PRACTICES OF ICT TOOLS IN TEACHING MATHEMATICS

A

THESIS

BY

BAL KRISHNA BANSKOTA

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

SUBMITTED

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शिक्षा शास्त्र केन्द्रीय विभाग
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Letter of Certification

This is to certify that Bal Krishna Banskota student of Academic year 2072 / 073 with Campus Roll No.321, Exam Roll No. 7228249, Thesis Number 1474 and T.U. Regd. No. 9-2-1-35-2012 has completed his thesis under supervision of Mr. Krishna Prasad Adhikari during the period prescribed by the rule and regulation of Tribhuvan University, Nepal. The thesis entitled "**Practices of ICT Tools 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 Master degree of Mathematics Education.

Date:13, March 2022

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Prof. Dr. Bed RajAcharya

Head

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Letter of Approval

This thesis entitled "**Practices of ICT Tools in Teaching Mathematics**" submitted by Mr. Bal KrishnaBanskota in partial fulfillment of the requirement for the Master's Degree in Education has been approved.

Viva-VoiceCommittee	**Signature**
1.Prof.Dr.Bed Raj Acharya	……..
(Chairman)	
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(External)	
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Date: April,8 2022

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Recommendation for Acceptance

This is to certify that Mr. Bal Krishna Banskotahas completed his M. Ed. thesis entitled **"Practices of ICT Tools 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.

.....

Mr. Krishna Prasad Adhikari

(Supervisor)

Date:13 March, 2022

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Defensed Date: 2022

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Dedication

Honestly dedicated

To

My parents

Father Abi Narayan Banskota and Mother Indra Maya Banskota

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:13 March, 2022

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Bal Krishna Banskota

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Bal Krishna Banskota

Abstract

The study entitled "**Practices of ICT tools in teaching mathematics** "aims to examine the use of ICT tools in teaching mathematics and identify teacher's practices ICT tools in teaching mathematics. The data were collected by questionnaire to 152 teachers from 50 schools of Kathmandu district. The respondents were selected by simple random sampling method. The survey design was conducted to achieve the objectives of the study. The score of 1,2,3,4,5 were used to the skill in favor of always, frequently , sometime, rarely and never these five points of Likert scale was adopted were asked to indicator their options with tick (..) mark.The statistical toolsMann-Whitney u test were used to find out significance difference between mean scores of teachers the use of ICT in teaching mathematics. The collected data was tabulated and analyzed by using SPSS software version 21.0 to get the value of statistics percentage, mean and standard deviation for objective first and second respectively.

By analyzing and interpretation of obtained data, the researcher found that maximum teachers do not used ICT tools regularly in the mathematics classroom. More than one fourth percentage of teacher using ICT in daily whenever required and that percentage is very poor in maximum ICT tools which indicates that maximum of them are poorly using it in their daily activities in school. It is conclude that there is no significant difference in the use of ICT tools between private and public schools, male and female age groups, teaching experiences, job position and ICT using experience. This study also shows that maximum secondary school's mathematics teacher has minimum practices in ICT tools.

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Chapter I

Introduction

Background of the Study

Information and Communication Technology (ICT) has changed our daily activities in many ways. In most of developing countries, the potential of ICT to support pedagogy is yet to be fully realized. Since these changes are evident amongst younger members of our society, they are evident on primary and secondary schools' students. Considering that ICT plays an increasingly important role in society, especially if we take into account social, economic and cultural role of computers and the internet, it is clear that the time has come for the actual entry of ICT in the field of education. The combination of ICT and the Internet certainly opens not only many opportunities for creativity and innovation, but also for approaching the teaching material to current generation of students. Researchers argued that with the introduction of technology, it is possible to de-emphasize algorithmic skills; the resulting void may be filled by an increased emphasis on the development of mathematical concepts. Technology saves time and gives students access to powerful new ways to explore concepts at a depth that has not been possible in the past.

