

PERCEPTION OF MATHEMATICS TEACHERS TOWARDS ICT IN TEACHING  
MATHEMATICS

A  
THESIS  
BY  
TIKARAM DAHAL

FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE  
DEGREE OF MASTER OF EDUCATION

SUBMITTED  
TO  
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शिक्षा शास्त्र केन्द्रीय संकाय  
गणित शिक्षा विभाग

TRIBHUVAN UNIVERSITY  
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### Recommendation for Acceptance

This is to certify that Mr. Tikaram Dahal has completed his M. Ed. thesis entitled  
**"Perception of Mathematics teachers towards ICT in Teaching Mathematics"**  
under my supervision during the period prescribed the rules and regulations of  
Tribhuvan University, Kirtipur, Kathmandu, Nepal. I recommend and forward his  
thesis to the Department of Mathematics Education to organize final viva-voice.

.....

Mrs. Hom Kumari Adhikari

(Supervisor)

**Letter of Approval**

**A**

**Thesis**

**By**

**Tikaram Dahal**

Entitled

**" Perception of Mathematics teachers towards ICT in Teaching**

**Mathematics "** submitted by Mr. Tikaram Dahal in partial fulfillment of the requirement for the Master's degree in Education has been approved.

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Date: Aug 14, 2019



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### Letter of Certification

This is to certify to Tikaram Dahal a student of academic year 2072 / 073 with campus Roll No. 136, Exam Roll No. 72278417, thesis number 1498 and T.U. Regd. No. 9-2-9-424-2011 has completed his thesis under supervision of Mrs. Hom Kumari Adhikari during the period prescribed by the rule and regulation of Tribhuvan University, Nepal. The thesis entitled " **Perception of Mathematics teachers towards ICT in Teaching Mathematics** " has been prepared based on results of his investigation. I, here by recommend and forward that his thesis be submitted for evaluation as the partial requirements to the degree of Master of Mathematics Education.

.....

Assoc. Prof. Laxmi Narayan Yadav

(Head)

Date: July 25, 2019

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**Dediction**

Honestly dedicated

To

My parents

**Puspa Bahadur Dahal and Late mother Amuna Devi Dahal**

### **Declaration**

This dissertation contains no material which has been accepted for the award of other degree in any institutions. To the best of knowledge and belief this dissertation contains no material previously published by any authors except due acknowledgement has been made.

Date:

.....

Tikaram Dahal

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.....

Tikaram Dahal



### **Abstract**

This study is based on survey research design entitled “Perception of Mathematics Teachers Towards ICT in Teaching Mathematics.” The purpose of this research is to find out the perception of mathematics teachers towards the use of ICT in teaching mathematics and to compare the perception of pre-service and in-service mathematics teachers towards the use of ICT in teaching mathematics. The sample of the study consisted from who studied ICT in Mathematics Education at Central Department of Education 2075. The data were collected from questionnaire. For this study 50 in-service and 45 pre-service mathematics teachers were selected by accidental sampling method. The questionnaire was prepared on the basis of six dimension (skill development, teaching materials, student’s achievement, time management, student’s motivation and classroom management). The perception of mathematics teachers measured in the five-point Likert scale. The collected data was tabulated and analyzed by using SPSS software version 21.0 to get the value of statistics chi-square value and percentage for first objective, mean and standard deviation were computed by using t-test at 0.05 level of significance for second objective.

The study concluded that in-service and pre-service mathematics teacher’s had positive perception towards use of ICT in teaching mathematics. ICT help to develop the teacher skills, effective teaching material, time and classroom management. The researcher found that ICT help to increase the student achievement in mathematics and motivated the students to learn mathematics. Also, concluded that there is no significance difference between the perception of in-service and pre-service mathematics teacher towards ICT in teaching mathematics.

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## **Chapter I**

### **Introduction**

#### **Background of the Study**

The general educational activities empowering the pedagogical activities in school education of Nepal, Where Information Communication Technology (ICT) has been playing significant role in the field of education. ICT can be effective in teaching learning activities to decrease the percent of failure in secondary education. The role of ICT in mathematics has been globally acknowledged and appreciated.

According to Pelgrum (2001), ICT is a crucial catalyst and tool to bring about educational reforms which enable our students to be productive knowledge workers. So, ICT plays a catalyst role in enhancing learning in classroom and beyond. Moreover, it enhances scope of education by facilitating mobile learning and inclusive education. In this essence, mathematics teacher should have the knowledge of ICT about mathematics which help him/her to promote the ICT culture in teaching and learning mathematics.

In modern science and technological societies education demands more knowledge of teacher regarding ICT and skills to use ICT in teaching-learning process. Now a days ICT's are transforming schools and classrooms a new look bringing in new curriculum based on real world problems and providing tools for enhancing mathematical learning. So, ICT has emerged as necessary tool in modern classrooms for the effective outcome from teaching learning activities. Thus, every teacher must know the use of ICT in their subject areas to help the learners for learning more effectively.

According to Bransford other's (2000), several studies have reviewed the ligature on ICT and learning and have concluded that it has great potential to enhance student achievement and teacher learning, Wong other's (2006) point out that

technology can play a part in supporting face-to-face teaching and learning in the classroom. Many researchers and theorists assert that the use of computers can help students to become knowledgeable, reduce the amount of direct instruction given to them and give teachers an opportunity to help those students with particular needs (Iding, Crosby & Speitel, 2002; Shamtha, Peressini & Meymaris, Remeo, 2006). Based on this assumption, ICT seems to be an important tool to support new ways of teaching and learning and teachers must be competent in the use of ICT. In this regard, teacher education programs play a significant role in pre-service teachers as well as in-service teachers to integrate ICT into education. Different research indicates (Bansal, 2007) that ICT can change the way of teaching and it is useful in supporting more student-centered approaches to instruction and in developing the higher order skills and promoting collaborative activities.

Also, UNESCO (2009), state that the use of ICT promotes the quality in education. That is why, mathematic teachers should be provided with different professional development trainings including use of ICT in the mathematics classroom according to the demand of time. In the context of Nepal teaching method is traditional. So, it decreases student's attraction on learning process and get less education achievement.

From the above discussion, I reached in the conclusion about the perception of teachers that the Nepalese education system has been influenced by tools and technique of ICT. The goals of ICT in education master plan 2013-2017 was to improve the service delivery system in education but the goals didn't fulfill till now because the education system and teaching learning methods are traditional (teacher center and parrot learning). But some Nepalese Universities has started to practice in ICT but the reality far from it. Tribhuvan university realized that the necessity of ICT in teaching and learning mathematics and started to teach the course of ICT in

mathematics education since 2070. ICT trained teacher had been working in teaching profession and some other ICT trained teacher were preparing for teaching occupation.

### **Statement of the Problem**

Most of the students think about mathematics is hard subject. How we attract student's attraction on mathematics? Now a days this is a complicated question in teaching and learning mathematics. If teacher can use material and ICT tool and technique, we can increase students' attraction on teaching and learning mathematics. Knowledge is expanding day - by- day so teaching becoming one of the most challenging professions in our country. While learning mathematics, learner expect from facilitator to facilitate meaningful learning rather than just knowledge and skills. In this modern period the use of ICT in teaching mathematics provides new possibilities in teaching profession. In this situation in Nepal, Tribhuvan University design and implement the curriculum of ICT in mathematics education for Master Degree course in Mathematics Education, ICT based manpower were produced I also got a chance to study elective subject as ICT in mathematics education in fourth semester I fell that ICT can play the role of scaffolding in teaching mathematics, ICT play the vital role in teaching mathematics and then the researcher raised the question how pre-service and in-service teachers think about using ICT in teaching mathematics, to investigate such problem I chose this topic on my research to fulfill my partial fulfillment of master degree course. So, the study was focused on the following research questions.

- What do pre-service mathematics teacher think about using ICT in teaching mathematics?
- What do in-service mathematics teacher think about using ICT in teaching mathematics?

- Is there same among pre-service and in-service mathematics teachers towards ICT in teaching mathematics?

### **Objectives of the Study**

The main objectives of the study were following,

- To find out the perception of mathematics teachers towards the use of ICT in teaching mathematics.
- To compare the perception of pre-service and in-service mathematics teachers towards the use of ICT in teaching mathematics.

### **Statistical Hypothesis**

- Null Hypothesis: There is no significance difference between perception of in-service and pre-service mathematics teachers towards ICT in teaching mathematics.
- Alternative Hypothesis: There is significance difference between perception of in-service and pre-service mathematics teachers towards ICT in teaching mathematics.

