

# Use of Educational Technologies in Teaching and Learning Activities: Strategies and Challenges

*A Nepalese case*

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# ABSTRACT

The aims of this study are to identify implementation of policies on ICT in teaching and learning activities, and challenges in the implementation of educational technology in a Nepalese higher education context. This study provides insights on understanding how policies concerning technology are implemented in this national context and what challenges are faced in the sector of higher education in this developing country.

Empirically, the study applies a qualitative approach and a case study research design in order to investigate and collect detailed, comprehensive information on challenges faced in the use of educational technology in a selected educational institution in Nepal. The study is methodologically based on a combination of document analysis and interviews. The interviews are conducted to elicit views of leadership, teachers and students. Relevant official documents are examined. The physical infrastructure of this case-context is presented as a supplement to the findings from interviews and document analysis. The data are analysed and interpreted from the perspective of Cultural-Historical Activity Theory (CHAT) developed by Leonti'v (1978, 1981) and further elaborated and expanded by Engeström (1987).

The results indicate that lack of infrastructure is a main challenge. Moreover, the lack of plans and strategies for technology use also seems to emerge as a challenge. In addition to this, the observed case institution is facing challenges related to teacher motivation. Finally, based on these major findings, the study recommends the institution to start formulating strategic plans in line with higher education policies and ICT policies in order to monitor and follow up the incentives given by the ministries. In addition, a more supportive infrastructure needs to be developed for technology use in order to successfully implement technology in teaching and learning activities.

**Key words:** technology, educational, infrastructure , challenges, CHAT, policy, activity, object, implementation

# DEDICATION

Dedicated to my parents, my wife and relatives.

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# ACRONYMS

B.Ed.	Bachelor of Education
CHAT	Cultural Historical Activity Theory
Dr.	Doctor
FoE	Faculty of Education
ICT	Information and Communication Technology
M. Ed.	Master of Education
M. Phil	Master of Philosophy
MoE	Ministry of Education
MoIC	Ministry of Information and Communications
NESP	National Education System Plan
NNEPC	Nepal National Educational Planning Commission
NORAD	Norwegian Agency for Development Cooperation
NORHED	Norwegian Programme for Capacity Building in Higher Education and Research for Development
Ph. D.	Doctor of Philosophy
Prof.	Professor
SHEP	Second Higher Education Project
TU	Tribhuvan University
UGC	University Grants Commission

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# 1 INTRODUCTION

## 1.1 Background of the study

The advancements of digital technology have modified the fundamental activities of education, scholarship, research and service to society quite significantly, and have created new channels of communication throughout the university and with the broader society through electronic mail, chat rooms, Web site conferences, etc. Therefore, the university is challenged in adapting to new forms of teaching and research (Duderstadt, Atkins, & Van Houweling, 2002). Similarly, due to global competition for good staff and students, universities are struggling in search of how they can provide better education and enhance opportunities for students. For this, they should look for how they can upgrade the curriculum, teaching methods, assessment, course outcomes, etc. so that the students can face the challenges ahead in their lives (Ellis & Goodyear, 2010). Moreover, the increased internationalization and commercialization of higher education, distance-learning and e-learning schemes provided by the universities, the use of ICTs is growing. Consequently, the competition among higher education institutions is rapidly increasing (Stensaker, Maassen, Borgan, Oftebro, & Karseth, 2007).

Technology has profound impacts on teaching, freeing the classroom from the constraints of space and time, and supplementing the learning of students through access to original source materials. As a result, higher education has experienced significant changes from teaching to administration and management processes (Duderstadt et al., 2002). Furthermore, Säljö (2010) advocates that technologies do not only support learning but also change how learning happens. Therefore, the activities of learning are under increasing pressure of the developments of digital technologies.

More importantly, the changes taking place in the field of teaching and learning are being brought about by a wide range of tools and Internet itself (Ramorola, 2013). So, with the innovations of technologies, “many nations have already integrated technologically based strategies into their educational development plans, or are in the process of doing so” (Kurt, 2014, p. 91). Hence, it seems that technologies can be useful in enhancing teachers and students freeing from traditional ways of teaching and learning if they are used in the right way (Kozma & Vota, 2014). Further, Schwartz and Schmid (2012) conclude “technology can

significantly improve learning environments, but only when properly implemented that is, improving pedagogy” (p.228). Regarding the effectiveness of technology use in learning, Kurt (2014) states:

...technology-enhanced learning is extremely effective when certain criteria are met: teachers are skilled with, and comfortable in using, educational technology; sufficient resources are available; and workload requirements for teachers are reasonable, so that they have sufficient time to dedicate to using technology resources (p.91).

Thus, technology can be effective for teachers and students in teaching and learning processes if teachers are skilled in using technology with sufficient resources.

In fact, the application of ICTs has already changed the organization and delivery of higher education ((Yoloye, 2015) and provided learning opportunities for the students freeing them from the constraints of space and time, offering both students and teachers with access to learning resources far beyond the boundary of the university itself. It significantly promotes interactive learning providing new mechanisms for rich social interactions (Duderstadt et al., 2002).

However, the transition from traditional educational approaches to technology-enhanced ones has been a great challenge for many countries (Kurt, 2014). So, it is essential that teachers are willing to learn to use the technology themselves, to incorporate it successfully into their interactions with students in the classroom. It is therefore the successful integration of technology into the classroom, and the degree to which students can benefit from a technology-enriched environment depend almost entirely on teachers (Kozma, 2003). In addition, challenges related to infrastructure, maintenance, contents, and teacher training, etc. are challenging in the adoption and implementation of technology or ICTs in developing countries (Kozma & Vota, 2014). Therefore, it is important to study on challenges faced by the universities in developing countries, especially in Nepalese context in order to recommend and suggest policy makers, researchers and all concerned with teaching and learning.

## **1.2 Statement of the problem**

Although a number of research on use of technology in teaching and learning activities in higher education context in developed or western countries have been conducted, there is

insufficient empirical research on how these aspects are manifested in the educational practice, and what challenges in their implementation are faced by the universities of developing countries, especially in the Nepalese context. It is therefore significant to study and identify the situation of technology use in teaching and learning activities in Nepalese higher education context.

The present study provides a little glimpse of the situation in Nepal regarding how ICT policies are implemented and what strategies are employed to adopt educational technologies in teaching and learning activities at one particular institution. Additionally, it identifies challenges or problems faced in technology use, which might help leaders, policy makers, teachers and other interested stakeholders to see how lacking strategies in technology implementation appears as a challenge in order to succeed with technology implementation particularly in university setting to support teaching and learning.

### **1.3 Aims of the study and research questions**

The focus of this study is to uncover policy measures that are relevant for technology implementation in Nepalese higher education and how this is followed up in practical implementation at the selected case institution of the Faculty of Education, Tribhuvan University, Nepal. In order to approach this overarching goal, the following study aims are presented to guide the study:

- To identify the implementation of ICT policies at the Faculty of Education, Tribhuvan University, Nepal and
- To identify the challenges faced in the implementation of educational technology at the Faculty of Education.

In order to achieve these aims, the following research questions are formulated.

1. What are the policies and strategies regarding the use of educational technologies in Nepal and how is this approached at the Faculty of Education, Tribhuvan University?
2. What educational technologies are used in practical teaching and in student learning at the Faculty of Education, Tribhuvan University?

3. What challenges are faced in the implementation of educational technology in this setting?

The first research question is stated in order to identify ICT policies in Nepalese higher education and how this can be related to strategies in teaching and learning at the faculty studied in this study. The second question addresses the kinds of technologies that are used by teachers and how students perceive this technology use. Finally, the third question addresses the aspects of technology implementation and challenges these practices are facing in comparison to the policy expectations in the sector.

## **1.4 Outline of the study**

This study is divided into seven chapters with sub sections. The first chapter deals with introductory part of the study followed by statement of the problem, and aims of the study and research questions.

The second chapter deals with the higher education system in Nepal. It also includes a brief introduction to the history of Nepalese higher education. Further, it presents current universities and academies responsible for providing higher education in the country. It is also concerned with University Grants Commission, Tribhuvan University and finally Faculty of Education where this study is contextualized.

The third chapter is concerned with literature review which introduces technology and education. It also provides some insights on technology integration higher education in particular. It especially deals with challenges with regard to technology use in developed and developing countries. Further, it presents planning implementation of technology in developing countries, followed by summing up section.

The fourth chapter provides the theoretical background for this study. First of all, this chapter introduces Cultural-Historical Activity Theory (CHAT) with its development. It further presents core concepts of CHAT and CHAT as theoretical basis for the current study. Finally, it describes CHAT contradictions as analytical framework, followed by summing up.

The fifth chapter introduces various aspects of methodology employed in this study. Firstly, it deals with qualitative research design along with rationale for selection of this approach for this study. Secondly, it discusses about a case study research design employed in this study,



followed by empirical context. Thirdly, the next section is concerned with methods of data collection. Further, it deals with purposive sampling and procedures for data analysis and interpretation. Finally, it presents issues of validity and reliability, ethical issues and limitation of the study.

The sixth chapter dealing with data presentation and analysis consists of several sections. It presents an analysis of policy on technology use in Nepalese higher education. Moreover, the Faculty of Education with institutional features and initiated technology projects with potential and practical use of technology, and observation of physical environment and practical use of technology are presented in this section. In addition, it presents the discussions of findings from document analysis and institutional strategies related to technology use. Similarly, it discusses findings on teacher perspectives on the potential and practical implementation of technology in teaching and learning. Furthermore, it analyses student perspectives on potential and practical implementation of technology and presents findings from perceived potential for own learning and teaching practices. Finally, it analyses contradictory features based on CHAT perspectives followed by discussions of findings in relation to research questions.

Last but not the least chapter is concerned with concluding remarks with recommendations on what implications the findings from this study regarding technology use in teaching and learning both in the given case and in Nepalese higher education as such.

## **2 HIGHER EDUCATION SYSTEM IN NEPAL**

This chapter is concerned with an overview of history of Nepalese higher education. It provides an overview of brief historical background of Nepalese higher education development with current universities and academies. Further, it presents an account of University Grants Commission established for providing financial assistance, formulating policies for university operation, establishment and maintain quality of education. Similarly, it includes a brief description of Tribhuvan University. Finally, it deals with the Faculty of Education where the present study is located.

### **2.1 An overview of history of Nepalese higher education**

The history of Nepalese higher education is relatively short. However, its development and expansion is significant in a short period. The beginning of Nepalese higher education started after the establishment of Tri-Chandra College in 1918. Initially, it was affiliated to Calcutta University, India and later affiliated to Patna University, India. After the beginning of democracy in 1951, new colleges including private and public were opened and in 1959 the first university of Nepal, Tribhuvan University (TU) was established. After the establishment of TU, 29 colleges which were affiliated to Patna University, India, were brought together and run under TU. Since then the growth of Nepalese higher education has expanded rapidly (Khaniya, 2007; Simkhada & Van Teijlingen, 2010). Therefore, the establishment of TU is remarkable in the history of Nepalese higher education development.

For a long time, TU remained a single university providing higher education throughout the country. Later, the multi-university approach recommended by National Education Commission in 1992, was adopted (Khaniya, 2007), and has been gradually reducing the overall responsibility of TU providing higher education in the country .(Shrestha et al., 2007).

Tribhuvan University was the only university in the country until 1985. In the early 1980s, the government developed the concept of a multi-university system. As a result, Nepal Sanskrit University (NSU), formerly known as Mahendra Sanskrit University in 1986 was established, followed by Kathmandu University in 1991, Purbanchal University in 1994, Pokhara

University in 1997 and Lumbini Boudhha University in 2005. Similarly, three more universities: Far-western University, Mid-western University and Agriculture and Forestry University in 2010, and four autonomous medical academies- B.P. Koirala Institute of Health Sciences in 1993, National Academy of Medical Sciences in 2002, Patan Academy of Health Sciences in 2009 and Karnali Academy of Health Sciences in 2013 were established (University Grants Commission, 2012/13).

