

**TEACHER'S ATTITUDE AND PRACTICES TOWARDS ICT IN TEACHING
MATHEMATICS**

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THESIS
BY**

PRAKASH BAHADUR RANA

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

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PRAKASH BAHADUR RANA

2017



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Letter of Certificate

This is certify that Mr. Prakash Bahadur Rana a student of academic year 2070/71 with Campus Roll No: 290, Thesis number 1235, Exam Roll No: 280472 and T.U. registration number 9-2-329-704-2009 has completed this thesis under my supervision and guidance during the period prescribed by the rules and regulations of Tribhuvan University, Kirtipur, Kathmandu, Nepal. This thesis entitled on “**Teacher's Attitude and Practices towards ICT in Teaching Mathematics**” has been prepared based on the results of his investigation conducted during the prescribed period under the Department of Mathematics Education, Central Department of Education, University Campus, Tribhuvan University, Kirtipur, Kathmandu, Nepal. I recommend and forward that his thesis be submitted for the evaluation as the partial requirements to award the degree of Master of Education.

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(Assoc. Prof. Laxmi Naryan Yadav)

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Date: 26/Feb/2017.



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Letter of Approval

This thesis entitled “**Teacher’s Attitude and Practices towards ICT in Teaching Mathematics**” submitted by Mr. Prakash Bahadur Rana in partial fulfillment of the requirements for the Master's Degree in Education has been approved.

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Recommendation for Acceptance

This is to certify that Mr. Prakash Bahadur Rana has completed his M. Ed. thesis entitled “**Teacher’s Attitude and Practices 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-voce.

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Acknowledgement

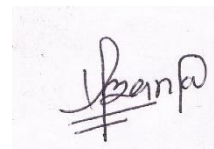
My first obligation is to the Department of Mathematics Education T.U., Kirtipur for providing me an opportunity to do a thesis on the topic of **“Teacher’s Attitude and Practices towards ICT in Teaching Mathematics”**.

I would like to express my sincere thanks, gratitude and gratefulness to my thesis supervisor Mr. Arjun Neupane who provided me ideas, guidance, advice, mentoring, encouragement and feedback throughout my research study. Without his encouragement, advice, motivation, and support, this research study would not have been possible.

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I would also like to thanks the principal and mathematics teachers of sampled school family for their help collection of data and participated throughout my study. Without their participation and support my research study would not have been possible.

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Prakash Bahadur Rana

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Abstract

This study focused on Teacher's Attitude and Practices towards ICT in teaching mathematics of grade IX and X of Kthmandu district. This study is based on mixed design. The purpose of this study is to find the teacher's attitude and practices towards ICT in teaching mathematics. Researcher selected 150 teachers from sixty schools by simple random sampling method and five teachers from five schools by purposive sampling method for his study. The data were collected from questionnaire, interview and class observation note. Attitudes towards ICT five - point Likert's Scale developed by Albirini (2006), in which the questionnaire contains 20 items.

The collected data were organized, tabulated, analyzed and interpreted by using the statistical package for social sciences (SPSS) programmer , such as percentage, and χ^2 -test a. The χ^2 -test was employed to find out the attitude of teachers towards ICT at 0.05 level of significance. The responses from interview and observation were recorded and transcribed under headings and then were organized in themes and categories that emerged.

The result of this study indicated that the secondary level teachers (grade IX and X) had positive attitude towards ICT. Only ten percentage teachers teach mathematics using ICT at classroom. Ninety percentage teachers may not use ICT in teaching mathematics because they have lack of skills, knowledge and infrastructure of ICT.

Dedication

This work is affectionately dedicated to my father **Mr. Jang Bahadur Rana**

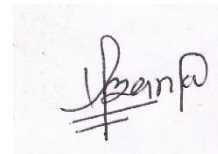
And mother **Mrs. Hasa Rana**

Who even in a very difficult situation gave me a great span of their

Life for what I am now.

Declaration

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

A handwritten signature in black ink on a light-colored background. The signature is stylized and appears to read 'Prakash Bahadur Rana'.

(Prakash Bahadur Rana)

Date: 26/Feb/2017.

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Abbreviations

CDC	:	Curriculum Development Center
DEO	:	District Education Officer
DOE	:	Department of Education
F.M.	:	Frequency Modulation
ICMI	:	International Commission on Mathematics Instruction
ICT	:	Information Communication Technology
MOE	:	Ministry of Education
NCED	:	National Center for Educational Development
NCF	:	National Curriculum Framework
NCTM	:	National Council of Teachers of Mathematics
OHP	:	Over Head Projector
OLPC	:	One Laptop per Child
PSM	:	Principal and Standards of School Mathematic
SPSS	:	Statistical Package for Social Science
TU	:	Tribhuvan University
T.V	:	Television
US	:	United State

Chapter-I

INTRODUCTION

Background of the Study

In 21st century the most of human activities are depending on the technology. Information and communication technology (ICT) refers to the different kind of technologies that provides access information. Modern information and communication technology have created a “global village” in which people can communicate with others across the world as it if they were living next door. Technology use in education is one of the most prioritized phenomenon during last two decades. Both teaching and learning have become increasingly technology based. Most of the educational research in the decades are continually suggesting to use information commutation technology (ICT) in teaching learning. As result, new practices like e-learning, M-learning, online learning, etc. are emerging to represent technology integrated educational practices. These practices have supported online courses and face- to- face courses. Therefor Technology and pedagogy together is the today's concern in education.

In this globally changing phenomenon of technology use, there is a rising attitude in Nepal to integrate technology in educational delivery. The need for ICT in Education has been realized. As a result, some policies have been made and some activities related to ICT have been carried out. ICT and computer education courses have been offered in general as well as technical education. For example, National Centre for Educational Development (NCED) has been providing training to the teacher through National Radio and FM; Computer science has been taught as an optional subject in school (grade vi to xii); Computer Engineering/Computer Science/ ICT programme in Bachelor's and Master's Levels are run by different colleges under various universities; various Training Institutes conduct technical education and vocational training courses in computer and ICT; Tribhuvan University has

started Bachelor's in Education program in computer science. One Laptop per Child (OLPC) pilot project in selected twenty six schools of six districts; Lab model (computer sharing mechanism) Project in some schools and Internet connectivity to District Education Offices (DEOs) and schools (through matching fund to schools) and computer labs with internet connection from local ISPs. Similarly, Central Level Agencies under MOE, five Regional Directorates (REDs) and seventy five District Education Offices have launched their web sites. Department of Education (DOE), with the involvement of some NGOs, has developed interactive digital learning materials for the students of grade two to six in Nepali, Mathematics, English and Science subjects (MOE, 2013). Also NCD has mentioned that teacher's competency framework (2072) in which ICT is one most important competency for teachers. Therefore, ICT has been practiced in many aspects like formal, informal and distance education from basic level to university level in education industry.

Technology use in education is also supportive in the discipline of mathematics. Taking about mathematics it is collection of definitions, procedures and abstract axiomatic theories to be learned and applied. It is used to often think as tedious, boring, abstract, and rote learning subject. Technology use has created some rooms in the mathematics for discovery, joy and fun. Most of mathematician these days think that ICT use promote both affective and cognitive part in mathematics. Many stakeholders have highlighted the potential of digital technologies for mathematics education. The U.S. National Council of Teachers of Mathematics, for example, in its position statement claims that "Technology is an essential tool for learning mathematics in the 21st century, and all schools must ensure that all their students have access to technology" (NCTM, 2008). ICMI devoted two studies to the integration of ICT in mathematics education, the second one expressing that "digital technologies were becoming ever more ubiquitous and their influence touching most, if not all, education systems" (Hoyles & Lagrange, 2010, p. 2).

According to PSM's Technology principle, "Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students learning (NCTM, 2000, p.24). Electronic technologies- calculators and computers are essential tools for teaching, learning and doing mathematics. They furnish visual image of mathematical idea, they facility organizing and analyzing data and they compute efficiently and accurately. They can support investigation by students in every area of mathematics, including geometry, statistics, algebra, measurement and number. When technical tools are available, students can focus on decision making, reflection, reasoning and problem solving. Students can learn more mathematics more deeply with the appropriate use of technology. Technology should not be used as a replacement for basic understanding and intuitions; rather it can and should be used to faster those understanding and institutions. In mathematics instructions programs technology should be used widely and responsibly, with the goal of enriching students learning of a mathematics. With appropriate teaching material, teacher can use better strategies in to the classroom in order to get better performance from the side of students (Upadhyay, 2010, p.181).

However mathematics is more changeable in the present digital era using the technological tools calculator, mobile, computer, e-learning and different software tools. It has a greater significance to teach and learn mathematics. When technological tools are available, students can focus on decision making, reflection, reasoning, and problem solving. Students can also benefit in different ways from technology integration into everyday teaching and learning. ICT also adds a new dimension to the teaching and learning of Mathematics by helping students to visualize certain mathematics concept and claimed that the visualization and exploration of mathematical objects and concepts in multimedia environments can foster understanding in new ways (Voorst, 1999).

Achieving a meaningful use of computer technology in the field of education can be influenced by many factors. One of these factors is teachers' attitudes towards the use of technology in teaching and learning process. Research shows that the success of technology use in the educational settings largely depends on teachers attitudes toward technology use (Albirini, 2006, Baylor & Ritchie, 2002). Teachers' attitudes are considered as a major predictor of the use of new technologies in the educational settings (Albirini, 2006). Thus, their attitudes toward computer can play an important role in the acceptance and actual use of computers. The successful utilization of technologies in the classroom depends mainly on the teachers' attitudes toward these tools. Thus, it can be concluded that the attitude further related to the usage frequency of technology and usage amount of the technology.

So attitudes are key factors in whether teachers accept ICT as a teaching tool in their teaching practices. In this study the researcher found that teachers attitude and practices towards ICT in teaching mathematics at secondary level.