### **Significance of the Study**

According to the European Commission the importance of ICTs lies in the technology itself than in the ability to create greater access to information and communication in underserved population many countries around the world have established organizations for the promotion of ICTs because it is feared that unless technologically advanced areas have a chance to exacerbate the already exist economical gap between technological have and have not areas ICT(2005).

Worldwide research has shown that ICT can lead to improved student learning and better teaching methods. This report will be proving that an increase student's explore on educational ICT through curriculum integration has a significant and

positive impact on students' achievement specially in terms of mathematical knowledge in comprehension practical skill and presentation skill in subject areas.

The significance of this research as follows:

- It helps to curriculum developer.
- It helps to in-service mathematics teachers and pre-service mathematics teacher.
- It helps to students for attractive mathematics learning.
- It helps to master's levels mathematics students.
- It helps to school management committee for making school as ICT zone.

### **Delimitation of the Study**

This research was limited in scope and coverage of pre-service mathematics teacher and in-service mathematics teacher. The sample were pre-service teacher of master's degree pass out students of Central Department of Mathematics who studied ICT in mathematics education in fourth semester. In-service mathematics teacher of master's degree pass out students of Central Department of Mathematics who studied ICT in mathematics education in fourth semester who had been teaching secondary level mathematics. The data was collected by questionnaire.

### **Operational Definition of Related Terms**

An operational definition is the key terms/word which were frequently used in the research. The following are the key terms in this research.

**ICT.** Here information communication and technology (ICT) means applied hardware and software to produce and share learning materials for the students.

**Pre-service teacher.** Those people who complete master's degree in mathematics education taking elective subject ICT in mathematics education but not start to teaching.



**In-service teacher.** Those people who complete master's degree in mathematics education taking elective subject ICT in mathematics education and start teaching.

**Mathematics teacher.** The teachers who teaches mathematics in secondary school level.

**Perception.** Perception is the thought/mental image/behavior or thinking of teacher towards their skill, teaching method, materials, student motivation, classroom management, time management as well as student's achievement in teaching.

## **Chapter II**

### **Review of Related Literatures**

In this section, I describe the literature to related to this are classified two types Empirical and theoretical. In fact, working with the literature is an essential part of the research process which generates the idea, helps in developing significant question and is regarded as instrumental in the process of research.

#### **Empirical Review**

The review of the empirical literature connects the systematic summary of scientific researches and real investigations including their topics, the reasons of why this study is conducted, methods of the study, data collection tools and method of confirming their validity and reliability and major findings in the related field. It guarantees that the researcher appraises of the scientific investigation and systematic study, its ways and required procedures for it.

The major propose of the present study finds the perception of mathematics teacher towards the use of ICT in teaching mathematics and compare the perception of pre-service and in-service mathematics teacher towards the use of ICT in teaching mathematics. There are so many journals, reports and related research studies. So, researcher was reviewed these studies in order to explain the present problem of the study. they are as follows.

According to Timilsena (2017), this studied focused on the “Attitude of teachers towards ICT in teaching mathematics”. The main purpose of this study was to find out the attitude of teacher towards ICT in teaching mathematics. This study consists 200 mathematics teachers out of 925 teachers in Surkhet district. The study adopted the survey design and a set of 30 questionnaires for teachers. This study different methods to collect the data. In this study data analysis by using Likert five-point scale for statistical analysis. To find teacher attitudes were used Chi-square test

at 0.05 level of significance with two degree of freedom. Finding of this study the teacher of secondary level has positive opinion towards ICT in teaching in teaching mathematics. In existing situation some of teacher have negative perceptions misconception, misunderstanding and illusions towards ICT, due to lack of sufficient information knowledge and popularization among all stakeholder. Also he concluded that if government provides the training for mathematics teacher in ICT they can teach easily mathematics by using ICT.

Similarly, Dahal (2018), research out on “Attitude of teachers and students towards the use of social media in teaching and learning”. The objective of this study was to find out the attitudes of teacher and students towards the use of social media in teaching and learning and compare their attitude. This study was limited within 5 secondary schools of Sindhupalchowk district. This study used the quantitative research design through the survey and descriptive nature. The survey design collected required information opinion and attitude of respondents using questionnaires techniques. In this study data analysis by Likert scales are a non-comparative scaling techniques and are students and teacher the use of social media in teaching and learning used Chi-square distribution and t-test was use to find the significance difference between mean score of student and teachers toward the use of social media in teaching learning process at 0.05 level of significance. This study concluded that the attitudes of secondary level students and teachers had positive towards the use of social media in teaching and learning and the attitude of teachers toward the social media are slightly better attitudes than student’s attitudes.

Also, Joshi, (2018) carried out the research on the topic “attitude of master’s level students towards ICT in mathematics education”. The objective was to find the attitude of master’s level students towards ICT in mathematics education and compare their attitude of students in the basis of gender. The sample was taken from the

master's level students of ICT in mathematics education of Tribhuvan university of Nepal. The data was collected by the questionnaire on the basis of Likert's scale. The method was mixed. The data was interpreted by chi-square distribution and t-test and calculated and analysis by the software SPSS of version 21.0. The study concluded that masters level students has positive attitude towards use of ICT in mathematics education. But there is significant difference between boys and girl's student attitude towards ICT in mathematics education. Also concluded that the attitude of boy's student is better than attitude of girl's students towards ICT in mathematics education. The students have positive attitude towards symmetric classroom activities, well managed equipment and course evaluation process.

Likewise, Benning (2015), conducted a journal on "Pre-service teacher use and perception of GeoGebra software as an instructional tool in teaching mathematics". This paper presents a case study of 85 pre-service mathematics teachers from the University of Cape Coast, Ghana; who enrolled in an instructional technology mathematics course to develop competencies in teaching mathematics using the GeoGebra software which was being introduced to them for the first time. The study focused on an in-depth investigation of the pre-service teachers' perceptions and use of GeoGebra in teaching mathematics. Questionnaire, interviews and lesson artefacts developed by the teachers were the data sources of the study. Descriptive, t-test and effect size statistics were used to analyse the quantitative data whereas the interview data and lesson artefacts were analysed qualitatively. Statistical analysis confirmed that the use of the GeoGebra helped pre-service teachers expand their own understanding of mathematical concepts as well as their knowledge of Instructional strategies. The study also indicated that two perceived barriers; lack of awareness of the GeoGebra software and time constraint in designing GeoGebra lessons hinder pre-service teachers' use of the tool. That notwithstanding, the pre-

service teachers' perceived developed attitudes and pedagogical views on the use of GeoGebra point to its potential as an instructional tool in developing their experiences in technology integration within an initial teacher education programme in Ghana.

Bogt (2010), conducted a research on the topic "ICT use in the teaching of mathematics: Implications for professional development of pre-service teachers in Ghana". Included in the contemporary mathematics curricula in Ghana is the expectation that mathematics teachers will integrate technology in their teaching. However, importance has not been placed on preparing teachers to use ICT in their instruction. This paper reports on a study conducted to explore the feasibility of ICT use in mathematics teaching at senior high school levels in Ghana. Interviews and survey data were used for data collection. Preliminary results show that the mathematics teachers in Ghana do not integrate ICT in their mathematics instruction. Among the major perceived barriers identified were: Lack of knowledge about ways to integrate ICT in lesson and Lack of training opportunities for ICT integration knowledge acquisition. To overcome some of these barriers, opportunities of a professional development arrangement for pre-service mathematics teachers were explored. Findings from the study revealed specific features of a professional development scenario that matters for ICT integration in mathematics teaching in the context of Ghana.

Moreover, Bozkurt (2016), conducted a research of "Mathematics Teachers and ICT: Factors Affecting Pre-service use in School Placements". This study examines the factors influencing student teachers use of information and communication technology (ICT) to teach mathematics. Data collection involved questionnaire surveys and individual follow-up semistructured interviews of student teachers concerning the factors that they felt had hindered or promoted their

development in the use of ICT. This study shows that this particular group of student teachers is committed to using ICT in their teaching; they are mostly confident and mostly believe in the value of ICT in mathematics teaching. However, findings indicate that the barriers inhibiting the student teachers' use relate to poor access to facilities, limited encouragement from mentors and the other teachers in mathematics department and irregular use of ICT of existing teachers in teaching, lack of links in the scheme of work, and time constraint.

