Chapter I

INTRODUCTION

Background of study

E-learning, a new way of study different from traditional face to face learning, is defined as an innovative way of conducting learning activity at flexible times and places through the internet (Sparacia, Cannizzaro, D.D. Alessandro, M.D. Alessandro and Lagalla, 2007). Normally e-learning includes most kinds of electronically supported learning, and teaching (Govindasamy, 2002). Web based learning, Internet based learning and Computer based learning are all frequently used terms meaning e-learning (Kahn, 2001).

The term “e-learning “has only been in existence since 1999, when the word was first utilized at a CBT systems seminar. Other words also began to spring up in search of an accurate description such as “online learning” and “virtual learning”. However, the principles behind e-learning have been well documented throughout history, and there is even evidence which suggests that early forms of e-learning existed as far back as the 19^{th} century.

Long before the internet was launched, distance courses were being offered to provide students with education on particular subject or skills. In the 1840’s Issac Pitman taught his pupils shorthandvia correspondence. This form of symbolic writing was designed to improve writing speed and was popular amongst secretaries, journalists, and other individuals who did a great deal of note taking or writingpitman, who was a qualified teacher, was sent completed assignment by mail and he would then send his students more work to be finished using the same system.

In 1924, the first testing machine was invented. This device allowed students to tests themselves. Then, in 1954, Bf Skinner, a Harvard professor, invented the “teaching machine”. Which enabled schools to administer programmed instructing to

their students. It wasn't until 1960 however that the first computer based training program was introduced to the world. This computer based training program (or CBT program) was known as PLATO-programmed logic for Automated Teaching operations It was originally designed for students attending the university of Illinois, but ended up being used in schools throughout the area.

With the introduction of the computer and internet in late 20th century, e-learning tools and delivery methods expanded.The first MAC in 1980's enabled individuals to have computers in their homes making it easier for them to learn about particular subjects and develop certain skill sets. Then, in the following decade, virtual learning environment began to truly thrive, with people gaining access to a wealth of online information.

Recent figure from the Nepal Authority show that bound 24 % of Nepali now have access to same from of internet connection. An NTA report, however show that only around 6 % of the internet users have access to a trust worthy internet connection (wireless modem, optical fibre, cable modem, ADSL, CDMA). A responding 93 % of the 6.4 million internet users in Nepal are still using unreliable and low-quality internet connection based on GPRS, EDCE and WCDMA technologies. These technologies are used in mobile phones. The report show that 0.23 % of the internet user's still use dial up internet. Internet service providers in Nepal only have a market share of less than 2 %. NCell and Nepal Telecom- both of whom are also voice operators…collectively have a market share of 98 %. Nepal has been ranked in the 142th position among 159 countries in the ICT Development index(IDI)2010published by the international Telecommunication Union(ITU); the UN agency for information and communication technologies. The ranking is based on development information technology and telecom sector of 2008. According to the report, Nepal was 141st position in the IDI in 2007 (ITU,2010).

MOE has implemented some of programs related to ICT in education. Some NGOs have developed interactive digital learning materials for the school students in mathematics. Under the matching grant schemes (2007 to 2010), DOE provided 2 computers and one printer to 3038 schools (DOE, 2010). Under the formative research project of education for all program 2004-2009, MOE provided one computer and one printer to each 62 schools. Beside, some NGOs, trusts and individuals have provided computers and other accessories to some schools and basic computers training to teacher (ICT in education master plan 2013), during the fiscal year 2010 and 2011, the government of Nepal has supported for ICT related infrastructure and internet connectivity to 785 schools. In addition, DOE provided with internet connectivity to 85 secondary schools to conducting distance education program for secondary level (DOE, 2012). TO improve educational management and delivery system, the ministry of education has provided some additional ICT related equipment to all District education offices and lunched website in each district education office. In June, 2012, the ministry of education has endorsed a guideline for the implementation of ICT in school in Nepal.

E-learning includes all learning (whether it is formal or informal) carried through electronic delivery. More precisely, e-learning encompasses both internet based learning and computer based learning, which consist of components of online learning.

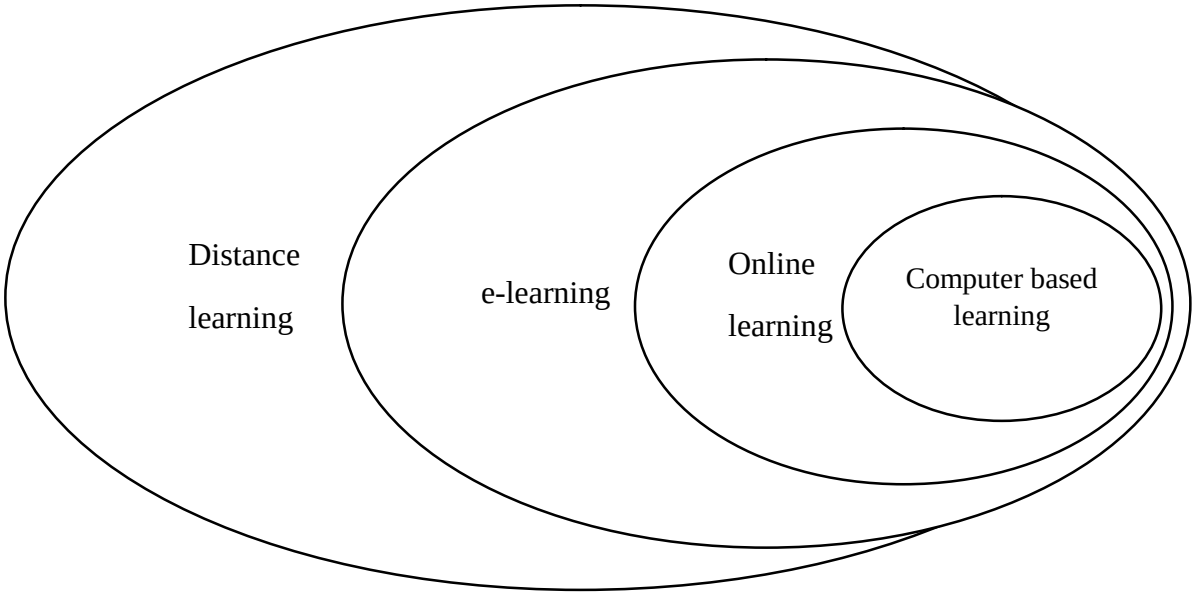

Figure 1

Sources: Scope of e-learning Adapted from Bachman (2002).

The use of web-based teaching materials, multimedia, CD-ROMs,e-mail,educational animation etc,have all been used and being used extensively in developed countries for the learning purpose. However, the concept is somewhat new to the developing country like Nepal. Nepal's education system relies mostly on the traditional approach to learning, though in recent years e- learning is being adopted in Nepalese cities.

Statement of the Problems

Overcrowded classroom, sitting close to one another not being able to move, write on their copies, see the blackboard or white board and listen to the teacher are the difficulties in overcrowded classroom (Upadhyay,2001).Although, students are attracted towards Mathematics only few of them becomes really successful. Many researchers have been done about attitude towards mathematics and they suggested that many students have positive attitudes towards Mathematics, but there is a challenge for Mathematics and Mathematics educators that achievement of students in Mathematics is poor.

There is no such study carried out on the attitude of the students in e-learning at secondary level in the context of Nepal. So the purpose of this study is to find out opinion of students and teachers about e-learning. This study provides systematic and empirical data on opinion of students and teachers on e-learning, even if it was limited to the boundary of secondary level administration, students as well as Mathematics teachers.

MOE accesses the different policy and programme related to ICT in school level. IT policy (2010), SRRP (2009-2015), and three year plan 2011-2013, GON have provided some policy and integration of ICT in education (MOE, 2013 and NCF, 2005). Such as,

- Expansion of access of the Internet to all schools; coordination and collaboration with national and international institutions to develop skilled human resources for continuous, relevant and quality education;
- Promotion of Industry-Academic collaboration (IAC); and formulation and implementation of special IT programme focusing on students, teachers and schools in order to develop competent human resources.

The problems of the study are concerned with the existing situation for practices of e-learning in Mathematics. It also included the opinion of secondary level students and teachers towards e-learning. Therefore the research questions for the study were recognised by researchers which are given as:

- What are the existing situation for practices of e-learning in school for Mathematics?
- What are the opinion of Mathematics teachers and students towards e-learning?
- What are the challenges in promoting ICT integration in school?

Significance of the Study

The internet has become one of the vital ways to make available resources for research and learning for both teacher and students to share and acquire information (Richard and Haya, 2009). Technology based e-learning encompasses the use of the internet and other important technologies to produce materials for learning, teach learners and also regulate courses in an organization(Fry, 2001). The Ministry of Education aims at providing necessary skills an Information and Communication Technology to the students as well as using Information and Communication Technology as an important tool to improve classroom delivery, increase access to learning materials and improve effectiveness and efficiency of overall educational governance and management (MOE,2013).

This study has the following significance.

- This research would investigate the beliefs, feelings and perception of Mathematics teacher towards E-learning.
- It would contribute to find the way to decrease the failure rate of the students on Mathematics at secondary level.
- It would help to guide the instruction on the basis of individual difference.
- It would help to decrease the students' dependency to their teacher to solve the Mathematical problems.
- It would introduce additional pedagogy in existing educational system.
- It would help the councillor to provide the positive attitude of E-learning.
- It would support educational administrators and policy makers in choosing the appropriate methods of managing changes associated with ICT use in the educational system.

Objectives of the Study

- To find out the existing situation for practices of e-learning in mathematics.
- To find out the opinion of teachers and students towards the practices of e-learning in mathematics.

De-limitations of the Study

This study has following limitations.

- The study was based on opinion of secondary level students and mathematics teachers.
- This study was limited in the public and private secondary school in Kathmandu district.
- We explored the problem of teaching and learning on the basis of observation checklist, questionnaire and FGD.

Definition of the Related Terms used in this Study

- **E-learning**: E-learning is a computer based educational tool or system that enables students to learn anywhere and at any time. It is one way or two way learningusing the different tools such as computer, laptop, mathematics software,video, book, internet, and television.
- **Information and communication Technology**: The ICT here means applied hardware and software to produce and share learning materials for the students. 1. Hardware: Video input (laptop), video output (monitor or screen), sharing devices (pen drive, mobile) 2. Software used to produce and share learning materials through mathematical software.
- **Practice of e-learning**: Classroom practice includes the relationship, interaction and communication between teacher and students for teaching and learning process.

