happy to get a confirmation of interview from him because he is the person who can give us very useful information for our research.

- *Deputy Controller Examination (DCE)*

He is working as Deputy Controller Examinations since 2007. He was involved in the IT team of Virtual University of Pakistan at the initial stages. So, he is also a well informed interviewee for our research. The IT Manager also suggested us to have an interview with him as he worked with him as a colleague in the past and IT Manager said that his interview would be handy for us. . During this research, we will call him as DCE (Deputy Controller Examination).

- *Lecturer*

  He is a member of the faculty since 2006. Before this he was involved in the television department. Therefore we have decided to interview him because he can provide information about the use of technology related to faculty activities as well as the television department of the Virtual University of Pakistan.

- *Network Engineer*

  He is working as network engineer since 2006. He is very senior employee in the network department. We have decided to interview him because he can give us detailed information about integration of three components of VU's Hybrid Model and the use of modern technologies in Virtual University of Pakistan.

- *Earth Station Incharge (ESI)*

  He is working as earth station incharge in Virtual University Television Department since 2004. He is quite experienced to provide information about the television department i.e. lecture recording, studio environment, lecture broadcasting. In this study we will call him as ESI (Earth Station Incharge).

3.2.3 Conducting interviews

We selected VoIP (Skype) to conduct interviews because in our case, we could not conduct face to face interview which was very expensive and time wastage for us to travel to Pakistan. We conducted interview by using Skype after having a confirmation from our interviewees about the access of Skype at their working place. We started interviews with a brief introduction of ourselves, reasons to conduct interview and background of our research study. We conducted all interviews in English language but in case of confusion sometimes Urdu language was also used to have a complete understanding and avoid any uncertainty. During the interviews we took notes to keep all important information available for later use. We also sent these questions to them through email after the interview and asked them to add any missing details about those questions. Normally our interview time was in between 35 to 60 minutes.

3.3 Data Analysis

After completing empirical data collection we started interviews' transcriptions. There are no standards of whether to transcribe an interview word to word or in precise form (Kvale, 1996). To made transcriptions of the interviews, we decided to transcribe the most important parts of answers in a summarized form, from those notes which we took during interviews. As we conducted semi-structured interviews, so we had some non-relevant data like fun making stances, thinking moments etc which we omitted to reduce the length of transcription which was irrelevant for data analysis process. These transcriptions were also sent to the interviewees to confirm their validity. And then we summarized the results of these interviews according to our research framework and presented in Section 4. We divided these results into different categories by following the framework. This categorization was very helpful when we compared our findings with others interviewees answered. Then each section of these empirical findings was compared with other researchers and discussed in view of the literature. During the analysis process we tried to interpret the empirical findings and search out the meaningful information for our research. We believe that this analysis process helped us to find the relevant information which we asked from our interviewees.

3.4 Research Quality

3.4.1 Reliability and Validity

Research reliability and validity are basic factors that ensure the trust about your research therefore it is important to justify that a research study has reliability and validity. We have tried to the possible extent to keep this study understandable for our readers and documented each and every step so that if someone tries to redo this study then he can follow our procedures to get the desired outcomes. Seale (1999) considers this approach as reliability. Therefore to achieve good reliability we have kept this study so simple and clear that this study can be simulated by using the same methodology. Also we made sure that the decisions made in this study are fairly well explained. We worked hard to make sure that our research is reliable, so we tried to explain everything which we had done during this study.

According to Seale (1999) validity requires that a researcher have to make sure that he is doing that things which he claims to do i.e. keep the facts of the research. Therefore we have tried to keep every component of this research within the framework and have focused on the general objective of the study. Validity is described as a method to investigate what it is intended to investigate (Kvale, 1996). In our study, the interview validity will be assured if we can correctly understand what the interviewees mean. Therefore, we have verified the text with our interviewees after transcribing. We sent our transcriptions to interviewees for their

opinion, and to make sure that there are not any objections in any part of transcriptions after interviewees' verifications to maintain a high level of validity of our research.

3.4.2 Ethics

Ethical behaviour helps to protect individuals, communities and environments, and offers the potential to increase the sum of good in the world (Israel & Hay, 2006). Being responsible researchers, we have made sure that our interviewees will not have any problem due to our research. Therefore before starting the interview, we asked all of our interviewees about the anonymity. They were of the view that if it is not necessary then it would be better not to use their names. But they have given us the permission to mention their designations. Also before starting the interview we explained them our research purpose, and the objective of the study and confirm their consent for the participation in the study. We also tried not to force them to participate as it would be unethical and also then there is a possibility that it can have a negative effect on the research.

3.5 Bias

As a researcher we can control the research and some time the interviewees as well, and therefore there is a possibility that we add our own interpretations in some sections where they must not be described (Hammersley & Gomm, 1997). By keeping in view this, we decided to conduct semi-structured interviews so that the interviewees will control the answers and we can only give little consideration to our thoughts. Also there was a great chance of biased responses from the interviewees in this particular study. As we have decided to interview the different employees of our research object and some of them were on high position in that university therefore we requested them to give fair responses. We have tried to convince them about the importance of this study and motivated them not to be biased. As we know it is difficult to fully remove biases and errors, so we can say that there is a little chance that still there is possibility of biases existence.

4. Empirical Findings

The Government of Pakistan established Virtual University of Pakistan in 2002 to deliver ICT based distance education throughout the country (Hussain, 2007). The Virtual University of Pakistan adopted Hybrid/Blended approach of education delivery to provide distance education from internet, physical campuses and broadcasting media. This university has an aim to combine the teaching resources on a sole platform and then make these resources available across the whole country with the help of ICT. Learning Management System (LMS) is used as a platform for delivering this education over internet (Masood, 2006 in Siddiqui, undated). In the coming section we will explain the role of ICT in the field of education with the help of literature review.

As in section 2.1, Virtual University of Pakistan is using LMS as a platform for interaction between students, faculty and educational resources. So this component of Hybrid model becomes more interested for our research. In the next section we will have a detailed discussion about the use, purpose and different tool of learning management system.