Also, Zhu (2015) , conducted a research of "Pre-Service Teachers' Perceptions of ICT Integration in Teacher Education in Turkey". The objective of this study is to identify pre-service teachers' perceptions of ICT integration in teacher education and its association with their teaching practices. A stratified two-stage probability sampling design was used. Firstly, three Turkish state universities with the highest and lowest number of the pre-service teachers were chosen. Secondly, pre-service teachers from the subject domains of Turkish language, social sciences, elementary education mathematics and science were selected. A qualitative method was used in this study. Data were collected from 782 pre-service teachers from open ended questions in a survey and interviews were conducted with 15 participants. Qualitative data were analyzed with thematic coding. The results identified the specific conditions of ICT integration in teacher education and pre-service teachers' perceptions of ICT integration and the associations with their teaching practices.

From the above different books, journals and researches which were carried out in relation to use of ICT in mathematics classroom for my literature review and most of them, I found that they have more or less similar type of conclusion that ICT helps of a lot for learning mathematics. By reading different journals and book I found that there are a number of issues about the research and evidence on the effective use of ICT in teaching in schools. Research is rarely comparative in nature

and so cannot help us to identify whether ICT is better than other approaches and this make it difficult to decide whether the use of ICT is cost-effective (Higgins, 2000) though these various research studies have been carried out in the field of ICT in mathematics, yet I felt a lot of gap prevailing in these various researches carried out. Although, I don't claim that my research will be completely different than these previous researches, but still I can claim that my research is quite different from those researches, there were many research on ICT various group but I can not found that the research thesis in the context of Nepal about the perception of mathematics teacher towards ICT in teaching mathematics. So I am intersted to find out the perception of mathematics teacher towards ICT in teaching mathematics to fullfill my partial fullfillment of the master degree course of TU.

### **Theoretical Review**

Researches and theories are interrelated and inseparable. “A theory provides a conceptual framework for research. Research, in turn, contributes to the development of theory” (Pant, 2012). A theory plans and directs the research studies. Any philosophies must be supported by any theory for its pedagogical implementation. Likewise, the Use of ICT supported by many theories. Here I will discuss in brief about these theories.

### **Constructivism**

The word “construct” is to build or make something. We always use this word in our daily life. In the field of education, “construct” means to develop an idea or a belief that is based on various pieces of evidence which are not always true. Many theories/approaches have been introduced in teaching/learning field. The “Constructivism” has also developed as a philosophy in different discipline. It has become a strong means in teaching/learning approach. This point of view maintains 15 that people actively construct new knowledge as they interact with their

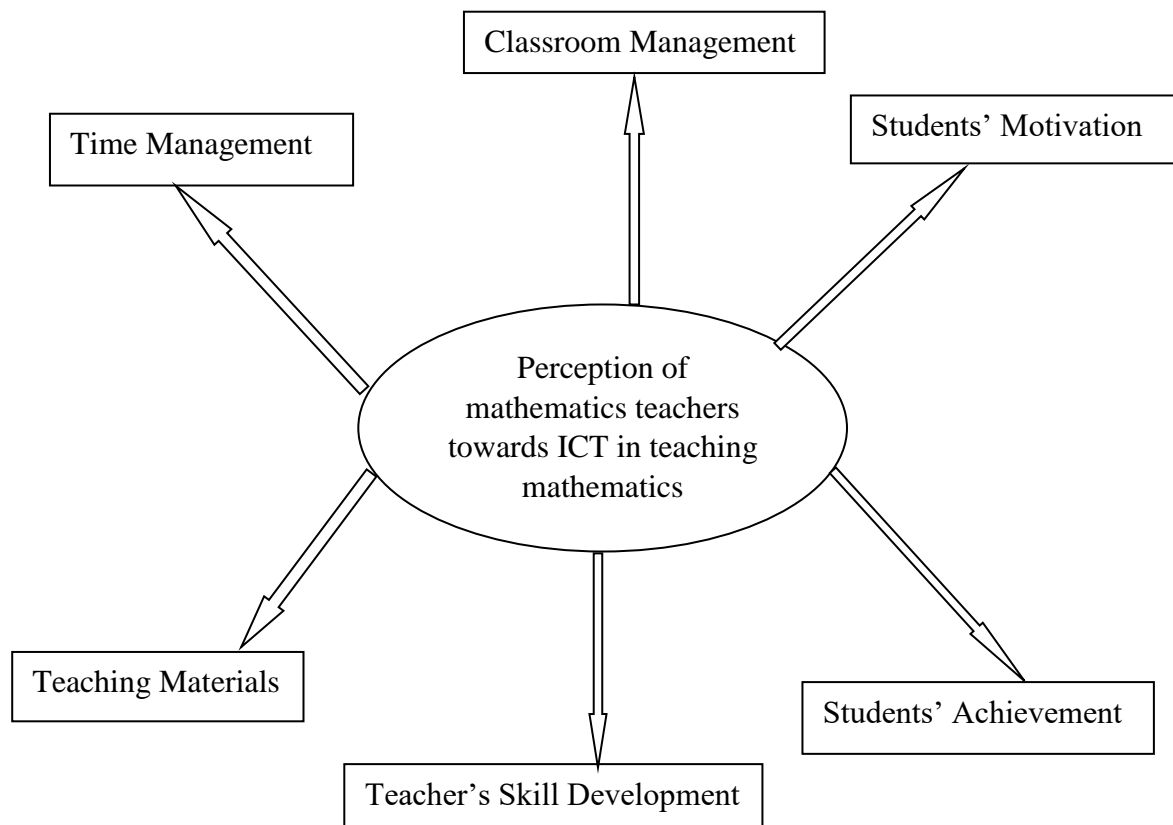
environment. Constructivist theory of learning believes that the knowledge can be developed within the classroom, being participated in different activities, using different learning agents and through different meaning making processes. One of the key assumptions of constructivism is that “Knowledge is symbolically constructed by the learners who are making their own representations of action”. The guideline principle of constructivist learning theories is the learners owns active initiative and control in learning, and personal knowledge construction that is self- regulation of learning (Chan, 2002, p. 3). Most of the educators utilizing a constructivist perspective may emphasize an active learning environment that may incorporate learners centered and problem based learning in which students are actively engaged in critical thinking activities so Use of ICT in classroom is based upon the assumptions of constructivism where teachers should play role of instructor and students are actively participate in classroom. In constructivist classroom student try to find the solution of the problems by learning in a group where students are motivated to do their work themselves and find the solution and teacher work is just to facilitate the student. By using ICT in math classroom student will develop their knowledge by visualizing and here teacher role is just as a facilitator. Further, in this type of constructivist class student are motivated to share their ideas, expand their knowledge through ICT or by utilizing their experience (Natshes, 2002). All in all, ICT supports constructivist pedagogy where students use technology to explore and reach an understanding of mathematical concepts where it promotes higher order thinking and better problem-solving strategies.

### **Conceptual Framework**

A conceptual framework is presented either in graphical or narrative forms which depicts the relation between the variables, brings clarity, focus to see and organize the research questionnaire more clearly. The framework was as follows.



Figure 1: Perception of mathematics teachers towards ICT in teaching mathematics.



Source: Timilsena (2017).

From above review of literature and theoretical model, researcher has come to the point that the topics of perception of mathematics teachers towards ICT in teaching mathematics. The main purpose of the research is to find the perception of mathematics teacher towards ICT in teaching mathematics. For finding perception of pre-service mathematics teacher and in-service mathematics teacher. The perception about teacher skill development, teaching materials, students' motivation, students' achievement, classroom management and time management are main domain of the study. So, determine the perception of mathematics teachers towards ICT in mathematics. This aspect is creating the constructivism learning theory. So, the conceptual framework of the study is based on this aspect and constructivism learning theory. The researcher collected the data through survey. The researcher was included the positive and negative decision in final.

### **Chapter III**

#### **Methods and Procedures**

The following methods and procedures were concluded the details of the design of the study, population of the study, sample of the study, tools of data collection, reliability and validity of tool, Data collection procedure and data analysis and interpretation procedure are presented in detail.

##### **Design of the Study**

This study was concerned with survey method. According to Muijs(2004), Probably the most popular (quantitative) research design in the social sciences is survey research. Survey research designs are quite flexible and can therefore appear in a variety of forms, but all are characterized by the collection of data using standard questionnaire forms administered by telephone or face to face, by postal pencil-and-paper questionnaires or increasingly by using web-based and e-mail forms. All of us are likely to have had some experience of survey research, if not as developers then as participants in one of the many surveys carried out on our consumption patterns. Research design is the plan, structure and strategy of investigation conceived to answer to research question and to control variance. Research design is the map or guideline of the research that provides the basic and fundamental way to conduct the research work successfully. This research design is suitable for this topic, survey research design had used to attain the objective of this study. This study was following the quantitative research design.

##### **Population of the Study**

All the students who studied ICT in Mathematics Education at Central Department of Education 2075 were taken as population of pre-service teacher and in-service teacher are those who had studied ICT in Mathematics Education and teach secondary level mathematics were taken as population.