Statement of the Problem

Nepal is developing country which is still behind in employing technology for teachings and learning mathematics. The government of Nepal emphasizes integrating technology on teaching and learning Mathematics (MOE,2007),however in practice there appears to be little or no encouragement of students to explore mathematical ideas and concepts that they are expected to know. The paper-pencil method is traditional. Technology has a minimal to non-existent role at school in Nepal. Very few schools have access to technologies, and even fewer integrate them in teaching and learning mathematics. In fact, the school-educational system is based on a traditional approach with emphasize given to drill-and –practice and procedural fluency. In an effort to provide an opportunity in present situation. The education system of Nepal has also been influenced by the change made by ICT in the global context. The government of Nepal, MOE, through National Curriculum

Framework (NCF-2063), has introduced ICT as a subject as well as ICT as a tool for instruction in school education. In the modern innovative time it is necessary to identify the beliefs, opinions of teachers towards their used materials. As a teacher as well as students researchers found that in secondary level teachers feel mathematics as a boring subject and harder one because when they start solving problem of mathematics then they are not able to visualize. Teaching and learning mathematics through ICT play important role as well as attitude towards ICT in mathematics also. The teachers have positive or negative attitude towards it. To find that the study concern the following specific research questions:

- What are the teachers' attitudes towards the use of ICT in teaching mathematics at grade IX and X?
- What are the practices of teachers on the use ICT in teaching mathematics at grade IX and X?

Objective of this study

The objective of this study was as follows:

- To find out the attitude of grade IX and X mathematics teachers towards ICT.
- To find out the practices of ICT in teaching mathematics at grade IX and X.

Significance of the Study

This study identifies the secondary level mathematics teachers' attitude and practices on the use of ICT in Kathmandu district. Mathematics is a complex subject than others. The tendency for most students is to consider the subject as one that is boring, and so far creating lack of interest. Therefore new pedagogy ICT is going to elaborate with this research such challenges and gap the opportunities created by 21st century. The use of ICT in mathematics education can make the teaching process more effective as well as enhance the students' capabilities in understanding basic and innovative ideas about the every branches of

mathematics. The study of teachers' attitude and practices on use ICT in teaching mathematics at secondary level is the following significance.

- It informs teachers' readiness to use ICT for teaching mathematics.
- To understand the teachers attitude to use ICT in mathematics education.
- It also helped improve to the teaching learning situation in the context of negative attitude towards ICT in mathematics education.
- This study provides the important information to the instructor in using ICT in mathematics education
- It is helpful for national policy maker, mathematics curriculum administrators and all other concerned personal dents to it.

Delimitation of the Study

Each study is no rigorously perfect and free from delimitation. So it focuses only particular area which could be investigated within the limit of the researchers' capacity. Delimitation are boundaries that are set by researcher in order to control the range of the study. Following were the delimitation of the study.

- This study was limited only in 150 mathematics at grade ix and x teachers' in Kathmandu district.
- This study was conducted only to mathematics teacher in selected school at secondary level.
- This study was focused only to find attitude and practices of teacher towards the use of ICT.
- This study was concerned with teachers who use ICT in teaching mathematics.

Definition of Related Terms

ICT

Information and communication technology regarded as a combination of 'informatics technology' that enhance the learning opportunity and secure the quality in education. ICT is a teaching and learning tools by the help of which we get more information fast, easy and systematic way than traditional materials. In this study, it indicates to use Internet, computer, mobile phone, calculator, projector, software tools and ICT lab for teaching mathematics.

Attitude

In this study the concept of attitude is used to denote teacher's belief, feeling, and behavior towards the use of ICT in mathematics education.

Practices

Use ICT tools in classroom when teaching mathematics at grade IX and X.

Secondary level mathematics teacher

The Person who teaches mathematics at secondary level (grade ix and x) in Kathmandu district on academic year 2073 B.S.

Community school

Community School means those schools that have obtained approval or permission and receiving regular grant from Government of Nepal.

Institutional school

Institutional School means those schools that have obtained approval or permission for operation on condition that they are not receiving regular grants from Government of Nepal.

Chapter-II

REVIEW OF RELATED LITERATURES

The main objective of literature review is to gain familiarity with the subject matter to get enough knowledge to develop conceptual framework and to validate to concepts as well as adopt appropriate research methods. "It eliminate the duplication of what has been done and provides useful hypothesis and helpful suggestions for significant investigation" (Best and Kahn, 2012, P. 39). Therefore, for selecting design, sample, tool, data collection procedure, analyzing data and making decision, it gives instruction and makes a reliable research.

It included the various studies carried out by different researches that were related with this title .This chapter presents the review of related literature to this study. It is divided into three section: Empirical literature, Theoretical literature, and Conceptual understanding.

Empirical Literature

The major propose of the present study was to find the attitude and practices of teachers towards ICT in mathematics teaching at secondary level. There were so many journals, reports and related research studies, so researcher was review these studies in order to explain the present problem of the study. They were as follows:

A study carried by Albrini (2006), conducted a research entitled "Teachers' attitude towards information communication technology". His main objective was to find out what are the attitudes of high school English as a Foreign Language (EFL) teachers in Syria toward ICT in education? It was a descriptive study of an exploratory nature. A simple random sample of 326 subjects were selected to participate in the study. He had been identified that teachers positive attitude towards ICT usually foretell future computer use and it concluded that policy makers can make use of teachers positive attitude towards ICT to better prepare them for incorporating ICT in their teaching practices. He explain that the main barriro to

technology implementation perceived by the teachers in the case of Syria is the mismatch between ICT and the existing curricula and the class time frame .In the case of Syrian education the researcher has explain about the another barrier in which teachers low level of access to school computer, which may have played a role in teachers modest computer competence so essential to future computer use.

A study carried by Al-Zaidiyeen et al., (2010), entitled “Teachers attitude and Level of technology use in classroom”. Investigated the level of ICT use for educational purposes by teachers in Jordanian rural secondary schools; the study demonstrated the importance of teachers' attitude towards the use of ICT for educational purposes. A questionnaire was used for data collection and it was distributed among 650 teachers in Jordan. The survey included questions concerning the level of ICT use as well as questions related to the attitude of teachers towards the use of ICT. The findings revealed that teachers’ level of ICT use for educational purpose was low although their attitude towards the ICT use was positive.

Bakr (2011), entitled “Attitude of Egyptian teachers towards computers”. Her study aims at investigating Egyptian teachers' attitudes towards computers in terms of gender and years of teaching experience. Attitudes of a sample of 118 public school teachers, 53 (45%) male and 65 (55%) female, were assessed using ‘The Attitude towards Computer Instrument, developed by Shaft et al (2004), which is a Likert type instrument with three factors of affective, cognitive, and behavioral. The gathered data were analyzed using an analysis of variance. Findings showed that the Egyptian public school teachers' attitudes towards computers are positive. There were no significant differences in terms of gender and teaching experience.

Cavas et al. (2010), studied Turkish primary science teachers’ attitudes towards ICT in education and (then) the relationship between teachers’ attitudes and the factors related to teachers’ personal characteristics (gender, age, and computer ownership at home, and

computer experience). The instrument was developed by researchers and administered to 1071 science teachers. The results indicated that the Turkish science teachers have positive attitudes toward ICT; no gender differences have been traced in their attitudes towards ICT but differences were found in terms of their age, their computer skills (experience) and their ownership of computers at home.

Teachers must be given the opportunity to become acquainted with newly introduced technologies. Mcalister et al., (2005), in their study of teachers' use of computers to teach mathematics, found that overall attitudes towards using computers were very positive, although many of them had limited experience with computers. Mcalister et al., (2005) stated that more training and support in information technology should be given to teachers and more value should be placed on the teacher as a role model for students.

Jimoyiannis and Komis (2006), conducted an exploratory study probing secondary education teachers' attitudes toward and beliefs about ICT integration. They found that roughly 25% of the participants used ICT for preparation and communication purposes rather than for instruction delivery or assigning students ICT-based tasks. The researchers claimed that there was a noticeable increase in teachers' attitudes toward ICT utilization for pedagogical reasons in Greece. Moreover, despite teachers' lack of the necessary computer skills, they held positive attitudes toward the potential of ICT in improving teaching practices. The need to convince teachers for the utility of ICT in education, the insecurity about success in ICT training and the fear that students might be more knowledgeable about computers were additional factors that shaped teachers' attitudes in the study.

In the Moroccan educational context, Ouardaoui et al., (2012), investigated how ICT-based education may generate a better motivation and performance in science students (Chemistry-Physics, Mathematics, and Life-Earth sciences). The results led to the rejection of the null-hypothesis as the experimental group outperformed the control group. The analysis

concluded that ICT had a positive impact on students' learning and performance in Chemistry-Physics for the 8th and 9th grades in one institution and 7th and 9th grades in the other. The observations showed that ICT-based activities caused an increase in students' motivation for learning.

Pandey (2014), conducted a research entitled "Teachers attitude towards ICT at Kathmandu district". Her main objective was to find out the attitude of secondary science teachers towards ICT. Her methodology of this study mixed type nature. The sample of this study were 26 secondary science teacher in which 13 teachers were selected from the public school and 13 teachers were from private school. The selection was done through purposive sampling procedure. The information has been elicited from the secondary science teacher with the help of structural and open ended questionnaire. The study identified that the attitudes of secondary science teachers towards ICT was strongly positive. Most of the teacher have high knowledge about using printer, using keyboard, on using power point, creating files and folder at on using internet.

Paudel (2015), studied "Teachers and students perception towards use of ICT in mathematics Teaching" proposed to explore the perception of students and teachers towards mathematics teaching with the use of ICT. This research was qualitative in nature. He did the study in four lower secondary and secondary schools among four teacher and four students of Bhaktapur district by using discussion, interview and observation as a tool of research. By observing the class, taking interview, and discussing with students and teacher he has collected and analysis of the data. The findings indicated that students and teachers both have positive perception towards use of ICT in mathematics teaching.

Placidius (2014), entitled "Teachers' attitudes towards the use of ICT as a pedagogical tool in secondary schools in Tanzania". Within this broad aim, the paper provides a better understanding of ICT as a pedagogical tool. The development of this study

was influenced by various concerns of educational stakeholders about the level of teachers' competence on the use of ICT as a pedagogical tool. The data collection methods involved questionnaire and interview. A total of 80 teachers, through random sampling in 10 schools were involved in this study at the first phase of data collection and 10 teachers were obtained through purposive sampling from 2 schools at the second phase. It was found that teachers have positive attitudes towards the use of ICT as a pedagogical tool but they did not integrate it in their teaching effectively. Also, low familiarity with ICT use as a pedagogical tool among teachers was found to be a problem. The use of ICT as a pedagogical tool in Tanzania seems to be a critical situation among teachers. The paper recommends further in-depth investigation on teachers' willingness, confidence, motivation, feeling, thinking, belief and the actual practices through classroom observations including larger samples. On the whole, the study's findings are seen to be of particular relevance to both teachers and the educational policy-makers in Tanzania.