The overview of current Nepalese universities and academies are given below.

Table 1: Higher education institutions in Nepal

University/Academy		Constituent Campuses	Affiliated Campuses	
			Community Campuses	Private Campuses
1	Tribhuvan University (TU), 1959	60	425	638
2	Nepal Sanskrit University (NSU), 1986	14	2	2
3	Kathmandu University (KU), 1991	6	0	15
4	Purbanchal University (PU), 1994	5	6	120
5	Pokhara University (PokU), 1997	4	0	58
6	Lumbini Bauddha University (LBU), 2005	1	0	5
7	Mid-Western University (MWU), 2010	1	0	0
8	Far Western University (FWU), 2010	1	0	0
9	Agriculture and Forestry University (AFU), 2010	2	0	0
10	B. P. Koirala Institute of Health Sciences (BPKIHS), 1993	1	0	0
11	National Academy of Medical Sciences (NAMS), 2002	1	0	0
12	Patan Academy of Health Sciences (PAHS), 2009	1	0	0
13	Karnali Academy of Health Sciences (KAHS), 2013	1	0	0
Total		98	433	838

Adapted from Education Management Information system (2014)

The above table shows that Nepalese higher education institutions and academies own two types of campuses: constituent campuses and affiliated campuses. The constituent campuses are directly managed and administered including financial management by the concerned universities whereas affiliated campuses whose academic programs are affiliated to a university but are managed and administered financially either by private individual/organization in case of private campuses or by local community in case of community campuses. The academic activities of both campuses are regulated by the rules and regulations of the concerned university (Education Management Information system, 2014).

The funding from the government for the above given universities and academies is managed and distributed by University Grants Commission, Nepal, which is in turn discussed briefly below.

## **2.2 University Grants Commission and financing of Nepalese higher education**

For promoting, facilitating and supporting the development of higher education in Nepal, University Grants Commission (UGC) was established under the University Grants Commission Act approved by the parliament in 1993 as a statutory autonomous body (University Grants Commission, 2012/13).

Education Management Information system (2014) states “Higher Education (HE) institutions of Nepal receive financial support from the government channeled through the Ministry of Education; it is managed and distributed by the University Grants Commission. However, the medical academies receive the financial support for higher education directly from the Ministry of Health and Population” (p.29). Thus, University Grants Commission is especially responsible for allocating and disbursing grants to the universities and their campuses.

In addition, UGC formulates policies, plans and programs to promote and enhance the quality and development of higher education in Nepal. It also makes necessary arrangements for the exchange of facilities and fellowships between universities and educational institutions within and outside Nepal (University Grants Commission, 2010/11).

## **2.3 Tribhuvan University**

Tribhuvan University (TU), established in 1959, is the first national institution of higher education in Nepal (Tribhuvan University, 2014). It is the largest university of Nepal in terms of the courses it offers, and the number of students and teachers it owns (University Grants Commission, 2010/11).

TU is operated across the country through five institutes (Institute of Agriculture and Animal Sciences, Institute of Medicine, Institute of Engineering, Institute of Forestry, and Institute of Science and Technology). It also runs its various programs through four faculties (Faculty of Education, Faculty of Humanities and Social Sciences, Faculty of Management and Faculty of Law) and four research centres (centre for Economic Development and Administration, Research Centre for Educational Innovation and Development, Centre of Nepal and Asian Studies, and Research Centre for Applied Science and Technology) (Khaniya, 2007; University Grants Commission, 2010/11).

Below we will give a more thorough account of the Faculty of Education at this university, which is the chosen case-context of this study.

### **2.3.1 Faculty of Education**

With the need of teachers and teacher training, Nepal National Educational Planning Commission (NNEPC) 1954-55 recommended for the establishment of a college providing teacher education in the country. As a result, College of Education was established in 1956. The prime objective of the College of Education (CoE) was to produce trained manpower to teach at the primary and secondary schools. In 1971, National Education System Plan (NESP) was introduced in the country and CoE was renamed as the Institute of Education (IoE). A decade later in 1982, IoE was given the status of the present Faculty of Education (EoE) (Faculty of Education, n. d.).

Faculty of Education (FoE) at Tribhuvan University is the leading institution in the field of teacher education in Nepal (Tribhuvan University, 2014). Before the establishment of TU in 1959, Faculty of Education started as a College of Education in 1956. It is the largest faculty of Tribhuvan University in terms of number of students and the affiliated campuses. It has the

biggest network of teacher education in 26 constituent campuses and 590 affiliated colleges throughout the country (Tribhuvan University, n.d.-b).

The main goal of FoE is to produce trained school teachers and teacher educators. In addition to this, it also produces educational planners and managers, educational researchers, curriculum designers and all sorts of human resources required for the development of educational sector of the country through its different programs (Tribhuvan University, n.d.-a). According to the Faculty of Education, 16 departments are run in this faculty offering various programs to students throughout the country. Currently, it has 184 staff members (132 teaching +52 non-teaching) apart from 30 part-time, daily wages employee and 3554 students from different parts of the country (Tribhuvan University, n.d.-b).

# 3 LITERATURE REVIEW

This chapter is concerned with review of literature relevant to the current study. Anderson and Arsenault (1998) state that for a successful research it is necessary to gather knowledge based on previous studies, which provides a researcher a guide to the right way. So, reviewing the existing literature in order to acquaint ourselves with the available body of knowledge relevant to the area of interest is one of the preliminary tasks while carrying out a research (Kumar, 2005).

Further, Bryman (2016) asserts “the aim of the literature review is to establish what is already known about the topic and to frame the review in such a way that it can act as a background and justification for your investigation” (p. 90). Therefore, the review of the literature is an essential step in the process and makes a valuable contribution to almost every operational step of carrying out a research (Anderson & Arsenault, 1998; Kumar, 2005).

## 3.1 Technology and education

Research on technology use has broadly documented that Information and Communication Technologies (ICTs) have brought changes in a range of sectors with extensive impact on contemporary society, and fundamentally changing the way that we communicate, work, and entertain. Education is no exception, where ICT applications have been used extensively over the years (Karagiannidis, Politis, & Karasavvidis, 2014). It is therefore argued that the university education has changed in such a way that there is growing pressure on the teachers to adopt new technology requiring them to undergo new orientation and training (Khaniya, 2007). Thus, the use of educational technology is essential for enhancing both teaching and learning activities in higher education. This is because with technology, teachers can help to enhance classroom teaching and learning. They can use ICTs or technologies and provide students with structure and advice, monitor students’ progress, and assess their achievements. Students, on the other hand can be provided new opportunities in working together in teams or groups and using technology to search for information (Kozma, 2003).

Here, technology as an innovation can be an idea, practice, or object that is perceived as relatively new and helps individuals to form a network. Therefore, technologies having

characteristics to communicate can enhance students and teachers in teaching and learning activities in higher education setting (Rogers, 2003).

With the rapid advancement of computers, digital learning materials offer additional affordances over traditional print materials that can significantly improve the quality of education (Karagiannidis et al., 2014) as digital technologies can facilitate learning through interaction, construction, discussion and collaboration (Laurillard, 2010). As a result, initiatives around the world from ministries, educational organizations, companies, etc., emerged and digital learning resources and educational software were developed (Karagiannidis et al., 2014). Therefore, innovations or technologies can mediate activities of teaching and learning. The question is although, how higher education approaches these technologies and what experiences we can draw from these approaches in practice.

We further go in details in the below sub sections which deal with findings of empirical studies, carried out in different contexts.

## **3.2 Technology integration in higher education**

Information and communication technologies (ICTs) for computer supported collaborative learning and learning management systems are rapidly gaining place in the field of higher education. As a result, new visions and ideas are entering educational practices. These technologies are introduced to support learning and the development of professional competencies (Jochems, van Merrienboer, & Koper, 2004). ICTs further have become resources for networking environments and communications among teachers, giving the possibility to update themselves, share experiences, create informative materials and theoretical improvements. In addition, ICTs allow teachers to work in a wider universe of data and information (Ferreira, Haddad, & Faria, 2014).

The existing literatures on technology and education reveal that they can enhance teaching and learning considerably if they are used in the right way. Below, some selected examples illustrate some typical benefits.

Regarding the impacts of technology in learning, a study shows that technology allows students to learn gradually and autonomously at their own pace. As a result, this has a positive impact on their progress. Therefore, ICTs can facilitate positive results when they are used to



understand content and concepts of the subject (López-Pérez, Pérez-López, Rodríguez-Ariza, & Argente-Linares, 2013).

A study by Rasiah (2014) revealed that social media like Facebook was indeed viewed as an effective tool in a student-centred learning environment that enriched students' educational experiences, increasing the relevance of the subject matter and encouraging students to collaborate with their peers. In addition, Facebook as a course management system has the potential to increase student involvement in discussions and out-of-class communication among teachers and students (Albayrak & Yildirim, 2015). More specifically, social networking sites open up the opportunity for class members to interact beyond the classroom, which as a result leads to additional learning opportunities and enhances participation in the face-to-face classroom (Hung & Yuen, 2010).

Productive learning can be achieved by acquiring and operating with student-oriented educational strategies focusing on the development of a personal learning style, but also can be further supported by means of educational technologies ((Viorica-Torii & Carmen, 2013). When technologies are integrated into student centered classrooms, students become active learners, and the opportunities of interaction supports this process (Ajjan & Hartshorne, 2008). It is here important that technology promotes cooperative learning. The result of this study revealed that the technology-based cooperative learning supported knowledge development on a broad range (Albayrak & Yildirim, 2015). Furthermore, it has been proved that ICT is a valuable gift in life-long and distance learning, simply because it provides an effective delivery vehicle for course content where learners participate and work in a form of collaboration community (Crook, 2011).

Finally, Kirkwood (2014) claims that the adoption of technology helps students in constructive learning and knowledge building as technologies can create a context-free environment. Technologies can enhance productive learning and supports the learning of how to communicate and argue in ways recognized and accepted, develop intellectual autonomy, and critical thinking. Moreover, ICTs facilitate e-feedback as a joint activity by sharing comments among teachers and peers in these respects, technology is a potentially a rich source for student learning (Dysthe, Lillejord, Wasson, & Vines, 2010). But, the use of computers or educational technologies in teaching and learning is different in developing and developed countries.

Even though research has documented a long range of benefits of technology use in higher education, these efforts are not problem-free. Therefore, the following section discusses challenges in adopting technology.

### **3.3 Challenges in adopting technology**

Despite the fact that research and studies reveal that educational technologies can enhance teaching and learning processes, there are many challenges being faced while implementing them in practice.

A particular aspect relevant for this study is that challenges about technology use in teaching and learning activities differ between developed and developing countries. Developing countries often represent contextual factors in organizational culture and societal structures which are very different compared to developed countries. Technological factors such as cost, usability and appropriateness of technology as well as management characteristics are here more challenging than in developed countries (Andersson & Grönlund, 2009). While European countries use advanced information technology in teaching and learning processes as an integrated part of societal structures, African countries have been unable to independently create and use new technologies in their education system due to various reasons given surrounding societal premises (Hamidi, Ghorbandordinejad, Rezaee, & Jafari, 2011).

Regarding the underuse of technologies in developing countries, Malapile and Keengwe (2014) state that some factors such as costs, low effectiveness, etc. are responsible. Similarly, lack of technology policy, insufficient technology equipment, a lack of teachers qualified in technology integration, and maintenance and technical problems are the major challenges affecting integration of technology at the school level (Ramorola, 2013). Moreover, users in developing countries are not familiar technology users as in developed countries. As a result, it is unlikely to see the importance of technology in teaching and learning (education). This has also resulted in the failure of technology implementation in universities. Therefore, technology awareness, computer skills and knowledge are important short-comings of e-learning success in developing countries (Bhuasiri, Xaymoungkhoun, Zo, Rho, & Ciganek, 2012). In addition to these challenges, limited or lack of connectivity, equipment and

relevance in other parts of society is also a challenging regarding technology integration in higher education of developing countries (Olutola & Olatoye, 2015).