### **Sample of the Study**

I used accidental sampling. Accidental sampling (also known as Haphazard sampling or convenience sampling) is a type of non-probability or nonrandom sampling. Where members of the target population that meet certain practical criteria, such as easy accessibility, geographical proximity, availability at a given time or the willingness to participate are included for the purpose of the study (Etikan, Musa, & Alkassim, 2016). I had taken 45 pre-service mathematics teacher and 50 in-service mathematics teachers from the total population of the study.

### **Tools of Data Collection**

It is an important part of the study. To fulfill the objective, some necessary data are needed there are many data collection tools. In this research the researcher used Questionnaire as data collection tool which were describe as follows.

**Questionnaire.** Questionnaire is an important tool using for data collection in the research. The researcher had prepared a set of questionnaires on the basis of conceptual framework with six dimensions (Teacher Skill Development, Teaching Materials, Students Motivation, Students' Achievement, Classroom Management and Time Management). Questionnaire were developed based on Likert five-point Scale strongly agree, agree, neutral, disagree and strongly disagree respectively. Rank response for each statement through each aspect were strongly agree, agree, neutral, disagree, strongly disagree. Each positive statement received the score based on the basis of five point for strongly agree, four for agree, three for neutral, two for disagree, one for strongly disagree, for negative statements one point for strongly agree, two for agree, three for neutral, four for disagree, five for strongly disagree.

### **Reliability and Validity of Tools**

For the validation of tools researcher was conducted the questionnaire form based on conceptual framework. To ensure the validity of instruments, the researcher

consulted with thesis supervisor. Reliability concerns to degree to which a measuring instrument gives similar results over number of repeated trials. Here in this survey to ensure the reliability of questionnaire researcher had conducted the pilot test among five in-service and five pre-service mathematics teachers, which were not included in the study. For reliability, obtain data were calculated by using Statistical Package for Social Sciences (SPSS) programmer, version 21.0, setting at 0.05. The Cronbach's  $\alpha$  was found 0.78 and 0.72(>0.60) respectively, this are the highly reliable for each statement.

### **Data Collection Procedure**

Data is the foundation of any research. Therefore, collection of reliable data is very essential part of all types of research. The researcher made questionnaire from Google Form and provide the link 75 in-service mathematics teachers. After that researcher call them to fill up questionnaire on the perception. But only 50 teacher's response among them. And 45 in-service mathematics teachers were met at Central Department of Mathematics Education then researcher took permission with them before the distribute questionnaire. After getting response of all the teachers, the questionnaire was taken back with thanks. Then collected data was tabulated. Each statement was followed through each aspect by the rank responses in five-point Likert-scales.

### **Data Analysis and Interpretation Procedure**

Data analysis is considering to be important step and heart of the research work. After collection of data with the help of relevant tools and technique, the next logical step is to analyze and interpret data with a view to arriving empirical solution of problem (Singh, 2007).

After the completion of data collection, the researcher had analyzed the obtained data by using the statistical procedure. The researcher analyzed the obtained

data by using the Statistical Package for Social Science (SPSS) software version 21.0.

Nonparametric chi-square test was used for each statement to find the perception of in-service and pre-service mathematics teacher towards ICT in teaching mathematics.

By the help of Chi-Square test at 0.05 level of significance and percentage of each statement. For second objective to compare the pre-service mathematics teacher and in-service mathematics teacher's perception, t-test at 0.05 level of significance, mean and standard deviation were used.

## Chapter IV

### Analysis and Interpretation of Data

This is a survey research conducted on the topic entitled on the perception of mathematics teacher towards ICT in teaching mathematics. This chapter presents the results of statistical analysis of collative data which were collected from the mathematics teacher who studied ICT in Mathematics Education at Central Department of Education 2075. From the list there are 100 Mathematics teachers were selected by the method of accidentally sampling. The questionnaire consists thirty-eight statements which were developed and constituted under the guidance of supervisor. Questionnaire was the main tools for the collection of data in this research.

The collected data were tabulated and analyzed by using the Statistical Package for Social Science (SPSS) software version 21.0 setting 0.05 level of significance. For analyzing the data, percentage and chai-square test were used. The collected data were analyzed and interpreted under the following headings.

Candidates were asked to respond to 38 statements related to all these factors. The statements designed under teacher skill development were (1-8), Teaching materials were (9-15), Students' motivation was (16-21), Students' achievement was (22-26), Classroom management were (27-32) and time management were (33-38). Perception of mathematics teachers were represented by  $\chi^2$ - value on a five-point scale for positive statements, where five point was given for strongly agree represents the maximum score of scale and one point was given for strongly disagree represents the minimum score and same thing is done in negative statements. The analysis and interpretation of the data obtained through questionnaire were presented as follows.

### Teacher Skill Development

There were eight statements (1-8) for teachers related to teacher skill development. The following table consists the teacher's perception and it's corresponding  $\chi^2$ - value of the questionnaire.

**Table 4.1 In-service teachers' responses on the teacher skill development**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
1. ICT makes teaching more interesting	82	16	2	0	0	124.6	S
2. ICT helps to teacher confidence	56	38	6	0	0	65.4	S
3. ICT helps to easy to calculate hard problem	38	44	14	4	0	39.8	S
4. The high level of ICT skills makes the mathematics teaching easier	46	42	10	2	0	49.6	S
5. ICT has given me more confidence to extend my use of computer to other topics	20	70	6	4	4	83.6	S
6. Teacher has better understanding of his teaching using ICT	20	48	28	4	0	37.6	S
7. I use internet for searching document related to any course	40	36	16	6	2	29.8	S
8. Using ICT is important for good teaching of mathematics	42	42	10	4	2	41.2	S

(Critical region:  $\chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49$ )

From the above table the statement, “ICT makes teaching more interesting” which is highly significant with the  $\chi^2$ -value 124.6 at 0.05 level of significance. A total of 98% in-service teachers agree and 2 % in-service teachers are neutral about this statement. This state that most of the in-service mathematics teachers are positive with this statement. Also, the statement “ICT helps to teacher confidence” about 94% in-service teachers agree and 6 % in-service teachers are neutral. This statement is significant with the  $\chi^2$ -value 65.4 at 0.05 level of significance. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT helps to easy to calculate hard problem” with the  $\chi^2$  – value 39.8 which is significant. A total of 84% in-service teachers agree and 14% in-service teachers are neutral about this statement. This state that most of the in-service mathematics teachers are positive with this statement. Also, the statement” The high level of ICT skills makes the mathematics teaching easier” with  $\chi^2$  –value 49.6 which is significant. A total of 88% in-service teachers agree and 10% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT has given me more confidence to extend my use of computer to other topics” which is highly significant with  $\chi^2$  –value 83.6. A total of 90% in-service teachers agree and 6% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the Statement “Teacher has better understanding of his teaching using ICT” which is significant with the  $\chi^2$  –value 37.60 at 0.05 level of significance. A total of 68% in-service teachers agree and 28% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.



On the “I use internet for searching document related to any course” with  $\chi^2$  – value 29.8 which is significant. A total of 76% in-service teachers agree and 16% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement. Also, the statement “Using ICT is important for good teaching of mathematics” with the  $\chi^2$  –value 41.2 which is significant. A total of 84% in-service teachers agree and 10% in-service teachers are neutral about this statement. This state that most of the in-service mathematics teachers are positive with this statement.

From above data analysis statement (1-8), majority of the in-service mathematics teachers have positive perception. The statement “ICT makes teaching more interesting” is highly significant and statement “I use internet for searching document related to any course” is low significant others teacher skill development related statement. Use of ICT in classroom is based upon the assumptions of constructivism where teachers should play role of instructor and students are actively participate in classroom. The result of this finding was interlinked with constructivism theory. So, It is concluded that majority of in-service mathematics teacher towards the use of ICT in teaching mathematics in teacher skill development have positive perception.