Nuri (2015), did a study on "Attitudes of Students and Teachers towards the Use of Interactive Whiteboard in Elementary and Secondary School Classrooms." This study tries to understand teachers' and students' attitudes toward interactive whiteboard technology along with differences in attitudes resulting from some demographic factors. Two parallel surveys consisting of 25 items were applied to 255 students and 23 teachers from three private schools. Students from sixth to twelfth grades and teachers from 15 different branches participated in this research study. In this study, the descriptive statistics calculated were the means and percentages. The inferential statistical models used were the t-test for independent samples, correlation for relationship and linear regression for prediction. The research questions were tested at an alpha level of .05. The results indicate that interactive whiteboards are highly rated by both teachers and students. Students mostly prefer the usage of interactive whiteboards in math courses, and their attitudes differ across their genders and school levels.

As students get elder, their positive attitudes toward interactive whiteboard technology decrease, and it has been found out that there is no difference between teachers' and students' attitudes.

Yuan (2012), did a study aims at investigating elementary school teachers' perceptions toward to the use of ICT. Magic Board, an interactive web-based environment which provides a set of virtual manipulative for elementary mathematics, is used as the case of ICT. After participating in Magic Board workshops, 250 elementary school teachers in Taiwan responded to a researcher developed questionnaire to get teachers' perceptions toward the use of Magic Board. The study revealed that teachers rated high scores on perceived teaching assistance, perceived learning assistance, and perceived competence of technology integration. The correlation among the three subscales indicates that teachers had a higher score on one scale correlated with higher scores on the other two scales. Findings show no gender difference on perceptions toward Magic Board. However, teachers who have data projectors in their classrooms rated higher scores on perceived teaching assistance and perceived competence of technology integration than those without data projectors in their classrooms.

Rahman (2014), did study aimed at investigating "Knowledge, Attitude & Practice level of using ICT tools and services by the teachers and students of universities in Dhaka Metropolitan City". A total of 523 respondents from 31 universities were surveyed using questionnaire method in 2015. Univariate frequency distribution method, bivariate crosstabs method and testing methods for qualitative data were used for data analyses. The study found that, in spite of a higher level of knowledge regarding different tools & services of ICT in teaching & learning, the practices of those were not satisfactory. Also, there were significant associations between K, A & P of different ICT tools and services, though for most of them the associations were not so strong. Finally, it is also found that, occupation, university type

and ownership of a PC makes significant differences for knowledge and practice level in using ICT in teaching & learning.

Alemu(2015), did study entitled “Integrating ICT into Teaching-learning Practices: Promise, Challenges and Future Directions of Higher Educational Institutes”. This study aimed at exploring the process of integrating ICT into teaching-learning practices and its emerging challenges in Adama Science and Technology University. In this study, a mixed design (quantitative & qualitative) in line of descriptive survey method was used. The sample population consisted of 203 respondents (188 instructors, 10 school deans and their vices and 5 department heads) from the five schools. Instruments were observation, individual interviews and questionnaires. The analysis of data revealed that integrating ICT into teaching-learning is yet to be accomplished.

In literature review, researcher's central focus was to examine and evaluate what had been before on a topic and establish the relevance of this information to own research. Out of different studies reviewed, researcher central focus was to examine and evaluate what had been before on a topic and establish relevant information to research. This review of the study was taken from various sources including books, journals, articles, previous research etc. this entire source helps to bring the clarity and focus on the research problem, improve methodology and contextualize the findings. It was also equally important to examine and evaluate what had been said before on a topic and what had not been said yet for finding new area for further research. Here this research focused on the attitude and practices of teachers towards ICT in teaching mathematics. ICT use is changing teaching nature of mathematics education. Researcher got information on mixed method in which survey research design from different reviewed; researcher was follow the same i.e. Survey research design, use questionnaire interview and observation as a tool of data collection.

Theoretical Review

Researches and theories are interrelated and inseparable. A theory provides a conceptual framework for research in term contributes to the development of theory. A theory plans and directs the research studies. Any philosophies must be supported by any theory for its pedagogical implementation. Likewise the use of supported by many theories. Here researcher will discuss brief about Cognitive-Affective-Conative Model.

Cognitive-Affective-Behavioral Model

Aiken (1996) conceptualizes an attitude as a “learned predisposition to respond positively to certain objects, situations, institutions, concepts or persons.” As implied in this definition, attitudes possess cognitive (beliefs, knowledge, and expectations), affective (motivational and emotional), and performance (behavior or actions) components. Schiffman & Kanuk (2004) suggest that attitudes are constructed around three components:

Affective Component

The affective component is the emotional response (liking/disliking) towards an attitude object. Most of the research place emphasis on the importance of affective components. An individual's attitude towards an object cannot be determined by simply identifying its beliefs about it because emotion works simultaneously with the cognitive process about an attitude object. Agarwal & Malhotra, (2005) express that the affect (feelings and emotions) and attitude (evaluative judgment based on brand beliefs) streams of research are combined to propose an integrated model of attitude and choice.

Behavioral Component

The behavioral component is a verbal or overt (nonverbal) (Wicker 1969) behavioral tendency by an individual and it consists of actions or observable responses that are the result of an attitude object. It involves person's response (favorable/unfavorable) to do something regarding attitude object. Attitudinal responses are more or less consistent. That is, a series of

responses toward a given attitudinal stimulus is likely to show some degree of organizational structure, or predictability (Defleur & Westie 1963).

Cognitive Component

The cognitive component is an evaluation of the entity that constitutes an individual's opinion (belief/disbelief) about the object. Cognitive refers to the thoughts and beliefs an individual has about an attitude object. Fishbein & Ajzen (1975) express that belief is information a person has about an object; information that specifically links an object and attribute. The cognitive component is the storage section where an individual organizes the information (Jain, 2014, P.6).

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 questions more clearly. From the above review of literature and the theoretical model, the researcher has come to the point that the topic of current research attitude and practices of towards the use of ICT in teaching mathematics. The above mentioned literatures have helped the researcher to save the research and draw meaningful conclusion. The following conceptual framework was constructed with the help of above mentioned literature review. The following was the framework of the study:

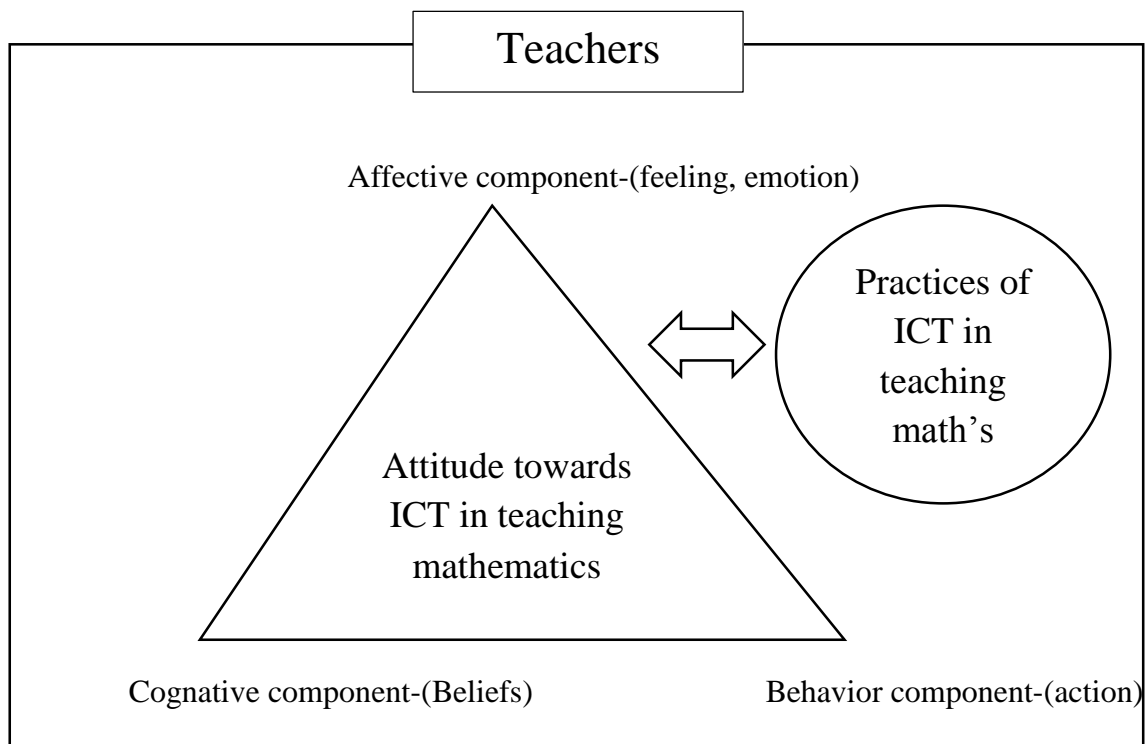
Fig.1: Conceptual Framework

Figure: Conceptual Framework (Source: Jain, 2014)

In this study, the researcher intended to find out the attitude and practices of teachers towards ICT in teaching mathematics based on research reports in the field of attitude. Researcher used questionnaire to investigate respondents' attitudes possess, affective (motivational and emotional), cognitive (beliefs, knowledge, and Conative component (behavior, action) attitude towards ICT. For the questionnaire, 20 statements were prepared based on the above main theme of conceptual framework and the help of experts. The selected statements that reflect the issue in the questions were given to the respondents to indicate their degree of agreement/disagreement by selecting the appropriate response category or a number on a numeral scale. Use interview guide line and observation tools for find out the practices of ICT in teaching mathematics. Finally researchers were analysis data by triangulation method.

Chapter- III

METHODS AND PROCEDURE

Methodology is the useful bridge to solve the research problem in systematic way.

"Methodology is a technique for scaling objects or statements" (Stephenson, 1953. as cited in Best & Kahn, 2012). This chapter explains the methodology which was used to conduct research and techniques applies to analyse the data based on the information .More over this study was based on quantitative and qualitative approach so that the study is considered as survey of secondary school's teachers attitude and practices towards ICT. Thus the framework of this chapter contains design, population, sample, and tools of data collection, procedure of data collection and data analysis procedure.