Today's students live in a global knowledge based age, and they deserve teachers whose practice embraces the best that technology can bring to learning (Lemke,1999 as cited in Samuel, 2014). So as a student when I finished my bachelor level I was searching for a new way of teaching that is teaching methodology based on ICT and I wanted something new so, I joined Tribhuvan University for my master degree in mathematics. I thought it was a great platform for me to learn with the teachers who were updated with the use of ICT. Where, ICT includes all technical

means that are used for handling information and facilitating communication, including computers, network hardware, communication lines and all the necessary software. In other word, ICT means all types of process and transfer of audio video signals. In general, the integration of ICT in the classroom can involve computers, graphic calculators, cameras, projector and much more. (Chrysanthou, 2008).

While learning in classroom I had to make slides for power point presentation. While doing that I gained the knowledge of computer and it was all possible with the great support of teachers and friends. Then I started using ICT in an effective way as well as I started to use them in the school classes. It get good responses from the students so I was motivate more. In the beginning it was not easy because of the different environment. As the time progressed, I was able to adapt to the system and classroom activities. I was very keen to use ICT in mathematics classrooms and the result and the response was good. Therefore, Tribhuwan University had been the great platform to sharpen my skills. The assignments had to be done by using computer and we had to send email to our teachers.

I learned a new way of checking the assignment, to teach mathematical problem to the students by using ICT. During the power point presentations, I learned so many things from my friends as well. After joining Tribhuvan University I have been learning many things from there about different techniques and strategies about teaching and also the use of ICT in mathematics teaching like use of GeoGebra software and Mathematica software in mathematics, use of power point slide while teaching math, and other mathematical software while teaching mathematics. ICT in mathematics can be used to improve the quality of teaching and learning at any level of education. It helps to clarify the abstract concept easily and broaden the horizon of knowledge. Hence by finding the several positive impact and advantages at ICT in

Teaching and learning , I was motivated to research in this title " Practices of ICT Tools in Teaching Mathematics" to search the further ideas about using the ICT tools inside the classroom effectively.

Statement of the Problem

Knowledge is expanding day by day so teaching becoming one of the most challenging professions in our society. While learning mathematics, learner expect from facilitator to facilitate meaningful learning rather than just knowledge and skills. In this modern period the use of ICTs in teaching mathematics provides new possibilities in teaching profession. Different research indicates 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 of 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 the quality of education is poor and one of the approaches to address this problem is to integrating ICT based teaching learning approach to get quality in education (Bhatta, 2008).

As a student, I found that school level students feel mathematics as a boring subject and harder one. Most of the students were not able to understand mathematics due to their perception towards math. Basically in most of the mathematics class, the way of teaching was mechanical problem solving method and there was not appropriate visualization of the things used in mathematics and it is oriented towards marks only. In the context of Nepal, most of the mathematics teachersteach the

students only for getting marks so they just solve the problems. Use of ICT has a very positive impact in teaching and learning mathematics.

Use of ICT is helpful for students and for teachers to teach mathematics effectively and dynamically, as they are visual, interactive and stimulating. In addition, student also becomes motivated while ICT instruments are used in teaching. The effectiveness of ICT in teaching mathematics also depends on the teachers‟ interest, ability and knowledge about it.

According to Kislenko, Grevholm, &Lepik, (2005), the student's perception towards mathematics teaching and learning play an important role in teaching learning activities and the student's perception towards mathematics is it is important but it is hard and boring subject because when they start to solving problems mathematics than they are not able to visualize the problem so they fails many times while solving the problems. Therefore, my research focused on the "Practices of ICT Tools in Teaching Mathematics". It seeks to answer the following research question:

- What are the commonly used ICT tools in teaching mathematics at secondary level?
- How does secondary school's mathematics teacher practice ICT tools in teaching and learning mathematics?

Objectives of the Study

The objectives of the study are as follows:

- To examine the use of ICT tools in teaching mathematics at secondary level
- To identify teachers practices of ICT tools in teaching mathematics at secondary level.

Hypothesis of the Study

The following hypotheses are formed in null form for statistical testing at 0.05 level of significance.

H01: There is no significant difference between use of ICT tools in mathematics in relation to school types, gender, teaching experience, job position types and ICT using experience.

H02: There is no significant difference between the Practices of ICT tools of mathematics teacher in relation to school types, gender, teaching experience, job position types and ICT using time.