The results from the interviews are presented in this chapter. The interview guides (Appendix A1-A5) are based on our research framework. We have formulated questions in a way that it will make possible for us to compare the empirical findings with the theories presented in our literature review later in the next chapter i.e. discussion. We conducted five interviews and the summarized results of the five transcriptions (Appendix B1-B5) made from these interviews are presented in this chapter.

We have divided the results from these interviews into four categories which we consider summarize the information obtained from these interviews. These categories are lecture delivery through television broadcasts or video recordings, physical campuses and computer laboratories, and student interactions with faculty members and learning resources via the internet (LMS, email). In the fourth category we presented overall view of our interviewees about the hybrid/blended approach and ICT in the success of Virtual University of Pakistan. We think these categories represent almost complete working of our research object i.e. Virtual university of Pakistan and also these categories are connected to our literature review as well. The summarized results are also approved by the interviewees.

We conducted these interviews from the employees of Virtual University of Pakistan to understand the working of ICT based education delivered by Virtual University of Pakistan and hence the role of ICT in their success can be confirmed. The interviewees can be divided into two categories i.e. Technical staff that is responsible to ensure the working of this ICT

based education system in the form of Hybrid Model, and faculty who can tell us about feedback, usage, working, and success of this system due to ICT.

The category wise summarized results of these interviews are given below.

4.1 Lecture delivery through television broadcasts or video recordings

The first focus of our interviews was to understand the process of Lecture delivery through television and video recordings. We asked our interviewees that by keeping in view the fact that Pakistan is facing the problem of shortage of highly qualified faculty, especially in higher education, what was the strategy of Virtual University of Pakistan to develop content that follow the world recognized curriculum with the help of ICT. The participants think that Virtual University of Pakistan have been successful to resolve that problem with the help of efficient use of technologies.

One Interviewee (Lecturer) told us that Virtual University of Pakistan has made the strategy that if we consider the whole country as a university then there are more than sufficient numbers of highly qualified teachers in all the fields of education. Then the only thing required was the pooling of these resources which will result in the development of the courses that follow world recognized curriculum. Virtual University of Pakistan has done exactly the same. Nationally recognized experts in particular fields are assigned the responsibility of content development. Lecturer said these experts are identified from all the national universities as they are senior faculty members of those institutions and also sometimes the foreign experts who are available for a period of time in Pakistan are also consulted to design the course outlines and lesson plans. These experts are contacted and asked to be a part of the team without relocating them with the help of modern communication technologies. By using these latest technologies these experts are consulted according to their feasibility and availability.

Interviewees told us that Virtual University of Pakistan has its own professional studio that is equipped with the latest equipment for recording of the course lectures. After the design of course outlines and lesson plans by the best faculty members of the country the lectures are recorded in professional studio environment. ESI said these recorded lectures are passed through a comprehensive editing process where other materials like animations, slides and clips are added to make these recorded lectures more interactive.

After recording these lectures delivery through television comes in action which is used to spread the quality education not only to the length and breadth of the country but in fact beyond the geographical boundaries of the country as well. ESI told us that Virtual University of Pakistan has its own four channels which are used to broadcast these course lectures over free to air television. In this way same quality of education to every student is available without regards to the geographical location of the student. It means the students

from any part of the country have the same lecture and hence the quality of the education throughout the country remains the same.

These lectures are also recorded in the form of multimedia CD's, video cassettes, and also as a streaming media on virtual university servers. Lecturer informed us that these lectures are also available on YouTube website which can be accessed all over the world free of cost. The multiple formats of the course lectures provide the convenience for the students to view these lectures according to their availability and hence provide flexibility.

Our interviewees were satisfied with the process of content delivery and think that the modern technologies have played a vital role in the success of this process otherwise it was almost impossible to develop and deliver content without the use of these technologies and they think with the passage of time and with the help of the these technologies further enhancements to this process are possible but the current state of this process is quite up to the mark.

4.2 Physical campuses and computer laboratories

According to IT Manager, physical campuses are an important component of their hybrid model. The interviewees consider these campuses are of distinct importance for students. In fully e-learning systems students can only meet their fellow students online and hence there is no face to face contact between them. As a result students feel them isolated and they do not have chance to learn social ethics and personality grooming. Also for new students who have just completed their higher secondary education and are now going to start their university life, it is very hard for them to just sit in front of computer and study without any face to face contact with the teacher and their fellow students. To overcome these issues the concept of physical campuses is a great solution where at least student can contact and discuss with their classmates.

Network Engineer told us that Virtual University of Pakistan is now having 173 physical campuses out of them 11 are owned by them and located in the major cities and they have 162 private partners all over the country who are called as PVC's (Private Virtual Campuses). He told us that these campuses have the regular classroom where television is available and students attend the broadcasted lecture. Computer laboratories are used by students to interact with the faculty and content through internet. The attendance is only mandatory for those students who are enrolled at a specific campus. Normally students that are enrolled at a campus, lack the facility of television or internet at their homes. Therefore university wants their presence at the campus to learn and have the experience about this ICT based education. DCE informed us that examinations are held only in the designated

campuses to have a control on the process. These campuses play a vital role and offer extra-curricular activities like others do. These are connected with the head office with the help of modern communication technologies.

Our interviewees think this idea of physical campuses, with the help of modern technologies to provide connectivity, proves to be very useful as it enables the students to be confident, useful member of society and completely equipped to interact with their colleagues and hence perform reasonably well in professional atmosphere.

4.3 Student interactions with faculty members and learning resources via the internet (LMS and e-mail)

The third component of their hybrid model is tutoring through internet which is mainly done by a Learning Management System. IT Manager told us that Virtual University of Pakistan has a learning management system with the name of VULMS which is accessible from any location through internet. This is the most important component of their hybrid model. One of our interviewee considers this component as heart of their model of working because all the interaction of students with faculty is through internet. Also student's interaction with all the supporting materials is also dependent on internet. The technology implementation of Virtual University of Pakistan is presented in the figure 4.1.