Design and method of the Study

This study adopted the mixed method which considers both quantitative and qualitative methods. According to Cresswell (2009), a mixed method approach is an approach to inquiry that combines or associates both qualitative and quantitative forms. This approach assists the researcher to come up with the findings that are more comprehensive, holistic and integrates various aspects of the problem investigated .The first part of this study was quantitative research. The research design helps the researcher for suitable planning and provides guideline for collection of data. The researcher was adopted the survey design in this study. The survey type research studies with large population or universal setting and studies samples chosen from the population to discover the relative incidence distribution and inter relations of sociological and psychological variable. Survey research is probably best adopted in obtaining personal and social facts, beliefs, concepts and opinions. It is significant that although hundreds of thousands of words are spoken and written about what people presumable think about education there is little dependable information on the subject we simply don't know about what peoples attitude are. So, the researcher was apply survey

design to find out the attitude of teachers towards ICT in teaching mathematics at secondary level and second part of this study was practices of teachers towards ICT in teaching mathematics depends on qualitative nature.

Population of the Study

This study was focus on the investigation of attitude of teachers' towards ICT in teaching mathematics at secondary level. Till now in Nepal there are the total number of schools come down to 34,806 in the current school year. Out of the total 34806 schools are secondary, 8,814 level in Nepal (MOE, 2072). Among them Kathmandu district secondary level schools are 763(DEO, 2070). Therefore, the teachers at secondary level maths teacher was the population of this study at Kathmandu district.

Sample of the Study

This study sample included 150 teachers from 60 schools at the first phase of data collection and 5 teachers at the second one. In the first phase, simple random sampling was used to select teachers who responded to the closed-ended questionnaires. In the second phase, purposive sampling was used to select 5 teachers from 5 schools who responded to the interview questions and class observation at the second phase of data collection.

Tools of the Data collection

Tools are important factors for collecting the data. There was different types of tools for collecting data which as follows:

Questionnaires

Teacher attitudes towards ICT Scale developed by Albirini (2006). The questionnaire contains 20 items. The questionnaire is designed as 5-point Likert's scale, where positive statements, 1=strongly disagree to the concept, 2=disagree to the concept, 3=undecided to the concept, 4=agree to the concept, and 5=strongly favorable to the concept and vice versa. The

data collection was limited to community and institutional secondary schools teachers in Kathmandu district.

Reliability of Tools

For the reliability of the instruments, a pilot study was conducted to assess the reliability of tools or instruments. The pilot study was carried out of ten teachers which were not included in the study. The obtained data were calculated using by using the Statistical Package for Social Sciences (SPSS) programmer, version 21.0 setting at 0.05 .The Cronbach's α reliability coefficients was found 0.82.

Validity of Tools

For the validation of the instruments, the researcher consulted with the thesis supervisor. The research tools used in this study were questionnaire. It also prepared by through the consultation with the expert. The statement was being fixed for the final study. The statement was related with attitude towards ICT. For the observation form, the researcher consulted with the thesis supervisor.

Interview

Interview is an important method to collect primary data. It is a data collection procedure including verbal communication between the research and respondent by telephone or face to face situation. 'The interview sequence follows the same progression-one usually starts by engaging the consultant in an open-ended interview, posing general indirect or grand tour questions first. Eventually, as the focus narrows toward specific key terms on topics, questions with a narrower range or structural questions are asked to elicit greater detail on particular items .The research prepaid interview guideline (open ended interview questions) on the basis of the suggestion from supervision and the study of research book. Interview is a kind of widely used data collection method of educational method. It is also a kind of oral questionnaire which help us to understood participants' perception reaction view and her/ his

facial expression about the ICT in teaching mathematics .Researchers ask question by using interview guide lines

Observation

For the purpose of collecting primary data, the observation method is commonly used. It has become a scientific tool and the method of data collection for the research. It is systematically planned and recorded and is subjected to check on validity and reliability. Under this method, the information is sought by the way investigators with his/her own direct observations without asking from respondent. The classroom observation note was developed by the researcher to observe practices of ICT in teaching mathematics. The classroom observation note was developed on the following basis as shown in appendix-I. One observation note was developed and photocopied to make more as required. The teaching activities of teacher and students, their interaction were noted down by the researcher in the observation note as information for collecting data. In this study researchers was observe classroom teaching activities to see use ICT in teaching mathematics by using observation note.

Data Collection procedure

Data is the foundation of the research. Therefore, collection of reliable data is very essential for all kinds of researches. For this study, the researcher was visited the secondary level school of Kathmandu district on both community and institutional schools. The researcher visited the principal and maths teacher and was asked for permission before administering the questionnaire to teacher. The researcher was describe about the process and purpose of the research. Then researcher will administer the questionnaire and collect the data.

Methods of Data Analysis and Interpretation.

This was a mixed design research so; it was based on quantitative and qualitative nature. The researcher analysed the obtained data by using the Statistical Package for Social Sciences (SPSS) programmer, version 21.0. The collected data, nonparametric chi-square (χ^2) test was used for each statement to find the attitude of teachers towards ICT. By the help of chi-square test (χ^2) at 0.05 level of significance the researcher found out the significance of each statement and percentage to identify the attitude of teachers towards the ICT in teaching mathematics at secondary level. The responses from interviews and observation were recorded and transcribed under headings and then were organized in themes and categories that emerged.

Chapter-IV

ANALYSIS AND INTERPRETATION OF DATA

This chapter is concerned with the analysis and interpretation of data which was collected from mixed design. Firstly, simple random sampling was used in the selection of 150 mathematics teachers from 60 schools who were involved in responding to questionnaire as they were knowledgeable with pedagogical techniques in teaching. In the second phase, purposive sampling was used to select 5 teachers from 5 schools who responded to the interview questions and classroom observation form at the second phase of data collection. The data gathered from different sources were analyzed and interpreted under the two theme viz. teacher's attitude towards the use of ICT and practices of teachers on the use of ICT in teaching mathematics at classroom.

The closed ended questions related to the teaching attitudes towards the ICT were to be answered with five alternatives, strongly disagree, disagree, neutral, agree, and strongly agree. Regarding statistical description measures of the data were analyzed by using the Statistical Package for Social Sciences (SPSS) programme, version 21.0 setting at 0.05. The data obtained were calculated in means and standard deviations for easy interpretation of the information. For analyzing the data, percentage, and chi-square test were used. The responses from interviews observation were recorded and transcribed under headings and then were organized in themes and categories that emerged. The collected data were analyzed and interpreted under the following headings.

- Attitude of secondary level (grade IX and X) teachers towards ICT
- Practices of teachers towards ICT in teaching mathematics at grade ix and x.

Analysis of Teacher's Attitude towards ICT

Participants were asked to respond to 20, Likert-type statements dealing with their attitudes toward ICT in teaching mathematics. The items were designed to measure the affective domain of computer attitude (items 1–6), cognitive domain (items 7–15), and behavioral domain (items 16–20). ICT attitudes of Secondary level mathematics teachers was represented by a χ^2 -value on a 5-point scale, for positive item (1,3,5,7,9,11,12,14,17 and 19) where 5 (Strongly Agree) represents the maximum score of the scale and 1 (Strongly Disagree) represents the minimum score and negative item vice versa. The analysis and interpretation of data obtained from questionnaire can be presented as follows:

Teacher's Affective view towards ICT in Teaching Mathematics

There were six statements (1-6) related to the affective component (feeling) towards ICT. The following table consists the teacher's attitude and its corresponding χ^2 - value of the questionnaire.

Table 4.1 Number of responses and chi-square values of affective scale

Statements	SD %	D %	N %	A %	SA %	χ^2	Decision
1. I like to use ICT in teaching	0.7	3.3	2	57.3	36.7	198.53	S
2. ICT make me feel uncomfortable	29.3	51.3	12	3.3	4.0	125.00	S
3. I am glad there are more computers these days	4.7	10.0	18.7	49.3	17.3	90.33	S
4. I do not like talking with others about computers(ICT)	30.7	53.3	10.0	5.3	0.7	143.53	S

5. I enjoy using ICT when teaching math's at classroom	1.3	4.0	10.0	62.0	22.7	185.66	S
6. I dislike using ICT in Teaching mathematics	30.7	52.0	8.0	6.0	3.3	131.66	S

Critical region $\chi^2_{\alpha, v} = \chi^2_{0.05, 4} = \leq 9.49$ (Non-significant)

On the statement "I like to use ICT in teaching." is highly significant with the χ^2 -value 198.533 at 0.05 level of significance. A total of 94% of teachers are agreed and 2% of teachers are neutral about this statement. It shows that most of the teachers are highly positive for this statement.

On the statement "ICT make me feel uncomfortable." is highly significant with the χ^2 -value 125 at level of significance. A total of 80.6% of teachers are disagreed and 12% of teachers are undecided about this statement. It shows that majority of teachers are positive for this statement.

On the statement "I am glad there are more computers these days" is significant with the χ^2 -value 90.333 at 0.05 level of significance. A total of 66.6% of teachers are agreed and 18.3% of teachers are undecided about this statement. It means that most of teachers are positive for this statement.

On the statement "I don't like taking with others about computers." is highly significant with the χ^2 -value 143.533 at 0.05 level of significance. A total of 84% of teachers are agreed and 10% of teachers are neutral about this statement. It shows that most of the teachers are highly positive for this statement.

On the statement "I enjoy using ICT when teaching mathematics at classroom." is highly significant with the χ^2 -value 185.667 at 0.05 level of significance. A total of 84.7% of teachers are agreed and 10% of teachers are neutral about this statement. It shows that majority of teachers are positive for this statement.

On the statement "I dislike using ICT in teaching mathematics." is significant with the χ^2 -value 131.667 at 0.05 level of significance. A total of 82.7% of teachers are disagreed and 8% of teachers are neutral about this statement. It means that most of teachers are positive for this statement.

Hence, from the analysis of the data, majority of the teachers had positive attitudes towards positive statements and negative towards negative statements. So, it is concluded that majority of secondary level mathematics teachers of Kathmandu district had positive attitudes towards ICT.

Teacher's Cognitive View towards ICT in Teaching Mathematics

There were nine statements (7-15) related to the affective component (beliefs) towards ICT. The following table consists the teacher's attitude and it corresponding χ^2 - value of the questionnaire.