**Table 4.2 Pre-service teachers’ responses on the teacher skill development**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
1. ICT makes teaching more interesting	82.2	17.8	0	0	0	114.22	S
2. ICT helps to teacher confidence	55.8	37.8	4.4	2.2	0	57.11	S

3. ICT helps to easy to calculate hard problem	33.3	46.7	13.3	4.4	2.2	33.55	S
4. The high level of ICT skills makes the mathematics teaching easier	35.6	28.9	28.9	6.7	0	22.0	S
5. ICT has given me more confidence to extend my use of computer to other topics	20	60	20	0	0	54.0	S
6. Teacher has better understanding of his teaching using ICT	22.2	48.9	17.8	6.7	4.4	28.44	S
7. I use internet for searching document related to any course	33.3	42.2	17.8	6.7	0	28.22	S
8. Using ICT is important for good teaching of mathematics	48.9	40.0	11.1	0	0	47.55	S

(Critical region:  $\chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49$ )

From above table the statement “ICT makes teaching more interesting” which is highly significant with the  $\chi^2$ -value 114.22 at 0.05 level of significance. A total of 100% pre-service teachers agree about this statement. This state that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “ICT helps to teacher confidence” with the  $\chi^2$ -value 57.11 which is significant. A total of 93.6% pre-service teachers agree and 64.4% pre-service teachers are neutral

about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On statement “ICT helps to easy to calculate hard problem” which is significant with the  $\chi^2$  –value 33.55 at 0.05 level of significance. A total of 80% pre-service teachers agree and 13.3% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “The high level of ICT skills makes the mathematics teaching easier” with the  $\chi^2$  –value 22.0 which is significant. A total of 64.5% pre-service teachers agree and 28.9% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “ICT has given me more confidence to extend my use of computer to other topics” which is significant with  $\chi^2$  –value 54.0 at 0.05 level of significance. A total of 80% pre-service teachers agree and 20% pre-service teachers are neutral about this statement. This state that most of the pre-service mathematics teachers are positive with this statement.

On the statement “Teacher has better understanding of his teaching using ICT” with the  $\chi^2$  –value 28.44 which is significant. A total of 71.1% pre-service teachers agree and 17.8% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “I use internet for searching document related to any course” Which is significant with the  $\chi^2$  –value 28.22 at 0.05 level of significance. A total of 75.5% pre-service teachers agree and 17.8% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. The statement “Using ICT is important for good teaching of mathematics” with the  $\chi^2$  –value 47.55 which is significant. A total of 88.9% pre-

service teachers agree and 11% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

From above data analysis statement (1-8), majority of the pre-service mathematics teachers have positive perception. The statement “ICT makes teaching more interesting” is highly significant and statement “The high level of ICT skills makes the mathematics teaching easier” is low significant others teacher skill development related statement. Use of ICT in classroom is based upon the assumptions of constructivism where teachers should play role of instructor and students are actively participate in classroom. The result of this finding was interlinked with constructivism theory. So, it is concluded that majority of pre-service mathematics teacher towards the use of ICT in teaching mathematics in teacher skill development have positive perception.

### Teaching Materials

There were seven statements (9-15) related to teaching materials. The following table consists the teacher perception and it is corresponding  $\chi^2$ – value of the questionnaire related to teaching materials use of ICT in teaching mathematics.

**Table 4.3 In-service teachers’ responses on the teaching materials**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
9. ICT improves the presentation of material in my lesson	30	58	10	2	0	59.2	S
10. ICT makes my lesson more diverse	30	48	18	4	0	38.6	S
11. ICT are not sufficient for understanding concepts of	26	36	26	6	6	18.0	S

mathematics							
12. ICT provides instructional materials	32	42	20	6	0	30.6	S
13. Using ICT in teaching mathematics hinders the completing of the learning materials	16	56	22	4	2	47.40	S
14. I can get mathematical information from the internet more than from books	28	30	32	10	0	20.2	S
15. Using ICT in teaching mathematics demonstrates the mathematical concept to students	38	36	14	10	2	26.0	S

(Critical region:  $\chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49$ )

From the above table the statement “ICT improves the presentation of material in my lesson” with the  $\chi^2$  –value is 59.2 which is significant. A total of 88% in-service teachers agree and 10% in-service teachers are neutral about this statement. This state that most of the in-service mathematics teachers are positive with this statement. Also, the statement “ICT makes my lesson more diverse” which is significant with the  $\chi^2$  –value 38.6 at 0.05 levee of significant. A total of 78% in-service teachers agree and 18% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT are not sufficient for understanding concepts of mathematics” which is significant with the  $\chi^2$  –value 18.0 at 0.05 level of significance. A total of 62% in-service teachers agree and 26% in-service teachers are

neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT provides instructional materials” with the  $\chi^2$  –value 30.6 which is significant. A total of 74% in-service teachers agree and 20% in-service teachers are neutral about this statement. This state that most of the in-service mathematics teachers are positive with this statement. Also, the statement “Using ICT in teaching mathematics hinders the completing of the learning materials” which is significant with the  $\chi^2$  –value 47.40 at 0.05 level of significance. A total of 72% in-service teachers agree and 22% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “I can get mathematical information from the internet more than from books” which is significant with the  $\chi^2$  –value 20.2 at 0.05 level of significance. A total of 58% in-service teachers agree and 32% in-service teachers are neutral about this statement. This conclude that most of the in-service mathematics teachers are positive with this statement. Also, the statement “Using ICT in teaching mathematics demonstrates the mathematical concept to students” with the  $\chi^2$  –value 26.000 which is significant. A total of 74% in-service teachers agree and 14% in-service teachers are neutral about this statement. This conclude that most of the in-service mathematics teachers were positive with this statement.

From above data analysis statement (9-15), majority of the in-service mathematics teachers have positive perception. The statement “ICT improves the presentation of material in my lesson” is highly significant and statement “ICT are not sufficient for understanding concepts of mathematics” is low significant. ICT supports constructivist pedagogy where students use technology to explore and reach an

understanding of mathematical concepts where it promotes higher order thinking and better problem-solving strategies. The result of this finding was interlinked with constructivism theory. So, this shows that majority of in-service mathematics teacher towards the use of ICT in teaching mathematics in teaching materials have positive perception.

**Table 4.4 Pre-service teachers' responses on the teaching materials**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
9. ICT improves the presentation of material in my lesson	28.9	46.7	24.4	0	0	36.22	S
10. ICT makes my lesson more diverse	28.9	40	26.7	2.2	2.2	26.0	S
11. ICT are not sufficient for understanding concepts of mathematics	11.1	42.2	46.7	11.1	8.9	18.44	S
12. ICT provides instructional materials	22.3	48.9	17.8	11.1	0	29.77	S
13. Using ICT in teaching mathematics hinders the completing of the learning materials	26.7	42.2	22.2	8.9	0	24.0	S
14. I can get mathematical information from the internet more than from books	22.2	40	20	17.8	0	18.22	S

15. Using ICT in teaching	28.9	42.2	22.2	6.7	0	26.0	S
mathematics demonstrates							
the mathematical concept to							
students							

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “ICT improves the presentation of material in my lesson” which is significant with the  $\chi^2$  –value 36.22 at 0.05 level of significance. A total of 75.6% pre-service teachers agree and 24.4% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “ICT makes my lesson more diverse” which is significant with the  $\chi^2$  –value 26.0 at 0.05 level of significance. A total of 68.6% pre-service teachers agree and 26.7% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “ICT are not sufficient for understanding concepts of mathematics” with the  $\chi^2$  –value 18.44 which is significant. A total of 53.3% pre-service teachers agree and 46.7 pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “ICT provides instructional materials” which is significant with the  $\chi^2$  –value 29.77 at 0.05 level of significance. A total of 71.2% pre-service teachers agree and 17.8% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “Using ICT in teaching mathematics hinders the completing of the learning materials” with the  $\chi^2$  –value 24.0 which is significant. A



total of 88.9% pre-service teachers agree and 22.2% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “I can get mathematical information from the internet more than from books” which is significant with the  $\chi^2$  –value 18.22 at 0.05 level of significance. A total of 62.2% pre-service teachers agree and 20% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “Using ICT in teaching mathematics demonstrates the mathematical concept to students” with the  $\chi^2$  –value 26.0 which is significant. A total of 71.1% pre-service teachers agree and 22.2% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

From above discussion statement (9-15), majority of the pre-service mathematics teachers have positive perception. The statement “ICT improves the presentation of material in my lesson” is highly significant and statement “I can get mathematical information from the internet more than from books” is low significant. ICT supports constructivist pedagogy where students use technology to explore and reach an understanding of mathematical concepts where it promotes higher order thinking and better problem-solving strategies. The result of this finding was interlinked with constructivism theory. So, this shows that majority of pre-service mathematics teacher towards the use of ICT in teaching mathematics in teaching materials have positive perception.

### Students Motivation

There were six statements (16-21) related to student's motivation. The following table consists the teacher perception and it is corresponding  $\chi^2$  – value of the questionnaire related to student's motivation use of ICT in teaching mathematics.