Justification of the Study

This twenty first century is the age of technology everywhere there is a use of technology and it is one of the basics needs of everywhere so I hope this research will be helpful for many students, teachers, educators, policy maker and so on as well as it is very helpful for me too for my career in teaching profession. By the use of ICT image can easily be used in teaching and improving the retentive memory of students, also teacher can easily complex instruction and ensure students' comprehension as well as teacher are able to create interactive classes and make the lesson more enjoyable, which could improve students attendance and concentration.

It is very important to study the certain issues in detail that help to identify the problem related to the issues and adapt the suitable plans and pedagogies to bring out improvement in existing system. ICT can provide for children the opportunity to practices and develop their understanding of math concepts and skill in an interesting and exiting way. Therefore, the significance of the study is to use of ICT in

mathematics to change the student's perception toward mathematics. Thus, the researcher has illustrated that signify the justification of study:

- It would be much helpful for students and teachers to identify the commonly used ICT tools in teaching mathematics.
- This study helps those researchers who are going to conduct research related to this topic.
- This research will provide suitable plans and pedagogies to bring out improvement in the existing system
- This research will be helpful for many students, teachers, educators, policy makers and so on as well as it will be very helpful for me too for my career in teaching profession.
- It is guideline for school administration and school management committee to developed ICT lab mathematics class in schools.

Definition of Key Terms

ICT used instruction. In this study the terms ICT stands for information and communication technology. Technologies and tools that people use to share, distribute and gather information, and to communicate with one another through the use of computer and interconnected computer networks. Mathematical software (GeoGebra, Mathematica, Microsoft mathematics…) to information systems.

Practice. In this study, the definition of the words practice means tools of ICT tools using by teachers for teaching and learning mathematics.

Secondary school. Secondary school is a public or private school providing instruction at the level of secondary education including the classes from1to 10.

Public school. The secondary school present under the sole management of government or its agencies is called a public school.

Private school. The secondary school managed by private organization or persons, either partially or totally is considered as a private school.

Teacher. Result of the study be helpful to mathematics teacher to adopt the effectives teaching method-using ICT.

Delimitation of the Study

The delimitation of this research study are as follows:

- This study focused only secondary level where there should be the use of ICT while teaching mathematics.
- This study was conducted secondary level teacher of Kathmandu district.
- This study was based on only 50secondary schools (Publicand Private) of Kathmandu district.
- Only 152 teachers were included in the survey.
- Questionnaires were used to collect the information.
- This study was based on quantitative research design.
- This study only use of ICT tools and activities for teaching of mathematics.

Chapter II

Review of Related Literature

Literature review is one of the essential aspects for my research. A literature review is a written summary of journals articles, books, and other documents that describes the past and current state of information on the topic of your research study (Creswell, 2014). So, literature review is the search, study and analysis of the existing knowledge in the area of research problem. Also it helps for finding what the earlier researchers have done in the related problem issue and determining the gap as well. The main objective of literature review is to enhance the level of understanding of the various theoretical as well as conceptual constructs of the present study that is it is a theoretical framework.

Empirical Review

This chapter consists of related article, journals, report and previous thesis. I have reviewed some literature, which were related to my research topic “Practices of ICT tool in mathematics". The literature review are as follows

Shah (2021) studied on the topic “Effectiveness of Geogebra in Teaching Geometry at secondary level“. The main objectives of the study were find out the effect of GeoGebra in teaching geometry and explore the student’s attitude about Geogebra. He conducted by using quantitative method focused only experiment design. Grade ten, 57 students from two different schools are in the same classes participated in the study with one class assigned as a experiment group and other as a control group. He found that students has positive attitude about Geogebra and proved the Geogebra is the effective tool teaching geometry.

At the same, Timilsena (2017) studied on the topic “Attitude of teacher towards ICT in teaching Mathematics. He followed Vygotsky’s constructivist theory of learning depends on prior knowledge linkage with ZPD. The samples were 200 mathematics teachers out of 925 from Surkhet District Nepal. The data collection tools are Questionnaire and interview. The data analysis procedure was chi – square distribution at 0.05 level of significance. He found that the most of the schools in Surkhet district has ICT tools and some teacher are use ICT tools in teaching mathematics but some teachers didn’t use ICT materials because of lack of knowledge. Finally, it was concluded that all mathematics teacher of Surkhet district have positive attitude towards the use of ICT in mathematics teaching.