Table 4.2 Number of responses and chi-square values of cognitive scale

Statements	SD %	D %	N %	A %	SA %	χ^2	Decision
7. ICT save time and effort	1.3	2	14	52.7	30	140.67	S
8. Schools would be a better place without ICT	2.7	14	14.7	44	24.7	72.20	S
9. Students must use ICT in all subject matters	1.3	6.7	17.3	54	20	130.13	S
10. Learning about ICT is a waste of time	42	41.3	4	87	4	118.47	S
11. ICT would motivate students to do more study	1.3	2.7	6.7	61.3	28	194.93	S

12. ICT is a fast and efficient means of getting information	2	1.3	6	54.7	36	174.47	S
13. I do not think I would ever need a ICT in my teaching	18.7	53.3	13.3	10.7	4	112.53	S
14. ICT can enhance Students' learning	2	2	13.3	65.3	17.3	206.60	S
15. ICT do more harm than good	23.3	50	16	1.7	0	54.85	S

Critical region $\chi^2_{\alpha, v} = \chi^2_{0.05, 4} = \leq 9.49$ (Non-significant)

On the statement "ICT save time and effort." is highly significant with the χ^2 -value 140.667 at 0.05 level of significance. A total of 82.7% of teachers are agreed and 14% of teachers are neutral about this statement. It shows that most of the teachers are highly positive for this statement.

On the statement "School would be better place without ICT." is highly significant with the χ^2 -value 72.00 at 0.5 level of significance. A total of 68.7% of teachers are disagreed and 14.7% of teachers are about neutral his statement. It shows that majority of teachers are positive for this statement.

On the statement "student must use ICT in all subject matters." is significant with the χ^2 -value 130.133 at 0.05 level of significance. A total of 74% of teachers are agreed and 17.3% of teachers are neutral about this statement. It means that most of teacher are positive for this statement.

On the statement "Learning about ICT is waste of time." is highly significant with the χ^2 -value 118.467 at 0.05 level of significance. A total of 83.3% of teachers are disagreed and 4% of teachers are neutral about this statement. It shows that most of the teachers are highly positive for this statement.

On the statement "ICT would motivate students to do more study." is highly significant with the χ^2 -value 194.933 at 0.05 level of significance. A total of 89.3% of teachers are agreed and 6.7% of teachers are neutral about this statement. It shows that majority of teachers are positive for this statement.

On the statement "ICT is fast and efficient means of getting information." is significant with the χ^2 -value 174.167 at 0.05 level of significance. A total of 90.7% of teachers are disagreed and 6% of teachers are neutral about this statement. It means that most of teachers are positive for this statement.

On the statement "I do not think I would ever need an ICT in my teaching." is significant with the χ^2 -value 112.533 at 0.05 level of significance. A total of 72% of teachers are disagreed and 13.3% of teachers are neutral about this statement. It shows that most of the teachers are highly positive for this statement.

On the statement "ICT can enhance student's learning." is highly significant with the χ^2 -value 206.6 at 0.05 level of significance. A total of 82.6% of teachers are agreed and 13.3% of teachers are neutral about this statement. It shows that majority of teachers are positive for this statement.

On the statement "ICT do more harm than good." is significant with the χ^2 -value 54.853 at 0.05 level of significance. A total of 73.3% of teachers are disagreed and 16% of teachers are neutral about this statement. It means that most of teachers are positive for this statement.

Hence, from the analysis of the data, majority of the teachers had positive attitudes towards positive statements and negative towards negative statements. So, it is concluded that majority of secondary level mathematics teachers of Kathmandu district had positive attitudes towards ICT

Teacher's Behaviour View towards ICT in Teaching Mathematics

There were five statements (16-20) related to the behaviour component towards ICT. The following table consists the teacher's attitude and it corresponding χ^2 - value of the questionnaire.

Table 4.3 Number of responses and chi-square values of behaviour scale

Statements	SD %	D %	N %	A %	SA %	χ^2	Decision
16. I would rather do things by hand than with a computer	5.3	37.3	29.3	24.7	3.3	67.67	S
17. If I had the money, I would buy a computer	2	6	19.3	48.7	24	101.87	S
18. I would avoid computers as much as possible	28	52.7	8.7	8.7	2	128.40	S
19. I would like to learn more about ICT	2.7	3.3	3.3	48	42.7	161.53	S
20. I have no intention to use ICT in the near future	44.7	44	4.7	4	2.7	148.20	S

Critical region $\chi^2_{\alpha, \nu} = \chi^2_{0.05, 4} = 9.49$ (Non-significant)

Where, α - Level of significance, ν - Degree of freedom, r- Number of rows

c- Number of column, S- Significant, NS- Not Significant

On the statement "I would rather do things by hand with a computer." is highly significant with the χ^2 -value 67.667 at 0.05 level of significance. A total of 42.6% of teachers are disagreed and 29.3% of teachers are neutral about this statement. It shows that teachers are positive for this statement.

On the statement "If I had the money, I would buy a computer." is significant with the χ^2 -value 101.667 at 0.05 level of significance. A total of 72.7% of teachers are agreed and

19.3% of teachers are neutral about this statement. It means that most of teachers are positive for this statement.

On the statement "I would avoid computer as much as possible." is significant with the χ^2 -value 128.4 at 0.05 level of significance. A total of 80.7% of teachers are disagreed and 8.7% of teachers are neutral about this statement. It shows that most of the teachers are highly positive for this statement.

On the statement "I would like to learn more about ICT." is highly significant with the χ^2 -value 161.53 at 0.05 level of significance. A total of 90.7% of teachers are agreed and 3.3% of teachers are neutral about this statement. It shows that majority of teachers are positive for this statement.

On the statement "I have no intension to the use ICT in the near future." is highly significant with the χ^2 -value 148.2 at 0.05 level of significance. A total of 88.7% of teachers are disagreed and 4.7% of teachers are neutral about this statement. It shows that majority of teachers are positive for this statement.

Hence, from the analysis of the data, majority of the teachers had positive attitudes towards positive statements and negative towards negative statements. So, it is concluded that majority of secondary level mathematics teachers of Kathmandu district had positive attitudes towards ICT. Also χ^2 -value of each statement is significant, so affective, and cognitive and behaviour component of attitude is highly significant. It shows that most of the teachers had positive attitude towards ICT.

Analysis of Teacher's Practices on the using ICT in teaching mathematics

The second objective of the study was to find out the practices of teachers on the use of ICT in teaching mathematics. In order to investigate the practices of ICT, interview schedule and observation note were used as tool of data collection from purposive sampling

schools (Appendix A). The information collected from these tools has been presented as follows:

Teacher's View about Practices of ICT in Teaching Mathematics

The data analysis was based on teachers who participated in the second phase of data collection in which trained five teachers were purposively selected to participate in the interview. Using interview guideline, the information from the open-ended questionnaires provided the experiences of teachers that allowed the researcher to decide on respondents to participate in the interview. The participants in the interview had good knowledge and experiences about ICT skills in teaching.

Teacher one was familiar with ICT. He had already practiced about ICT. He didn't taken any training but by his self-effort has learnt about ICT. Researcher asked the question – What types of tools do you use in teaching mathematics? Teacher said that

“I am highly interested in teaching mathematics using ICT, so I am using Laptop, OHP, and Tablet, mobile phone, internet and sometime use power point presentation and do not use mathematical software because lack of training. But didn't used in daily in classroom only in a period of week use ICT on particular some topic of geometry, trigonometry and algebra.”(Teachers' view)

From this reply it is clear that teacher is highly interested and motivated towards the use of ICT. To become perfect in ICT, teacher had used so many tools. So it can be drawn that teacher's attitude was positive and there practice also. Teacher was familiar with software but he had not used due to lack of training. For the evaluation of students use of ICT was not in practice. The researcher asked can we increase learning achievement of student by helps/ use of ICT in mathematics. What do you think? Regarding this.

“ICT probably increase learning achievement of student, if we teach only traditional method only few student who are talent they will know mathematics but if we teach through

ICT the weak students also get some attention towards mathematics. So All the teachers know about ICT and use ICT in teaching mathematics. But there are lack of tools, lack of knowledge, and lack of curriculum, I did not use ICT in my teaching, probably only use in a period of week.” (Teachers’ view)

Above teachers view showed that ICT enhance the learning achievement of students, because ICT is new technology of teaching mathematics. Therefore, talented as well as weak students also benefited from the use of ICT in teaching mathematics. So that all the teacher should know about ICT and its importance. In spite of poor infrastructure, lack of curriculum, lack of ICT knowledge did not use in daily classroom.

Another teacher said,

“I well known about ICT, it helps to teach difficult concepts of mathematics. I have taken one day TPD training. I have used software e.g. Mathematica, Geo-gebra power point presentation and TV. But the use of geogebra was less in practice. Through the use of ICT achievement of students can be increase, so the practice of ICT is necessary. ICT makes easy to teach abstract mathematical concepts. So teacher should need knowledge of ICT. But did not use ICT in daily classroom only use some times.” (Teachers’ view)

By analyzing the responses of second teacher it is clear that attitude of teacher was highly positive but practices of ICT in teaching mathematics sometime of months. Teachers were familiar with ICT, they used ICT to teach difficult concept of mathematics through mobile phone .In the same way the teacher had also taken trained related with the use of ICT. The used mathematical software as mathematica, geogebres and you tube video in a month. Thus, ICT increased the students learning achievement. Ten percentage of practices of ICT in teaching mathematics.

Similarly, Researcher conducted interview with third teacher.

“In my opinion, ICT is not used as a pedagogical tool at our school. We have enough computers, digital cameras, LCD projectors and TV rooms but most of us don't use them since we don't have sufficient training about them. I remember last year there was training at our school in which most of us participated but it focused on equipping basic ICT skills instead of pedagogical competence. Some of us are even afraid to use projectors in the classroom because we are not able to prepare digital presentations”. (Teachers' view)

Regarding the practices of ICT, they were not use regularly although they got training at their school. But the above respondent's also said that I don't know use ICT as mathematical software. It concludes that above teacher had not use ICT as a pedagogical tools for teaching mathematics.