- **Existing pedagogy:**Pedagogy, in which teacher first gives the basic idea or concept on some topic of mathematics and teacher solves some problems related to that concept as example in classroom and remaining problems to that topic are given to the students as classroom and homework..
- **Teachers' class presentation:**Teacher's lecture or explanation on some topic at the predetermined period and predetermined time with his/her plan. It also includes the solution of mathematical problem by teacher for purpose of students' understanding.
- **Situation of e-learning:**Situation of e-learning means readiness of teacher/tutor, and learners towards e-learning, school administration by materials, attitude as well as access of e-learning.
- **Asynchronous:** Refers to any type of communication where interactions take place at separate times and usually from different places. It is the predominate mode of communication used in email, learning managements(eg. Moodle) bulletins boards, website and text massages.
- **Synchronous:**Any type of communication where interaction between participants occurs simultaneously. Examples relevantto this research include face-to-face conversations and telephone calls.

Chapter II

REVIEW OF LETERATURES

The review of literature involves the systematic identification and analysis of documents related to the study under taken review of the previous studies helps to conduct the new research in systematic manner by providing the general outline of the research study and avoids the unnecessary duplications. Realizing the importance of the literary review some efforts are mode here to present the significant results or conclusions of different studies mainlyfocusing to the opinions towards e–learning in mathematics with these assumptions. Some works in opinions and the related topic are presentedhere.

Empirical literatures

Njagi (2014) did a descriptive research on the topic "Teacher's perspective towards Differentiated Instruction Approach in Teaching and learning of mathematics in Kenya" with the main objective to investigate the teacher's perspective towards differentiated instruction in teaching and learning of Mathematics in secondary school in Kenya. The researcher finding in line with objective that guided the study total of 20 teachers responded to the questionnaire form and researcher found out that 70% of younger people preferred using differentiated instruction always in all the lessons they teach. The researcher found out that teachers have positive predisposition about differentiated instruction and that there is need for extensive training and support so that differentiated instruction can succeed.

Clacke (2007), carried out a research article "Exploring the use of computer technology in a Caribbean content: view of pre-service teachers". This article presents a qualitative study of five pre-service secondary school Mathematics (PSSM) teachers in English-speaking in Caribbean context. The major goal of this study was to investigate the experiences and perceptions of the PSSM teachers as they explored the

use of computer technology (CT) in their Mathematics instructional practices and to identify factors they consider necessary for successful integration of CT in Mathematics instruction.

Moila (2006) did a research on the "The use of Educational Technology in Mathematics Teaching and learning: An investigation of a South African Rural secondary school". The investigation followed a mixed method approach that was more evaluative and was a case study. The study consist 25 students and 5 Mathematics teachers from phacelia secondary school. The findings concluded that the computer technology was not used in Mathematics teaching and learning, there are no plans on the use of educational technology tools in Mathematics teaching and learning, inadequate educators training on the use of educational technologies in teaching and learning and lack of relevant educational technology tools for rural schools.

Chong CheeKeong, SharafHorani and Jacob (2005), did a research on "A study on the use of ICT in Mathematics Teaching" in Malesia. This research deployed a survey method to investigate the use of ICT and barriers of integrating ICT into the teaching of Mathematics. The survey was carried out during Mathematics in service course conducted by state education Department. The findings concluded that the use of ICT in teaching Mathematics can make the teaching process more effective as well as enhance the student's capabilities in understanding basic concepts. Nevertheless, implementing its use in teaching is not without problems as numerous barriers may arise.

Kalinga (2008) did a descriptive research on "Development of an interactive e-learning management system for Tanzanian secondary schools" with the main objective to develop an interactive e-learning management system to be used by Tanzanian secondary schools support teaching and learning functions. He concluded

that when application of ICT in e-learning that is accessible even in remote and rural secondary schools will improve the performance of students in such secondary schools as well as raising morale for teachers and students.

Sapkota, B.K. (2015) did a research on “effectiveness of information communication technology integrated pedagogy at secondary level”. With the aim to find the effectiveness of ICT integrated pedagogy in the existing educational system among students in the experimental and control group of grade IX. 46 students of two public secondary school of Kathmandu district were selected for the study. She concluded that ICTIP bring the effective result in terms of the achievement of mathematics in comparison to the existing pedagogy as well as students taught by ICTIP are more motivated towards mathematics instruction.

Rivet, J.R.(2001) studied on “students achievement in middle school Mathematics Computer Assisted Instruction versus traditional instruction method”, for 6^{th} grade class-room were identified, two classroom within each of two middle schools. Two classrooms used Computer Assisted Instruction as the primary means of content delivery involving mathematical concepts all pertaining to the content area of fractions. Within the same content area, the other two class rooms “primary mode of instruction remained the lecture and text-book. A quasi experimental pre-post-test design was used. Following a six week study, difference scores were examined to substantiate the primary hypothesis that the use of computer Assisted Instruction led to increases student achievement when computers to traditional instruction techniques. Findings: In spite of variability in performance in individual types of fraction operations, the overall improvement scores were significantly greater in Computer Assisted classrooms than in the traditional classrooms. Further, in spite of the achievement difference between schools, the Computer-Assisted classrooms performed better than the traditional class-rooms at each school.

Rendell (2001) was concerned with recognising the effectiveness of ICT-assisted teaching for Mathematics in algebra and geometry topics (Invest learning programs) for rural public schools students. The study sample consisted of two groups: experimental and control groups with a total number of students amounted to 120. The 80 students of the control group studied over three semesters using traditional methods, while the experimental group comprised 40 students who studied using ICT-assisted methods. The study indicated that ICT-assisted teaching was more effective in raising the arithmetical and logical skills in mathematics compared with traditional methods.

Cox (1997) studied elementary and secondary school students' use of technology and their attitudes towards ICT. The study was grounded in an analysis of the literature relating to motivation, as it indicates that the regular use of ICT for various topics can have a stimulating and beneficial effect on students' learning. Students' responses showed their increasing commitment to the learning task, reinforcing enjoyment, benefit and feeling of achievement in learning when using ICT, and emphasising their self-esteem. Over 75% of secondary school students stated the response 'I agree' or 'I strongly agree' to the statement that the use of computers made the school subjects more exciting. Also, over 50% of the students showed agreement that the use of ICT helped them understand their topics in a better manner.

Jabr (2007) investigated the effect of using ICT on seventh grade students' achievement in mathematics, compared with traditional methods in addition to identify the teachers' attitudes towards using ICT as a learning aid during the academic year 2006/2007. The sample size encompassed 94 seventh grade students, male and females. The students were enrolled in two schools, one for boys and the other for girls. The researcher sample consisted of 37 mathematics teachers. The

students were divided into two groups: An experimental group comprised 47 students who studied replying on ICT consisting of 24 males and 23 females. The control group consisted of 47 students who studied via traditional methods, split similarly to the one in the experimental groups. This study attempted to answer the following questions: the study finding revealed that there were significant differences between the average achievement amongst seventh grade students after both methods were applied (ICT and traditional) in favour of ICT method. No significant differences were found regarding gender or the interaction between teaching method and gender. Additionally, positive attitudes among mathematics teachers were found towards using ICT as a learning aid in teaching mathematics.

Hussein's study (2000) aimed to investigate the effect of teaching mathematics enhanced by ICT on the students' attitudes and their achievement in 'circle' unit for the secondary grade, at scientific branch, in Doha, Qatar. The researcher selected four schools, and then the sample was divided into four groups, two for males and two for females. Two groups, males and female, studied relying on traditional methods while the other two studied replying on ICT. The researcher confined his study to the 'circle' unit from second secondary grade curriculum during the first semester, because of the ease of ICT application, and for the difficulty of the mental processes by Qatari students. Ultimately, after the data being analysed, statistically significant differences were found in favour of the group that studied relying on ICT.

Mawata (1998) studied the effect of ICT on the achievement among high school students and their attitudes towards mathematics. For this purpose, the researcher prepared a series of lessons related to conversions' engineering by teachers who were teaching this coursework. Additionally, he undertook teacher training on developing java Applet software and using java language, to make learning from web pages more interactive. The study sample consisted of 163 students enrolled in three

high schools within Baltimore, USA. The finding indicated that students' achievement was high according to the achievement test. Furthermore, the finding indicated the presence of a positive growth in attitudes towards mathematics from the study sample.

Clark's study (2005) aimed to identify the effect of ICT use in teaching geometry for academically talented students at high intermediate stage. The study sample consisted of 50 students from ninth and tenth grades. The sample was divided into two groups: the experimental group that comprised 25 ninth grade students enrolled in Hispanic School, who studied geometry relying on ICT, and the control group that comprised 25 tenth grade students enrolled in Florida School, who studied geometry relying on traditional methods. With respect to instruments. Florida test competency achievement test, and teachers' observations were used. The Florida test was applied before and after teaching the same lessons for both groups. Then, a comparison was conducted between the averages of scores to measure the students' progress. After collecting and analysing data, the findings revealed that there were statistically significant differences in students' achievement in the experimental and control groups in favour of the experimental group. Like most of the previous ICT studies related to mathematics, this study has notable strengths and concerning weakness. The most important contribution of the study is its ability to identify the gains in mathematics that students may attain relying on ICT-based technology. In contrast, the study's most prominent weakness is its heavy reliance on the use of conventional ICT tools as well confining its goals to achievement.

Uribe, Klein, and Sullivan (20030 was concerned with identifying the effect of 'computer-mediated collaborative learning' on solving 'ill-defined problems'. The study addressed the following main question: 'what is the effect of Collaborative learning by using Computer as mediation on student achievement in solving ill-defined problems?' This study emerged in the light of the paucity in empirical studies

related to this topic. Firstly, the participants received training on how to use a learning program available on the internet that teachers them the process of solving the problem through four steps associated with solving ill-defined problems. The participants worked within in their pairs or as individuals in order to apply the practical steps of solving the problem. The finding revealed that participants who worked in pairs were more effective than participants who worked alone. In addition, the finding revealed significant differences in the amount of time students invested in the work, with 'paired' students working for longer than individuals. Also the finding indicated that the two experimental groups have had positive attitudes towards collaborative learning and ICT-based learning using the World Wide Web.

After studying over all literatures, researcher finalised that there are not conducted same types of research so it will be new finding in the field of research. Next, he got much ideas for research process such as; creating research questions, conceptual framework, and analysis ideas as well. Also researcher can compare and make valid for his analysis results also with previous research.