But the first and foremost challenge in the context of developing countries refers to establishing ICT supported infrastructure which has been identified as one of the main barriers in technology adoption. For this, vision and plans play important roles. Therefore, lack of visionary plans hinder technology integration into teaching and learning processes. (Khan, Hossain, Hasan, & Clement, 2012)

### **3.4 Planning implementation of technology in developing countries**

Governments and non-governmental agencies funding education in developing countries advocate the use of technologies to reduce the cost of educating a large number of students who are missing out higher education. It is therefore, widely suggested that technologies can help to address issues of educational equity and social exclusion, and open democratic and accessible educational opportunities (Gulati, 2008). However, to gain optimum impact of ICT in education, certain issues such as how ICT implementation can be effective; what the requirements are to achieve, etc. are to be addressed. As a result, ICT integration in higher education can be possible (Alam, 2016).

In developing countries, the adoption of technology in teaching and learning in higher education context has been affected mainly due to lack of sufficient and suitable infrastructures (Quimno, Imran, & Turner, 2013). Moreover, individual motivation, time, technological confidence, etc. are also affecting it. In addition, content, design and delivery of courses pose challenges for successful implementation of e-learning. Furthermore, trainings for teachers and staff, funding, attitudes to ICT and e-learning are important factors for technology use in education. More importantly, the access to/and cost for technology and its software are challenges for higher education institutions in developing countries. Therefore, challenges related to individuals (teachers and students), course, context and technology are challenging (Andersson & Grönlund, 2009).

In short, the success of e-learning in developing countries has been influenced by various critical factors. For this, infrastructures, technology awareness, knowledge, motivation, computer training, etc. are pre-requisites (Bhuasiri et al., 2012).

### **3.5 Summing up**

From the discussion above, educational technologies can be tools to enhance teaching and learning but there appear many challenges in their adoption either in developed or in developing countries. ICT has the potential to improve the educational system. However, developing countries are far from reaping these benefits because of certain challenges (Khan et al., 2012).

Some challenges identified in the context of developing countries include limited electrical or Internet infrastructure in rural areas, limited availability of technically skilled support staff, the predominance of minority languages, and under qualified teaching staff (Kozma & Vota, 2014). Moreover, lack of vision and plans, lack of ICT supported infrastructure and resources, insufficient funds, lack of ICT knowledge and skills, etc. also pose challenges in ICT use in education especially in developing countries (Khan et al., 2012).

# 4 THEORETICAL FRAMEWORK

By and large, this chapter deals with theoretical basis for the current study. It describes Cultural-Historical Activity Theory (CHAT) with its development and presents core concepts of the theory followed by CHAT as a theoretical basis to this study. It finally presents contradictions as an analytical lens for the study.

## 4.1 Cultural-Historical Activity Theory

Cultural-Historical Activity Theory (CHAT) based on the thoughts and ideas of Vygotsky was developed by Leont'ev (1978, 1981) and further elaborated and expanded by Engeström (1987). The name 'Cultural-Historical Activity Theory' (CHAT) suggests that human activity is influenced and shaped by their cultures, which evolve over time (Gretschel, Ramugondo, & Galvaan, 2015).

Vygotsky focused on mediated action in activity theory. According to him individual development and learning occur in social contexts and practices. The cultural embeddedness implies that human action and interaction cannot be understood without including the social and cultural context in the analysis. This implies that the unit of analysis is the person in context (Havnes, 2010). Moreover, Leont'ev (1981) emphasized that learning is not simply an activity in an individual; rather it is understood as a collective subject acting within an activity, where their actions are mediated by cultural tools (Lupu, 2011).

The object of activity in CHAT is a central element which motivates and directs the participation of the actors in the activities (Edwards, 2011). The concept of activity is thereby closely connected with the concept of motive in the object of activity (Leont'ev, 1978). CHAT considers subjects, objects, tools, rules, community and division of labour as core elements in an activity system, each of them holding cultural and historical dimensions (Foot, 2014).

### 4.1.1 Development of CHAT

Engeström (1987) introduced the notion of activity system analysis as a more elaborative version of activity theory, which is commonly known as the third generation. This third-generation activity theory "explores the nested nature of an activity system within other

activity systems and describes how one activity system connects to other activity systems...” (Gretschel et al., 2015, p. 53). Engeström (2001) also developed a ‘conceptual tool to understand dialogue, multiple perspectives and networks of interacting activity systems” (p. 135) and expanded the unit of activity to include three additional components of rules, community and division of labour in the activity system. The first additional component rules regulate the subject’s actions towards an object and relations with other participants in the activity. The community of people sharing an interest and involvement with the same object is also important to explain the social structure of an activity. Finally, the division of labour refers to divisions of tasks i.e. what is being done by whom towards the object (Foot, 2001). The figure one illustrates these concepts of the activity system of CHAT.

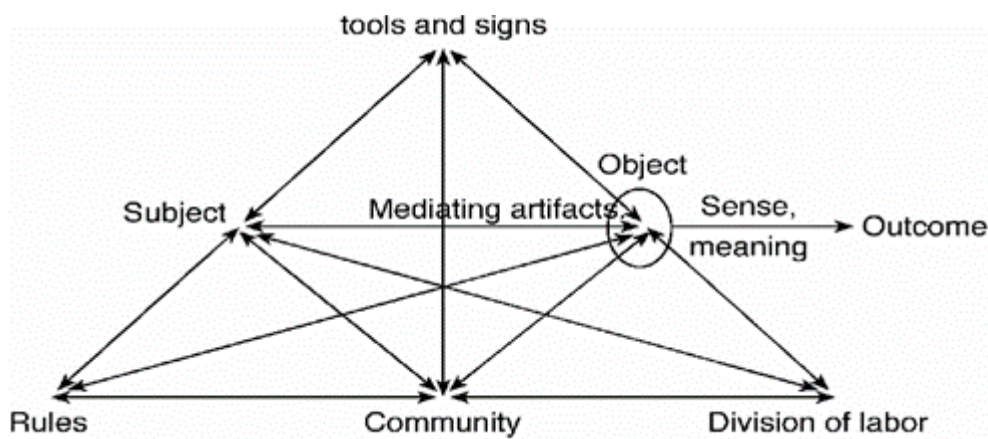


Figure 1: The structure of a human activity system adapted from Engeström (2001)

Based on these concepts, Engeström (2001) presents five principles, which depict the overall picture of the third generation of CHAT. The first principle states that a collective, artefact-mediated and object-oriented activity system, in relations to other activity systems, is the main unit of analysis. Secondly, the multi-voicedness of an activity system is multiplied in networks of interacting activity systems. The third principle is historicity. He further claims that “...problems and potentials of activity systems can only be understood against their own history” (p. 136). Thus, history plays a crucial role in the activity of the individual participants and the mediating tools and rules (Gretschel et al., 2015). Similarly, the fourth principle is concerned with contradiction in the activity systems. This principle implies that the contradictions can occur within or between elements of an activity system (Foot, 2014) and can cause hindrances; but also bring productive change and development in the activity. Finally, the fifth principle states the possibility of expansive transformations in activity

systems. This can happen when contradictions in the activity systems get intensified. This can be handled as deliberate collective effort to change (Engeström, 2001).

To understand the meaning of activity system, its interrelatedness with other activities should be considered. It means that an activity system should be studied with relation to one other or more activity systems with which it interacts (Havnes, 2010). This concept is represented in the figure two given below.

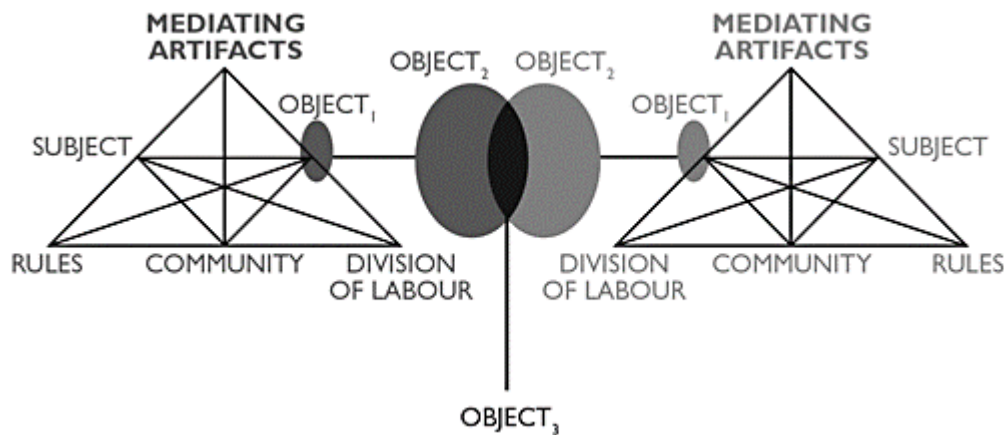


Figure 2: Two interacting activity systems as a model for third generation of CHAT (Engeström, 2001)

#### 4.1.2 Core notions of CHAT

Based on the core conceptual descriptions of CHAT above, we see that this theory focuses on that humans act together and communicate by adopting tools in social settings (Foot, 2014). So, artefacts, including language, signs and tools, play a prominent role in CHAT (Postholm, 2015). CHAT is therefore a useful analytical lens for understanding how individuals or groups and their goals or objects are mediated by conceptual and physical tools developed within communities of practice (Kim, 2012). These active and material notions in CHAT are thoroughly illustrated below.

**Activity:** In CHAT, the central idea is that an activity is influenced and directed by an actual motive. Thus, one activity differs from another due to the difference in their objects as motives. This is the case of the activity of human collective rather than focusing on individuals alone (Leont'ev, 1978).

Gretschel et al. (2015) argue that the concept of activity in the activity theory is “centred on the creation of an object and thus it is the object-oriented nature of human activity that defines the term activity in activity theories” (p. 52).

Mediated artefacts: CHAT centres on mediated actions carried out through historical and culturally formed artefacts (Wertsch, 1981). In other words, actions are mediated with tools. These tools can be either material or conceptual such as pen, pencil, computer or knowledge, skills, etc. Moreover, the tools reveal the historical records of the relationship between the subjects and the object of the activity on one hand. On the other hand, mediating tools “enable certain forms of actions, and constrain others” (Foot, 2014, p. 14).

Activity System: Activity system is the unit of analysis in CHAT (Gretschel et al., 2015). An activity system includes both the active, participatory role of individuals and the impact of the wider social system in which the agents operate (Havnes, 2010). In addition, activity systems are multi-layered in the sense that they have collective activity undertaken by actors with different roles, positions, and perspectives (Foot, 2014).

Object of an activity system: The object of an activity is a central element in CHAT. This distinguishes one activity from another. It is therefore the object of activity that gives it a determined and defined direction (Leont’ev, 1978). The object in an activity system can be the thing to-be-acted-upon, that is, how for example courses or subject matters are presented or delivered during classroom teaching. At the same time, as mentioned above, the object is the objectified motive, for example, when students are engaged in learning during a course. Similarly, an object can be a desired or intended outcome, for example when aiming at the students to achieve good results or to perform well in the exams (Foot, 2014).