Fourth teacher is familiar with ICT. It helps too much in learning because students are also curious to know. He had taken ICT subject carrying 50 marks and he was also taken training. I try myself to gain knowledge. Some time he also teaches math. He was also familiar with ICT tools. There was also facility of ICT tools in his school. Mathematical software increases achievement of students. His view was that in comparison to world context use of ICT is necessary but they had followed traditional way. ICT tools are not available. Knowledge of ICT is necessary. Each school needs ICT lab.

Fifth teachers said that:

“I really don't know anything about mathematical software to use teaching materials with my teaching. What I know is just preparing notes in power point and sometimes present them to my students. In fact, we had a one day workshop at our school on instructional media design but I did not understand due to limited time and other teacher who attended ended up with nothing about using ICT in teaching mathematics.” (Teachers' view)

The fifth teacher was unknown about the knowledge of ICT but he is trying to get knowledge about it. Really ICT helps to teach nicely but there were not infrastructure. He

was interested in ICT. It helps to increase knowledge. From above data researcher can conclude that teacher was familiar with ICT but it was not practiced due to lack of training and ICT tools.

The above information implies ten percentage of secondary level mathematics of Kathmandu district had practices on the using ICT as a pedagogical tool in teaching mathematics. Because of lack of knowledge, lack of training, lack of infrastructure but teachers attitude is positive towards ICT.

Analysis Based on Classroom Observation

The researcher visited five schools of Kathmandu district, from the method of purposive sampling in which three community and two institutional were observed and data was collected by the use of observation schedule.

Community Schools

The researcher visited on three community schools were observed three classes of teachers in teaching mathematics in Kathmandu district to collect data for the practices of ICT in teaching mathematics by the helps of observation schedule. Data analysis based on observation in separate topic as follows:

Infrastructure of ICT at school

From the observation out of three schools were found that, there were electricity, computer lab, laptop, overhead projector, multimedia room, and sound system available but these tools were used period of week in teaching mathematics. On the observation researcher was found that computers and laptop were most used for official purposes but period of some times of month practices for learning and teaching. Internet services was found slow speed but period of week used for teaching mathematics. In the same way the number of students were large in classroom. So, visualized material on overhead

projector not properly seen. Finally it analysis that ICT was used period of week in teaching mathematics.

Use of ICT in teaching mathematics at classroom

Researcher observed three times in purposive sampled schools by the helps of observation schedule. Regarding use of ICT in teaching mathematics there was students and teachers present MS power point presentation in ICT lab and mathematical software was not used in teaching mathematics but sometimes YouTube video and internet was found used in teaching mathematics. In the same way teachers and student were mainly used calculator to solve the mathematical problem. Teachers also used ICT for preparing exam paper and grade set. On the basis of observation the researchers found that most of mathematics teachers were practicing period of week. Teachers attitude were positive towards ICT but low label practices because of lack of knowledge, lack of training, lack of infrastructure, lack of manpower, lack of curriculum and lack of ICT friendly students and environment schools. In spite there were teacher and students are motivated towards ICT.

Participation and learning environment

On the basis of observation the researchers found that both teachers and students were equally participated in the use of ICT. On which student also prepare Power Point ennerjetively participation in learning process. ICT was very helpful to teach mathematics for teacher as well as students. There was collaborative learning environment in the classroom. CT helped to motivate students to learn mathematics. The researchers also found that student felt enjoy in classroom when their teachers teach through power point .ICT enhance students learning mathematics. Similarly, learning process was well organized and purposeful. But the researchers was found that the use of ICT was time consuming process because it took much time than other classes. From the observation it analyzed that use ICT in teaching

mathematics, period of week but not use in daily teaching practices. Due to exam oriented learning and teaching style.

Institutional Schools

The researchers was visited on two institutional schools were observed three classes of teachers in teaching mathematics in Kathmandu district to collect data for the practices of ICT in teaching mathematics by the helps of observation schedule. Data analysis based on observation in separate topic as follows:

Infrastructure of ICT at school

From the observation out of three schools were found that, there were electricity, computer lab, laptop, overhead projector, multimedia room, and sound system available but these tools were low level of use in teaching mathematics. On the observation researchers was found that computers and laptop were most used for official purposes but low level practices for learning and teaching. Internet services was found slow in teaching mathematics. In the same way the number of students were large in classroom so, visualized material on overhead projector not properly seen. Finally it analysis that ICT was low level of practices in teaching mathematics.

Use of ICT in teaching mathematics at classroom

Researcher observed three times in purposive sampled schools by the help of observation schedule. Regarding use of ICT in teaching mathematics there was low level .MS power point presentation and mathematical software was not used in teaching mathematics but sometimes YouTube video and internet was found used in teaching mathematics. In the same way teachers and student were mainly used calculator to solve the mathematical problem. Teachers also used ICT for preparing exam paper and grade set. On the basis of observation the researchers was found that most of schools mathematics teachers was low level practices ICT in teaching mathematics. Teachers attitude were positive towards ICT but

low level practices because of lack of knowledge, lack of training, lack of infrastructure, lack of manpower, lack of curriculum and lack of ICT friendly students and environment schools.

In spite there were teacher and students are motivated towards ICT.

Participation and learning environment

On the basis of observation the researchers was found that both teachers and students were equally participated in the use of ICT. ICT was very helpful teach mathematics for teacher as well as students. There was collaborative learning environment in the classroom. ICT helped to motivate students to learn mathematics. The researchers also found that student felt enjoy in classroom when their teachers teach through power point. ICT enhance students learning mathematics. Similarly, learning process was well organized and purposeful. But the researcher was found that the use of ICT was time consuming process because it took much time than other classes. From the observation it analyzed that use ICT in teaching mathematics, some times of months not use in daily teaching practices. Due to infrastructures of ICT and lack of ICT competency of teachers and lack of ICT friendly students.

From the observation it is clear that school environment was positive towards ICT but they were not daily use ICT for teaching mathematics. It would better to use daily. The information taken from interview and observation are similar so the validity of result is high. Only one teacher was unknown about the use of ICT but his attitude was positive but practice was less in comparison to attitude. So it concluded that teachers Attitude is positive towards ICT but it is non-significant practiced in teaching mathematics. Ten percentage of schools mathematics teachers were used ICT as a pedagogical tools for teaching mathematics, they were only used YouTube video and MS PowerPoint presentation but not used mathematical software.

From the primary sources of data. It is concluded that all teachers were positive towards ICT in teaching mathematics. In spite of lack of knowledge, ICT competency and

infrastructure. All responds showed that positive response about the use of ICT .Similarly, learners were benefited from the ICT, PowerPoint presentation .and you tube video. But no one use mathematical software to teach mathematics because they were not familiar with how to use mathematical software and didn't get any chance to training about mathematical software .Therefor ,the finding of the study showed that use and practices of ICT was very poor than their positive attitude. Some respondents only used twice of months. Thus this study showed that attitude of teachers were positive but the practices seemed very poor in the secondary level mathematics classroom of Kathmandu district.

Chapter-v

SUMMARY, FINDINGS, CONCLUSION AND RECOMMENDATIONS

After the analysis and interpretation of collected data and per the design of study. In this concluding chapter an attempt has been made to draw conclusion. This chapter represents the summary of the study with major findings and conclusion. Finally the last section presents recommendations for the future study.

Summary and Findings of the Study

This study was carried out to examine the attitude and practices of secondary level mathematics teachers towards ICT, the objectives of the study were:

- To find out the attitude of secondary level mathematics teachers towards ICT.
- To find out the practices of ICT in teaching mathematics at secondary level.

For the achievement of these objectives of the study, the researcher gathered data by mixed research design method on which questionnaire for quantitative part and interview and observation for qualitative part and used "Likert Attitude Scale" as a tool. The study sample included 150 teachers from 60 schools at the first phase of data collection and 5 teachers at the second one. In the first phase, simple random sampling was used to select teachers who responded to the closed-ended questionnaires. In the second phase, purposive sampling was used to select 5 teachers from 5 schools who responded to the interview questions and class observation at the second phase of data collection.

Teacher attitudes towards ICT Scale developed by Albirini (2006). The questionnaire contains 20 items. The questionnaire is designed as 5-point Likert's scale, where 1=strongly disagree to the concept, 2=disagree to the concept, 3=undecided to the concept, 4=agree to the concept, and 5=strongly favorable to the concept and vice versa. In this statement there were 10 (statement 1,3,5,7,9,11,12,14,17 and 19) positive and 10 negative statements. These questionnaires consist of different aspects of attitude component. The items were designed to

measure the affective domain of computer attitude (items 1–6), cognitive domain (items 7–15), and behavioural domain (items 16–20). On the other hand practices of teachers on the use of ICT in teaching mathematics were data collected by interview and observation. The responses from interviews observation were recorded and transcribed under headings and then were organized in themes and categories that emerged. The collected data were analyzed following were the major findings of this study.

- The chi-square test and percentage of responses for the statements was used to find the attitude of secondary level teachers towards ICT. From this test, all statements are significant and teachers were favor for most of statements. Thus, the researcher found that the secondary level teachers had positive attitude towards ICT.
- On the basis of interview and classroom observation finding that ten percentage practices of ICT in teaching mathematics.
- Teacher's attitude is positive but non-significant practices of ICT in teaching mathematics at secondary level (grade IX and X).

Conclusion of Study

This study tries to find out the attitude of grade IX and X mathematics teachers towards ICT and its current practices. After the analysis and interpretation of the data obtained from the primary sources it was found that all target population i.e. secondary level mathematics teachers were positive attitude towards use ICT in their teaching and learning process but ten percentage practices on the use of ICT in teaching mathematics. Some teachers teach mathematics through MS power point, through you tube video, and through mobile phone but some teachers may not because they have lack of skills, knowledge and infrastructure of ICT. Approximately all teachers who are belong old period they were not familiar with ICT as well as mathematical software. Although they were they familiar with

the importance of ICT, didn't use of ICT in their classroom because of lack of knowledge, training, and skills.

Thus, this research concludes that all mathematics teachers who teach in secondary level .They should be provided training in mathematical software and encourage them to take part in different training sessions, seminars, and workshop broaden their knowledge and skills about use of ICT in the classroom.

Recommendations

Since the present study was limited in secondary school within the Kathmandu district, so finding of the study can be generalized for the same district but it can't be generalized to all level and national wise. So, considering these limitations the following recommendation had been made.