Theoretical Review for the Study

In the 20thand 21st centuries, many scholars attempted to define teaching and learning. These definitions become theories of teaching and learning, created to try and clarify the meaning of both. Learning theories provide us with conceptual frameworks of interpretation for the act of learning, and show us where to look for solutions to practical problem. Teaching methods are in the main based on theories of learning. The most important learning theories areCognitivism, Behaviourism and Constructivism. These two approaches are based on two main schools of psychology that have influenced learning theory. They have different perspectives on learning, different perspectives on teaching styles, and different approaches to pedagogy and evaluation.

The theoretical perspective of this study was the constructivist theory of learning. The constructivist theory has chosen because it builds on prior knowledge: students use what they already know to make connections to new method of ICT assisted instruction. When students make connections, they learn new technology and relate it to what they already know. In this study ICT assisted instruction has based on constructivist theory of learning, because knowledge is actively constructed by the students while they are making constructions and analysing figures instead of knowledge being passively received and accepted. Many educators today believe that the constructivist theory is a relatively new theory in education although the tenets of constructivism can be traced back to Socrates.

Some modern day constructivist theorists are Vygotsky, Brunner, and Von Glasersfeld. Von Glasersfeld (1987) has stated that the constructivist view involves two principles:

- Knowledge is always being created, built up by learner. It is not inertly established.
- Coming to know is a course of action based on the learner's constant adaptations to the experiences of the world.

Von Glaserfeld (1996) is a mirror proponent of abstract ideas that reflect one's situations to build conceptual structures through self-regulation. He has stated that real learning happens when one takes ownership of the problem. Huitt (2003) stated that, while Vygotsky was a social constructivist theorist, activity theory and situated learning, however, were the main tenets of his research. Vygotsky developed a "zone of proximal development," which is basically the difference between what a child knows and what that child is taught by others (Vygotsky, 1978). He believed that children learn through social interaction and by learning to solve problem with others. He called this process "scaffolding".

Brunner (1973) stated that learning is a process that occurs through social interactions, and students generate new knowledge by building onto what they already know:

The student selects information, constructs hypothesis, and makes decisions, with the aim of integrating new experiences into his existing mental constructs. It is cognitive structures that provide meaning and organization to experiences and allow learners to transcend the boundaries of the information given. For him, learner independence, fostered through encouraging students to discover new principles of their own accord lies at the heart of effective education.

Thus, curriculum should be developed in a spiral manner so that students can build upon what they have already learned. This review of literature includes the constructivist theory of learning because the students in this study actively built on what they already knew in order to gain an understanding of mathematics. The instructor has actively engaged in leading the students as they encountered their zone of proximal development (ZPD). The students have also actively engaging in the process of scaffolding as they sought assistance from more advanced students in their mathematics classes by ICT-assisted instruction.

These theoretical concepts gave me a lot of ideas about the use of ICT in education. Theoretical reviews helped me understand about the ICT and its implementation in education. It is significant to use ICT in education. Thus, I tried to find out the existing situation of ICT in our context, I also tried to find out the opinions of students and teachers towards e- learning.

Conceptual Frameworkfor the Study

Students satisfaction with e-learning environments was examined in several studies (Santhanam, Sasidharan, and Hsia,2010; Zhu,2012). Positive learning climate and performance expectations affect students satisfaction, and performance

expectations provide the greatest contribution (total effect) to learning satisfaction users (students and instructors) will hold positive attitudes towards e-learning if they recognise that it would help them improve their learning and teaching effectiveness and efficiency (Rehamat et al. 2012; Wu. Tennyson, and Hsia, 2010). Chen and Huang (2012) stated that understanding student attitudes can help expand e-learning system functions and meet student needs, which should further increase the impact of learning and enhance satisfaction with the learning process. Aixia and wang (2011) found that the vast majority of students who were satisfied with an e-learning environment held positive believes and attitude towards it.

From the above discussed point of views in related literature, opinion towards e-learning in mathematics may depend upon different variable. These variable are expectations of teachers as well as student's and satisfaction of teachers as well as students. It is modified framework from (Mayer, 2004).

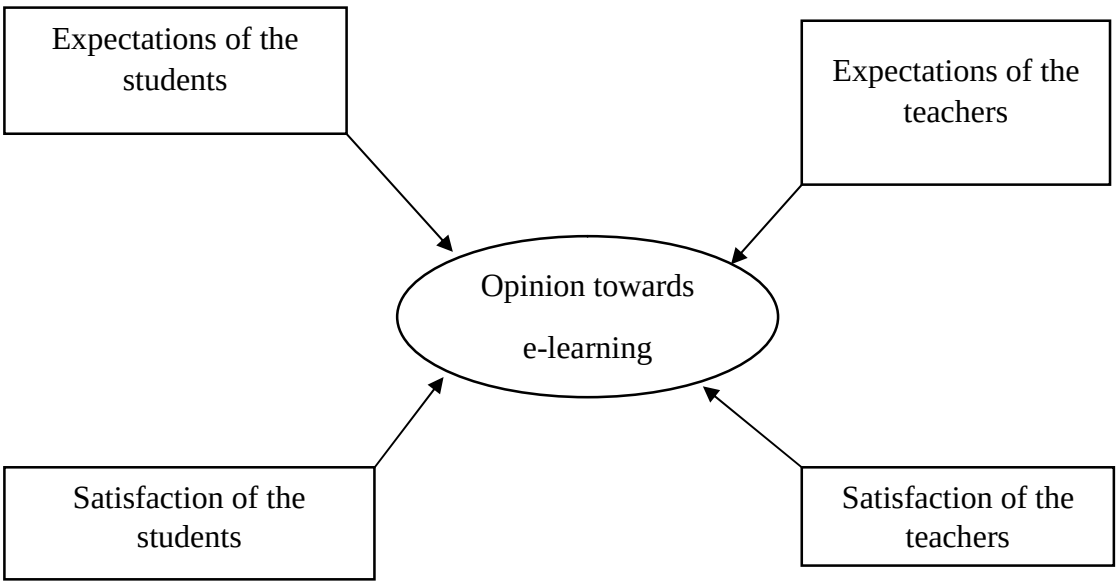

Figure 2

Sources: e-learning process and its clients from Mayer (2004).

Chapter III

METHODS AND PROCEDURES

This chapter described how the study was conducted to fulfil the objectives of the study, so methodology is the most important part of the research. This chapter deals with procedure of the qualitative research which was carried out to achieve the response of the problem. This chapter gives the clear and concrete direction to answer the research questions and to achieve the objectives, because this chapter deals with the following topics:

- Research design of study
- Population and sample of study
- Tools of the study
- Validation of tools
- Data collection procedure
- Data Analysis and Interpretation procedure

Research Design of Study

The method of research which concerns itself with the present phenomena in terms of conditions, practices, beliefs, process, relationships or trends invariably is term as descriptive survey study. According to Dr. Y .P. Agarwal, (2008) descriptive research is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation. This type of research method is not simply amassing and tabulating facts buts include proper analyses, interpretation, comparisons, identification of trends and relationships. At last descriptiveresearch describe the present status of people, attitude and progress and my research is related to opinion towards e-learning so the design of the study is descriptive survey design.

Population and Sample of the Study

The population of the study was consisted of all the secondary level students of public and private school of Kathmandu district on the academic year 2072. This study was conducted only Kathmandu district. In order to fulfil the objectives of this research, the researcher has taken sample to represent the total population. The sample of the study was 200 students and 100 teachers of Kathmandu district from twenty secondary level school. 10 students, 5 teachers and one administration were from each school.

Sample of schools, teachers, students, and administration

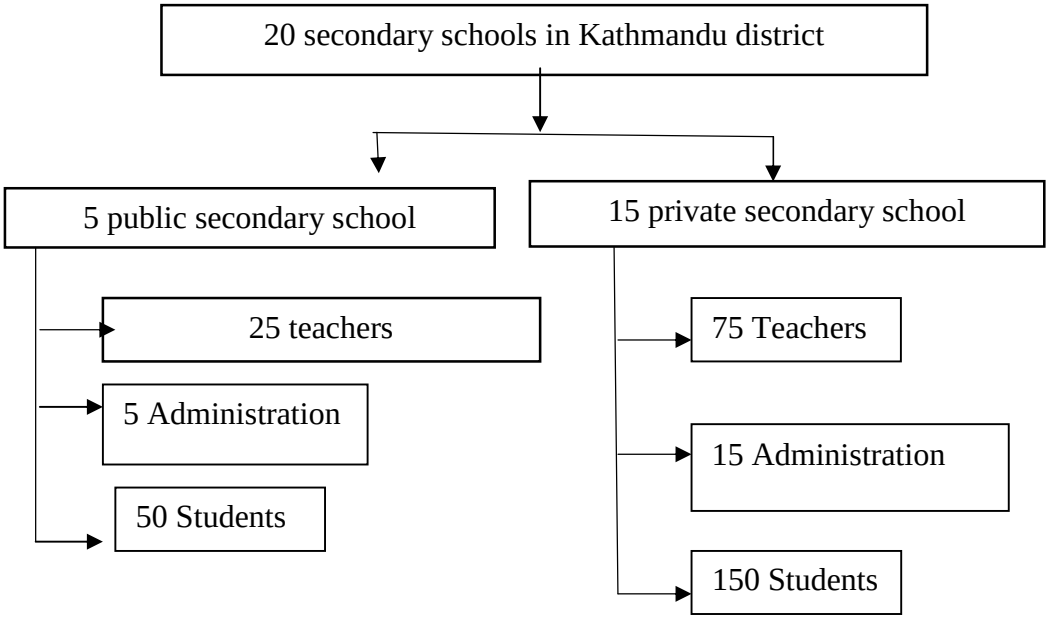

Figure 3

Tools of the Study

To collect the valid data three types of tools were adopted. To fulfil the first objective researcher was used checklist, and for second objective the researcher was used questionnaire and focus group discussion.

Observation checklist

The observation checklist is for people that have a role in making decisions or providing recommendations on the purchase or development of ICT to support e-learning. It is serve as a handily guide to the key steps and sign-offs needed for must

e-learning. It helps to find out the existing situation, environment for e-learning and to find out the ICT related material available in schools (Moila, 2006).

Questionnaire

A questionnaire was major tools for data collection in the study. The questionnaire was considered on the basis of the use of ICT relating to curriculum, teaching methods, classroom management, student background, teacher training and personal problems (i.e. time management, speaking style, body language, knowledge of subject matters), of the teacher. The detailed of the questionnaire was prepared and presented. The questionnaire consisted personal bio-data such as name, age, gender, academic qualification school name, trained or untrained and length of teaching experience of secondary mathematics teacher was also present.