CHAT contradictions: Contradictions in CHAT are “events which can hinder or promote the activity systems towards its intended outcome” (Gretschel et al., 2015, p. 53). In fact, contradictions create opportunities for innovations, for new ways of performing the activity. Such contradictions can occur within and/or between the components of an activity or activity systems. In other words, contradictions in an activity indicate “a misfit within elements [of an activity system], between them, between different activities, or between different developmental phases of a single activity”, (Kuutti, 1996, p. 34). On this basis, we can identify four types of contradictions: primary, secondary, tertiary and quaternary in the



activity system (Beatty & Feldman, 2012). The following table can provide a helpful overview of types of contradictions in CHAT analysis:

Table 2: Levels of contradictions

<b>Levels of contradiction</b>	<b>Characteristics of contradiction levels</b>	<b>Corresponding learning action(s)</b>
Primary	Occurs between the use value and exchange value of any corner of an activity system.	Questioning
Secondary	Develops between two corners of an activity system.	Analysing Modelling
Tertiary	Arises when the object of a more developed activity is introduced into the central activity system.	Examining model Implementing model Evaluating process
Quaternary	Occurs between central activity and neighbouring activities, triggered by tertiary contradiction.	Consolidating new practice Questioning

Adapted from Foot (2014, pp. 25-26)

A primary contradiction arises within each constituent element of the system. In other words, primary contradictions occur when factors have tensions within themselves (within tools, rules, etc.). Secondary contradictions arise between elements of an activity system (between rules and tools, etc.) whereas tertiary contradictions arise when the object of a more advanced activity is introduced into the central activity system (between two activities). Finally, quaternary contradictions occur between central activity system and other neighbouring activity systems (Engeström, 1987; Foot, 2014; Postholm, 2015).

Based on these core notions, the following section will explain which concepts will be used in the analysis in this particular study.

## 4.2 CHAT as a theoretical basis for current study

From the lens of CHAT, the study here considers various challenges being faced in using educational technologies in teaching and learning activities in a higher education context. Before dealing with the challenges as contradictions from CHAT perspectives, components of the activity system involved in this study are discussed.

To illustrate the concepts of CHAT in this study, subjects or actors are leaders, faculty members and students. At the same time, these subjects belong to different communities, for example, leaders form their own community with high dominance whereas faculty members or teachers form another. Similarly, students belong to their own community which does not belong to the staff of the faculty in question. These actors/ subjects therefore act upon their own specific objects (here object refer to desire to achieve an outcome/a result). From the perspectives of leaders, faculty members, objects in this context are, to enable students to perform well in the exam, to provide knowledge or to enhance students learning. Gaining knowledge or securing good grades is on the other hand the object of the activity from students' perspectives. For this, mediating tools play a crucial role, that is, mediating tools mediate the relationship between the subjects and the object, what the participants are trying to achieve (Gretschel et al., 2015). Here, educational technologies such as laptops, multimedia projectors, etc. are artefacts. These tools are crafted at a point in time and adapted over time, and are shaped by the needs, values, norms and user policies of institution as well as the students user preferences (Foot, 2014).

In this study, the communities of leaders, teachers and students can also influence on the other elements (here, outcomes, tools, etc.) of the activity system (Gretschel et al., 2015). The members of the community sharing the same interest and involvement with the same objects, are regulated by some rules, norms or values of interest. The rules in the perspective of faculty staff in this study are teachers' guidelines, policies, professional and social rules which govern the interactions with both leadership and students during teaching (Foot, 2014).

The tasks and responsibilities of using technologies in teaching and learning activities are here considered as a shared, negotiated process between involved subjects in the faculty versus student communities. In this regard, tasks of policy making, implementation of the policy, adoption of educational technologies, supervision and evaluation to ensure their proper use in teaching and learning activities are handled by different subjects in especially

the faculty staff and leadership, while students convey their experiences of these practices (Engeström, 1987; Foot, 2014).

### **4.3 CHAT contradictions as an analytical framework**

The analytical framework presented above is a guideline for me as a researcher to analyze and present the data, and helps to move to the right way of findings in the research. In this study, the researcher uses contradictions of CHAT as an analytical framework as discussed above.

According to Foot (2001), contradictions are illuminative hinges that open new views of understanding an activity system. They are thus present in every collective activity and indicate emergent opportunities for the development of the activity (Foot, 2014). They emerge and evolve within and between each of the six “corners” of the activity triangle, that is, they occur within and between six components of the activity system (Engeström, 1987). Thus, it is natural contradictions occur within or between those elements in an activity system.

The aim of the analysis in this study is here to identify contradictive features between the expected ambitions of technology implementation in the faculty leadership, teachers’ own notions and experiences and the students’ perception of technology use in class.

### **4.4 Summing up**

To conclude, CHAT provides the theoretical foundation in order to identify what role technology plays in enhancing teaching and learning in the observed setting. It can here be more useful to find different interacting activity systems with different subjects, objects, tools, etc.

In this study, the core concepts of CHAT are used to view and analyze interview and document data in order to address the research questions. Moreover, the concept of contradictions of CHAT is used to analyze different potentially conflicting factors and challenges with respect to technology use in the given context.

# 5 RESEARCH METHODOLOGY

This part deals with the overall methodological framework. It consists of research design, research methods along with data collection and data analysis procedures followed by the discussion of the validity and reliability of the study. Finally, the chapter presents the ethical issues and limitation of the study.

## 5.1 Qualitative research design

Qualitative research is concerned with “understanding how people interpret their experiences, how they construct their world, and what meaning they attribute to their experiences” (Merriam, 2009, p. 5). So, the present study adopted a qualitative research design and methods to interpret and explain what challenges are being faced to implement educational technologies in teaching and learning activities at FoE, Tribhuvan University, Nepal.

Qualitative research, according to Anderson and Arsenault (1998), is a kind of inquiry exploring phenomena in their natural settings. It uses multi-methods to interpret, understand and explain them. It is, therefore, “understanding experience as nearly as its participants feel it or live it” (Sherman & Webb, 1990, p. 7). In qualitative research, researchers believe that “there are multiple realities represented in participant perspectives, and that the context is crucial in providing an understanding of the phenomenon being investigated” (McMillan, 2008, p. 271). A qualitative research tries to reveal the meaning embedded in people’s experiences. However, the meaning is explained through the investigator’s own perception (Merriam, 1998).

For Sherman and Webb (1990) a qualitative research is directly concerned with experience as it is ‘lived’ or ‘felt’ or ‘undergone’ (p. 7). Therefore, qualitative research depends on the views of participants in the study (Creswell, 2012). Hence, this study, due to the nature of the problem and the research questions, employed a qualitative approach to investigate the case with the detailed and intensive study of perspectives and experiences of those people involving in teaching and learning activities with respect to educational technology.

## **5.2 Case study**

According to Yin (2014), a case study is an investigation of a contemporary phenomenon in depth and within its real-world context, and its purpose is to collect detailed, systematic, and in-depth information about the case of interest Patton (2002). Moreover, “it is important in case studies for events and situations to be allowed to speak for themselves, rather than to be largely interpreted, evaluated or judged by the researcher” (Cohen, Manion, & Morrison, 2007, p. 254).

In case study, multiple methods are used for data collection. The researcher concentrates on a single phenomenon or case, and describes and explains it on the basis of the data (Merriam, 1998). It is a holistic research approach that uses several sources of evidence to study or evaluate a specific phenomenon or instance (Anderson & Arsenault, 1998). Case study research design is employed when researchers are interested in insight, discovery and interpretation rather than hypothesis testing (Merriam, 1998) so it is in fact an interpretation of a case or entity in a natural context, defined and characterized by its time and place (Cronbach, 1975; McMillan, 2008).

In this study, the detailed analysis of a single case (Bryman, 2016) refers to the context of the Faculty of Education (Tribhuvan University), concerning the challenges in the use of educational technology. The case study research design in this thesis is applied to also involving student teacher experiencing technology use during courses and teachers and leadership perspectives on the premises for technology implementation in this context.

## **5.3 Empirical context**

As mentioned in the chapter two, Tribhuvan University is the largest university of Nepal in terms of the courses it offers, and the number of students and teachers. It runs different programs and courses under the faculties of Education, Humanities and Social Sciences, Management and Law. It also runs courses through five institutes of Agriculture and Animal Sciences, Medicine, Engineering, Forestry, and Science and Technology (University Grants Commission, 2010/11).

The specific case setting in this study is at the Faculty of Education (FoE), which is the largest faculty of Tribhuvan University in terms of the number of students and the number of campuses (Tribhuvan University, n.d.-a).

For the current study, the Faculty of Education is selected with specific focus on the teacher education program. The rationale behind this selection is that it is the largest faculty in terms of students and campuses providing teacher education, which can reflect the current situation in the use of educational technologies in teaching learning activities in Nepalese higher education. This implies that the selected case can have a comparative and illustrative value for other educational programs and disciplines in Nepalese higher education.

## **5.4 Methods of data collection**

There are multiple methods for collecting data for qualitative research. In qualitative research, interviews, observation, document analyses, etc. are some ways of collecting the intended data (Bryman, 2016). Similarly, Yin (2009) discusses six commonly used sources of evidence in case study research namely documentation, archival records, interviews, direct observations, participant-observation and physical artefacts. After all, mostly observation and interview with document analysis are the primary means of data collection in case study (McMillan, 2008).

For this study, interviews, document analysis and observation were used for data collection. Nevertheless, the main source of data was based on semi-structured interviews of participants. The document analysis and observation were used only to supplement the ideas elicited from the interviews. The reasons behind the selection of these methods of data collection are that multiple sources of evidence are the development of converging lines of inquiry (Yin, 2009) and provide greater details and depth of information (McMillan, 2008). In this way, findings from the interviews can be mirrored against documents and my observation from being in the setting and seeing the physical surroundings directly. This last aspect is important also in order to understand possible limitations in technology use due to physical infrastructure in lecture hall, seminar rooms and technical equipment.

### 5.4.1 Semi-structured interview

Using interview as a main data source in this study also calls for some more thorough outline of this data collection process. Firstly, interviewing is one of the ways of extracting data to study a case in qualitative research. It is a common means of collecting qualitative data (Merriam, 1998). In qualitative research, interviewing is also typically conducted unstructured or semi-structured ways (Bryman, 2016).

An interview in collecting data for qualitative research allows a researcher to enter into the other person's perspectives (Patton, 2002) so that required information can be obtained. Therefore, semi-structured interview for this study was chosen as it allows informants or respondents to express their opinions, experiences, perspectives freely as well as it allows me as a researcher to frame the data within certain thematic boundaries. The flexibility (Bryman, 2016) is also a strength of semi-structured interviews, which enables the researcher to go back and forth in posing questions in order to elicit the required data.

With respect to this study, semi-structured interview was applied as the main instrument of data collection to get detailed views of participants with regard to technology use in teaching and learning and what challenges the informants experienced in the education context. For this, interview guides with a list of questions to cover specific topics (Bryman, 2016) were prepared. The interviews were conducted with six separate people from FoE, TU, Nepal. The interviewees included a leader, a teacher and four students in a group.

Table 3: An overview of interview

S.N.	Title of the interviewee	Number	Interview date
1	Leader	1	2.1.2017
2	Teacher	1	5.1.2017
3	Student	4	29.12.2016
Total		6	

The leader of the Faculty of Education was interviewed in order to collect data regarding strategic plans and challenges faced in the implementation of educational technologies at the department level. Similarly, an interview was conducted with a teacher so that the opportunities, difficulties and challenges in the use of educational technologies in teaching and learning activities could be sorted out. Finally, four students in a focus group representing different departments were interviewed. This helped me as a researcher to maintain a balance in data representing several related activity systems of the students and the faculty level. Students were here useful for the researcher to gather information regarding how their learning was enhanced with educational technologies and what challenges they were facing in adopting educational technologies.

#### **5.4.2 Document analysis**

An analysis of available documents relevant to the study was also as a source securing the interpretation of the interview data. Bryman (2016) argues that “virtual documents provide a rich and varied source of documents for the researcher to analyze” (p. 567). Furthermore, documents can provide specific details to verify information from other sources (Yin, 2009). It is therefore documents are important sources of data in a research, which also validate other sources.

So, according to the nature of the current study, document analysis was used as a tool to obtain information especially related to policy with respect to technology use in higher education context in Nepal. Here, document analysis also allowed me to identify the gaps between policy of the ministry, the university, and the actual implementation of educational technology in teaching and learning at the faculty level. In addition, it helped to back up the findings from the interview data.