We have found that students have to log into the Virtual University's LMS (learning management system) to access the contents and also the other supporting materials. This learning management system of Virtual University of Pakistan supports three types of users as most of the learning management systems do. This system supports students, faculty and the administration. The features of Virtual University's LMS according to IT Manager include contents, announcements, discussion boards, links, grade book, assignments, date sheet making, question bank, online tutorials, email and set of FAQ's.

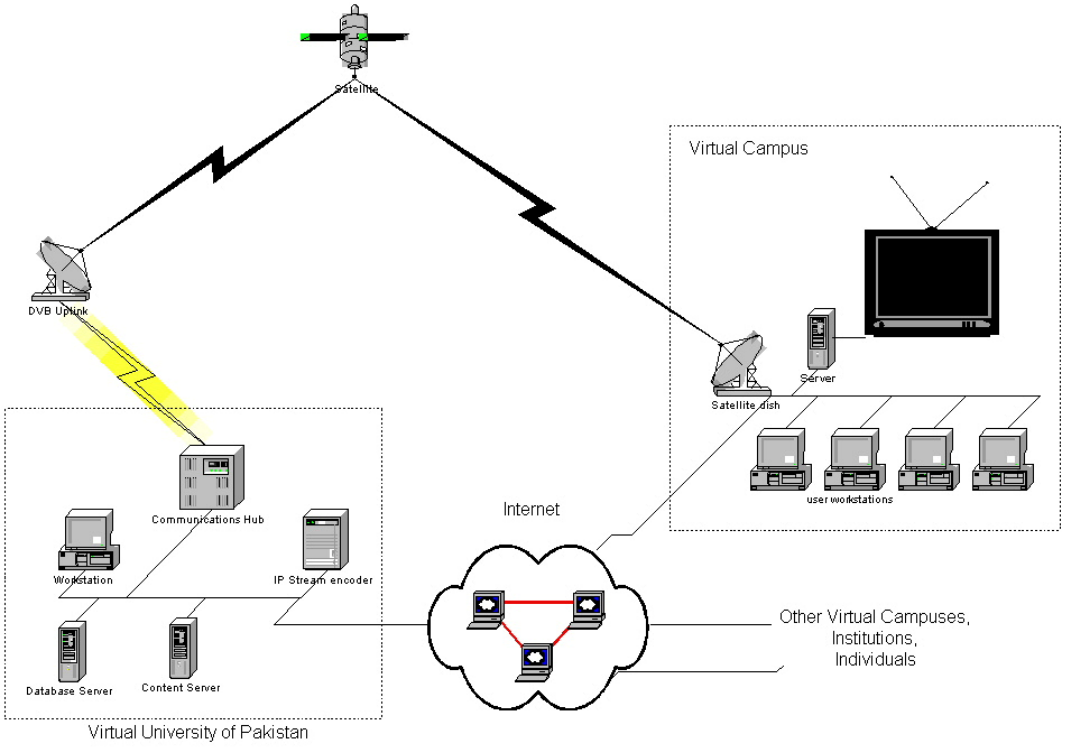

Figure 4.1: The Technology Model used by the Virtual University of Pakistan (Malik, undated)

He told us that all students have their personal account to access all the features and items available on LMS. The Virtual University's LMS provides the facility of uploading text documents; it also allows downloading office, audio, video, and image files as well. Assignments are also an important component of delivering education and the Virtual University's LMS provides an assignment interface which permits the students to view the questions, upload assignments, view the marked assignments and the comments made by tutors and hence provide an ample chance to learn from their mistakes and avoid in the future.

Discussion boards are very important feature of LMS. By using Virtual University's LMS discussion boards students interact and discuss their issues with each other without any interference of the faculty. On a discussion board named as Moderated Discussion Board (MDB) students interact with faculty to ask questions about the lectures. And also every lecture has its Moderated Discussion Board to create an environment of classroom so that students can ask their questions and get answers. An extended version of this kind of discussion board is Graded Moderated Discussion board (GMDB) where students are asked to have an advance discussion about topic given by the faculty. For this purpose tutors are trained to provide any related support for the students. Our interviewees consider these discussion boards very useful because they enable students to develop a skill to speak up and convey their ideas and help to improve the standards of education. Also these boards work as a platform where views of large number of students are available and hence students can collect information about certain topics of their interest.

The discussion boards become the basis for the FAQs where students find answers to the most common inquiries. Also the links to library resources and other important websites and books are also present on the LMS. Furthermore for the issues like late submissions of assignments, campus change request, and other queries like that Virtual University of Pakistan issues an e-mail account to every student and by using this account the student can contact all the departments of the university and sometimes they can contact the top management directly to convey their problems.

DCE informed that through VULMS Virtual University of Pakistan has provided its students an interface with a facility of making their own date sheet for examinations within the specified dates and students can even appear in their examination on weekends as well. Also Virtual University' LMS has a feature named as Question Bank where tutors are requested to enter all the possible questions within the course outlines about their courses. And then these resources are used to make a unique paper automatically for every student. It means every student has a different question paper but there is possibility that some questions can be same. But the repetition of questions is also limited. Because of this, Lecturer was very happy and satisfied. He said this facility is very helpful to improve their standards of education.

4.4 ICT and Hybrid Model

After discussing the role of ICTs in every component of their hybrid model as mentioned in the previous sections, we have asked all of our interviewees about the success of the Virtual University of Pakistan and the overall role of ICT in their success. All of our interviewees think that the ICT is the most significant factor of their success. In fact they think it was impossible to have this system working without the use of ICTs. Three of our interviewees think the combination of Hybrid Model with ICTs made it unique and enabled Virtual University of Pakistan to reach its goals and objectives. The use of ICTs to support their hybrid model covered each and every aspect of education delivery.

IT Manager said "*We are having four TV channels working to broadcast our lectures to the students. We have a website, LMS and physical campuses. So I believe that we are trying to use all the modes of technology with us. I judge that without ICT it was impossible to achieve our goals and objectives*". It provided multiple options to the students to gain knowledge according to their feasibility i.e. to study from anywhere at any time and hence made Virtual University of Pakistan a successful institution to deliver quality education at the doorstep. All interviewees were very much satisfied with the hybrid model adopted by Virtual University of Pakistan and they think that integration of hybrid model with ICT have made this university successful.