**Table 4.5 In-service teachers' responses on the student's motivation**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
16. The use of ICT generates motivation	50	38	8	2	2	50.4	S
17. ICT helps students to learn mathematics easily	30	58	10	2	0	59.2	S
18. Students are given advice through ICT	18	50	22	8	2	34.4	S
19. ICT helps classroom disturbed	6	36	24	14	20	12.6	S
20. Using ICT in teaching mathematics encourage students self-learning	34	48	10	8	0	40.6	S
21. Using ICT in teaching mathematics is helpful for students	46	40	10	4	0	45.8	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “The use of ICT generates motivation” which is significant with the  $\chi^2$  –value 50.40 at 0.05 level of significance. A total of 88% in-service teachers agree and 8% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement. Also, the statement “ICT helps students to learn mathematics easily” with the  $\chi^2$  –value 59.2 which is significant. A total of 88% in-service teachers

agree and 10% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “Students are given advice through ICT” which is significant with  $\chi^2$  –value 34.4 at 0.05 level of significance. A total of 68% in-service teachers agree and 22% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT helps classroom disturbed” with  $\chi^2$  –value 12.6 which is significant. A total of 42% in-service teachers agree and 24% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “Using ICT in teaching mathematics encourage students self-learning” which is significant with the  $\chi^2$  –value 40.6 at 0.05 level of significance. A total of 82% in-service teachers agree and 10% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement. Also, the statement “Using ICT in teaching mathematics is helpful for students” which is significant with the  $\chi^2$  –value 45.8 at 0.05 level of significance. A total of 86% in-service teachers agree and 10% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

From above data analysis statement (16-21), most of the in-service mathematics teachers have positive perception. The statement “ICT helps students to learn mathematics easily” is highly significant and statement “ICT helps classroom disturbed” is low significant others student’s motivation related statement. Most of the educators utilizing a constructivist perspective may emphasize an active learning environment that may incorporate learners centered and problem-based learning in which students are actively engaged in critical thinking activities. The result of this

finding was interlinked with constructivism theory. So, this shows that majority of in-service mathematics teacher towards the use of ICT in teaching mathematics in student's motivation have positive perception.

**Table 4.6 Pre-service teachers' responses on the student's motivation**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
16. The use of ICT generates motivation	24.4	44.4	20	6.7	4.4	23.33	S
17. ICT helps students to learn mathematics easily	11.1	73.3	13.3	2.2	0	82.88	S
18. Students are given advice through ICT	20	37.8	24.4	17.8	0	16.66	S
19. ICT helps classroom disturbed	0	42.2	13.3	17.8	26.7	22.22	S
20. Using ICT in teaching mathematics encourage students self-learning	33.3	40	22.2	4.4	0	27.55	S
21. Using ICT in teaching mathematics is helpful for students	40	46.7	8.9	4.4	0	42.22	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “The use of ICT generates motivation” which is significant with the  $\chi^2$  –value 23.33 at 0.05 level of significance. A total of 68.8% pre-service teachers agree and 20% pre-service teachers are neutral about this

statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “ICT helps students to learn mathematics easily” which is highly significant with the  $\chi^2$  –value 82.88 at 0.05 level of significance. A total of 84.4% pre-service teachers agree and 13.3% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “Students are given advice through ICT” which is significant with the  $\chi^2$  –value 16.66 at 0.05 level of significance. A total of 39.8% pre-service teachers agree and 24.4% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, “ICT helps classroom disturbed” with the  $\chi^2$  –value 22.22 which is significant. A total of 42.2% pre-service teachers agree and 13.3% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are neutral with this statement.

On the statement “Using ICT in teaching mathematics encourage students self-learning” which is significant with the  $\chi^2$  –value 27.55 at 0.05 level of significance. A total of 70.3% pre-service teachers agree and 22.2% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “Using ICT in teaching mathematics is helpful for students” which with the  $\chi^2$  –value 42.22 at 0.05 level of significance. A total of 86.7% pre-service teachers agree and 8.9% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

Hence, from above data analysis statement (16-21), most of the pre-service mathematics teachers have positive perception. The statement “ICT helps students to learn mathematics easily” is highly significant and statement “Students are given advice through ICT” is low significant. Most of the educators utilizing a constructivist perspective may emphasize an active learning environment that may incorporate learners centered and problem-based learning in which students are actively engaged in critical thinking activities. The result of this finding was interlinked with constructivism theory. So, it is concluded that majority of in-service mathematics teacher towards the use of ICT in teaching mathematics in student’s motivation have positive perception.

### **Students Achievement**

There were five statements (22-26) related to student’s achievement. The following table consists the teacher perception and it is corresponding  $\chi^2$ – value of the questionnaire related to students’ achievement use of ICT in teaching mathematics.

**Table 4.7 In-service teachers’ responses on the student’s achievement**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
22. ICT helps to evaluate the students	30	40	22	6	2	24.16	S
23. ICT helps student’s achievement increase	32	62	4	2	0	72.2	S
24. Using ICT makes the students understand more	44	32	22	2	0	36.2	S
25. ICT helps to encourage the interest	38	48	10	4	0	46.6	S

of the students							
26. Using of ICT motivation students for learning	44	30	24	2	0	35.4	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “ICT helps to evaluate the students” which is significant with the  $\chi^2$  –value 24.16 at 0.05 level of significance. A total of 70% in-service teachers agree and 22% in-service teachers are neutral about this statement.

This shows that most of the in-service mathematics teachers are positive with this statement. Also, the statement “ICT helps student’s achievement increase” with the  $\chi^2$  –value 72.2 which is significant. A total of 94% in-service teachers agree and 4% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “Using ICT makes the students understand more” which is significant with the  $\chi^2$  –value 36.2 at 0.05 level of significance. A total of 76% in-service teachers agree and 22% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT helps to encourage the interest of the students” which is significant with the  $\chi^2$  –value 46.6 at 0.05 level of significance. A total of 86% in-service teachers agree and 4% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “Using of ICT motivation students for learning” which is significant with the  $\chi^2$  –value 35.4 at 0.05 level of significant. A total of 74% in-

service teachers agree and 24% in-service teachers are neutral about this statement.

This shows that most of the in-service mathematics teachers are positive with this statement.

Hence, from above data discussion statement (16-21), most of the in-service mathematics teachers have positive perception. The statement “ICT helps student’s achievement increase” is highly significant and statement “ICT helps to evaluate the students” is low significant than others statement. So, it is concluded that most of the in-service mathematics teacher towards the use of ICT in teaching mathematics in student’s achievement have positive perception.

Table 4.8 Pre-service teachers’ responses on the student’s achievement

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
22. ICT helps to evaluate the Students	28.9	48.9	2.2	2.2	0	32.81	S
23. ICT helps student’s achievement increase	24.4	51.1	11.1	13.3	0	34.0	S
24. Using ICT makes the students understand more	37.8	44.4	13.3	4.4	0	36.0	S
25. ICT helps to encourage the interest of the students	26.7	37.8	26.7	8.9	0	20.88	S
26. Using of ICT motivation students for learning	37.8	35.6	13.3	13.3	0	23.55	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “ICT helps to evaluate the students” with the  $\chi^2$  –value 32.81 which is significant. A total of 77.8% pre-service teachers agree



and 2.2% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “ICT helps student’s achievement increase” which is significant with the  $\chi^2$  –value 34.0 at 0.05 level of significance. A total of 65.5% pre-service teachers agree and 11.1% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “Using ICT makes the students understand more” which is significant with the  $\chi^2$  –value 36.0 at 0.05 level of significance. A total of 82.2% pre-service teachers agree and 13.3% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “ICT helps to encourage the interest of the students” which is significant with the  $\chi^2$  –value 20.88 at 0.05 level of significance. A total of 64.5% pre-service teachers agree and 26.7% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “Using of ICT motivation students for learning” which is significant with the  $\chi^2$  –value 23.00 at 0.05 level of significance. A total of 73.4% pre-service teachers agree and 13.3% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

From above data discussion statement (16-21), majority of the pre-service mathematics teachers have positive perception. The statement “Using ICT makes the students understand more” is highly significant and statement “ICT helps to encourage the interest of the students” is low significant than others statement. So, it is concluded that most of the pre-service mathematics teacher towards the use of ICT in teaching mathematics in student’s achievement have positive perception.

### Classroom management

There were six statements (27-32) related to classroom management. The following table consists the teacher perception and it is corresponding  $\chi^2$  – value of the questionnaire related to classroom management use of ICT in teaching mathematics.