The analyzed documents draw on a broad range of sources such as Educational Information-2015, the Proposed Higher Education Policy-2014, Information and Communication Technology Policy-2015 and University Grants Commission Work Management Rules, (2004). These sources are listed in the following table.



Table 4: An overview of documents

S.N.	Title of documents	Translated title	Publisher
1.	Shaikshik Suchana, 2072	Information on Education, 2015	MoE
2.	Uchcha Shiksha Policy Prastawana, 2070	Proposed Higher Education Policy, 2014	UGC
3.	Suchana tatha sanchar prabidhi niti, 2072	Information and Communication Technology Policy, 2015	MoIC
4.		University Grants Commission Work Management Rules, 2004	Nepal Law Commission

Through these documents, I have tried to identify what goes on in the organization and uncover how the organization is coping with technology. In this way, the documents are used as windows on the social and organization realities (Bryman, 2016). However, it is challenging for a researcher to find relevant documents. So, a systematic search and selection of only the most relevant documents have been conducted in this study (Yin, 2009). These documents were located and accessed, and their authenticity (Merriam, 1998) was checked before they were used.

### 5.4.3 Observation

Observation offers an investigator or observer the opportunity to gather live data from naturally occurring situations. It is a powerful tool for obtaining insight into situations (Cohen et al., 2007).

For this study, observation was not a major tool for collection of data. However, it provided basic information to complement the ideas elicited from the interviews with regard to the use of educational technology in teaching and learning activities at the given context of the Faculty of Education. During the data collection, I therefore observed the infrastructures including classrooms, libraries, etc. so that the findings from interviews and documents could be validated as emerging findings (Merriam, 1998).

The following pictures illustrate the classrooms and ICT lab at the FoE.



Figure 3: Picture of classroom



Figure 4: ICT Lab at FoE

## 5.5 Sampling, data analysis and interpretation

A part of the analysis also regards how informants and sources were selected. There are in this respect some ways of sampling from the population. The sample population was here purposively sampled for this study because “the goal of purposive sampling is to sample cases/participants in a strategic way so that those sampled are relevant to the research questions that are posed” (Bryman, 2016, p. 408). The judgement of the researcher regarding who can provide the best information to achieve the objectives is considered in purposive sampling. He/she only goes to those people who in his/her opinion are likely to have required information (Kumar, 2005). Therefore, for this study, sample population was selected based on the researcher’s purpose to address the research questions.

Six participants were here purposively selected for the interviews. One of them was a leader of the Faculty of Education, Tribhuvan University, Nepal. Similarly, a teacher from the faculty was interviewed. Finally, four students in a group representing different departments were interviewed.

Analyzing data is one of the complicated tasks as it “involves working with data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others” (Bogdan & Biklen, 1998, p. 157). While analyzing the data from the interviews, first they were transcribed into written summaries. These transcriptions and the summaries were thoroughly looked through multiple times in search for a pattern in the data and in identifying possible contradictive features. Then they were categorized under different themes or categories. Apart from interviews, documents were also used to confirm the patterns found in the data and to support and relate contradictive features to program statements. During the analysis process, I therefore simultaneously read the documents thoroughly. From the documents, significant information was sorted out and extracted. Finally, the data are discussed and interpreted based on concepts of theory and research questions.

## **5.6 Issue of validity and reliability**

The issue of validity and reliability is significant in research. By and large, validity and reliability are criteria to measure how valid and reliable the findings of a study are.

In research, validity refers to “the issue of whether an indicator (or set of indicators) that is devised to gauge a concept really measures that concept” (Bryman, 2016, p. 158). In addition, Yin (2009) opines that the finding of a study is likely to be more convincing and accurate if it is based on several different sources of information. Thus, the findings of this study can, on the basis of its diverse sources, allow me to describe the reality of the case more convincingly, or valid. This again can provide a better opportunity to generalize to a wider population, similar situations (Cohen et al., 2007; Merriam, 1998).

On the other hand, reliability in research is concerned with the consistency of measures (Bryman, 2016). It refers to the extent to which research findings can be replicated over time (Merriam, 2009). In this respect, Lewis and Ritchie (2014) point out that quality of the data and its interpretation are important in maintaining the reliability of findings of a research. As

the goal of reliability is to minimize the errors and biases in a study (Yin, 2009), the selection and development of appropriate instruments for gathering data required, the selection of an appropriate sample and the selection of appropriate methodology for answering research questions (Cohen et al., 2007) helped to maintain the reliability of the findings of the current study. The data obtained from interviews, document analysis and observation in this sense represent a convincing basis to ensure the findings and conclusions in this study.

## **5.7 Ethical issues**

In research, ethical issues are important to be considered throughout the research process, but they are especially important during data collection and in writing and disseminating reports (Creswell, 2012). The issues of ethics “may stem from the kinds of problems investigated by social scientists and the methods they use to obtain valid and reliable data” (Cohen et al., 2007, p. 51).

To address the ethical issues concerning the respondents for this study, I considered the principles of informed consent, anonymity and confidentiality, protecting participants from harm (Cohen et al., 2007; Webster, Lewis, & Brown, 2014).

Following the principle of informed consent, I approached the prospective participants by explaining the purpose of the study. They were also given the opportunity to refuse or accept their participation in the interviews. Moreover, they were informed that their participation in the study is voluntary (Bryman, 2016; Cohen et al., 2007).

The principles of anonymity and confidentiality is here equally important (Cohen et al., 2007). In this respect, I convinced the informants that the information provided would not reveal their identity, and the information would be well protected and used only for the purpose of this study. The participants were here guaranteed to maintain anonymity in analyzing, writing and disseminating the thesis (Creswell, 2012). Considering the principle of protecting participants from harm, they were assured that they would have no harm while taking part in the interviews and that records of individuals were maintained, and that all interview data would be deleted when ending the project (Bryman, 2016).

## **5.8 Limitation of the study**

All research is confined to limitations both regarding data collection and the conclusions that can be drawn from the findings. This study is limited to a case study of the Faculty of Education, Tribhuvan University, Nepal. Thus, its findings may not be applicable to other contexts. It is based on only the challenges about technology use in teaching and learning in this context. As a result, the findings of the study do not cover other aspects of technology use.

The current study is further based on a small number of informants selected purposively due to limited time of the field work. Further, data were collected mainly through interviews and documents although observation of physical environment during the field work contributed to the study. Therefore, findings of the study cannot be generalized to other contexts without clear reservations of these limitations. This study is further limited to the analysis of a small sample of official documents.

Finally, the findings of this study in a Nepalese context may not be applicable in other developing countries even though these countries share more or less same features.

# **6 DATA PRESENTATION AND ANALYSIS**

This chapter deals with an analysis and presentation of the data on the basis of documents and interviews with a leader, a teacher and four students. Firstly, it presents an analysis and main findings from the documents related to policies and strategies in technology use in higher education in Nepal and how this relates to priorities at the Faculty of Education, Tribhuvan University. Secondly, it describes the institutional context, policy documents and infrastructures along with the discussion of findings based on the document analysis of institutional strategies and observation of physical environment. Thirdly, it describes potential and practical implementation from teacher and student perspectives. Finally, it analyses the contradictory features that seem to emerge based on CHAT perspectives. This is followed by the summary of findings related to the research questions of this study.

## **6.1 Policy on educational technology use in Nepalese higher education**

Policies are important orientation measures for an institution such as a university. Policies are therefore important in signaling ambitions and obligations, and are equally important in assessing achievement of these ambitions. They are in fact, guidelines showing the way forward.

This section deals with the attempts made by ministries to use technology in the context of Nepalese higher education. It analyses policies on ICT use in higher education particularly and attempts to reveal how Ministry of Education and Ministry of Information and Communication and University Grants Commission look at the ICT use in education in Nepal. Therefore, to obtain information on policy on ICT use in higher education, particularly the following four official documents were examined.

Table 5: Overview of documents used for the analysis

S.N.	Title of documents	Translated title	Publisher
1.	Shaikshik Suchana, 2072	Educational Information, 2015	MoE
2.	Uchcha Shiksha Policy Prastawana, 2070	Proposed Higher Education Policy, 2014	UGC
3.	Suchana tatha sanchar prabidhi niti, 2072	Information and Communication Technology Policy, 2015	MoIC
4.		University Grants Commission Work Management Rules,2004	Nepal Law Commission

*Educational Information* document provides overall information regarding education. While examining *Higher Education Policy -2015* under this, policies and strategies for higher education in universities and institutes are identified. But this policy document does not exactly state the use of ICT or technology in teaching and learning (Ministry of Education, 2015). Therefore, the use of ICT or technology in education is not prioritized by the Ministry of Education in particular or how to implement digital technology in practical teaching. The document does although convey digital ambitions on a larger society scale but without going into details.

Similarly, while analyzing and examining *Proposed Higher Education Policy-2014* document, the use of information and audio-visual technology is highly encouraged in higher education. It is also mentioned that budget for the development of higher education infrastructures and technology will be increased and reached 10% in forthcoming four years. In other words, the *Proposed Higher Education Policy-2014* focuses on the ICTs in teaching, learning, administrative, etc. activities, for which funds for the development of higher education institutions and technology will be increased every year (University Grants Commission, 2014). This document is therefore more specific in its expectations and ambitions both in principal terms (specific areas of implementation) as well as in providing resources.

Regarding ICT use in teaching and learning context, *Information and Communication Technology Policy-2015* (ICT Policy-2015) formulated by Ministry of Information and Communication, clearly states that appropriate measures will be taken to facilitate and promote the integration of ICTs in the entire Nepalese educational system to support administration, pedagogy, learning and research, with a view to improving the quality of education and training at all levels and enhancing access to education. Furthermore, ICT capacities of tertiary level educational institutions will also be enhanced in a way that helps improve broad learning outcomes. For this, arrangements will be made to ensure effective implementation of ICT in Education through Master Plan-2013-2017 formulated by the Ministry of Education. Moreover, a *National ICT Research and Development Fund* will be created with a view to promoting a) The development and deployment of applications and relevant content associated with government developmental goals to be delivered over telecommunication networks (including via smart phones and tablets) and through telecentres, b) The development of telecommunications and Information technology domains, working in conjunction with the international research and development community (Ministry of Information and Communication, 2015). Hence, adequate emphasis for technology use in education is placed by the Ministry of Information and Communication in a more explicit way compared to the two previous documents presented by the educational agencies.

From the examination of *University Grants Commission Work Management Rules-2004*, many tasks are carried out by the Commission in order to maintain quality of higher education in Nepal. It provides financial assistance to universities for the development and maintenance of physical infrastructures. Similarly, it states that financial support can be provided to produce study materials, reference materials, etc. Furthermore, for symposium, workshops, technical training, etc. shall be conducted to enhance teachers' quality (University Grants Commission, 2004). This document mentions technology, but the aim is still more on emphasizing quality work on a broad scale rather than highlighting the role of ICT.

The above presented documents indicate that the use of technology in Nepalese higher education is encouraged. For the use and integration of ICTs in teaching, research, etc. the documents-ICT Policy- 2015 is very clear. As a result, Ministry of Information and Communication has formulated *ICT in Education Master Plan-2013-2017* with the help of Ministry of Education for its effective implementation. In addition, *University Grants*



*Commission Work Management Rule-2004* is also clear in considering the use of ICT in Nepalese higher education. The Commission is committed to providing financial assistance to universities to develop their infrastructures, resources, research, etc. But, the document of *Higher Education Policy -2015* issued by Ministry of Education does not mention anything about how the use of ICT can contribute to enhance teaching and learning in Nepalese higher education or how this is supported through more practical measures of implementation. Therefore, the Ministry of Education neglects the importance of being specific about how to implement and evaluate the outcomes in using ICT in teaching and learning. Similarly, the *Proposed Higher Education Policy- 2014* has mentioned just few lines stating that technology is encouraged in higher education increasing percentage of budget without outlining any further expectations and how this should be assessed.