5. Discussions

5.1 Lecture delivery through television broadcasts or video recordings

Instructional strategy and contents have great impacts on the education process. As stated before in Section 2.3 the effectiveness of the educational system is not totally dependent on the technology for the delivery purpose but also on the design and contents of the learning material as well. By keeping in view these statements we have noticed that Virtual University of Pakistan has given a considerable attention to the process of content

development and made a handsome strategy, i.e. pooling the faculty resources for the development of courses as mentioned in the Section 4.1, to overcome the problems by using the modern technologies.

The delivery of their content through television is also a very important component of their model to impart knowledge. As mentioned before literature review (section 2.4), "*television is a part of our daily life and due to the advancement in communication technologies its price is dropping and hence made this tool essential in the field of education*". Virtual University have used it nicely to deliver the quality education not only in the whole country but also beyond the geographical boundaries of the country as well. In this way virtual University of Pakistan have accepted the importance of television and given strength to the statement mentioned in Section 2.3.1 i.e. delivery of education through television provides opportunity for those students who are incapable to study at educational institutions. For this they have established their own professional studio for the lecture recording.

The results presented in Section 4.1 shows that Virtual University of Pakistan believes in providing the content in multiple formats by using the modern technologies to give strength to their hybrid model. The lecture delivery through television and through other source of video recordings like CDs, DVDs, and YouTube really allow the students to the self-directed learning. The students can plan their study hours according to their convenience. The connectivity of their lecture delivery through television with other components of their model is also interesting. As the students who have not the opportunity to afford television they can visit the physical campuses where the facility of television room is the right solution for them. Then after attending the broadcasted lecture the students contact with the faculty by using discussion boards through LMS for discussions and questions regarding that lecture is also an excellent approach to use the ICT. In this way we can say that they are following different transmission channels to deliver quality education by the use of modern technologies to provide anywhere at any time access to the remote educational resources.

5.2 Physical campuses and computer laboratories

It was looking quite awkward at the start of this research that why there are physical campuses in this system. As the name, Virtual University, suggests there can be virtual campuses but why physical campuses it was not making any sense. But in Section 4.2 we came to know that it is a very important component of the Hybrid/Blended approach adopted by Virtual University of Pakistan. As mentioned in Section 2.4 experts give strong preferences to hybrid model because they think it is the most superior method for the delivery of modern education and its growth rate as compared to its counterparts is also higher. The Section 4.2 shows that Virtual University of Pakistan believes in these

statements and we have noticed that the hybrid or blended approach with the help of physical campuses by Virtual University of Pakistan was really a unique idea in the country and have really played a vital role in confidence building of its students and make them a useful member of the society. So, these physical campuses are playing a role of a support hub as mentioned before in section 2.6 where students can have infrastructural support. Again the role of information and communication technologies to provide the connectivity between the physical campuses and the head office is apparent. Without the proper connection of these physical campuses with the head office, this concept was impractical.

5.3 Student interactions with faculty members and learning resources via the internet (LMS and e-mail)

The role of ICT in distance education is of great importance. The most important component of any educational institution is the interaction between students and faculty. Therefore it is necessary for those institutions that have no face to face contact between their faculty and students to ensure this by any means. The use of ICTs for developing that interaction is invaluable. From Section 4.3 we came to know that Virtual University of Pakistan have developed a learning management system that provides not only that interaction but also many other distinct features as well that made this mode of education delivery successful. The adoption of a learning management system by Virtual University of Pakistan proves the statement given in section 2.5 i.e. "*Learning Management System (LMS) is the most significant development in the use of ICTs adopted by higher educational institutions*".

As mentioned before in chapter 2 (section 2.5), Learning Management System makes it possible for institutions to allow the students to have electronic access to course materials, upload or submit assignments; view assessments made, and also facilitate an online interaction between faculty and students. LMSs provide facility of document repositories, discussion forums, online chat rooms, grade books, and the ability to track students' performance. The results obtained from the interviews as mentioned in Section 4.3 have made it possible for us to say that Virtual University of Pakistan have tried to obtain maximum benefits from this learning management system which is no doubt a major development in the use of ICT.

The first purpose of LMS as mentioned in Section 2.5.1 is resource/content provision to the students. Also this provision must have to support independent study by allowing access to information sources like lists of required readings, links to specific library resources, downloadable materials such as lecture notes and audio recordings, additional readings and other audio/video materials. From section 4.3 we have become aware that Virtual university's LMS support the independent study by giving their students the access to the contents, links to library resources, links to other related websites, and downloadable video

and audio lectures.

Another purpose of LMS as stated in Section 2.5.2 is to perform a role of a communication and interaction channel between the students and faculty. Virtual University of Pakistan have given a considerable amount of attention to their LMS to provide features that will develop interaction between the students and faculty up to a required level of an educational institution. Their LMS provides both the synchronous as well as asynchronous communication tools. At the moment their LMS has discussion boards, online tutorials, announcement areas and email specifically for the purpose of interaction and connectivity. Three types of discussion boards as stated in Section 4.3 with different functionalities are very useful for students. The students can discuss different issues regarding their lectures with each other and faculty as well. Online tutorials are online chats between students and faculty where students can contact and discuss with the faculty online. The option of e-mail within LMS is also a good use of this tool, so that the students can forward their problems or findings directly to their fellows or faculty without going out of the interface. As mentioned in Section 2.5.2 these features facilitate the students by giving them time and place independence, any time discussion possibility, every student has chance to speak, makes students active and they can help each other in doing common tasks.