Further Study

- Effectiveness of ICT in teaching mathematics.
- Challenges of ICT in teaching mathematics.
- Advantage and disadvantage of using ICT in teaching mathematics
- Current status of ICT in teaching and learning process of Nepal.
- Teacher training programme oriented with handling ICT in education should be provided by the government,

For educational implication

- Computer should be given priority in education.
- Curriculum should be related with ICT.
- More training and support in ICT needs to be given to schools;
- Teachers should be used ICT as a pedagogical tools for teaching mathematics.
- ICT tools are not sufficient at School, so government needs to fulfil the infrastructure.

- ICT knowledge is essential in mathematics learning and teaching different opportunity should provide to the mathematics teachers.
- The number of computers in each classroom needs to be increased and resources made available across the institutions;
- Policy-makers should provide additional planning time for teachers to experiment with new ICT-based approaches.
- Technology initiatives should include measures for preparing teachers to use computers in their teaching practices

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Appendix A

Purposive sampled schools who are participation in interview and Observation process

S.N	Name of Schools	Name of Teachers	Types
1	Mangal Secondary School,Kirtipur 3,Kirtipur	Anirudra Pd Neupane	Community
2	Bishwoniketan Secondary school,Kamapa 11,Tripureshowar	Dilliram Paudel	Community
3	Guheswori Secondary School, Kamapa 9, Sinamangal	Megh Bdr. Banjara	Community
4	Laboratory secondary schools,Kirtipur 3 ,Nayabato	Rosan Sinha	Institutional
5	Panga secondary school,Kirtipur 9,Sahidhpath ,Panga	Depak Parajuli	Institutional

Appendix B

ICT Attitude Questionnaire

Dear Sir,

I am from the central department of mathematics education, university campus T. U. to conduct a research on the topic attitude and practices of teacher towards the use of ICT in teaching mathematics. Which is for the practical fulfillment of requirement for the degree of masters in mathematics education. This questionnaire consists of 20 statements about ICT. Please read each statements then indicate your reaction to each of the following statements by ticking (√) appropriate choice for the statements represents your level of agreement or disagreement with it. Make sure to respond to every statement.

Researcher

Prakash Bahadur Rana

rana.prakash102@gmail.com

Name of teachers:

School:

Level:

Subject: Mathematics

Types of school :()Community/() Institutional

Teaching experience:

Note=ICT: e-mail, Internet, computer, mobile phone, calculator, projector, software tools, ICT lab etc.

S.N	Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	I like to use ICT in teaching					

2.	ICT make me feel Uncomfortable					
3.	I am glad there are more computers these days					
4.	I do not like talking with others about computers(ICT)					
5.	I enjoy using ICT when teaching math's at classroom					
6.	I dislike using ICT in Teaching mathematics					
7.	ICT save time and effort					
8.	Schools would be a better place without ICT					
9.	Students must use ICT in all subject matters					
10.	Learning about ICT is a waste of time					
11.	ICT would motivate students to do more study					
12.	ICT is a fast and efficient means of getting					

	Information					
13.	I do not think I would ever need a ICT in my teaching					
14.	ICT can enhance Students' learning					
15.	ICT do more harm than good					
16.	I would rather do things by hand than with a computer					
17.	If I had the money, I would buy a computer					
18.	I would avoid computers as much as possible					
19.	I would like to learn more about ICT					
20.	I have no intention to use ICT in the near future					

❖ THANK YOU FOR CO-OPERATE

Appendix C

ICT PRACTICES: INTERVIEW GUIDELINES

1. Do you know about ICT?
2. Have you got any training about use of ICT?
3. DO you use ICT really in your classroom?
4. What type of tool do you use in your classroom?
5. Do you teach through power point?
6. Are you familiar with mathematical software? For example: Geogebra, mathematica, maple, etc.
7. How mathematical software help in teaching mathematics?
8. Have you use E-mail for students evaluation process?
9. Can we increase learning achievement of student by helps/ use of ICT in mathematics?
What do you think?
10. Teachers' competency in the use of ICT is necessary. What's your opinion regarding this?
11. What are the issues to use ICT in teaching mathematics?
12. Is ICT necessary in teaching mathematics? What do you think?

❖ Thank you

Appendix D

ICT classroom Observation Note

Name of teachers:

School:

Grade:

Subject:

Topic:

Date and time:

Write at least one sentence.

1. Physical status of ICT
 - a. Computer lab.....
 - b. Overhead projector.....
 - c. Lighting in lab.....
 - d. Sound system.....
 - e. Desk and bench.....

2. Use of ICT in learning activities
 - a. MS power point presentation
 - b. Virtual teaching material
 - c. Use of internet
 - d. Use of mobile phone.....
 - e. Use of calculator.....
 - f. Mathematical software.....

3. Participation and learning environment
 - a. Only teacher active.....
 - b. Only student active.....
 - c. Teacher and student both active.....
 - d. Teacher active but student passive.....

- e. Collaborative learning environment.....
- f. Student are motive to learning mathematics.....
- g. Teacher and student feel enjoy in classroom.....
- h. ICT enhance students learning.....
- i. Learning process is well organized.....
- j. Time management.....

4. Assignment

- a. Use e-mail.....
- b. Use multimedia.....

Note.....
.....

Observer

Principal

APPENDIX E**Response of Teachers towards ICT in teaching Mathematics**

I→ R↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Tot al
1	5	5	4	4	5	4	5	3	2	5	5	5	5	4	4	4	5	5	5	5	89
2	4	5	4	5	5	5	4	4	4	5	4	4	5	5	4	3	4	5	2	5	86
3	5	4	4	4	4	5	4	5	5	4	4	5	4	3	4	3	5	5	5	4	86
4	5	4	5	5	4	4	4	4	5	5	4	4	2	4	4	3	4	2	5	5	82
5	5	4	4	3	4	4	4	4	4	5	4	4	2	4	5	3	4	4	5	4	80
6	5	5	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	3	80
7	5	5	4	4	4	4	5	4	4	5	5	4	4	4	5	4	4	5	5	5	89
8	5	5	5	4	5	5	5	5	4	5	5	5	5	5	4	4	5	5	5	5	96
9	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	81
10	5	4	4	4	5	5	5	4	3	4	4	4	4	4	2	4	4	4	4	4	81
11	4	4	4	4	4	5	5	4	4	5	5	5	4	4	2	4	4	5	5	5	86
12	4	5	4	4	4	5	4	5	4	4	4	4	4	4	4	4	4	4	5	5	85
13	5	5	4	5	4	4	4	4	4	5	4	5	5	4	5	2	5	5	5	5	89
14	4	4	5	4	4	4	5	5	4	5	5	5	4	5	5	2	5	4	5	5	89
15	2	1	3	2	3	1	4	3	2	1	2	4	1	5	2	3	5	4	5	1	54
16	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	80
17	4	5	3	5	4	4	5	5	4	5	4	5	4	4	5	4	5	5	5	5	90
18	4	4	5	4	3	4	5	3	4	5	4	4	4	4	3	3	2	4	4	4	77
19	4	4	5	4	4	4	4	5	4	1	4	5	2	4	4	5	4	2	5	4	78
20	1	4	2	5	5	4	5	4	4	4	5	4	3	4	4	3	4	4	4	4	77
21	4	4	4	5	4	4	4	3	4	4	4	4	4	4	3	3	4	4	4	4	78
22	5	4	4	4	3	4	4	4	3	4	4	5	4	4	4	4	4	4	5	4	81
23	4	5	4	5	5	5	4	4	4	5	4	4	4	4	5	4	5	3	5	5	88
24	5	4	5	4	5	4	5	4	3	4	4	4	4	5	4	2	5	4	5	4	84
25	4	1	5	4	4	4	5	5	5	5	5	5	4	4	4	3	5	4	4	4	84
26	4	4	3	4	4	4	4	4	3	4	4	4	4	4	4	3	4	2	4	4	75
27	5	5	3	4	5	5	5	4	5	5	5	5	5	4	5	3	5	4	5	5	92
28	5	5	4	5	5	4	5	5	4	5	5	5	1	4	5	2	4	5	5	4	87

29	5	5	5	5	5	4	4	5	4	5	5	5	2	4	5	2	4	5	5	5	89
30	4	4	4	5	4	1	3	5	5	5	4	4	4	4	3	4	4	5	5	5	82
31	4	5	4	4	5	5	4	5	5	5	5	5	5	5	2	3	4	3	4	4	86
32	4	3	1	4	3	4	4	2	5	3	2	3	4	4	4	2	5	4	1	1	63
33	4	4	4	4	4	4	4	5	3	5	5	4	3	4	4	4	4	5	5	5	84
34	5	1	4	5	5	5	4	5	4	5	4	5	2	5	4	3	3	5	4	5	83
35	5	5	4	4	4	5	5	5	5	5	4	5	4	4	2	4	4	4	4	4	86
36	5	5	5	5	4	5	5	4	4	5	4	4	5	4	4	4	4	4	4	4	88
37	5	5	5	5	4	5	5	5	3	5	4	4	5	5	4	5	5	4	5	5	93
38	5	5	3	3	4	4	4	4	4	4	4	4	4	4	5	3	3	4	4	4	79
39	4	5	4	5	3	4	5	5	5	5	5	5	4	4	4	4	4	5	4	5	89
40	5	4	5	4	4	4	5	4	4	2	5	4	4	5	5	4	5	4	5	4	86
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42	4	4	3	3	4	4	4	4	4	4	4	4	4	4	5	3	3	4	4	4	77
43	4	4	5	5	4	4	5	4	4	5	4	4	4	4	4	4	4	4	4	5	85
44	4	4	3	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	77
45	4	3	3	3	2	3	4	3	2	2	3	3	4	3	3	3	4	3	3	4	62
46	4	3	1	4	5	3	5	5	5	4	5	5	5	3	5	4	4	4	5	5	84
47	5	5	5	5	5	5	5	4	3	5	5	5	5	5	5	5	5	4	5	5	96
48	5	5	4	5	4	4	5	5	5	4	5	5	5	5	5	4	4	5	5	5	94
49	5	5	5	5	4	4	4	5	3	4	4	4	4	4	4	5	3	4	4	5	85
50	5	4	4	3	4	4	4	4	4	3	4	3	4	4	3	4	3	4	4	4	76
51	4	4	4	4	5	5	5	4	4	5	4	4	4	3	5	3	5	3	5	4	84
52	5	2	3	3	5	4	4	3	4	3	4	4	3	4	4	4	4	3	4	3	73
53	4	3	4	4	4	3	3	4	3	5	4	5	4	5	4	3	2	4	3	4	75
54	5	5	4	4	4	4	4	4	4	4	5	4	3	4	5	3	3	4	5	4	82
55	4	4	4	5	5	5	5	4	4	5	4	4	5	1	4	4	4	4	4	5	84
56	4	4	1	4	5	5	4	3	5	3	4	3	4	4	4	2	3	4	5	4	75
57	4	5	5	5	4	4	3	5	4	4	4	4	4	4	4	2	5	5	5	4	84
58	5	5	3	5	3	3	5	3	3	4	3	4	3	4	3	3	2	2	4	4	71
59	5	4	4	4	5	5	5	4	4	5	4	5	4	1	5	4	5	5	4	5	87
60	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	2	4	4	4	4	77
61	4	5	3	5	4	2	5	3	4	5	4	5	4	4	2	5	5	4	5	2	80