Two form of the questionnaire were developed. One was given to learners and the other one was given to teachers. They were prepared in the turn of structured guide line of articles, published and unpublished thesis “The use of Educational technology in Mathematics teaching and learning”. (Moila, 2006)

Focus Group Discussion

Unlike, the observation checklist and questionnaire, the group discussion stimulates a discussion and uses its dynamics of developing conversation in the discussion as the central source of knowledge (Flick, 2006). Participants tend to provide checks and balances on each other which weeds out false or extreme views. The extent to which there is a relatively consistent, shared view can be quickly assessed (Patton, 1990). The focus group discussion is a rapid assessment, semi-structured data gathering method in which a purposively selected set of participants gather to discuss and concerns based on a list of key themes drawn up by the researcher. To make discussion effective, participants should be kept on round table. One hour discussion among participants is done. The group should be homogeneous

but ideas, feelings, thoughts, perceptions and tendency of participants are involved in focus group involving 6 to 8 participants is best. Similarly, if in a group more than 12 participants are involved, then the group cannot be well managed and become fragmented (Cohen, Manion and Morrison, 2007). Beside this, it is not sufficient to discuss in only one group to receive/gain sufficient information. So, to receive detailed information, discussion should be done among four groups. (Paneru, 2015)

Following the requirements of a good focus group guideline, the researcher prepare the guidelines based upon the themes/issues related to e-learning. Focus group discussion guideline (given in Appendix-D) was constructed based on research problem, objectives, literature review. The other points could be raised on the process of discussion as probing and hint is given in each theme.

Validation of Tools

Every research demands high degree of validity because it is all of the empirical study of the phenomena. The research was made on the basis of checklist, questionnaire, and focus group discussion. The format of those all tools were prepared on the basis of review of related literature, conceptual framework and verified with subject exports, and supervisor. Also it was compared with the way of preparing checklist, questionnaire, and focus group discussion from related books, published and unpublished thesis Eid Alharbiet.al. (2007).

Data collection Procedure

There are different methods to collect the data. But it is the qualitative research, so researcher needed only data through primary source i.e. first handed data. First of all for the collection of data the researcher visited sample school himself and met the responsible administrative staffs, head teacher and mathematics teacher of the school and asks permission for the administration for questionnaire of class 9 and 10 as well as mathematics teachers of Kathmandu district.

The researcher was given the observation checklist in each school for find out the ICT related materials. The collected data were tabulated by using the Edwards's two point scale. i.e. 1) exists and 2) Does not Exists.

Then the researcher collected the checklist and the researcher was already developed two form of the questionnaire. Before administrating the set of questionnaire for the students and teachers, they were informed about the purpose of questionnaire. The respondents were request to provide their valuable response. Out of two form of the questionnaire, one was given to students and other one was given to the teachers.The researcher was made the statements clear when they found any difficulty. Tick mark (✓) in any column of the options Agree, Neutral and Disagree for each statements according to their willing. In the questionnaire, the some of them respondent may provide to show false information their expertise. So that, the researcher was taken focus group discussion for their right or valid or actual views of respondent towards e-learning.

To achieve the objectives of the study, the researcher formed four groups. The researcher conducted focus group discussion among those group of respondents, each consisting 8 members. Participant respondents were kept on round table and one hour group discussion was done among them on the research topics and problems. The role of moderator and note keeper was done by the researcher himself. For this, focus group discussion guideline (given in Appendix-D) was constructed based on research problem, objectives, literature review and selected theories for the study was used. In each group, the themes for the focus group discussion were about teachers, student's motivation, existing situation, believes, perceptions, thoughts towards e-learning in mathematics. The focus group discussion guideline was used while conducting the group discussion among teachers' group to explore their perceptual similarities and difference towards e-learning in relation to improve mathematics achievement. The

records of FGD among teachers was collected carefully. The information received from FGD was recorded in audio form in mobile phone and also noted in field note but taking permission from participant respondents. Finally, the researcher thanked to all the respondents to whom be consulted and school authorities of all schools administration and teacher for their kind co-operation.

Data Analysis and Interpretation Procedure

Data analysis is considered to be important step and heart of research in research work. After collection of data with the help of relevant tools and techniques, the next logical step is to analyse and interpret data with a view to arriving at empirical solution of problem (Singh, 2009).

Data collected by using observation checklist, questionnaire and FGD guideline were analysed and interpret verbally and numerically by making themes. The collected information/data from observation checklist, questionnaire and FGD was categorized according to the category of the respondents.

The checklist, all information was collected from primary sources by using Edward's two point scale (existents and does not existents). To analyse the gathered data, the percentage score of each statement was determined.

After the observation checklist, all information was collected from the questionnaire by using Edward's three point scale Agree, Neutral and Disagree. The significance of each statement was tested by computing corresponding $\chi 2$–value and comparing them with tabulated $\chi 2$ – value5.991, the value of $\chi 2$ at 0.05 level of significance with two degree of freedom**.** If the calculated $\chi 2$- value exceeded the tabulated $\chi 2$- value then the statement were considered to have been significant.The analysed the gathered data, the percentage score of each statement was determined and interpret by using the conceptual understanding of the study developed in literature review and selected theory.

More elaborately to explore the perceptual difference and similarities towards e-learning among mathematics teachers, students, administration and student's motivation to learn mathematics at first researcher again listen carefully all the audio records of data on mobile phone after the collection of data besides the field. The researcher transcribed all the oral, verbal expressions, views, perceptions as well as gesture of the respondents in written from that were listened from audio records and also from field note. After then original data are translated in English language for convenience. Some valuable and important narration were not altered, translate and kept in original form. Then similar themes/concepts were kept in one place where different information were kept in one. To arrange the theme and concept, theory under the study were used.

Mainly, Those different themes such as the expectation of students, expectation of teachers, satisfactions of the students and satisfaction of teachers as well as suitable situation of e-learning. Perceptual similarities and differences were used as the categories of analysis the text of focus group discussion. After that similar themes of the respondents were explained and analysed descriptively by using constructivist theory.

Chapter IV

ANALYSIS AND INTERPRETATION OF DATA

This chapter deals with the analysis and interpretation of the data. According to the set objectives of the study, researcher marked the responses of the students, very carefully and noted their outcomes systematically. Then on the basis of the observed and noted information the analysis and interpretation was carried out.

The information was collected through observation checklist, questionnaire, and focus group discussion with the students, teachers, and administrator. This entire phenomenon come under the fold of classroom practice. Classroom practice includes the relationship, interaction and communication between teacher and students for teaching and learning process.

The earlier studies of computer usage in developing countries have shown that these countries have more challenges in their ICT integration than the other developed countries. The analysis was carried out looking at the teacher frequent use of ICT in mathematics teaching and learning. Teacher is a live researcher for his students. So researcher interacted with teacher about the use of educational technology in mathematics teaching and learning i.e. enhance and difficulties. The results have been presented under the following major subheading which corresponds to the objective of the study. Where first point can help fulfil the first objective and other four point can help fulfil the second objective.

- Administrator's response towards ICT tools on the basis of their existence.
- Background information of students.
- Opinion of secondary level students towards e-learning (ICT).
- Background information of teachers.
- Opinion of secondary level teachers towards e-learning.

Administrator's Response towards ICT tools on the basis of their Existence

The first objective of this study was to find out the existing situation for practices of e-learning in mathematics. To verify this objective, 5 secondary level government school out of 99 school and 15 secondary level private schools out of 664 school of Kathmandu district were selected for the study (DOE, 2070). Here, the name of ICT tools, sampling score, and their percentage are tabulated below:

Table 1

S.N.	ICT tools	No. of School	No. of ICT toolsExists	Percentage	No. of ICT tools does not exists	Percentage
1	Overhead projector	20	3	15	17	85
2	TV	20	20	100	0	0
3	VCD/DVD	20	20	100	0	0
4	Camera	20	19	95	1	5
5	Radio/Cassette player	20	20	100	0	0
6	Photocopier	20	17	85	3	15
7	Computer	20	20	100	0	0
8	Mathematical software	20	9	45	11	55
9	Printer	20	18	90	2	10
10	Scanner	20	12	60	8	40
11	Telephone	20	20	100	0	0
12	Fax	20	11	55	9	45
13	Cable TV network	20	18	90	2	10
14	Internet	20	16	80	4	20

The result showed that 15 percentof the schools exist overhead projector where 85% school does not exist it. It also shows that 100% school out of total school exist TV, VCD/DVD, Radio cassette player, Computer and Telephone as an ICT tools. 95% school exists Camera where 5% school does not exist Camera. 45% school exists Mathematical software where 55% school does not exist it. 90% school exists printer, cable TV network where 10% school does not exist it. Similarly, 60% school exists Scanner where 40% school does not exist it. 55% school exists Fax where 45% school does not exist it. And, 80% school exists Internet where 20% school does not exist it. The data shows that majority of the schools exists ICT tools for teaching and learning mathematics.

The data above concludes that the majority of the schools i.e. 90 % of them exists ICT tools to teach mathematics and 100% of them were agreed to use ICT in the school. However, very few of them exists OHP and mathematical software as an ICT tools i.e. 3 schools out of 20 and 9 schools out of 20 respectively.

Background Information of Students

Two hundred students out of 50,163 mathematics students studying in Kathmandu participated in the study (DOE, 2070). Thus 0.004% participation of students was obtained. All the students were not from the same cast and taking Nepali and their own native language as their home language. 75 students from Newar, 15 students from Jha, 5 students from shah, 3 students from Yadav, 25 students from Magar, 35 students from Chhetri, 16 students from Dalit, 14 students from Bramhin, 5 students from Lama, and 7 students from Muslim. 64 percent of the students were girls and 46 percent were boys with an average age group of 14 years.

All the students are English second language speakers because their proficiency in Englishislow, the instruments had to be translated to their home language to facilitate the process of getting reliable information. 175 students who

participated in the study have computers at home and other 25 students who also participated in the study did not have computers at home and their only access to computers was school's computer laboratory, which had a limited number of computers. (Appendix-B)

Opinion of Secondary level Students towards e-learning (ICT)

This second objective of the study were to find out the opinion of students towards e-learning in Mathematics. In order to achieve these objectives, three point Edwards type attitude scale were used and the data were obtained. The obtained score of student's opinions are represented in percentage and $\chi 2$- value. The responses that have the greater than 50 % opinion score was consider as positive opinion and below 50% opinion score was considered as negative opinion. The details analysis and interpretation of the student's opinion in appendix-E.