Similarly Joshi (2016), studied on Status of Use of ICT by Secondary School Students of Nepal. The main objectives of the study were to study the status of ICT instruments with secondary school students and use of ICT by secondary school students at their home and school.106 students of class 9 and 10 from Kathmandu district were purposively selected for the study and data were analyze by using percentage and Mann Whitney U test. It was found that most of the students of that level are weakly using technology and public school students were poorer in several measured items even boys and girl students were not differ in the use of ICT.

The same one Ibrahim, (2016), conducted a research on the topics the “Influence of ICT tools in teaching and learning activities.” study aims to look at the influence of ICT tools in learning activities. To achieve these objectives, the counter posed the question of how the influence of ICT tools in learning activities. This study uses a quantitative approach to the form of survey research. The data obtained through questionnaires, documentary studies, and literature study as supporting data. Researchers revealed that there was a significant effect of the use of ICT tools in

learning activities. In concrete, forms of ICT tools are commonly used in teaching and learning activities are blogs and yahoo mail. Blog is short for web log which means it is a form of application / web service created to allow a user to publish information it holds through the writings contained in a posting. While Yahoo mail is a provider of electronic mail (webmail) from Yahoo!. It is the largest provider of electronic mail on the Internet, with millions of users. To take advantage of blogs in teaching and learning activities i.e. filling out a menu on the blog with lesson materials to format text, images, audio or video, resulting in a good interaction between teachers and students. The conclusion of the study, teaching and learning activities teachers can position them to get closer to the students without borders and distance, besides the students more active and independent in learning activities. This shows that ICT tools are very influential in teaching and learning activities.

Similarly, Timalsina(2021) a study on “Effectiveness of GeoGebra in teaching mathematics at secondary level ”. The main aims of this study were to find out the effectiveness of Geogebra in teaching mathematics and to explore the perception of students about Geogebra. He followed quantitative method in this research. He selected 24 students from Tripura Sundari Secondary school (control group) and 24 students from Samibhanjyang Higher Secondary School (experiment group). He used achievement test and semi- structured interview to collect data. He collected data were analyzed by SPSS (mean, standard deviation and t-test). He found that students have positive attitude towards GeoGebra and Geogebra is very effective in conceptual understanding of subject matter. The conclusion of this study is that GeoGebra is very useful and essential software for teaching mathematics.

Similarly, Acharya(2015) conducted a study on “Effectiveness of GeoGebra software on mathematics achievement”. On the purpose of compare the achievement

of the topic learning circle by using GeoGebra software with the achievement of student taught without using GeoGebra software. He follows the Vygotsky's social constructivist theory. The research design was quasi-experimental so he makes two groups one was experimental group having 28 students and another was control group having 25 students. The data collection tools were pretest and posttest on the basis of set of questionnaire for experimental group use Likert's scale. The data were analyzed by mean, variance, standard deviation and t-distribution at 0.05 level of significant. The researcher concluded that the GeoGebra software has effective tools in mathematics teaching and learning especially in learning circles. The GeoGebra software has a positive impact in student in the topics circle and students have positive perception on GeoGebra software.

Similarly, Sha (2017) conducted a study entitled "Teacher attitude towards media in teaching mathematics". The purpose of the study was to compare community and institutional school's mathematics teacher towards media in teaching mathematics separately and he was compared the attitude of community and institutional school's mathematics teacher towards media in teaching mathematics. The methodology of study was mixed. The study was based on mathematics teachers who are teaching mathematics with using media or not for secondary level students. The research adopted the theory of constructivism linkage with media. He took the sample from Kathmandu district mathematics teacher of secondary school who teaches mathematics in grade IX at academic year of 2073. Researcher takes 30 mathematics teachers from community school out of 152 and 30 mathematics teachers from institutional teacher out of 781. The teachers were selected by simple random sampling method. The data was collected by interview, questionnaire (on the basis of Likert's scale) and observation. The data analysis procedure was Z-test at 0.05 level

of significance, mean, variance, standard deviation and percentage. He concluded that the institutional teacher has more positive towards media in teaching and learning