**Table 4.9 In-service teachers’ responses on the classroom management**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
27. If I engage with ICT I would feel in control of my teaching	14	60	16	10	0	35.8	S
28. It is easy to teach through ICT by making group of students	30	46	14	8	2	32.0	S
29. ICT makes easier to revise the lesson	22	58	14	6	0	52.0	S
30. ICT limits the content of my lesson	22	48	18	8	4	29.8	S
31. ICT helps interfere classroom management	16	50	26	6	2	36.8	S
32. If I engage with ICT I would feel a sense of competence in the classroom	28	38	24	6	4	21.4	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “If I engage with ICT I would feel in control of my teaching” which is significant with the  $\chi^2$  –value 35.8 at 0.05 level of significance. A total of 54% in-service teachers agree and 16% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics

teachers are positive with this statement. Also, the statement “It is easy to teach through ICT by making group of students” with the  $\chi^2$  –value 32.0 which is significant. A total of 76% in-service teachers agree and 14% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT makes easier to revise the lesson” which is significant with the  $\chi^2$  –value 52.0 at 0.05 level of significance. A total of 80% in-service teachers agree and 14% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT limits the content of my lesson” which is significant with the  $\chi^2$  –value 29.8 at 0.05 level of significance. A total of 70% in-service teachers agree and 18% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT helps interfere classroom management” which is significance with the  $\chi^2$  –value 36.80 at 0.05 level of significance. A total of 66% in-service teachers agree and 26% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement. Also, the statement “If I engage with ICT I would feel a sense of competence in the classroom” with the  $\chi^2$  –value 21.40 which is significant. A total of 66% in-service teachers agree and 24% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

From above data analysis statement (27-32), majority of the in-service mathematics teachers have positive perception. The statement “ICT makes easier to

revise the lesson” is highly significant and statement “If I engage with ICT I would feel a sense of competence in the classroom” is low significant than others statement. So, it is concluded that most of the in-service mathematics teacher towards the use of ICT in teaching mathematics in classroom management have positive perception.

**Table 4.10 Pre-service teachers’ responses on the classroom management**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
27. If I engage with ICT I would feel in control of my teaching	31.1	48.9	13.3	6.7	0	35.55	S
28. It is easy to teach through ICT by making group of students	26.7	42.2	24.4	6.7	0	25.55	S
29. ICT makes easier to revise the lesson	13.3	60	17.8	6.7	2.2	48.22	S
30. ICT limits the content of my lesson	24.4	35.6	33.3	6.7	0	22.88	S
31. ICT helps interfere classroom management	20	44.4	35.6	0	0	36.88	S
32. If I engage with ICT I would feel a sense of competence in the classroom	20	46.7	24.4	8.9	0	28.22	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “If I engage with ICT I would feel in control of my teaching” which is significant with the  $\chi^2$  –value 35.55 at 0.05 level of significance. A total of 80% pre-service teachers agree and 13.3% pre-service

teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “It is easy to teach through ICT by making group of students” with  $\chi^2$  –value 25.55 which is significant. A total of 68.9% pre-service teachers agree and 24.4% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “makes easier to revise the lesson” which is significant with the  $\chi^2$  –value 48.22 at 0.05 level of significance. A total of 79.3% pre-service teachers agree and 17.8% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “ICT limits the content of my lesson” which is significant with the  $\chi^2$  –value 22.88 at 0.05 level of significance. A total of 60% pre-service teachers agree and 33.3% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “ICT helps interfere classroom management” with  $\chi^2$  –value 36.88 which is significant. A total of 64.4% pre-service teachers agree and 35.6% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “If I engage with ICT I would feel a sense of competence in the classroom” which is significant with the  $\chi^2$  –value 28.22 at 0.05 level of significance. A total of 66.7% pre-service teachers agree and 24.4% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

From above data analysis statement (27-32), majority of the pre-service mathematics teachers have positive perception. The statement “ICT makes easier to revise the lesson” is highly significant and statement “ICT limits the content of my

lesson” is low significant. So, it is concluded that most of the pre-service mathematics teacher towards the use of ICT in teaching mathematics in classroom management have positive perception.

### Time management

There were six statements (33-38) related to Time management. The following table consists the teacher’s perception and it is corresponding  $\chi^2$  – value of the questionnaire related to Time management use of ICT in teaching mathematics.

**Table 4.11 In-service teachers’ responses on the Time management**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
33. It enables the students and teacher to communicate with other	24	48	16	10	2	31.0	S
34. Using ICT in teaching mathematics speeds up the process of teaching	22	46	16	12	4	25.4	S
35. ICT helps in providing homework to students	16	59	13	8	4	49.06	S
36. I engage with ICT work would be more effective	40	46	10	4	0	45.08	S
37. ICT helps finished lesson more time	12	60	18	10	0	54.2	S
38. Lesson planning using ICT is time consuming	38	38	22	2	0	34.4	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “It enables the students and teacher to communicate with other” which is significance with the  $\chi^2$  –value 31.0 at 0.05 level of significance. A total of 72% in-service teachers agree and 16% in-service teachers

are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement. Also, the statement “Using ICT in teaching mathematics speeds up the process of teaching” with the  $\chi^2$  –value 25.40 which is significant. A total of 88% in-service teachers agree and 16% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “ICT helps in providing homework to students” which is significant with the  $\chi^2$  –value 49.06 at 0.05 level of significance. A total of 75% in-service teachers agree and 13% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “I engage with ICT work would be more effective” which is significant with the  $\chi^2$  –value 45.08 at 0.05 level of significance. A total of 86% in-service teachers agree and 10% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement. Also, the statement “ICT helps finished lesson more time” with the  $\chi^2$  –value 54.2 which is significant. A total of 72% in-service teachers agree and 18% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

On the statement “Lesson planning using ICT is time consuming” which is significant with the  $\chi^2$  –value 34.4 at 0.05 level of significance. A total of 76% in-service teachers agree and 22% in-service teachers are neutral about this statement. This shows that most of the in-service mathematics teachers are positive with this statement.

From above data analysis statement (33-38), majority of the in-service mathematics teachers have positive perception. The statement “ICT helps finished

lesson more time” is highly significant and statement “Using ICT in teaching mathematics speeds up the process of teaching” is low significant than others statement. So, it is concluded that most of the in-service mathematics teacher towards the use of ICT in teaching mathematics in time management have positive perception

**Table 4.12 Pre-service teachers’ responses on the Time management**

Statements	SA %	A %	N %	D %	SD %	$\chi^2$	Decision
33. It enables the students and teacher to communicate with other	33.3	31.1	20	8.9	6.7	13.56	S
34. Using ICT in teaching mathematics speeds up the process of teaching	20	53.3	17.8	4.4	4.4	36.0	S
35. ICT helps in providing homework to students	17.8	42.2	15.6	20	4.4	17.111	S
36. I engage with ICT work would be more effective	29	43.3	17.8	8.9	0	25.32	S
37. ICT helps finished lesson more time	13.3	31.1	37.8	13.3	4.4	17.333	S
38. Lesson planning using ICT is time consuming	26.7	35.6	31.1	4.4	2.2	21.778	S

$$(\text{Critical region: } \chi^2_{\alpha, V} = \chi^2_{0.05, 4} = 9.49)$$

From the above table the statement “It enables the students and teacher to communicate with other” which is significant with the  $\chi^2$  –value 13.556 at 0.05 level



of significance. A total of 64.4% pre-service teachers agree and 20% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “Using ICT in teaching mathematics speeds up the process of teaching” which is significant with the  $\chi^2$  –value 36.0 at 0.05 level of significance. A total of 73.3% pre-service teachers agree and 17.8% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “ICT helps in providing homework to students” which is significant with the  $\chi^2$  –value 17.111 at 0.05 level of significance. A total of 60% pre-service teachers agree and 15.6% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “I engage with ICT work would be more effective” which is significant with the  $\chi^2$  –value 25.32 at 0.05 level of significance. A total of 72.3% pre-service teachers agree and 17.8% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

On the statement “ICT helps finished lesson more time” which is significant with the  $\chi^2$  –value 17.333 at 0.05 level of significance. A total of 44.4% pre-service teachers agree and 37.8% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement. Also, the statement “Lesson planning using ICT is time consuming” which is significant with the  $\chi^2$  –value 21.778 at 0.05 level of significance. A total of 62.3% pre-service teachers agree and 31.1% pre-service teachers are neutral about this statement. This shows that most of the pre-service mathematics teachers are positive with this statement.

From above data analysis statement (33-38), majority of the pre-service mathematics teachers have positive perception. The statement “Using ICT in teaching mathematics speeds up the process of teaching” is highly significant and statement “ICT helps finished lesson more time” is low significant than others statement. So, it is concluded that most of the pre-service mathematics teacher towards the use of ICT in teaching mathematics in time management have positive perception.