In the response of first Statement is significant with $\chi 2$ –value 100.69 at 0.05 level of significance and 66.5% students are agreed i.e. the response is positive, 13% students are neutral and 20.5% students are disagreed with this statement. This shows that the most of students are agreed with using the ICT at school improves the learning. In response to this statements student's said, "*We can improve our mathematics if the school provides us ICT and teach us through it*."(Appendix-E)

In the response of second statement is significant with $\chi 2$ –value 149.08 at 0.05 level of significance and 72% students are agreed i.e. the response is positive, 3% students are neutral and 25% students are disagreed with this statement. This shows that the most of students are agreed with ICT makes learning more interesting. At that time thestudents replied, *"like in other subject now I do not have problem in mathematics regarding the missing contents because I can easily recover those contents by watching the video"*.(Appendix-E)

In the response of third statement is significant with $\chi 2$ –value 73.72 at 0.05 level of significance and 51% students are agreed i.e. the response is positive, 5% students are neutral and 44% students are disagreed with this statement. This shows that the most of students are agreed with the statement‘I can get access to computers at school whenever I need.’ They said, *“We have sufficient amount of ICT materials in our school and we can use them whenever needed.”*(Appendix-E)

In the response of fourth statement is significant with $\chi 2$ –value 74.68 at 0.05 level of significance and 52% students are agreed i.e. the response is positive, 5% students are neutral and 43% students are disagreed with this statement. This shows that the most of students are agreed with ICT are essential for education. They replied that ‘*ICT is very essential in modern context of learning*.’ (Appendix-E)

In the response of fifth statement is significant with $\chi 2$ –value 112.48 at 0.05 level of significance and 68% students are agreed i.e. the response is positive, 22% students are neutral and 10% students are disagreed with this statement. This shows that the most of students are agreed with the statements‘I enjoy lessons with computer.’ Some students said that they become very interested when they are taught with computer. (Appendix-E)

In the response of sixth statement is significant with $\chi 2$ –value 50.68 at 0.05 level of significance and 53% students are agreed i.e. the response is positive, 12% students are neutral and 35% students are disagreed with this statement. This shows that the most of students are agree with this statements. They replied that it is very comfortable to use computer and learn through it. (Appendix-E)

In the response of seventh statement is significant with $\chi 2$ –value 40.31 at 0.05 level of significance and 56% students are agreed i.e. the response is positive, 23.5% students are neutral and 25.5% students are disagreed with this statement. This shows

that the most of students are agreed with the statement, '*I believe that the more often teachers use computers, the more I will enjoy school.'* (Appendix-E)

In the response of eighth statement is significant with χ2 –value 298.41 at 0.05 level of significance and 3% students are neutral and 97% students are disagreed i.e. the response is negative with this statement. This shows that the most of students are disagreed with the statement, 'I have better information sources than ICT.' (Appendix-E)

In the response of ninth statement is significant with χ2 –value 72.01 at 0.05 level of significance and 54.5% students are agreed i.e. the response is positive, 6.5% students are neutral and 39% students are disagreed with this statement. This shows that the most of students are agreed with the statement, 'ICT is very helpful in learning process.' (Appendix-E)

In the response of tenth statement is significant with χ2 –value 284.53 at 0.05 level of significance and 3% students are agreed, 7.5% students are neutral and 89.5% students are disagreed i.e. the response is negative with this statement. This shows that the most of students are disagreed with the statement, 'Computers scare me.' (Appendix-E)

In the response of eleventh statement is significant with χ2 –value 128.44 at 0.05 level of significance and 17% students are agreed, 12% students are neutral and 71% students are disagreed i.e. the response is negative with this statement. This shows that the most of students are disagreed with the statement, 'I need more and more help from teachers to learn ICT.' (Appendix-E)

In the response of 12th statement is significant with χ2 –value 259.48 at 0.05 level of significance and 8% students are agreed, 5% students are neutral and 87% students are disagreed i.e. the response is negative with this statement. This shows

that the most of students are disagreed with the statement, ‘computers are difficult to use.’ (Appendix-E)

In the response of thirteenth statement is significant with χ2 –value 26.89 at 0.05 level of significance and 50.5% students are agreed i.e. the response is positive, 26.5% students are neutral and 23% students are disagreed with this statement. This shows that the most of students are agreed with the statement, ‘It is time consuming using ICT in learning.’ (Appendix-E)

In the response of fourteenth statement is significant with χ2 –value 197.61 at 0.05 level of significance and 4.5% students are agreed, 43% students are neutral and 52.5% students are disagreed i.e. the response is negative with this statement. This shows that the most of students are disagreed with the statement, ‘Working with computers makes me nervous.’ (Appendix-E)

In the response of fifteenth statement, 13% students are neutral and 87% students are disagreed i.e. the response is negative with this statement. This shows that the most of students are disagreed with the statement, ‘ICT is unwanted to use for teaching.’ (Appendix-E)

The above data show that the use of ICT change teaching in several ways. With ICT, teachers are able to create their own material and thus have more control over the material used in the classroom than they have had in the past.

Pupils associated ICT use with raised interest and increased motivation on their part. Such views echo the findings of many researchers (for example, Watson et al., 1993; Cox et al., 1997). Interactive courseware was popular amongst pupils – particularly games and simulations seen as combining practical challenges with learning opportunities. Some comments suggested that such interest and motivation led not just to harder work on the part of pupils but to a changed quality of engagement. Pupils also saw ICT tools as helping to overcome difficulties they

experienced in producing work to a good standard – notably where this involved scribing by hand – so also reducing scope for criticism by teachers. Equally however, without the capacities required, ineffective use of ICT tools could be highly demotivating to pupils. For some pupils, too, use of ICT tools could diminish the sense of capability and accomplishment they gained from carrying out tasks without assistance.

According to the theory of constructivist, knowledge is not taught but is learned by the learner themselves through constructing new knowledge on the bases of old knowledge, under a certain setting, with the help of others such as teachers or study partners, and utilizing certain study resources. Students being the centre of teaching and learning process while teacher works as organizer, facilitator and motivator, utilizing setting, cooperation and dialogue to motivate students' interests, activity and creativity (Liu, 2010).

Result from this study support that learning through e-learning does give positive impact in constructing student's knowledge. The researcher noticed is that students were much motivated towards ICT itself. These shows that they are curious to the possibility of using teacher's classes repeatedly using available mobile technology. This could be a motivation of the students for this opportunity of learning.In conclusion from the above table that the student's opinion towards E-learning at secondary level in Kathmandu district is positive.

Background Information of Teachers

There were 112 Mathematic teachers among 925 teachers: 100 teachers out of 112 were participated. Thus 89.29% participation of Mathematics teacher were obtained. Among them 5 was female teacher for secondary level with having 3 years teaching experience, 2 female teachers having 3 month computer training, other 3 female teachers having 1 year computer training and all these female teachers having

computer with ADCL internet connection at their home. Other 95 teachers are male, only 40 teachers having more than 5 year teaching experience and 30 teachers having 3 year teaching experience and 15 teachers having 2 year teaching experience and 10 teacher having less than 1 year teaching experience. Among the 95 male teachers, only 45 teacher taken 1 year computer training, 20 teachers taken 6 month computer training, 11 teacher taken 3 month computer trainingand 19 teachers was not taken any types of ICT training. But all these 95 teachers having computer at their home. (Appendix-C)

Opinion of Secondary level Teachers towards E-learning

The second objective of the study were to find out the opinion of secondary level Mathematicteachers towards E-learning. In order to achieve these objectives, three points Edwards type attitude scale were used and the data were obtained. The obtained score of teacher's opinion is represented percentage and $\chi 2$ –value. The response have the percent opinion scores was consider positive and negative. The opinion score greater than 50 percentage considered as positive views and lower than 50 percentage considered as negative views. The details analysis and interpretation of the teacher's opinion towards e-learning (ICT) is given in appendix-F.

In the response of first statement is significant with $\chi 2$ –value 182.42 at 0.05 level of significance and 97% of sampled teachers are agreed i.e. the response is positive, 2% of teachers are neutral and 1% of teachers are disagreed with this statement. Hence majority of teacher has positive views that knowledge of use of computer is essential for teaching Mathematics. (Appendix-F)

In the response of second statement is significant with $\chi 2$ –value 176.78 at 0.05 level of significance and 96% of sampled teachers are agreed i.e. the response is positive, 3% of teachers are neutral and 1% of teachers are disagreed with this

statement. Hence majority of teacher has positive views that knowledge of use of ICT makes teaching more interesting. (Appendix-F)

In the response of third statement is significant with $\chi 2$ –value 182.42 at 0.05 level of significance and 2% of sampled teachers are agreed, 1% of teachers are neutral and 97% of teachers are disagreed i.e. the response is negative with this statement. Hence majority of teacher are disagreed with the statement, 'ICT makes teaching more difficult.' (Appendix-F)

In the response of fourth statement is significant with $\chi 2$ –value 154.90 at 0.05 level of significance and 2% of teachers are neutral and 98% of teachers are disagreed i.e. the response is negative with this statement. Hence majority of teacher has disagreed with the statement 'ICT makes lessons more diverse.' (Appendix-F)

In the response of fifth statement is significant with $\chi 2$ –value 149.21 at 0.05 level of significance and 3% of sampled teachers are neutral and 97% of teachers are disagreed i.e. the response is negative with this statement. Hence majority of teacher are disagreed with the statement "ICT decrease students' motivation." (Appendix-F)

In the response of sixth statement is significant with $\chi 2$ –value 112.22 at 0.05 level of significance and 83% of sampled teachers are agreed i.e. the response is positive, 5% of teachers are neutral and 13% of teachers are disagreed with this statement. Hence majority of teacher has positive views that ICT improves the presentation of material in lesson. (Appendix-F)

In the response of seventh statement is significant with $\chi 2$ –value 125.06 at 0.05 level of significance and 86% of sampled teachers are agreed i.e. the response is positive, 5% of teachers are neutral and 9% of teachers are disagreed with this statement. Hence majority of teacher has positive views that ICT limits the content of lesson. (Appendix-F)

In the response of eighth statement is significant with χ2 –value 120.26 at 0.05 level of significance and 85% of sampled teachers are agreed i.e. the response is positive, 9% of teachers are neutral and 6% of teachers are disagreed with this statement. Hence majority of teacher has positive views that ICT makes preparing lessons quicker. (Appendix-F)

In the response of ninth statement is significant with χ2 –value 171.14 at 0.05 level of significance and 3% of sampled teachers are agreed, 2% of teachers are neutral and 95% of teachers are disagreed i.e. the response is negative with this statement. Hence majority of teacher were disagreed with the statement, 'ICT makes the lessons more difficult.' (Appendix-F)