Jacob (2006), Study on Use of ICT in Mathematics Teaching, A survey design was conducted to study the barriers preventing the integration and adoption of information and communication technology (ICT) in teaching mathematics. Six major barriers were identified: lack of time in the school schedule for projects involving ICT, insufficient teacher training opportunities for ICT projects, inadequate technical support for these projects, lack of knowledge about ways to integrate ICT to enhance the curriculum, difficulty in integrating and using different ICT tools in a single lesson and unavailability of resources at home for the students to access the necessary educational materials. To overcome some of these barriers, this paper proposes an e-portal for teaching mathematics. The e-portal consists of two modules: a resource repository and a lesson planner. The resource repository is a collection of mathematical tools, a question bank and other resources in digital form that can be used for teaching and learning mathematics. The lesson planner is a user friendly tool that can integrate resources from the repository for lesson planning.

In the context of world there were many studies in information communication and technology in mathematics. in this way, (Bature,2016), This study investigates the role of ICT as a tool for effective teaching and learning of Mathematics in Secondary Schools. The purpose of this study was to explore students and mathematics teachers' trainees' use of ICT in the teaching and learning of mathematics. The study adopted survey research design and was conducted in Kafur Local Government Area of Katsina State. The target population was the entire students and mathematics teachers in Kafur Local Government. Five out of ten secondary schools in study were randomly selected as a sample. The instrument used was questionnaires for both

teachers and students. Simple percentage and chi-square were used to analyze the data. Among the findings are the use of ICT by students improved their performance, problem-solving skill and mathematics achievements. Some recommendations were equally made among which are. Adequate and qualitative ITC materials and computer laboratories should be made available in all secondary schools.

The very same one, Mahara (2017) conducted a study on "Using ICT tools in teaching: perception and practice at secondary teacher". The objective was to find out the practice using PowerPoint presentation in teaching learning and to explore the perception at teachers towards effectiveness at using PowerPoint presentation in classroom. Data were taken from five secondary school at Baitadi district. There were 80 teachers selected by the technique of non-random sampling. The research was quantitative research design. The researcher concluded that in public school at Baitadi district were generally positive. Teacher at Baitadi district were positive in PowerPoint presentation in teaching and learning activities.

Shrestha (2015), research in title "Status of ICT use in teaching/learning mathematics." Purpose of this study was to investigate the use of ICT in mathematics teaching and learning Heartland children's academy. This is a case study approach the researcher take data from only Heartland children's academy. This study was following and evaluative case study by qualitative phenomena. The major tools use for this study were observation and interview. Three mathematics teachers and 20 students from class 7,8,9& 10 were considered as sample of the study. The researcher was found from his study that there was neither any plan on the use of educational technology tools in mathematics teaching and learning, nor inadequate teachers training on the use of educational technologies. He also found that there was a lack of relevant educational technology tools for schools. There was major reason for the

school not to use the educational technology tools in mathematics teaching and learning. However, this tool was sometimes used for other purpose other than mathematics teaching and learning.

ICT tools are new dimension for teaching and learning procedures. There were so many researches carried out the in the field of ICT. In those researches it was presented that teachers and students were more positive and benefited in teaching and learning mathematics by using tools and technique of ICT. However has not been studied “Practices of ICT tools in teaching mathematics.” so I’m interested to study Practices of ICT tools in teaching mathematics to fulfill my partial fulfillment of master’s degree course of TU.

Theoretical Review

Researches and theories are interrelated and inseparable. “A theory provides a conceptual framework for research. 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 that people actively construct new knowledge as they interact with their environment. Constructivist theory of learning believes that the knowledge can be developed within