LMS is also used for assessment and administration of the students as stated in Section 2.5. The features of assignment submission, grade book, question bank approach, and date sheet explained in Section 4.3 illustrate that Virtual University of Pakistan have nicely used LMS in their assessment process. Virtual University of Pakistan is trying to provide maximum features and within the short span of time they have made many enhancements in their learning management system to meet the educational needs and facilitate their students. From the results mentioned in Section 4.3 the complete feature list of Virtual University's learning management system at present is following:

- Access to contents
- Announcement areas
- Discussion boards
- Links
- Grade book
- Assignments
- Online tutorials
- FAQ's
- Email
- Date sheet making
- Question bank

They have tried to make this learning management system a user-friendly interface so that

students can easily navigate and use all the provided facilities without any difficulty. Learning through this mode of education also improves the computer skills of the students without any regard of their field of education which is an added plus for them and also it is a need of time as well. In this way as mentioned before in Section 2.4 we can say that learning management system accelerate the learning and improve the effective communication among students, teachers, and staff. Because by using Virtual University's learning management system, students can not only access contents and faculty but also they can directly contact the top level management to convey their problem whenever they feel appropriate.

5.4 ICT and Hybrid Model

As Wagner et al. (2005) said computer and technology provides the processing capability and vehicle to commute the instructions to the learner. So, Virtual University of Pakistan has decided to use these technologies to commute the education at the doorsteps. ICTs provide easy access to learning resources, individualized learning experiences and cover innovative learning tools and resources, which in turn enables learning. Virtual University of Pakistan is using these technologies to avail the maximum benefits and satisfy its students. They are using these technologies in every department. The results obtained from the interviews show that ICT have played a vital role in the delivery of education. Our interviewees were satisfied with the use of these technologies and were of the view that Virtual university of Pakistan is ready to adopt future developments that will come in action due to these technologies for the betterment of learning processes and will make more satisfaction for their students. The results in Section 4.4 confirm that the hybrid/blended approach have provided multiple options to the students to gain knowledge according to their feasibility i.e. to study from anywhere at any time. The integration of all of the components of their hybrid model with ICT has made Virtual University of Pakistan a successful institution to deliver quality education at the doorstep.

6. Conclusion and Recommendations

Information and communication technology is playing an important role in the field of education, especially in the developing countries where it is little difficult to deliver education to the length and breadths of a country. These technologies have become a powerful tool that can reform and bring an educational change. The government of Pakistan realized the truth that without the use of modern technologies it is almost impossible to provide education to all of its citizens. So the decision in the form of Virtual University of Pakistan to provide completely ICT-based education was an indicator that

now Pakistan is willing to utilize these technologies to meet the educational needs.

The successful integration of ICT to the educational system is a complicated process. In fact it does not involve only the technology but how to use this technology is the main issue. So the strategy to use this technology is of great importance. According to Wagner et al (2005), the availability of computers in school is not sufficient to impact the student learning. The important thing is to use these resources in a way that they become more productive. In this research we have seen that the Virtual University of Pakistan has made an excellent strategy to meet the challenges that can be the barrier in their way of success. They decided to develop a hybrid model that will combine resources like television; physical campuses and internet with the help of ICT to achieve their set goals and objectives. So the decision of Virtual University of Pakistan to deliver quality education in a way that will attract the students by providing them a flexible learning environment was a great one. Our conclusion from this research is that the integration of ICT with the hybrid model has become a significant factor of the success of Virtual University of Pakistan.

We have tried to explain their process of imparting education with the help of ICT i.e. how they have used the information and communication technology for this purpose. By keeping in view Kim (2009) from this research we have seen that ICT supports Virtual University of Pakistan as a tool for enhancement of their teaching and learning process. It also supports as an administrative, interactive, and collaborative tool in the form of a learning management system. It provides the support in the expansion of the learning opportunities provided by Virtual University of Pakistan. And finally it supports to facilitate the students by providing self-directed and learner-centred approach. It means it facilitates the students to access the educational resources at anytime from anywhere and hence they can learn and educate themselves according to their convenience.

The complete ICT-based working system of Virtual University of Pakistan is presented and we think the other conventional institutions of Pakistan can observe from this research that how to use ICT to meet the educational needs of the country. As still the literacy rate of Pakistan is only 55% and Pakistan stands at 160 in the ranking according to literacy rate (Nation.com.pk, 2010) which is very low. So we think now the educational institutions providing education through conventional means must have to think about the integration of ICT. Without the integration of new technologies it is very difficult to meet the modern age educational requirements. So we recommend the conventional education institutions of Pakistan to accept the mediation of ICT into their educational system. As we have noticed in this research ICT's ability to go beyond the time and space, and access to the remote learning resources provide a great chance for the students from far flung areas to have same quality of education. And also ICT has a potential to improve the skills like adaptability, curiosity, communication and collaboration. It also equips the students with the digital age literacy skills.

Appendix A1: Interview guide for IT Manager

1. How long you are working in VU and what is your role and duties?
2. What are the means used to deliver the lectures?
3. How interaction between students and teachers is enabled?
4. Does the student have their personal account to log into the LMS and what are the features of Virtual University's LMS? Explain these features in detail.
5. What types of Discussion boards are there and explain their working?
6. What is the purpose of online tutorials?
7. Do you think this LMS is the good system to manage the whole teaching and learning process of students and teachers?
8. Are you satisfied with this type of support and interaction between tutors and students?
9. Do you think the Hybrid Model is appropriate for Virtual University of Pakistan?
10. To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?
11. Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Appendix A2: Interview guide for Lecturer

1. How long you are working in VU and what is your role and duties?
2. What is the mechanism of hiring faculty to develop content? And what is the role of modern technologies in this process?
3. How course outlines and lesson plans are designed?
4. Do you have your own studio for lecture recording? What is role of ICT to make these recorded lectures more interactive?
5. In which formats these recorded lectures are available (e.g. CDs, Video Cassettes, and DVDs etc.)?
6. What are the means used to deliver the lectures?
7. How many physical campuses virtual University of Pakistan have? What is the importance of physical campuses in Virtual University of Pakistan?
8. Do you think the Hybrid Model is appropriate for Virtual University of Pakistan? And is there any face to face contact between faculty and students in physical campuses?
9. How many TV channels Virtual University of Pakistan has? Are you satisfied with the delivery mechanism of Virtual University of Pakistan?
10. How interaction between students and teachers is enabled?
11. To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?
12. Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Appendix A3: Interview guide for Network Engineer