In the response of tenth statement is significant with χ2 –value 154.94 at 0.05 level of significance and 92% of sampled teachers are agreed i.e. the response is positive, 5% of teachers are neutral and 3% of teachers are disagreed with this statement. Hence majority of teacher has positive views that ICT makes the lessons more fun for the students. (Appendix-F)

In the response of eleventh statement is significant with χ2 –value 149.78 at 0.05 level of significance and 6% of sampled teachers are agreed, 3% of teachers are neutral and 91% of teachers are disagreed i.e. the response is negative with this statement. Hence majority of teacher were disagreed with the ICT makes it more difficult to control the class. (Appendix-F)

In the response of 12th statement is significant with χ2 –value 129.62 at 0.05 level of significance and 87% of sampled teachers are agreed i.e. the response is positive, 7% of teachers are neutral and 6% of teachers are disagreed with this statement. Hence majority of teacher has positive views that ICT often prevent teaching because of interruption in work or in software. (Appendix-F)

In the response of thirteenth statement is significant with $\chi 2$ –value 134.48 at 0.05 level of significance and 88% of sampled teachers are agreed i.e. the response is positive, 6% of teachers are neutral and 6% of teachers are disagreed with this statement. Hence majority of teachers has positive views that ICT gives more confidence to extend use of computer to other topics. (Appendix-F)

From the view of constructivist theory teaching through ICT in mathematics helps teacher to construct positive opinion towards e-learning and motivating students for learning Mathematics. And also from the literature review, Chong CheeKeong et al. (2005) found that positive opinion about the use of ICT in teaching Mathematics can make the teaching more effective as well as enhance the student's capabilities in understanding basic concepts. Kalinga (2008) found that when application of ICT in e-learning that is accessible even in remote and rural secondary schools will improve the performance of students in secondary schools as well as raising morale for teachers and students. (Sapkota, 2015; Cox 1997) found students more motivate to learn Mathematics, teaching by ICT tools. This study also interpreted the result that students become more motivated to learn mathematics through ICT. ICT tools /e-learning helped students to understand each topics and basics concepts of mathematics in better manner.

In conclusion, it is said that the opinion of teacher's towards e-learning at secondary level in Kathmandu district is positive. They are in favour of using ICT. Their responses show that ICT is needed for better learning to take place.

The Analysis of FGD

Having already analysed the checklist and questionnaire responses, attention is now focused on the structured focus group discussions which took place as part of the research. It is important to note that aims of this part of the data analysis.

At that time researcher discussed them informally on the basis of some questions:

1. What kind of ICT do you have?
2. Do you use any kind of ICT in the classroom?
3. What are the objectives that you want to achieve through the integration of ICT?
4. Are the students capable of using ICT during in classes?
5. Are half of the schools capable of using ICT?
6. What are the challenges in promoting ICT integration in schools?

The data obtained from these above questions were analysed and interpreted by connecting literature review.

When the researcher asked the first question to the group of Mathematics teachers then large number of respondents replied "*we have many more ICT tools like as computer, internet, different mathematical software, TV with cable connected, Android mobile, Radio cassette player, camera and sound recorder".*

When researcher asked the second question to the group of teachers then large numbers of group respondents had common replied "*yes, we have used some technology in the classroom like as mobile to search meaning, calculator for mathematical calculation, internet to search some definitions? Sometime we used projector to used projector to show some graphic diagram. We give some web sites to the students to search formulas and history/ origin of subject matter."* From the literatures review, Cox (1997) found that use of ICT helped them understand their topics in a better manner. Rendall, (2001) indicated that ICT-assisted teaching was more effective in raising the arithmetical and logical skills in Mathematics.

When the researcher asked the question no. 3 to the group then the most respondents cited based on four major areas are seen. A major objective associated with the integration of ICT in the classroom is that of the efficiency and speed gained in its application, both from the perspective of preparing for lessons, and the efficiency in which the subject matter is delivered during lessons:

‘*ICT helps the teacher to vary teaching methods and provides time and effort for students as well as teacher’.*

Another common response have was the opportunity to provide real-life, applied, examples of theoretical concepts applied in learning. ICT can enhance the opportunity to see visual examples of the work they are understanding, to enhance learning. Additionally, a more traditionally conception associated with ICT is that it focuses the student’s attention and increases internet in the subject matter.

Some of the respondents see ICT as a valid method of improving standards and outcomes for students:

‘The best objective that I strive to achieve is to raise student’s scientific and technological level’.

When the researcher asked the fourth question then the common response of respondents is positive about the ICT abilities of the learners; in addition to the facilities they have access to in their home lives. For example, one respondent describes the students as “*better than the teachers’* whilst another describes how they’….*have not seen a single student who does not have a computer at home*”. Other respondents describe the constraints to student’s use of ICT in the classroom, both in terms of the skills of the teacher and the technology available:

‘*This depends on the type of technology used in the class and the teacher’s ability in classes’.*

Similarly, when the researcher asked the fifth question to the teacher’s group then the common response of respondents is positive about it. Some of respondents said MOE has implemented some of the programs related to ICT in education. Some NGOs trusts and individuals have provided computers and other accessories to some schools and basic computers training to teachers (ICT in education Master plan 2013).

The researcher found that the mathematics teachers were sometimes used the available ICT in their teaching. Teachers were sometimes used internet facilities for teaching. School computer laboratory is used very minimally are in most instances, it is used for other purpose other than for teaching and learning Mathematics. Students and teachers have very strong positive perceptions about the use of educational technology in mathematics teaching and learning even though the educational technology resources are not utilized. Therefore, after the discussion with teacher, the researcher found various problems, to use available resources. They are described critically below.

Economic Problem

It says that school inputs, teacher inputs, student inputs, and family inputs along with the national, community and school contexts act through the school process to determine student outcomes. Using ICT technologies is comparatively more expensive in itself.

The economic condition of student depends upon the economic status, implementation and sources available of their guardians and parents. Throughout this study it has been found that the economic level of their guardians is normal. The students of community based schools are economically weak; they had many difficulties in their source management. So on the question, “How many students have computers or not?” teachers replied “*only 65 percent students have computers at home but we have*”. (Teacher’s view)

This is the fact that the study of mathematics using computers at home is not possible for them. Since the teachers have easy access to use computers at home and school, they are not motivated to use it for teaching and learning Mathematics. When researcher asked, “Why do you not use ICT in teaching and learning?” teacher replied “*Salary and facilities provided by school is not enough for us. We have totake tuition*

classes at different centres for little amount of money" (Teacher's view). That is way they spend huge amount of time even to earn little money. They don't have time to prepare to use ICT in teaching learning Mathematics. This also has discouraged the use of computers.

Lack of Manpower

Another important category of school inputs. Lack of adequate number of teachers is a serious problem. Neither the school administration nor the CLCR is responsible for skilful teacher. Project has managed only one teacher for ICT integration. On the question, "Do you have knowledge to use ICT in teaching learning Mathematics?" teacher replied "*we don't have enough knowledge, skill and idea to relate the Mathematics contents with ICT. This is something like affording a fish instead of teaching how to do fishing*". (Teacher's view)

Problem of Time Management

There seems to be problem in the management of time from all the sides, teachers, students, administration, CLCR project, school management committee and all other concerned bodies. The teachers, in the traditional vein are allocated 6-7 periods because of which they don't have time to use the computers. The school administration is unable to manage the time due to other responsibilities such as, curriculum, implementation and teaching. The time per period, the no. of students and the teachers, capabilities are quite imbalanced because of which the math teacher could not use their computer skills in teaching. On the question, "how much time is provided for Mathematics classes to use the computer laboratory?' teacher replied, "*We have to teach 6-7 period per day. We are unable to manage time to go computer lab to search the information and if we want some time, the computer lab is usually busy*" (teacher's view).

Since the computer is an obligatory subject from primary level to lower secondary, the labs are busy all time. So, this is impossible to teach other subjects using the computers. The school management committee doesn't seem much curious of such problems. This is not only the about the time but also about other activities and plans, they seem quite unconcerned. From the side of students, since they are taught tradition, the time could not be managed to each through computers.

Lack of Training

According to Coley, Cradler and Engel, for successful and effective ICT tools usage, teachers' training is of utmost important. ICT will be very useful for teachers to be in a position to purchase appropriate and relevant which will help in the development of high order thinking skills in Mathematics.

Apart from the students themselves, teachers and school leadership are the main agents of change at the school level. One of the preliminary steps in implementing any ICT-based educational approach is teacher preparation. Unless the teachers are fully comfortable with this new approach to teaching, providing students with computers and educational content alone will have limited impact on teaching and learning process. That's why training related to the specific subject with appropriate use must be essential for teacher. Based on this situation, researcher asked, "Are you trained in how to use ICT in your subject?' some of teachers replied, "*we are not trained how to use ICT in Mathematics* (Teacher's view).

From this, it can be seen that the training are not centred upon teaching the particular subjects. The training that the mathematics teachers need is not given yet. Although the project had taught about regarding teaching of mathematics, it is quite difficult to implement.

Lack of Mathematical Software

It has been seen that is not available appropriate software for Mathematics teaching and learning in the computer. Although they have Mathletics software, that is not sufficient for them because that works only on the access of the high speed internet. Neither their global partners nor the school management team have shown internet to install other type of offline software related with Mathematics software. So the unavailability of specific Mathematical software is also the problem of implementation. Thus the lack of enough Mathematical software makes it difficult for the teacher to accommodate the different learning styles and curriculum needs.

Limited Internet Facility

While computers are essential tools for delivering ICT-based education, the full power of ICT in education can only be realized when these tools are connected to a wider network that allows users to access information from across the globe and share their knowledge with others.

The cost of the internet is high and it is difficult for school management to afford the cost. The speed of the internet of the internet is also quite slow. (Teacher's view)

It shows that there is not unlimited facility for teachers and students. This is because the internet service added much economic weight on the school. Since the schools had to pay high bill of internet, they could not afford the service. However, it is found that it is possible for normal use of internet by the teachers. This might be the reason that it is also costly to keep computers up to date for high speeds.

Insufficient ICT Resources

One of the common problems in teaching using computers is also the improper ratio of students with computers. School does not have sufficient tools of the ICT. The unavailability of specific Mathematics software adds on to as another problem.

Access to a wider range of ICT tools and appropriate use supports learning. Lack of enough ICT tools makes it difficult for teachers to accommodate the different learning styles.