62	4	4	4	5	4	2	1	1	5	4	4	5	2	4	3	2	5	5	4	5	73
63	5	2	2	5	5	4	4	3	5	5	5	4	2	3	2	1	3	2	5	2	69
64	4	4	4	4	4	4	4	4	2	5	5	5	4	4	5	4	3	4	5	5	83
65	4	4	4	4	4	5	5	5	2	5	5	4	4	4	4	2	4	5	5	5	84
66	4	3	3	4	4	4	3	5	3	4	5	5	3	4	3	4	4	5	5	4	79
67	4	2	5	4	4	5	5	5	4	5	4	4	4	4	4	2	5	2	4	2	78
68	3	4	4	5	4	4	4	3	4	3	4	4	3	4	4	4	3	4	4	5	77
69	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	4	4	4	4	78
70	5	1	4	4	4	5	4	4	5	5	4	5	5	4	4	3	4	2	4	4	80
71	3	4	4	4	5	4	4	4	3	5	5	5	4	5	5	4	5	4	4	4	85
72	5	3	4	3	4	4	3	4	3	4	4	4	2	5	3	4	4	5	2	5	75
73	4	4	4	1	5	4	5	3	5	4	4	4	3	4	3	5	3	5	4	5	79
74	5	5	4	4	4	4	4	3	4	4	4	5	2	5	4	3	3	4	5	3	79
75	4	4	4	2	5	5	4	2	5	4	4	5	3	4	4	2	4	4	4	4	77
76	4	4	4	4	4	4	5	4	1	5	5	5	3	4	5	4	5	5	5	5	85
77	4	5	4	5	5	5	5	5	4	5	5	5	5	4	4	3	2	5	5	5	90
78	4	4	4	4	4	4	4	4	4	4	5	5	3	4	4	4	4	4	5	5	83
79	4	4	4	4	4	4	4	2	4	4	4	2	4	2	2	2	4	2	4	4	68
80	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	3	4	4	4	4	78
81	5	4	4	4	4	5	4	4	4	4	5	4	4	4	5	2	3	5	5	4	83
82	5	5	4	5	3	5	3	4	2	5	5	4	5	4	4	2	4	5	5	5	84
83	5	5	3	4	4	4	4	4	5	4	4	4	3	4	2	4	3	5	5	4	80
84	4	4	4	4	4	5	4	4	4	5	3	5	5	4	4	3	3	4	4	5	82
85	4	4	3	5	4	4	4	5	4	4	3	5	5	5	4	3	5	4	5	5	85
86	4	4	3	4	4	4	4	4	3	4	5	5	5	5	4	3	4	4	5	5	83
87	4	4	4	4	4	4	4	5	4	5	5	5	4	4	4	4	5	5	5	4	87
88	5	4	4	5	4	5	4	4	3	3	4	4	4	3	2	2	4	2	5	5	76
89	4	4	4	4	4	4	4	2	2	4	4	4	4	4	4	2	4	4	4	4	74
90	4	4	4	5	3	4	5	4	4	5	5	4	4	4	5	4	3	3	4	5	83
91	5	5	4	4	4	4	5	4	4	5	5	5	5	4	5	2	5	4	5	5	89
92	4	4	4	4	3	3	3	4	5	5	4	4	4	4	4	4	4	4	4	4	79
93	5	5	2	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	81
94	4	4	4	4	4	5	4	4	4	5	4	5	4	4	5	4	4	5	4	5	86

95	4	4	3	4	4	4	4	4	4	4	4	4	4	4	3	3	3	4	4	3	75
96	4	4	4	4	4	4	4	5	4	1	4	3	1	5	5	5	2	5	4	5	77
97	4	4	5	5	5	5	3	3	3	4	4	4	3	3	4	4	4	4	5	5	81
98	4	3	5	5	3	3	3	5	4	5	3	3	5	4	5	4	1	5	4	5	79
99	4	4	4	5	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	80
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101	4	4	4	4	4	4	4	4	4	5	4	5	4	5	5	2	5	4	5	5	85
102	5	5	5	4	5	5	5	5	4	5	5	5	5	4	4	4	4	5	4	5	93
103	5	5	3	2	4	3	4	3	4	2	4	3	4	5	5	3	4	3	1	3	70
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105	5	3	3	4	3	4	3	4	3	4	5	5	5	4	4	2	4	4	5	5	79
106	4	3	5	3	4	5	3	4	4	4	5	4	3	4	2	4	4	5	5	4	79
107	4	5	4	5	4	5	4	2	4	5	4	5	4	4	4	4	4	5	5	5	86
108	4	4	4	5	5	4	4	4	4	5	4	4	4	4	5	2	4	5	4	5	84
109	4	4	5	4	4	5	4	4	4	4	4	4	4	4	4	2	4	4	4	4	80
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111	5	5	3	2	1	2	5	5	3	4	1	4	4	4	2	1	4	4	5	2	66
112	4	4	1	5	4	4	3	3	2	4	4	4	3	4	3	3	4	4	4	4	71
113	5	3	4	2	4	5	3	4	4	4	4	5	3	3	3	4	3	4	4	5	76
114	4	3	4	3	4	3	3	4	4	2	4	4	2	3	3	3	3	3	4	4	67
115	5	3	4	4	5	5	4	5	4	4	4	5	4	3	4	2	4	3	4	4	80
116	4	5	3	4	2	4	4	3	5	4	4	4	5	3	4	4	2	3	2	4	73
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118	4	4	4	5	5	1	4	5	5	4	4	5	2	4	3	2	5	5	4	5	80
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120	4	4	1	4	4	4	4	3	4	5	5	4	3	4	4	3	3	4	4	5	76
121	4	1	4	3	4	1	4	3	4	4	3	4	1	3	2	3	4	1	4	2	59
122	4	4	4	4	4	5	4	5	4	5	4	5	5	5	5	2	4	5	5	5	88
123	3	2	5	5	2	5	4	5	4	1	4	5	3	5	4	3	5	5	5	5	80
124	5	4	2	5	4	3	4	4	5	5	4	4	4	3	4	2	3	4	4	4	77
125	4	5	3	4	5	4	2	3	4	4	4	4	4	3	3	3	2	2	4	4	71
126	4	4	4	5	5	5	5	4	4	5	4	5	5	1	5	4	4	4	4	5	86
127	5	3	3	4	3	3	3	3	3	4	4	4	4	4	3	3	1	2	4	4	67

128	4	4	5	5	4	5	5	5	3	5	4	5	4	4	4	2	1	4	4	4	81
129	5	4	2	4	4	4	4	2	4	4	3	4	4	4	4	2	4	4	4	4	74
130	4	5	1	5	2	4	5	1	5	5	5	1	4	4	4	4	5	5	5	5	79
131	4	4	4	5	5	4	4	2	4	2	4	2	2	3	4	2	5	4	4	3	71
132	4	2	2	3	2	2	4	2	4	2	4	4	4	4	4	1	3	1	5	5	62
133	4	4	3	4	4	4	2	4	2	4	4	4	4	4	2	4	2	5	4	4	72
134	5	4	2	4	4	5	4	2	4	2	4	4	4	4	5	2	5	5	5	1	75
135	5	4	3	5	4	4	4	2	4	2	4	4	4	4	3	2	3	4	4	5	74
136	5	5	2	4	4	4	4	2	5	1	5	4	4	3	5	1	4	2	4	5	73
137	2	3	4	3	1	2	4	2	5	4	3	3	5	2	2	2	2	2	3	5	59
138	5	4	4	5	4	5	3	2	4	5	5	5	5	5	4	3	5	4	1	1	79
139	4	4	2	4	4	5	4	1	5	4	4	4	2	4	4	3	5	4	1	5	73
140	2	3	1	4	4	2	4	5	1	1	2	4	4	4	3	5	5	4	4	4	66
141	4	4	2	5	5	5	4	2	5	2	4	4	4	4	4	2	3	3	5	5	76
142	2	1	2	2	2	2	2	2	3	2	1	1	1	2	2	3	5	4	2	2	43
143	4	5	3	4	3	3	4	2	4	2	4	4	2	4	3	2	3	4	2	5	67
144	2	4	2	4	4	4	5	2	5	2	5	4	4	3	4	3	4	1	5	4	71
145	4	4	2	3	4	5	3	2	5	2	4	4	2	4	3	2	4	4	4	4	69
146	4	4	3	2	4	2	4	2	4	4	4	4	5	4	5	3	4	4	3	4	73
147	4	3	3	4	4	1	5	3	4	5	2	4	3	4	4	3	4	4	4	3	71
148	4	5	2	4	3	2	3	2	4	4	4	4	4	3	3	1	3	4	4	5	68
149	5	5	4	4	4	4	1	1	2	4	4	3	4	3	4	4	4	5	5	4	74
150	4	4	2	4	4	5	3	2	4	4	4	4	1	5	4	4	4	3	5	5	75
Tot	63	59	54	61	60	60	61	56	57	61	61	63	55	59	57	47	58	59	63	63	
	9	8	7	2	1	1	2	1	8	3	8	2	8	1	9	5	0	4	7	6	

Note: I=Item, R= Response of Teachers.

SA=5,A=4,N=3,D=2,SD=1(POSITIVE STATEMENTS 1,3,5,7,9,11,12,14,17&19)

SD=5,D=4,N=3,A=1,SA=1(NEGATIVE STATEMENTS 2,4,6,8,10,13,15,16,18&20)