1. How long you are working in VU and what is your role and duties?
2. What are the means used to deliver the lectures? Do you think multiple formats of lectures really helpful?
3. How many physical campuses virtual University of Pakistan have? What is the importance of physical campuses in Virtual University of Pakistan?
4. How these campuses are connected to the head office?
5. How does Virtual University control and manage these campuses?
6. What facilities are provided by these physical campuses?
7. Does Virtual University of Pakistan have mail system? If yes/No then why?
8. To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?
9. Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Appendix A4: Interview guide for Earth Station Incharge (TV Section)

1. How long you are working in VU and what is your role and duties?
2. What are the means used to deliver the lectures?
3. How many TV channels Virtual University of Pakistan has?
4. Do you have your own studio for lecture recording?
5. The lectures are broadcasted only in the country or beyond the geographical boundaries of the country as well?
6. Do you make these recorded lectures interactive before broadcasting? If yes then how?
7. Do you think multiple means of lectures delivery are really helpful?
8. Do you think the Hybrid Model is appropriate for Virtual University of Pakistan?
9. To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?
10. Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Appendix A5: Interview guide for Deputy Controller Examination

1. How long you are working in VU and what is your role and duties?
2. How interaction between students and teachers is enabled?
3. Does the student have their personal account to log into the LMS and what are the features of Virtual University's LMS? Explain these features in detail.
4. What features are provided by LMS to support the examination/assessment process?
5. What do you mean by Make your own Date sheet? Explain.
6. Can you please explain the Question Bank approach?
7. Do you think this LMS is the good system to manage the whole teaching and learning process of students and teachers?
8. Do you think the Hybrid Model is appropriate for Virtual University of Pakistan?
9. To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?
10. Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Appendix B1: Interview Transcription for IT Manager

Date	03-May-2010, 14-May-2010
Duration	60 minutes
Interviewee title	IT Manager
Location	EC2 HCI Lab0211
Way of Interview	Email and Skype Voice Call

How long you are working in VU and what is your role and duties?

I have been working in Virtual University of Pakistan since it was launched in 2002. In fact I have been part of this project even before it was given a practical shape. I have done my Masters in computer sciences in 1998. As an IT Manger, I am responsible for the implementation of new technologies in every department of the University, and for this purpose I have a team and my job is make strategy and control all work done in my department.

What are the means used to deliver the lectures?

Virtual University of Pakistan is using television and internet as a delivery medium for its lectures. At the moment Virtual University of Pakistan has four dedicated TV channels. These lectures are also available on LMS. Also the lectures are available in the form of CDs and DVDs

How interaction between students and teachers is enabled?

Interaction between faculty and students is mainly enabled through LMS. Also students can contact faculty through e-mail as well. And also interaction is made possible through video conferencing and online tutorials.

What are the features of Virtual University's LMS? Explain these features in detail.

All students have their personal account to access all the features and items available on LMS. They are assigned designated password to access LMS. The features of Virtual University's LMS include contents, announcements, discussion boards, links, grade book, assignments, date sheet making, question bank, online tutorials, email and set of FAQ's. The LMS provides the facility of uploading text documents; it also allows downloading office, audio, video, and image files as well. Links to library resources and other important websites and books are also present on the LMS. It also provides an assignment interface which permits the students to view the questions, upload assignments, and view the marked assignments and the comments are made by tutors which are useful for students to learn from their mistakes.

What types of Discussion boards are there and explain their working.

We have three types of discussion boards.

- First is a discussion board where students interact and discuss their issues with each other without any interference of the faculty.
- Second type of discussion board is named as Moderated Discussion Board (MDB) where students ask questions about the lectures from the faculty. Every lecture delivered through television has a discussion board where students discuss various issues regarding that lecture with their fellows and faculty.
- Third type of discussion board is named as Graded Moderated Discussion board (GMDB) where students are asked to have an advance discussion about topic given by the faculty

The tutors are trained to respond to questions asked through these discussion boards to provide the required support and these discussion boards act as base for the FAQs.

What is the purpose of online tutorials?

Online tutorials are online chats between students and faculty where students can contact and discuss with the faculty online.

Do you think this LMS is the good system to manage the whole teaching and learning process of students and teachers? Please explain.

The third component of our hybrid model is tutoring through internet which is mainly done by this Learning Management System. Our LMS with a name of VULMS is accessible from any location through internet. This is the heart of our model of working because all the interaction of students with faculty is through internet. Also student's interaction with all the supporting materials is also dependent on internet. We have tried to provide every feature by using the latest technologies to provide competitive education as compared to the conventional institutions. It's a great resource for the students of ICT based education system. It is one of the key distinctions held by ICT based mode of education.

Are you satisfied with this type of support and interaction between tutors and students?

Yes, I am very much satisfied with the support and interaction between faculty and students supported by multiple means.

Do you think the Hybrid Model is appropriate for Virtual University of Pakistan?

Yes, no doubt the Hybrid Model adopted by us accomplish all requirements of education like we have face to face, off line and online interaction with our students by using this Hybrid Model of learning. We are using multiple sources with the help of ICTs to provide quality education. All three components of this model are of great importance for our educational system.

To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?

We are having four TV channels working to broadcast our lectures to the students. We have a website, LMS and physical campuses. So I believe that we are trying to use all the modes of technology with us. I think without ICT it was impossible to achieve our goals and objectives.

Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

The use of ICTs to support our hybrid model covered each and every aspect of education delivery. In fact ICT provides a base in which our whole system stands. And there is no doubt in saying that ICT is the most important factor of our success. With the help of ICT we have provided the system which is widely accepted by our students. And within only a span of eight years we have more than 50000 thousands at the moment. And it is only due to the strategy made by us with the help of ICTs.