Lack of a Policy

It is not necessary that they must have a practical aspect. Generally, Mathematical classes and environment are administered in theoretical basis where no such ICT are used. Even in private sector, there is no such policy to use ICT in teaching Mathematics. That's why without a policy, it is difficult for the schools to come up with logical and effective plans of how to use educational technology in the classroom environment.

Clearly, it is now time for policymakers and teachers to shift policy focus from quantity. By integrating ICT based teaching and learning approaches in mainstream pedagogy, we can enable students, teachers and families in different geographic and economic locations to access the same high quality educational resources. In particular, proper use of computers and modern networking technology has the potential to effectively address the problems of both quality and quantity.

Challenges in Promoting ICT Integration in Schools

The major challenge in our context is the required physical infrastructure for implementing ICT. In remote areas schools are like mud house where the wiring and putting desktop is itself a problem. Moreover the government has now focused more on secondary schools for ICT related programs. Out of 34 thousand schools they are only 8000. In private schools too very few ICT related activities are found in urban areas. Many school children, thus, are out of the access to ICT in classrooms.

Policy related: Still the MOE has not come up clear policies the implementation of ICT in classrooms. The macro policy is there but it is equally

important to transform them into micro policies so that each school will get an opportunity to have ICT facilities for their children.

Financial: MOE cannot spend for ICT in all schools because more than 90 percent of the budget of each school is consumed for salary purpose. At a time when minimum enabling conditions do not exist in schools, it will be very difficult to introduce ICT on government expenses.

Teacher related: Most of the teachers in the system are traditional employed some 25 years back. Because of the teacher unions the MOE has not been able to manage teacher positions for the past 2 decades. And those traditional minded teachers are another challenge to implement ICT in schools.

Curricula related: Although Nepal has a system of continuous improvement in curriculum it cannot do so frequently because of the distribution of free books in schools. So it should wait for at least 5 years in changing the curricula. The ICT will be coming in new shape every year but our curricula will be out of date by the time we install them based on existing efforts.

Sustainability: Twenty two percent of the total education budget comes from multi-donor agencies. This is the only money the government has for development purpose. The danger is that the development projects will not continue after the projects are over. Thus the initiation of the government for ICT integration in education will follow the same suit.

From the above information, it can be summarized, there were perceptual both positive and negative perceptions towards E-learning among teachers, students and administrations. There was found positive as well as negative effects of E-learning but more positive and least negative effects of E-learning was found in relation to the

motivation of students to learn mathematics. Math teachers, students, and administration of school had mix (similar and different) and relative perception about ICT in relation to improve student's mathematical achievement and motivate to learn mathematics. Most of the teachers, students and administrations of private school were favoured existing percentage in comparison to the government school. (Appendix-D)

Chapter-V

SUMMARY, FINDINGS, CONCLUSION, AND RECOMMONDATIONS

This chapter provides a brief summary of the study, states the finding of the study, gives concluding paragraph of the results of the study and suggests possible directions for future studies as recommendations.

Summary

The study was undertaken to examine the opinion towards the practices of e-learning in Mathematics. Especially the objectives of this study were:

- To find out the existing situation for practices of e-learning in Mathematics.
- To find out the opinion of teachers and students towards the practices of e-learning in Mathematics.

The methodological design of this study was descriptive survey type. The population of the study was consisted of all the secondary level students of public and private school of Kathmandu district on the academic year 2072. Total 200 students, 100 teachers, and 20 administrations were selected for the sample from twenty secondary schools. From each school ten students, 5 teachers, and 1 administration were chosen by random sampling method.

To achieve the objectives of the study, data and information were collected through checklist, questionnaire and FDG. All the information was collected from primary sources by using Edward's two point scale (Existence and Does not exists) and three points scale (Agree, Neutral, and Disagree). The analysed percentage score and $\chi 2$- test of each statement was determined and interpret by using the conceptual understanding of the study developed in literature review with selected theory. Perceptual similarities and differences was used as the categories of analysis the text of FGD.

Major Findings of the Study

On the basis of analysis of the data, the following findings are given:

- It is found out that most of the schools in Kathmandu has ICT tools.
- Some of the schools uses ICT tools to teach mathematics.
- Some schools have ICT materials but due to the lack of teachers' training, they could not use them in class.
- Secondary level students had a positive opinion towards e-learning.
- Maximum mathematics teacher at technical stream who had got basic training and orientation about ICT, highly favoured to ICT and positive perception towards it but least mathematics teachers had negative perception towards ICT because they had not get any training and orientation about e-learning.
- E-learning helps to increase the flexibility in learning Mathematics.
- E-learning to decrease the student dependency towards their teacher for learning Mathematics.
- The irregular students were also as equally benefited as regular students by the information communication technology integrated pedagogy.
- There is necessity of training, orientation program of both stream.
- Students are found interested when they are taught with ICT tools.

Conclusion

From the above finding of this study, it is concluded that the students and teachers of secondary level have positive opinion towards e-learning in Mathematics. In existing situation, there is almost maximum positive perceptions, and understanding among teachers, students and administrations towards e-learning. Some of teachers have negative perceptions, misconceptions, misunderstanding and illusions towards e-learning due to lack of sufficient information, knowledge and

popularization among all stakeholders. Schools and teachers are sure and believe in e-learning whether it increases student's mathematical achievement and learning. The researcher comes to the conclusion that government, MOE, CDC and other concerned bodies should give information about the implementation and how to practice it in school. The researcher found that mathematics teachers of technical stream has positive perception about e-learning because he/she has got basic training and orientation about ICT but least of teachers have negative perception and misunderstanding about ICT due to lack of sufficient information and knowledge. So, the researcher comes to the conclusion that perception about any system, process and event depends upon the knowledge and clear understanding about it. So, there is necessity of training, orientation and discussion programs about e-learning.

It was found that students were enthusiastic learning mathematics with the help of ICT. The various aspects of ICT tools (i.e. Geo-gebra) visually, dynamic in nature help students to provide more depth understanding of mathematics. The immediate feedback that students received with the help of ICT. Students were very much impressed and excited to know about the mathematical software. They also emphasized in publicizing information about the ICT throughout the country. It appeared that ICT can be a useful mathematical tools that can be interpreted for teaching and learning of mathematics at high schools in Nepal.

It is obvious that in general Information Technology and in particular, calculators, computers and software's don't actually mean major changes in how to teach rather than what to teach. A typical way does so is to replace older ways of communication with new possibilities offered by information technology and the internet. The use of web pages to disseminate information and e-mail for two-way communication with students can be very effective as it can reduce time, costs needed to transfer information and also noise in communication in this regards, the former

teacher centred educational activities began to turn into learner-centred activities. Thus e-learning helps the students to become more active in the education process. Particularly, calculators and computer technology has also great potential to affect presenting the contents of the school Mathematics.

Recommendations

From the findings of the present study the researcher suggests the following recommendations:

Recommendations for the Educational Implication

- Mathematics teacher should be encouraged to use and adopt educational technology together with teaching method.
- The mathematics teacher should be encouraged to emphasize the group discussion and student's centred methods instead of regular lecture method.
- Ministry of education and NCED should encourage the teacher through training to improve the existing mug and jug method by use of information and communication technology. For these NCED and MOE should organize the various training programmes, workshops, conferences etc.
- Every teacher should be capable to introduce the technology as a method and media in their teaching learning activities. For this the teacher's personal effort as well as the effort by the NCED is required. Besides, there needs a change in teacher education curriculum to incorporate ICT tools based pedagogies in academic programmes.
- MOE should be able to introduce the new pedagogies which are based on educational technology. So that such pedagogy could be a milestone to bring the deprive children to the main stream of education.

Recommendation for Further Studies

Research on a large scale is needed to see if the findings of this investigation can be generated to other such type of schools, so the following areas should be focused:

- The existence of relationship between ICT tools usage and ICT policy.
- Effective training model of ICT tools usage in teaching and learning.
- Whether the recommendation made in this will be feasible to all other such type of project

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APPENDIX-A

Observation checklist for Administrators

Dear administrator,

I am student of mathematics education in Central Department of Education in Kirtipur, Kathmandu. I am doing a research on **"Opinion towards the practices of e-learning inMathematics"**, the main objectives of my research is to find out the existing situation for practices of E-learning in Mathematics and to find out the opinion of students and teacher towards e-learning in Mathematics. To fulfil the objectives of the study, I would like to take your view and idea about E-learning. Your view and ideas are only used to complete this study not for other purpose. I hope you do not feel any difficulty to help me to complete my study.

Name of the administrator: ……

School Address: ……

Phone no: …….

Sector: 1-Public 2-Private

Gender: 1-Male 2-Female

Your age: …….

Number of secondary teachers: ……

Number of Mathematics teacher: ……..

Number of the years in administrating: ……Year/Years.

1. Please check out one option each (applicable for administrators and teacher only)

A. Did you receive any training on ICT before or after you joined in this School?

a- Yes b-No

B. Do you have an ICT department or ICT unit in your school?

a. Yes b. No

C. If the response is' no' in question no '2' do you have plan to introduce ICT in your School?

a. Yes b. no

D. Has your School allocated School budget for the implantation of the ICT?

A. Yes b. No

2. Please check out among the following ICT tools on the basis of their existence at your school (applicable for administrators only).

S.N.	Name of the ICT tools	Exists	Does not Exists
a	Overhead Projector		
b	TV		
c	VCD/DVD		
d	Camera		
e	Radio/Cassette player		
f	Photocopier		
g	Computer		
h	Mathematics software		
i	Printer		
j	Scanner		
k	Telephone		
l	Fax		
m	Cable TV network		
n	Internet		

APPENDIX-B

Questionnaire for the Students

Dear students,

I am student of mathematics education in Central Department of Education in Kirtipur, Kathmandu. I am doing a research on "**Opinion towards the practices of e-learning in Mathematics**", the main objectives of my research is to find out the existing situation for practices of E-learning in Mathematics and to find out the opinion of students and teacher towards e-learning in Mathematics. To fulfil the objectives of the study I would like to take your view and idea about E-learning. Your view and ideas are only used to complete this study not for other purpose. I hope you do not feel any difficulty to help me to complete my study.

Name of students:-…….