### **Comparison of perception in-service and pre-service teachers towards ICT in teaching mathematics**

The second objective of this study was to compare the perception of pre-service and in-service mathematics teachers towards the use of ICT in teaching mathematics. For this mean and SD were computed, tabulated and analyzed in table 4.13.

**Table 4.13 Mean, standard deviation and t- Value of pre-service and in-service mathematics teacher**

Comparison	N	Mean	SD	Calculated value	t-value	Decision
In-service teacher	50	4.04	0.39	1.31	1.96	No Significant difference
Pre-service teacher	45	3.93	0.42			

N= sample size =95

d.f.= degree of freedom ( $N_1 + N_2 - 2$ ) =  $50 + 45 - 2 = 93$

Table no 4.13 shows that there were 50 in-service mathematics teachers and 45 pre-service mathematics teachers from the table. The perception score of in-service teachers is 4.04 and pre-service teachers is 3.93 and their standard deviation of in-service and pre-service mathematics teachers are respectively 0.39 and 0.42 and the degree of freedom 93. This indicate that pre-service teacher has better perception than

in-service mathematics teachers. The calculated t-value with respect to differences of mean perception score 1.31 which is calculated value of t-test 1.31 lies between tabulated values  $\pm 1.96$  at 0.05 level of significance. Thus, it is concluded that there is no significant difference between the perception of in-service and pre-service mathematics teachers.

## **Chapter V**

### **Summary, Findings, Conclusion and Recommendations**

This chapter is basically concerned in brief summary of the study, states the finding of the study, gives concluding paragraph of the results of the study and some recommendations which would be useful for further studies and educational implication.

#### **Summary**

Mathematics is the most useful subject in our daily life. So, it is taught at every level of our formal education. But most of the students fail in this subject. It is due to lack of qualified teacher, lack of math lab, access of internet, lack of trained teacher, lack of teaching material, due to backward society due to lack of educated guardians all these factors become cause of low achievement in school level examination. For effective learning, Tribhuvan university realized that the necessity of ICT in teaching and learning mathematics and started to teach the course of ICT in mathematics education since 2070. So, researcher had tried to study with the purpose to determine the perception toward ICT in mathematics learning.

The sample of the study consisted from who studied ICT in Mathematics Education at Central Department of Education 2075. The data were collected from questionnaire. For this study 50 in-service and 45 pre-service mathematics teachers from central department of mathematics education passed out in 2075 who learned ICT in mathematics education. They were selected by accidental sampling method. Researcher had prepared questionnaire contains 38 items, which were in different dimension mentioned in conceptual framework. The questionnaire was designed as Five-point Likert's scale. All the questionnaire statements were positive. The chi-square test and percentage of response for the statement was used to find the perception of mathematics teacher towards ICT in teaching learning and the t-test ,

mean, and standard deviation was used to determine the significance difference between the in-service and pre-service mathematics teacher perception towards ICT in teaching mathematics.

### **Findings of the Study**

The major findings of the study were following:

- In-service and pre-service mathematics teacher's perception towards use of ICT in mathematics teaching, it was found that helped to develop the teacher skills.
- Most of the responded were agreed ICT is an effective teaching material.
- This study found that use of ICT in mathematics class helped to time and classroom managed.
- It was found that ICT helped to increase the student achievement in mathematics and motivated the students to learn mathematics.
- The perception towards use of ICT in mathematics both types of teacher had found positive.
- The mean score of in-services (4.04) mathematics teacher perception towards ICT in teaching mathematics was found higher than pre-service (3.93) mathematics teachers. This indicate that pre-service teacher has better perception than in-service mathematics teachers.
- Since calculated value of t-test 1.31 lies between tabulated values  $\pm 1.96$ . Therefore, there was no significance difference between perception of in-service and pre-service mathematics teacher towards ICT in teaching mathematics.

## **Conclusion**

From the above findings of this study, it is concluded that the in-service and pre-service mathematics teacher has positive perception toward use of ICT in mathematics teaching. In existing situation, there is almost maximum positive perceptions and understanding among teachers toward use of ICT. Teachers are sure and believe in ICT whether it increases student's mathematical achievement, teacher skill development, time management, classroom management, teaching materials, student's motivation 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.

Thus, it is concluded that the government should provide ICT access in all the government schools. In the context of Nepal, ICT in mathematics is new concept. It shows that most of the mathematics teachers are not literate by ICT. So, all the mathematics teachers, governments should provide proper training of ICT use in mathematics teaching.

## **Recommendation for Further Study**

The conclusion of the study cannot be generalized to all areas due to the limitation contained in this study. Thus, after analyzing the conclusion and implication of the study the researcher has made the following recommendation or suggestion for further studies.

- Availability of ICT in government school in rural area of Nepal.
- Comparison between student achievement of traditional method and ICT used.
- Attitude of students towards ICT in learning mathematics.
- ICT based teaching learning activities should be improved to learn ICT in mathematics education effectively.
- Policy makers should provide additional planning time for students to experiment with new ICT based approaches.

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## Appendix

### Perception of Mathematics Teacher towards ICT in Teaching Mathematics



#### “Mathematics Teachers Perception Scale”

This tool has been developed for the purpose of measuring perception of measuring perception of in-service and pre-service mathematics teachers on **teacher skill development, teaching materials, students’ motivation, student’s achievement, classroom management and time management**. This scale is for research purpose only. The information provides for this “**Mathematics Teachers Perception Scale**” will kept only for research purpose.

#### *Guidelines to fill up the Scale:*

Please tick (✓) all the statement as shown in the example.

1. Write the answers of all questions including supplementary questions.
2. After filling up, please reply this as soon as possible.
3. It is only for research proposes; information will be kept secret.
4. You can write answer of open questions in Nepali as well as in English.

**Under the Supervision of**

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**DEPARTMENT OF MATHEMATICS EDUCATION  
FACULTY OF EDUCATION  
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NEPAL**

## “Mathematics Teachers Perception Scale”

### Section A

#### Personal Details

**Name:** .....

**Sex:** Male ( ) Female ( )

**Qualification:** .....

**Age:** .....

**Experience:**

.....

**Job Title:** Teacher ( ) Student ( )

**If teacher school name:** .....

**Mobile Number:** .....

**ICT related training:** Yes ( ) No ( )

**If yes specify the types of training:**

### Section B

**Please study the statement and tick (✓) on one and only one box in each row.**

(SA= Strongly Agree, A= Agree, N=neutral, D= Disagree and SD= Strongly Disagree)

SN	Statements	SA	A	N	D	SD
<b>A. Teacher Skill Development</b>						
1	ICT makes teaching more interesting					
2	ICT helps to teacher confidence					
3	ICT helps to easy to calculate hard problem					
4	The high level of ICT skills makes the mathematics teaching easier					
5	ICT has given me more confidence to extend my use of computer to other topics					
6	Teacher has better understanding of his teaching using					

	ICT					
7	I use internet for searching document related to any course					
8	Using ICT is important for good teaching of mathematics					
<b>B. Teaching Materials</b>						
9	ICT improves the presentation of material in my lesson					
10	ICT makes my lesson more diverse					
11	ICT are not sufficient for understanding concepts of mathematics					
12	ICT provides instructional materials					
13	Using ICT in teaching mathematics hinders the completing of the learning materials					
14	I can get mathematical information from the internet more than from books					
15	Using ICT in teaching mathematics demonstrates the mathematical concept to students					
<b>C. Students Motivation</b>						
16	The use of ICT generates motivation					
17	ICT helps students to learn mathematics easily					
18	Students are given advice through ICT					
19	ICT helps classroom disturbed					
20	Using ICT in teaching mathematics encourage students self-learning					
21	Using ICT in teaching mathematics is helpful for students					
<b>D. Student's Achievement</b>						
22	ICT helps to evaluate the students					

23	ICT helps student's achievement increase					
24	Using ICT makes the students understand more					
25	ICT helps to encourage the interest of the students					
26	Using ICT motivation students for learning					
<b>E. Classroom Management</b>						
27	If I engage with ICT would feel in control of my teaching					
28	It is easy to teach through ICT by making group of students					
29	ICT makes eases to revise the lesson					
30	ICT limits the content of my lesson					
31	ICT helps interfere classroom management					
32	If I engage with ICT I would feel a sense of competence in the classroom					
<b>F. Time Management</b>						
33	It enables the students and teacher to communicate with other					
34	Using ICT in teaching mathematics speeds up the process of teaching					
35	ICT helps in providing homework to students					
36	I engage with ICT work would be more effective					
37	ICT helps finished lesson more time					
38	Lesson planning using ICT is time consuming					

Thanks for your help