Appendix B2: Interview Transcription for Lecturer

Date	13-May-2010
Duration	50 minutes
Interviewee's title	Lecturer
Location	EC2 HCI Lab0211
Way of Interview	Skype Voice Call

How long you are working in VU and what is your role and duties?

I am working as lecturer since 2006. Before this I was involved in the television department. My main duty is to manage the activities of my subordinates and mentoring to students in the E-learning environment.

What is the mechanism of hiring faculty to develop content? And what is the role of modern technologies in this process?

We have made the strategy that if we consider the whole country as a university then there are more than sufficient numbers of highly qualified teachers in all the fields of education. Then the only thing required was the pooling of these resources which will result in the development of the courses that follow world recognized curriculum. Virtual University of Pakistan has done exactly the same. Nationally recognized experts in particular fields are assigned the responsibility of content development.

How course outlines and lesson plans are designed?

The experts are identified from all the national universities as they are senior faculty members of those institutions and also sometimes the foreign experts who are available for a period of time in Pakistan are also consulted to design the course outlines and lesson plans. These experts are contacted and asked to be a part of the team without relocating them with the help of modern communication technologies. By using these latest technologies these experts are consulted according to their feasibility and availability. The guidance of other leading universities of the country and abroad is also consulted by our curriculum development team.

Do you have your own studio for lecture recording? What is role of ICT to make these recorded lectures more interactive?

Yes, we have a professional studio at our head office. After recording with the latest equipment these are passed through editing process where other materials like animations, slides and clips are added to make these recorded lectures more interactive.

In which formats these recorded lectures are available (e.g. CDs, Video Cassettes, and DVDs etc.)?

The recorded lectures are available over multiple sources in multiple formats. Like CDs, DVDs, and also available on YouTube website over internet.

What are the means used to deliver the lectures?

We have four dedicated TV channels for delivering the lectures. Also lectures are available on LMS, CDs, and DVDs and on YouTube over internet.

How many physical campuses virtual University of Pakistan have? What is the importance of physical campuses in Virtual University of Pakistan?

We have 173 physical campuses to facilitate the students. They have a television room where students attend the broadcasted lecture. Computer laboratories are used by students to interact with the faculty and content through internet. Students that are enrolled at a campus, lack the facility of television or internet at their homes. Therefore university wants their presence at the campus to learn and have the experience about this ICT based education. Physical campuses are a great solution where they have chance to learn social ethics and contact and discuss with their classmates.

Do you think the Hybrid Model is appropriate for Virtual University of Pakistan? And is there any face to face contact between faculty and students at physical campuses?

Yes, no doubt it is the Hybrid Model that enables us to provide quality education through multiple means. There is no face to face interaction between faculty and students at campuses. But at least students can contact with their fellow students and intermix with each other. Also campus management guides students on various issues of their concern.

How many TV channels Virtual University of Pakistan has? Are you satisfied with the delivery mechanism of Virtual University of Pakistan?

We have four channels which are used to broadcast lectures round the clock. Of course we have an efficient mechanism for lectures delivery. Students attend the broadcasted lecture and then by using the computer laboratories at physical campuses or from their homes contact the faculty through LMS for discussions. So it is a very comprehensive process.

How interaction between students and teachers is enabled?

The interaction between students and faculty is enabled trough LMS and e-mail. Also sometime students can contact us through telephone for serious issues. Students can also contact the top management when they have some complaints or issues on which they are not satisfied by the concerned officials.

To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?

I am absolutely satisfied with the ICT usage inside the institution. I think without ICTs it was impossible, in fact the whole system was developed with the help ICTs.

Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Yes, of course is the most important factor of our success. Our success is really due to the efficient use of these technologies.

Appendix B3: Interview Transcription for Network Engineer

Date	13-May-2010
Duration	35 minutes
Interviewee title	Network Engineer
Location	EC2 HCI Lab0211
Way of Interview	Skype Voice Call

How long you are working in VU and what is your role and duties?

I am working as network engineer since 2006. My duties include the management of the network to ensure the inter connectivity of the different departments with each other, television and physical campuses. And we have a qualified team for this purpose. I also control and manage this team.

What are the means used to deliver the lectures? Do you think multiple formats of lectures really helpful?

We provide multiple means for delivery of lectures that include television, internet, CDs and DVDs. Yes these multiple formats are really helpful for students and provide flexibility for students.

How many physical campuses virtual University of Pakistan have? What is the importance of physical campuses in Virtual University of Pakistan?

Virtual University of Pakistan is now having 173 physical campuses out of them 11 are owned by themselves and located in the major cities and they have 162 private partners all over the country who are called as PVC's (Private Virtual Campuses). In fully e-learning systems students can contact their fellow students online but the face to face contact is missing. So the students feel them isolated. Also for new students who have just completed their higher secondary education and are now going to start their university life, it is very hard for them to just sit in front of computer and study without any face to face contact with the teacher and their fellow students. Physical campus is a great solution to overcome these issues.

How these campuses are connected to the head office?

These campuses are connected with the head office through internet, telephone and fax.

How does Virtual University control and manage these campuses?

We control these campuses through proper rules and regulations defined by the university. Also we have a team of Inspectors and Directors. They keep visiting these campuses at random time periods to evaluate the daily working and performance of these campuses. If they are found guilty, they can put penalty or even revoke the licence of a campus to shut it down. VU rules and regulations are implemented in every campus.

What facilities are provided by these physical campuses?

These campuses have the regular classroom where television is available and students attend the broadcasted lecture. Computer laboratories are used by students to interact with the

faculty and content through internet. Also students can appear in examinations only at the designated exam centres out of these campuses. So students can not appear from their homes in examinations.

Does Virtual University of Pakistan have mail system? If yes/No then why?

We issue an e-mail account to every student and by using this account the student can contact all the departments of the university and sometimes they can contact the top management directly to convey their problems. The main purpose of this e-mail is to handle the issues like late submissions of assignments, campus change request, and other queries.

To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?

I am truly satisfied with the usage of ICTs. I believe that we are getting use of all the modes of technology with us. And one thing I would like to add is we are always looking for improvements in our system and make it comprehensive and simple to deliver quality education by any means of technology.

Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Yes, there is no doubt that ICTs have enable us to develop a system which I think is a unique one in the country to meet the modern day educational needs.

Appendix B4: Interview Transcription for Earth Station Incharge (TV Section)

Date	17-May-2010
Duration	40 minutes
Interviewee title	Earth Station Incharge (ESI)
Location	EC2 HCI Lab0211
Way of Interview	Skype Voice Call

How long you are working in VU and what is your role and duties?

I am Earth Station In-charge of Virtual University Television department. I have been working on this post since 2004. I am responsible for all the affairs of Virtual University Television station.

What are the means used to deliver the lectures?

We have multiple means like TV broad cast, internet, CDs, DVDs to deliver lectures. To ensure the viewership available for broadcasted lecture. We have an agreement with the cable operators of the country to provide this broadcast all over the country.

How many TV channels Virtual University of Pakistan has?

Initially we started with two TV channels but now we are having four TV channels that are working round the clock to broadcast lectures.

Do you have your own studio for lecture recording?

Yes, we have a very modern and hi-tech recording studio with the latest equipment. All the lectures are recorded over there.

The lectures are broadcasted only in the country or beyond the geographical boundaries of the country as well?

The lecture are not only broad casted in the country, in fact these lectures are broadcasted over free to air television through satellite. So the students abroad having permission to connect this through satellite can also have opportunity to attend these lectures.

Do you make these recorded lectures interactive before broadcasting? If yes then how?

Yes, after recording, these lectures recorded are passed through a comprehensive editing process. In this process animation, slides, videos and other materials are added to make these lectures more interactive.

Do you think multiple means of lectures delivery are really helpful?

Yes of course, the multiple means facilitate the students, and students feel comfortable and they can attend these lectures according to their feasibility i.e. from anywhere at any time.

Do you think the Hybrid Model is appropriate for Virtual University of Pakistan?

I think the strategy of Virtual university of Pakistan to use a blended, mixed or hybrid model by using the modern technologies available have made it unique institution.

To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?

I assume no one connected to Virtual University of Pakistan whether a student or an employee can deny the role of ICT in the success of this institution. Without these ICTs it was impossible to achieve the main objective of the institution of delivering quality education to the doorstep of the citizens.

Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

There is no doubt in saying that ICT is the key player in this system. I think it would be right to say that ICTs have reacted as a weapon kit of a warrior! In fact there is no doubt in the ability of these technologies. The only thing required was to use them nicely according to your goals. Virtual University of Pakistan have used these technologies efficiently and hence became a successful institution.

Appendix B5: Interview Transcription for Deputy Controller Examination

Date	03-May-2010, 14-May-2010
Duration	45 minutes
Interviewee title	Deputy Controller Examination (DCE)
Location	EC2 HCI Lab0211
Way of Interview	Skype Voice Call

How long you are working in VU and what is your role and duties?

I was involved in the IT team of Virtual University of Pakistan at the early days of its development phase. But due to some reasons I left this institution. Then in 2007, I again joined as Deputy Controller Examination. My responsibilities include planning and management of the examination process form the planning phase to the result declaration and degree issuance. I have a team under my supervision that is responsible to work accordingly.

How interaction between students and teachers is enabled?

Students can contact the faculty through LMS, e-mail and telephone. Students can also contact different departments through e-mail and telephone and some time we use conventional mail system to receive the important documents for the verification process.

Does the student have their personal account to log into the LMS and what are the features of Virtual University's LMS? Explain these features in detail.

Yes, all students have their personal account and a designated password to access all the features of LMS. The features of Virtual University's LMS according to include contents, announcements, discussion boards, links, grade book, assignments, date sheet making, question bank, online tutorials and set of FAQ's. This LMS allow students to upload or download documents that can be office, audio, video, and image files as well. Discussion boards are very useful feature which enable the students to discuss various issues with faculty and their fellow students. Also students can view the marked assignments and comments made by the tutors to improve their performance.

What features are provided by LMS to support the examination/assessment process?

The feature associated with the examination department include assignment interface, Grade MDBs, make your own date sheet, question bank and grade book.

What do you mean by Make your own Date sheet? Explain.

Virtual University of Pakistan has provided its students with a facility of making their own date sheet for examinations within the specified dates and students can even appear in their examination on weekends as well. They can make their own date sheet by using an interface on LMS.

Can you please explain the Question Bank approach?

Virtual University' LMS has a feature named as Question Bank where tutors are requested to enter all the possible questions within the course outlines about their courses. And then these

resources are used to make a unique paper automatically for every student. It means every student has a different question paper but there is possibility that some questions can be same. But the repetition of questions is also limited.

Do you think this LMS is the good system to mange the whole teaching and learning process of students and teachers?

LMS is core part of the third component of our hybrid model which is tutoring through internet. This can be accessed from any location through internet at any time. All the interaction of students with faculty is through internet. Also student can interact with the content and all the supporting materials available on LMS through internet. It's a grand source of information for the students in an ICT based education system.

Do you think the Hybrid Model is appropriate for Virtual University of Pakistan?

Yes, the hybrid model with the integration of ICT provides connectivity between different modes of delivering education. No doubt that Hybrid Model has allowed Virtual University to deliver quality education through multiple means to the doorstep. This Hybrid model has the characteristics of both its counterparts i.e. totally face to face mode and completely online mode. So it allows us to provide a flexible learning environment to our students.

To what extent you are satisfied with the use of ICTs in Virtual University of Pakistan and how do you think ICTs are helping you to achieve your set goals and objectives?

I would like to answer this question in a way that exclusive of these technologies it was not possible to give a practical shape to the idea of Virtual university of Pakistan. So it is obvious that ICT is a pilot requirement for this system to be functional.

Do you think ICT is a distinct success factor of Virtual University of Pakistan? Please explain.

Yes, ICT is the most important factor of our success. The combination of hybrid model as a strategy and ICT as technology have resulted in a successful world class educational institution i.e. Virtual university of Pakistan.

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