It therefore seems that the Ministry of Education is less concrete in its governance statements related to technology use towards its own sector, compared to the Ministry of Information and Communication. This also displays that there are few incentives following the policy documents stated by the Ministry of education which are binding for the higher education sector in Nepal.

Based on these preliminary findings, the analysis will now turn towards measures taken in the case-context of the Faculty of Education in their effort of using technology in their programs.

## **6.2 Faculty of Education – institutional features and initiated technology projects**

Faculty of Education has taken several initiatives in order to prepare their staff for technology use. In collaboration with projects like Second Higher Education (SHEP) and the Norwegian Programme for Capacity Building in Higher Education and Research for Development (NORHED) under Norwegian Agency for Development Cooperation (NORAD), the faculty initiated ICT training to teaching and non-teaching staffs to enhance them in using ICTs in teaching and learning activities. Furthermore, according to the faculty leader, an ICT lab has also been set up at the Faculty (Tribhuvan University, 2014).

## 6.2.1 Potential and practical use of technology

For obtaining formal information on technology use in teaching at the Faculty of Education, Tribhuvan University, the official website of Faculty of Education was examined. Apart from this, a leader of Faculty of Education was interviewed aiming at identifying policies, plans and difficulties or challenges in implementing educational technologies seen from an institutional perspective.

Though there was no official policy document about ICT or technology at the faculty, the official website of Faculty of Education (FoE) mentions ICT in several respects. Firstly, it describes the training of 100 hours for teaching and non-teaching faculty members which was conducted in different campuses. In addition to this, FoE makes grants available to purchase computers, and to establish ICT labs so that campuses can run ICT training for its teaching and non-teaching staff (Tribhuvan University, n.d.-a). These formal initiatives illustrate that there are some strategic measures taken regarding technology integration at the institutional level, even though these measures are somewhat broad and unspecific about practical use in teaching and learning.

Below we therefore go further into the interview data displaying the leadership-representative's opinions about the potential in technology use related to teaching and learning. In this regard, a leader from FoE was asked a set of questions.

In the answer of the question *What strategic plans do you have for the implementation of educational technology at the Faculty*, the leader reported in the interview that the efforts made to adopt technologies at the Faculty of Education, have been supported by SHEP and NORHED. With the assistance of SHEP and NORHED, 66 laptops and some multimedia projectors were purchased and an ICT lab was established. In addition, a NORHED project, which aims at supporting the capacity building of higher education in developing countries, has promised to make the FoE sound technologically. This support is therefore considered as essential in enabling technology implementation at the faculty.

With respect to plans for implementation of technology, the leader also states *FoE's accounting system, examination system, and teaching and learning systems which will be technologically enhanced. Moreover, e-library will be systematized and advanced with technology*. From this, the leader is planning to develop the entire teaching and learning systems along with examination, evaluation, etc. in near future, as digitally supported.

Similarly, in the answer of the question *What types of educational technologies are used in teaching and learning*, the leader reported that laptops, multimedia, projectors and tablets are used. He further added that the administration has provided all faculty members, students and the facility of Internet via free Wi-Fi. However, he also noted the information *despite some available educational technologies at the faculty, some classes are being run at the faculty without using them*. This implies that teachers do not use available technologies in their teaching.

Regarding challenges on technology implementation, the informant reported that the entire FoE is facing several obstacles related to infrastructure, power supply, economy, and teachers' competency and motivation. He reported that a supportive physical infrastructure is lacking. Furthermore, irregularity of power supply is a hindrance, where also alternative power through solar system appears insufficient. Similarly, it was reported that the physical infrastructure is not well enough managed with technology even though SHEP and NORHED have contributed to solving these problems to some extent. At the same time, all teachers are not capable in handling technology. In this respect, the leader in the interview stated that *all teachers especially those belonging to the old generation, who are soon getting retired, are reluctant to learn how to use and utilize ICTs in teaching and learning*. This is the case even though the training has been provided by the administration (Tribhuvan University, 2014).

In sum, seeing some strategic efforts in both developing competencies and infrastructure for technology use, the lack of clear goals and setting expectations to be evaluated appear to be absent at the institutional level.

### **6.2.2 Observation of physical environment and practical use of technology**

Visiting the institution and observing its infrastructure and location also provided some additional valuable information in considering the impact of the above described initiatives in developing viable environments for using technology in teaching and learning at the faculty. This is especially important regarding the physical infrastructure to identify the feasibility of implementing technology use. Interestingly, while reviewing the physical environment, all classrooms were not equipped with any sorts of technology. Furthermore, the physical infrastructure was insufficient in order to support teaching activities and online resources, as none of the classrooms were connected to the Internet. No smart boards were fixed so that

teaching materials could be displayed through multimedia. In summary, the physical environment observed at the empirical setting of this study was so poor, that a full implementation of technology use in teaching appears as very unlikely.

### **6.2.3 Discussing findings from document analysis and institutional strategies related to technology use**

From the examination of analysis of documents related to technology or ICT use, FoE is guided and directed by *ICT Policy-2015* and *Proposed Higher Education Policy-2014*. For the development of ICT infrastructures, other resources, research, etc. budget allocated for education is promised to increase every year. Similarly, University Grants Commission provides financial assistance to universities to carry out various activities to ensure quality of higher education (Ministry of Information and Communication, 2015; University Grants Commission, 2004, 2014).

More surprisingly, no existing documented policy documents of FoE and TU with regard to technology or ICT use in teaching and learning was found. That means, FoE and TU neglect developing and presenting transparent strategies in their approach in technology use in line with the essence and main spirit of policies formulated by ministries and UGC.

The interview with a leader also revealed that the involvement of two projects (SHEP and NORHED) are remarkable in capacity building in terms of ICT use in strengthening capacity and quality of faculties. SHEP and NORHED have had a crucial role in establishing ICT infrastructure at FoE, TU (Leader/interview). More interestingly, in this relation the observation of the physical environment revealed that the Faculty of Education is not rigged for technology use in classroom-based activities. Therefore, a lack of physically available technology is a huge challenge for technology use in this case. Similarly, teaching, learning, evaluation, administration, accounting systems are not equipped and advanced with technology. The question therefore is how the resources supported by SHEP and NORHED are utilized and to what extent these resources can be allocated more directly to support teaching and learning.

## 6.3 Teacher perspectives on potential and practical implementation of technology in teaching and learning

From the previous focus on institutional strategies and infrastructure, this section deals with teacher perspectives on technology use. In order to understand teacher's views on technology use in teaching, a teacher from FoE, was interviewed to elicit perspectives on the potential of and practical use of educational experiences in using educational technology.

### 6.3.1 Teacher perspectives on technology use

The teacher interview was based on an interview guide specifically aiming at bringing forward the teachers' views on how teachers see the potential in using technology, but also how they apply technology in their teaching and working practices. Starting with the potential of technology, the teacher responded to the following question: *What is your understanding regarding educational technology in teaching and learning activities?*

The teacher's response to this question was that he considered technology as an important mediating tool for both students and teachers. The informant considered it as helpful in teaching and learning activities as it facilitates both teachers and students. Similarly, through educational technology, it is easier for teachers to prepare their lessons, deliver them and receive feedback.

He further added that it is easy to create an interactive learning environment. Students can easily share ideas and answers to other friends and teachers through the means of some technology devices. More importantly, he emphasized:

*... students and teachers can establish immediate communication through technologies. If students have some problems or difficulties in understanding some subject matters, they don't have to wait for another day.*

In the above extract, the teacher emphasizes the efficiency in technology use. Moreover, the teacher's perception on educational technology is that it can create and strengthen collaborative learning:

*Sitting in a corner of a room, we can share information, materials, works, etc. with the help of technologies.*

The teacher here expresses how technology use can be helpful in collaborative learning between students, in a way which enhances both teaching and students learning.

At the same time, the teacher stated several limitations in practical technology use. First of all, the informant noted that mainly multimedia projectors are used by the teachers. Multimedia projectors are used to display slides of materials. Beyond that, they use laptops as an educational technology for preparing lessons, providing information to the students or colleagues, searching for literature, etc. at the faculty. On the other hand, the informant argued Internet access is not as reliable as it is supposed to be due to poor network facilities. This hinders sometimes the use of the available technology. The most interesting thing revealed from the conversation with the teacher is here illustrated in the following extract:

*Most teachers and students perceive only slides displayed through the multimedia projector as technology.*

What we see from the extract above is that teachers and students are not acquainted with technology and its benefits in education. Further, it shows the real condition of technology use at the faculty.

Regarding the potential of technology use in providing and receiving feedback, the teacher reported that teachers rarely use technology. Hence, teachers rarely use technologies in entire teaching practice of the faculty.

Another interesting but less surprising thing reported by the teacher informant in relation to whether *all teachers use technology in their teaching* is also that some teachers belonging to the old generation, and those who are getting retired soon, seldom use technologies. This tendency was also confirmed previously by the informant representing the leadership. Even though they have been provided training on how to use ICT to enhance teaching and learning, the older generation of teachers seem therefore less motivated in making a transition in providing ICT as part of their teaching practice.

But also, here as in the previous section, a clear pattern is pointing towards the limitations in the physical technology environments. This implies that even though technology or ICT can

enhance teaching and learning as displayed in this teacher interview, teachers at the faculty of education are facing severe challenges in practical implementation of digital resources.

### **6.3.2 Findings on potential and practical implementation of technology**

The data elicited from the interview with a teacher show that teachers perceive technology as a useful facilitating tool through which interactive learning environment can be created.

Additionally, it is considered as helpful in collaborative learning as it provides teachers and students the facility of sharing message, ideas, views related to their learning.

But the interview with the teacher revealed limited types of technology available in teaching. Similarly, it was revealed that technology is rarely used in student evaluation and in the process of providing feedback. Consequently, most teachers and students perceive only slides displayed through the multimedia projector as technology use.

## **6.4 Student perspectives-potential and practical implementation**

Below we continue by addressing students' perspectives on technology use in learning. More specifically, it deals with how students perceive the potential of technology, how it is used in learning, and what challenges they are facing in practical use.

### **6.4.1 Student perspectives on technology use**

In order to elicit students' perspectives on technology use, a focus group interview with four student informants was conducted. These four students studied at the Master's level at the Faculty of Education. The interview was prepared on the basis of a semi-structured interview-guide. This specifically aimed at letting the students express their understanding on educational technology and the opportunities they see to enhance teaching and learning. They were also asked about the practical use of technology during their on-going period as students.

A clear response from all the informants was that they had limited knowledge about technology in education in general. They did although add that technologies in their view

potentially can enhance their learning. In asking the students how technology can enhance learning, they noted that it can help to establish interaction among students and teachers, and provide an opportunity for sharing their thoughts, ideas and problems. They also were clear on the potential of receiving and distributing information.

In the response of the question *What sorts of educational technology do your teachers use in the class*, they reported that teachers mostly use PowerPoint and laptop. In this regard, one of the students added:

*When teachers teach, they display slides through this media. This makes it easier for us to understand the lessons delivered. However, all the teachers don't use this technology.*

Regarding the extent to which the technology is used to facilitate students learning, they expressed their dissatisfaction. They expect all the teachers to use technologies to prepare lessons, deliver them, assess students' performance and provide feedback to students. But as they stated, they never receive feedback on their assignments or works electronically.

In the response of *What sorts of technology do you use in your learning*, they added that students mostly use their own mobile phones to share materials and exchange messages related to their lessons and courses. Few students use laptops in their learning. Similarly, the students were asked whether they have the facility of e-library and Internet at the Faculty. In this regard, they hinted they have no idea about an e-library. At the same time, they said that Internet facilities provided via free Wi-Fi is very unstable and almost useless due to poor and low speed.