School's Name:-……

Sector 1-Public 2-Private

Gender 1- Male 2-Female

1. What year are you in?

a. 14 year b. 15 year c. 16 year d. 17 year

2. What class are you in?

a. 9 b. 10

3. Do you have a computer at home?

a- yes b-No

If yes, is the computer connected to the internet?

a- Yes b-No

4. Do you use your computer at home for your schoolwork?

a- Yes b-No

If yes, please explain what types……

5. At school, on a weekly basis, I use computer and it's applications for learning purposes

a. Never b. one hour c. two hour d. Three hour e. four hour f. more than four hours

6. At home, on weekly basis , I use computer and it's applications for learning purpose

A. Never b. one hour c. two hour d. Three hours e. four hour f. more than four hours

7. How long have you been using computer and it's applications for learning purpose either at school or at home?

a. Never use b. Less than one year c. One year d. two year e. more than two years

8. At school, on a weekly basis, I use computers for learning purpose

Time	English language	Science	math	English
Never use				
1 hour/ Week				
2 hour/ week				
3 hour/ week				
More than 3 hour/ week				

9. Please complete the following placing a tick in one of the three boxes next to each statement.

S.N.	Statements	Agree	neutral	Disagree
1	It is important than I use computers in my learning because it make my school work easy.			
2	Using computers at school improves my learning.			
3	When I use computers at they make learning more interesting.			
4	I make good use of email at school			
5	I can get a access to computers at school whenever I need to			
6	I think ICT are essential for education			
7	I use computer at school to do the following	Never	Daily	Weekly
A	Writing			
B	Email			
C	World Wide Web			
D	Mathematics learning			
E	Playing Games			
F	Others			
8	I use computer at home to do the following	Never	Daily	Weekly
A	Writing			
B	Email			
C	World Wide Web			
D	Mathematics learning			
E	Playing Games			
F	Others			

10. Your Opinion about using computer in the teaching/ learning process

S.N.	Please tick one box on each row	Agree	neural	Disagree
1	I enjoy lessons with a computer			
2	I feel comfortable working with computers			
3	I believe that the more often teachers use computers, the more I will enjoy school			
4	I am tired of using a computer			
5	I have better information sources than ICT			
6	ICT is very helpful in my learning process			
7	Computers scare me			
8	I need help from teachers to learn with ICT			
9	Computers are difficult to use			
10	I find it time-consuming using ICT in learning			
11	I know how to use ICT but am not interested in using it to learn			
12	Working with computers makes me nervous			
13	I wish ICT is unwanted to use for teaching			

APPENDIX-C

Questionnaire for the Teachers

Dear teachers,

I am student of mathematics education in Central Department of Education in Kirtipur, Kathmandu. I am doing a research on "**Opinion towards the practices of e-learning in Mathematics**", the main objectives of my research is to find out the existing situation for practices of E-learning in Mathematics and to find out the opinion of students and teacher towards e-learning in Mathematics. To fulfill the objectives of the study I would like to take your view and idea about E-learning. Your view and ideas are only used to complete this study not for other purpose. I hope you do not feel any difficulty to help me to complete my study.

Name of the teacher: ……

School Address: ……..

Phone no:

Sector: 1-Public 2-Private

Gender: 1-Male 2-Female

Your main specialisation (please specify: ……

Your age: …….

Number of the years in teaching: ……Year/Years.

1. Please check out one option each (applicable for administrators and teacher only)

A. Did you receive any training on ICT before or after you joined in this School?

a- Yes b-No

B. Do you have an ICT department or ICT unit in your school?

a. Yes b. No

C. If the response is' no' in question no '2' do you have plan to introduce ICT in your School?

a. Yes b. no

D. Has your School allocated School budget for the implantation of the ICT?

a. Yes b. No

2. Your Opinion about use ICT in the teaching Process:

S.N.	Please tick one box only in each row	Agree	Neutral	Disagree
A	I find it easy to think of ways to use computer in my teaching			
B	ICT makes teaching more interesting			
C	ICT makes teaching more difficult			
D	ICT makes my lessons more diverse			
E	ICT decrease student's motivation			
f	ICT improves the presentation of material in my lesson			
g	ICT limits the content of my lesson			
H	ICT makes preparing lessons quicker			
I	ICT makes preparing lessons more difficult			
J	ICT makes the lessons more fun for the students			
K	ICT makes it more difficult to control the class			
L	ICT often prevent teaching because of interruption in work or in software			
M	ICT has given me more confidence to extend my use of computer to other topics			

3. How many days did you have a face to face training?

…….

4. How often did you have computer practice after training?

……

5. Were you trained in technical support for your school?

a- yes b-No

If no, why not…….

6. Do you use information from the internet for teaching purpose?

a- Yes b-No

7. Do you see any barriers to your use of technology?

a- Yes b-No

8. Where are the computers located in your school?(check all the apply)

- Computer lab
- Library
- Classroom
- Administration areas
- Others……..

9. How long has the school been using computers?

- Not yet used
- Less than one year
- Less than five year
- Five year and above

10. The school's computer networking environment is:

- All the computers are networked
- Some of the computers are networked

- None of the computers are networked

11. In your opinion, What is the importance of using ICT in this school?(check out as many as applicable)

- Enriching teaching learning
- Finding information in internet
- Communication with others
- Development of ability to use ICT
- Management of functional operations
- Student assessments
- Others……..

12. In your opinion, the use of ICT at schools generates.

- Motivation
- Willingness to learn
- Work satisfaction
- Operational efficiency
- Others……

13. In your opinion, which of the following are the major problems handing the adequate use of ICT at your school? (Please check all that apply)

- Financial constraints
- Lack of skilled manpower
- Lack of adequate human resources
- Space problem
- Lack of readiness to introduce new technology

APPENDIX-D

FGD Guideline for the Teachers

FGD among teachers based on the following points/topics:

- Perception about e-learning
- Understanding and Knowledge of e-learning
- Advantage and disadvantage of e-learning
- Motivated and demotivated from ICT
- Feeling of competition among students, teachers after ICT was implemented
- Satisfaction from ICT tools received in Mathematics
- Home and school environment for mathematics teaching and learning
- Uses of ICT tools in teaching and learning in mathematics

Some of the model questions for FGD are listed here:

- What kind of ICT do you have?
- Do you use any kind of ICT in the classroom?
- What are the objectives that you want to achieve through the integration of ICT?
- Are the students capable of using ICT during in classes?
- Are half of the schools capable of using ICT?
- What are the challenges in promoting ICT integration in schools?

APPENDIX-E

Student's opinion score with their percentage and χ2- value towards E-learning

S.N.	Statements	No. of students	Agree	Percent	Neutral	Percent	Disagree	Percent	χ2- value	Decision
1	Using computer at school improves my learning	200	133	66.5	26	13	41	20.5	100.69	S
2	ICT makes learning more interesting	200	144	72	6	3	50	25	149.08	S
3	I can get a access to computers at school whenever I need	200	102	51	10	5	88	44	73.72	S
4	I think ICT are essential for education	200	104	52	10	5	86	43	74.68	S
5	I enjoy lessons with anICT embeded.	200	136	68	44	22	20	10	112.48	S
6	I feel comfortable working with computer	200	106	53	24	12	70	35	50.68	S
7	I believe that the more often teachers use computers, the more I will enjoy school	200	112	56	47	23.5	51	50.5	40.31	S
8	I have better information sources than ICT	200	0	0	6	3	194	97	298.41	S
9	ICT is very helpful in my learning process	200	109	54.5	13	6.5	78	39	72.01	S
10	Computers scare me	200	6	3	15	7.5	179	89.5	284.53	S
11	I need help from teachers to learn with ICT	200	34	17	24	12	142	71	128.44	S
12	Computers are difficult to use	200	16	8	10	5	174	87	259.48	S
13	I find it time consuming using ICT in learning	200	101	50.5	53	26.5	46	23	26.89	S
14	Working with Computer makes me nervous	200	9	4.5	86	43	105	52.5	77.53	S
15	I wish ICT is unwanted to use for teaching	200	0	0	26	13	174	87	197.61	S

APPENDIX-F

Teacher's opinion score with percentage and χ2- value towards E-learning (ICT)

S.N.	Statements	No. ofteachers	Agree	Percent	neutral	percent	Disagree	Percent	χ2-value	Decision
1	I find it is easy to think of ways to use computer in my teaching	100	97	97	2	2	1	1	182.42	S
2	ICT makes teaching more interesting	100	96	96	3	3	1	1	176.78	S
3	ICT makes teaching more difficult	100	2	2	1	1	97	97	182.42	S
4	ICT makes lessons more diverse	100	0	0	2	2	98	98	154.90	S
5	ICT decrease student's motivation	100	0	0	3	3	97	97	149.21	S
6	ICT improves the presentation of materials in lesson	100	83	83	4	4	13	13	112.22	S
7	ICT limits the content of my lesson	100	86	86	5	5	9	9	125.06	S
8	ICT makes preparing lessons quicker	100	85	85	9	9	6	6	120.26	S
9	ICT makes preparing lessons more difficult	100	3	3	2	2	95	95	171.14	S
10	ICT makes the lessons more fun for the students	100	92	92	5	5	3	3	154.94	S
11	ICT makes it more difficult to control the class	100	6	6	3	3	91	91	149.78	S
12	ICT often prevent teaching because of interruption in work or in software	100	87	87	7	7	6	6	129.62	S
13	ICT has given me more confidence to extend my use of computer to other topics	100	88	88	6	6	6	6	134.48	S

APPENDIX-G

Formula use for data analysis

Chi- square Value (χ^2) = $\sum \frac{(f_o - f_e)^2}{f_e}$

Where, f_o = Observed frequency

f_e= Expected frequency

APPENDIX-H

Name of the Schools

S.N.	Name of the schools	Sectors
1	Janseba H.S. School, Kirtipur	Public
2	TaudahRastiya H.S. School, Kirtipur	Public
3	Mangal H.S. School, Kirtipur	Public
4	Balkumari S. School, kirtipur	Public
5	Baghbhairab S. School, Kirtipur	Public
6	Rising Star H.S. School, Kathmandu	Private
7	Golden Rays A.Foundation, Kathmandu	Private
8	Hiltown H.S.S, Kathmandu	Private
9	Nepal A.P.F School, Kirtipur	Private
10	Rara Hill M. Schoo, Kirtipur	Private
11	JyanDeepS.School, Kathmandu	Private
12	Green V.S. school	Private
13	PuspaSadan A. Ma. Vi, Kirtipur	Private
14	G.S. H.S. school, Kalimati	Private
15	Kirtipur E. B. Ma. Vi. Kirtipur	Private
16	Suvkamna A. Kirtipur	Private
17	Himalayan A. Ma. Vi. Kirtipur	Private
18	Creative A. Ma.Vi., kirtipur	Private
19	Pipalsh A. Sitapaila, Kathmandu	Private
20	Rediant P. B. school. Sitapaila, Kathmandu	Private