Finally, the students were posed the questions: *What challenges do you see in the implementation of educational technology at the Faculty and do you face any challenges to use technology in your learning? If so, what are they?* In the response of the first question, they underlined challenges related to financial issue as well as the unwillingness of some teachers to learn how to use ICTs. They further added irregular power supply as a problem. For this, they blame that the administration has not made sufficient efforts to solve the problem. As far as the second question is concerned, they reported that they have no easy access to Internet. Due to these limitations in infrastructure and financial limitations, the use of technology to support their learning is very limited.



## **6.4.2 Findings on perceived potential for own learning and teaching practices**

Based on the previous examination, students perceive that technology can enhance their learning especially in creating interactive learning environment. In other words, technology can establish interaction among students and teachers so that they can share ideas, opinions and information more easily.

One of the most important points identified from the data is that students rarely use technology in their learning. On the other hand, most students use their cell phones but very few students use laptops for learning purposes. Similarly, the interview revealed that students have no knowledge about the e-library. In fact, it can be summarized in a sentence that students are not familiar with technology in their educational setting. It is therefore a clear pattern that the use and practice of technology in teaching and learning is limited in this case-context seen from a student perspective.

In continuance from this technology use in teaching at FoE was according to student informants considered as unsatisfactory.

With respect to challenges the students face in using technology in their own learning, finance was identified as the most important. Due to financial problems, they could not afford their own devices. In case of FoE, irregular power supply, lack of fund and teachers' unwillingness are identified as the main challenges. For this, they blame the administration for not prioritizing the matter sufficiently.

## **6.5 Analysis of contradictory features based on CHAT perspectives**

In this section, contradictory features emerging from the data in the previous sections are analyzed from CHAT perspectives, and discussing these findings in relation to policy, institutional leadership, teacher perspectives, and student experiences. Firstly, it presents an analysis of policy versus institutional goals and leadership. Secondly, it analyses leadership and teacher perspectives. Thirdly, it discusses the teacher perspectives versus infrastructure followed by teacher perspectives/practice versus student experience. Finally, it presents a summary of findings and what these imply regarding technology integration.

### **6.5.1 Policy versus institutional infrastructure, goals and leadership-opinions**

While examining the documents related to ICT use, it can be concluded that policies have been formulated to provide guidelines and encourage educational institutions for the promotion and integration of ICTs to support administration, pedagogy, learning and research to improve the quality of education enhancing access to education (University Grants Commission, 2014). Ministry of Education, Ministry of Information and Communication and University Grants Commission aim explicitly at enhancing administration, pedagogy and research through ICTs. Thus, improving educational quality through ICTs is a main object in the view of a CHAT perspective (Engeström, 1987).

The physical infrastructure at FoE has on the other hand no opportunity to meet this object. Technology implementation is here facing severe challenges because the institution owns no classrooms advanced and equipped with technology. This limited physical infrastructure characterizes the entire faculty as an activity system including accounting, examination, evaluation and e-library. In this sense, the object contradicts the prospect of a successful outcome of technology integration. We can therefore identify that the physical environment is a clear contradictive challenge causing a main problem in technology use at FoE.

In our further analysis two main activity systems are identified. At the institutional level, leaders, teachers and other staffs form an activity system of the FoE organization whereas students form another, which we here label as the student community. Similarly, at the highest level, or dominant level, leaders at policy making level form an activity system whereas teachers, staffs and students make another. The latter illustrates conflicts between central activity system (i.e. a dominant activity system) with other neighbouring activity systems (Engeström, 1987; Foot, 2014). In other words, leader, teacher and the whole FoE are not working in accordance with the essence of policy from the ministries, which create contradictions.

### **6.5.2 Leadership and teacher perspectives**

Focusing on FoE as a social activity system, this institution includes leaders, teachers and other staff and how they engage with technology as a part of the main object of activity. To

achieve this object, the activity has although to be mediated through artifacts such as infrastructure, curriculum and other resources (Engeström, 1987; Leont'ev, 1978).

Given the lack of these resources, this contradiction is illustrated as follows in the figure given below:

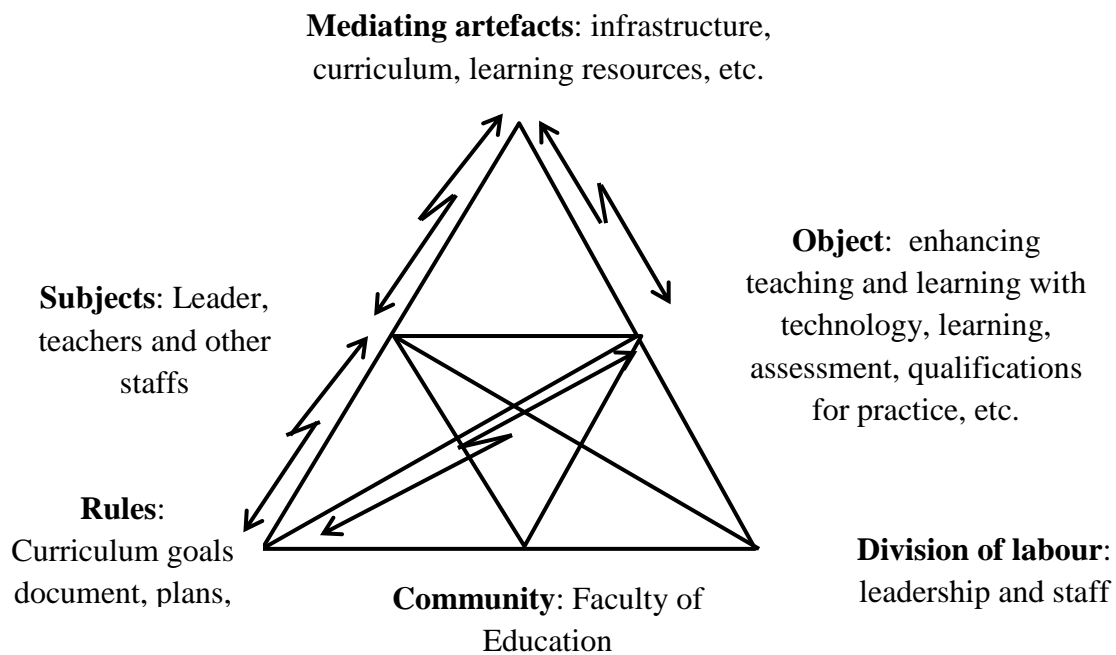


Figure 5: An activity system at the institutional level

The above figure illustrates how FoE including the leader, teacher and other staff (subjects) are involved with the aim of teaching and learning with technology (objects) regulated and directed by curriculum goals, documents and plans (Rules). In this activity, the community of Faculty of Education with different people (i.e. division of labour- leaders, administrator, teacher, etc.) clearly display how they are hindered from achieving this object due to lacking infrastructure (Engeström, 1987; Foot, 2014).

While achieving the object of student learning, the contradictions are noticed mainly on the technology involved in this process. While FoE provides some technologies (e.g. Laptops, multimedia) to the teachers to enhance teaching and training on how to use ICTs (leader/interview), the tensions trigger a conflict between rules (plans) and subjects experienced challenges in practices. In CHAT, this conflict is termed as a secondary contradiction which takes place due to conflicts between different nodes of an activity (Foot,

2014). This is supported by the teacher in the interview reporting that cost for purchasing technology and maintenance is almost non-existent. This conflict between leader and teacher triggers another contradiction between leadership and staff, where unsupportive physical challenges for teachers (subjects) to achieve their objects. Therefore, contradictions between artefacts and objects also trigger a conflict between the subject and the object of activity. Below we will continue following this notion by analyzing the teachers' experiences more thoroughly.

### 6.5.3 Teacher perspectives versus infrastructure

The data show that teachers (subjects) according to the rules of the activity of FoE are obliged by guidelines and lesson plans in use of digital artefacts in the activity of teaching and learning (Engeström, 1987; Leont'ev, 1978). The figure six here depicts the notion where teachers are directed through rules to the object of teaching through the curriculum. For obtaining this outcome, tasks are divided and carried out by different people in the community. In other words, the subject-object (teacher-student) relationship was expected to be mediated by technology. This formal structure of rules in the activity occurs as follows in this analysis:

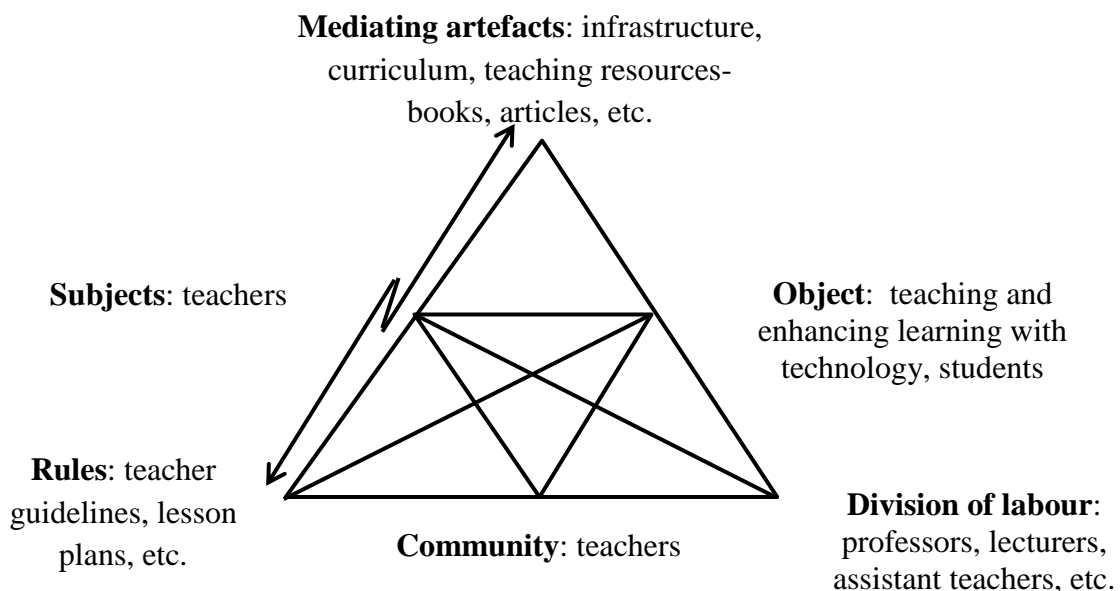


Figure 6: An activity system of teacher

From the analysis of the teacher interview, prospects on enhancing learning with technology emerges as virtually impossible beyond simple visual presentations as the supportive physical infrastructure is unsatisfactory and limited. That means that FoE is not functioning in line with the *Proposed Higher Education Policy-2014 and ICT Policy-2015*, which inspire universities to develop themselves technologically (Ministry of Information and Communication, 2015; University Grants Commission, 2014). Moreover, while University Grants Commission Management states that universities are provided financial assistance to develop their infrastructure (University Grants Commission, 2004). This lack of physical environment for technology use is a clear contradiction with policies. In other words, technology practices at the institutional level due to lack of physical environment contradicts the prospect of both object of ambition and resources for technology use.

### 6.5.4 Teacher practice versus student experience

Bringing the analysis one step further, we now approach how the Faculty of Education relates to student experiences as a separate activity in this study. Given that the Faculty of Education (FoE) aims at providing education while students aim at attaining competence and a degree (Engeström, 1987; Leont’ev, 1978). Even though students and teachers are triggered by different objects, they share objects in their ultimate outcomes. It is therefore important to illustrate how these two interacting activity systems relate to and influence each other (de Lange, 2010).

The whole concept of these activity systems is illustrated below in Figure 7.

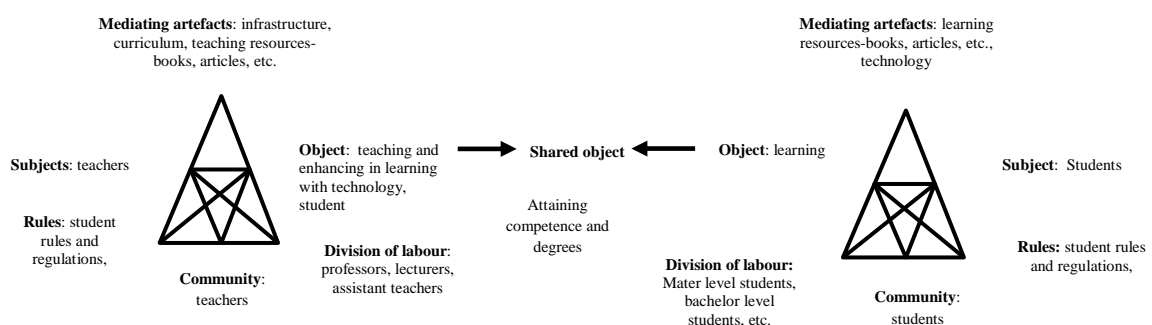


Figure 7: Two interacting activity systems based on Engeström (1987)

The above model illustrates two interacting activity systems (i.e. Faculty of Education and students). A challenge identified here is to some extent teachers’ unwillingness to prepare lessons by using ICT. The contradiction emerges here in the report from the leader and the

teacher versus students. The conflict is in students expecting the use of technologies to enhance in learning while this rarely happens or only in very limited ways. From a CHAT perspective, we can identify conflicts between these two activity systems (institutional and students) (Foot, 2014), which are therefore triggered by both absent technology infrastructure and the lack of using technology which students believe to be possible in enhancing their learning. In this sense, the conflict not only concerns unavailable physical artifacts but also the prospect of not prioritizing this issue at the institutional level.

## 6.6 Discussion of findings

The aim of this study was to identify the implementation of ICT policies on technology use in teaching and learning at the Faculty of Education, Tribhuvan University. Furthermore, the aim was to identify challenges faced in technology implementation. In order to address these aims, three research questions were formulated in the introduction which now will be discussed below.

The data elicited from the document analysis and interviews with a leader indicated that the use of technology in education is encouraged. However, a big gap between policy and practical use was identified.

Regarding the first research question: *What are the policies and strategies regarding the use of educational technologies in Nepal and how is this approached at the Faculty of Education, Tribhuvan University*, it was revealed that FoE has no concrete plans and strategies to implement technologies in teaching and learning activities. That is to say, FoE has no clear written policy, documents and strategies at the institutional level in line with ICT policy of ministry level to encourage the use of technologies nor are there any outlines or plans that allow a further monitoring of this implementation process. This lack of policy and strategy for technology use emerges as a problem and possible barrier to follow up this process. Similar problems have been identified in the context of Bangladesh where the lack of plans seems to result in a dissolvment of responsibility (Khan et al., 2012). Thus, one of the main problems for technology use in teaching and learning activities at FoE is that the institution is working in vacuum.

However, in collaboration with projects like SHEP and NORHED, FoE has been able to establish an ICT lab and provide training on ICT use (Tribhuvan University, 2014;

leader/interview). But, similarly, despite clear direction and encouragement from the Ministry of Information and Communication for the integration of ICTs in the entire Nepalese education system, FoE, is not equipped and advanced with technology to enhance teaching. In other words, FoE lacks also supportive physical infrastructure along with ICT equipment and connectivity systems. Therefore, the institution is facing a lack of technology-supportive infrastructure, which is also typical in many other contexts of other developing countries (Khan et al., 2012). Additionally, FoE is working in the blind as they do not evaluate their use and implementation of technology. As a result, the effectiveness and challenges of technology implementation are left undocumented. It is therefore difficult for the involved parties to identify and face these challenges associated with technology use.

The second research question- *What educational technologies are used in practical teaching and in student learning at the Faculty of Education, Tribhuvan University*, revealed that teachers use few technologies whereas students also use limited types of technology in their learning, basically, mobile phones to facilitate their learning.

In addition, this study uncovered that the attitudes of students towards technology is positive. In fact, both teachers and students believe in learning with technology create constructive learning environments. This is supported by the previous findings of research on how technology can enhance teaching and learning and help students in constructive learning and knowledge building (Kirkwood, 2014).

Despite positive benefits technology carries in teaching and learning, its implementation is difficult to accomplish due to various challenges related to infrastructure, maintenance and financial cost. Therefore, in order to address this issue, the final research question- *What challenges are faced in the implementation of educational technology in this setting*, was formulated.

Again, due to unsupportive physical infrastructure, the implementation of technology is challenging, where the classrooms compel teachers to use very limited kinds of technology. Moreover, systems like examination, evaluation, library, etc. are not systematized and modernized. Therefore, seen in a more overarching perspective, a well-equipped feasible classroom will probably need a much broader support in societal and financial structures in order to be rooted in the educational system. These societal features are although seemingly more available through mobile technology, which is indicated by the student user patterns of

mobile phones. These technologies have although not been explored or experimented within the given case-context.

Finally, the current study revealed that the challenges concerning technology use at FoE are similar to challenges being faced in other developing countries. More specifically, costs, low effectiveness, lack of technology policy, insufficient technology equipment, lack of qualified manpower, maintenance and technical problems pose challenges in the adoption of technology in education (Ramorola, 2013). Moreover, developing countries like Nepal are facing challenges related to Internet infrastructures and lack of technically skilled support staff (Kozma & Vota, 2014).



# 7 CONCLUSIONS AND RECOMMENDATIONS

This final chapter presents an overall concluding remarks drawn from the findings of the study. Further, based on the findings of the current study, it presents recommendations for researchers, policy makers, educationists, etc., who directly or indirectly involve in teaching and learning activities.

## 7.1 Conclusion

The findings of this study show developing countries like Nepal are facing many challenges in technology adoption.

In the empirical case of FoE, which is a leading faculty in terms of students and staff in the field of teacher education throughout the country (Tribhuvan University, 2014), lacks typical shortcomings in its own strategic plans on effective management and enhancement for improving the quality of the whole teaching and learning system. Also, the physical infrastructure is unsupportive for technology use. Therefore, one reason behind this is the lack of well-crafted plans and policy documents at the institutional level in line with the Proposed Higher Education Policy-2014 and ICT Policy-2015.

Various research regarding these issues prove that technology can benefit both teaching and learning activities when used in the right way, enriching the learning environment with tools that extend the possibilities of communication between teachers and learners and the world (Ferreira et al., 2014). Thus, technology use should be prioritized especially in developing countries. But technology use in Nepalese higher education is not highly prioritized despite direction and encouragement for the integration of ICTs in higher education (Ministry of Information and Communication, 2015; University Grants Commission, 2014). Awareness of typical pitfalls in developing countries seem here to be overlooked in both political and institutional respects.

Despite the lack of supportive physical environment equipped and advanced with technology, few technologies are used to enhance teachers and learners in their teaching and learning. More importantly, teachers and students in the whole perceive technology as a useful tool

which can create interactive learning environment providing them with an opportunity of sharing messages, views, ideas, learning resources, etc. It is therefore clear that attitudes regarding technology use are positive, which paves an important ground for further reform efforts. Nevertheless, few teachers seem unmotivated to blend technology in teaching and learning processes, which as a result, affects successful implementation of ICT (Khan et al., 2012).

But, in order to overcome the main shortcomings identified in this study, solid plans and evaluation strategies on technology use and implementation are clearly required.

## **7.2 Recommendations**

The current study shows that the institution i.e. FoE has no policy and strategic documents holding the institution accountable. It is therefore, strongly recommended that the institution must start formulating a policy document in line with higher education policies and ICT policies following up the incentives given by the ministries. Similarly, it is recommended that the evaluation of implemented technology should be carried out on a regular basis so that its effectiveness can be identified, which ultimately can also provide an opportunity for leaders and teachers to learn from their experiences and make informed decisions on how the institution should go further with strategies in practical work.

The potential of technology use at the institution is also limited due to unsupportive physical infrastructure identified during the observations. The institution lacks classrooms equipped with technological equipment. It is thus necessary that the institution needs to initiate developing a more supportive infrastructure. More specifically, classrooms should be smartened with necessary technologies, and technological equipment should be made available for teachers and students. This could technologically enrich classrooms to offer students new instructional and learning experiences, and promote a more interactive teaching and learning environment (Earle, 2002).

This study also revealed that students mostly use smart mobile phones in their learning. For example, mobile phones provide students with the facility of sharing messages, views and solutions on a particular subject matter. Therefore, mobile phone technology emerges as a beneficial tool to enhance learning and teaching environment. This technology could be used more systematically to provide students and teachers with the opportunity to access to

information and engage interactively (Abachi & Muhammad, 2014). Hence, it is suggested that mobile technologies should be further explored for other possibilities to digitize the educational setting. The potential in these efforts is especially interesting since the technology is cheap, easily available and can draw on an existing and more well-functioning infrastructure.

Since the study revealed that teacher's attitudes towards technology use is positive, this use on mobile technology appears as realistic regarding motivation. However, few teachers are not motivated. In this regard, Tarus, Gichoya, and Muumbo (2015) claim that lack of interest of the teaching staff to use technology in teaching poses a challenge hindering the implementation of e-learning. Therefore, it is necessary to identify possible factors demotivating them in using technology also in the future to enhance teaching and learning in this matter.

Similarly, the study revealed students' involvement in technology use in their learning is less focused. It is therefore important to train students to use ICTs to support them in learning. Finally, it is implied that more research on technology use in Nepalese higher education context from neutral parties rather than from those who are directly or indirectly connected with Tribhuvan University should be carried out so that there will be less chances of having biasness and influence in the findings of the study with regard to the situation of technology use at the university (Kirkwood, 2015). Documenting the features identified in the case-study in this study hopefully represents a possible step in the right direction both regarding the Faculty of Education, but also for the higher education sector as such in Nepal.

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# Appendix-Interview Guide

**Name:**

**Organization/Institution:**

**Current Position:**

**Telephone:**

**E-mail:**

**Past Involvement and Experience:**

## **Interview guide to the leader of the Faculty of Education**

1. What is your opinion regarding the roles of technologies in teaching and learning?
2. What types of educational technologies are used to enhance teaching and learning activities at the faculty?
3. To what extent is technology being used in teaching and learning activities at the faculty?
4. What strategic plans do you have for the implementation of educational technology?
5. Do you think educational technology enhances teaching and learning? If so, how?
6. What is your role as a leader to adopt and implement educational technology at your faculty?
7. Regarding the use and adoption of educational technology, do you see any gaps between strategies and policies at system level, and implementation at practical level?
8. How are you planning to make it possible to use of educational technology at the faculty and how do you evaluate this?
9. What difficulties or challenges do you as a leader face in adopting technology at the faculty?
10. How can the infrastructure play role in adopting educational technology at the faculty?
11. Are the faculty members competent in using technologies in teaching?

### **Interview guide to a teacher of the Faculty of Education**

1. What is your opinion regarding educational technologies in teaching at the faculty?
2. While teaching, what educational technologies do you use?
3. How comfortable do you feel using technologies in your teaching?
4. Do you think they enhance teaching and learning? Explain why?
5. How do you think technology can be used in collaborative learning?
6. Does the faculty provide some trainings regarding how technologies can be adopted and used in teaching? Explain briefly.
7. What difficulties and challenges do you experience to use technologies in your teaching at the faculty?
8. What are the efforts and support from administration in implementing technologies at the faculty?

### **Interview guide to a focus group of students of the Faculty of Education**

1. What is your understanding regarding technologies enhancing teaching and learning activities?
2. Do you think educational technologies can enhance teaching and learning?
3. What technologies are often used at the faculty?
4. Do you think technologies improve your learning?
5. Are you satisfied with the amount of technology use in teaching and learning at the faculty?
6. What difficulties or challenges do you see in the implementation of educational technologies at the faculty?
7. Do you face any challenges using technologies in your learning? If so, what are they?