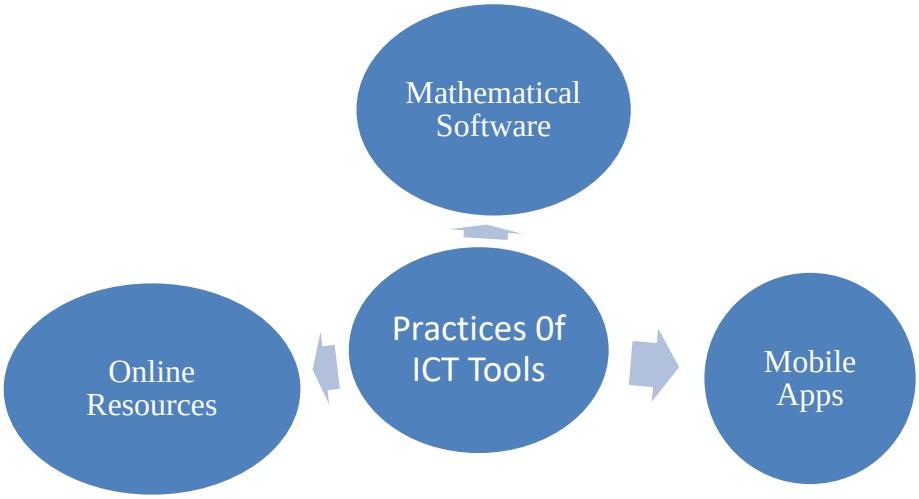
the classroom, being participated in different activities, using different learning agents and through different meaning making processes. The guideline principle of constructivist learning theories is the learner's own active initiative and control in learning, and personal knowledge construction that 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.

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 (Lttigson&Zewe, 2003 as cited in Keong, Horani& Daniel 2005).

Conceptual Framework

A theory provides a conceptual framework. A conceptual framework provides a clear road map for researcher. The framework is as follows:



From the above review of literature and the theoretical model, the researcher has come to the point that the topic of current research use of ICT tool in mathematics teaching at secondary school of Kathmandu valley. The main propose of the research is to examine the use of ICT tool in teaching mathematics at secondary level and to identify teachers practices of ICT tools in teaching mathematics at secondary level. The use of ICT in mathematics about online resource, mathematics software and mathematics application and practices on using ICT tools teaching mathematics are the main domain of the study. So they determine the attitude of ICT in Mathematics Education. All these aspect create the constructivism learning theory. So the conceptual framework of the study is based on these aspects and constructivism theory. The researcher will collect the data through survey.

Chapter III

Methods and Procedures

This chapter is the road map of study, which is directly linked with the problem and objectives of the study. Under this heading, research design, population of the study, sample of the study, data collection tools, data collection procedures and data analysis procedures are included.

Research Design

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. (Muijs, 2004). The survey research design is map or guideline for these research it provides the fundamental ways to conduct this research work successfully. It guides the whole process of the intended research. In this research the questionnaire was conducted to obtain the objectives and collect the data by face to face way. Therefore, the survey research design is suitable for this research study. So, survey research design was used to attain the objective of this study. This study followed the quantitative research design.

Population of the Study

Population of the study includes schools situated in Kathmandu. All mathematics teachers working there comprised of the population of the study. The private and public school of Kathmandu was visited as randomly. The teacher who is teaching mathematics in secondary levelsare selected as respondent.The total number

of schools in Kathmandu district are 1362 which 302 are public schools and 1060 are institutional schools (GON, 2017) even record of the total number of mathematics teachers and the number of schools having computer facilities were not found in District Education Office Kathmandu. So the study includes 152 secondary level teachers from 50 schools of Kathmandu by simple random sampling technique.

Sample of the Study

For this study simple random sampling method were used to determine the sample of study .For this research I choose 50 schools from Kathmandu district where there should be the use ICT while teaching mathematics. Moreover, I have meet with 152 mathematics teacher from private and public schools of Kathmandu districts.

Data Collection Tools

To fulfill the objective of this study questionnaire were the measure tool for data collection.

Questionnaire. Questionnaire is an important tool for data collection in this research. The I had prepared a set of questionnaire for the first objective on the basis of conceptual framework with three dimensions as ICT tools Software (GeoGebra, Mathematica,……), Online resources(khulakitab.com, youtube.com/education…….), Apps (Equation solver , Math playground……), . It was designed as 5-point rating scale. It for the value of 5, 4 3, 2 and 1 was assigned for the response of always, frequently, sometimes, rarely and never respectively.

Reliability and Validity of Tools

Reliability and validity of the tools was necessary to research for taking valid data. For the reliability of the tools, a pilot study was conducted to assess their

reliability of the tools. This pilot study was taken out of five teachers. .The questionnaire was made according to conceptual framework and by the help of supervisor. The obtained data were calculated by using Statistical Package for Social Sciences (SPSS) programmer, version 21.0, and setting at 0.05. A value of 0.72 or above for coefficient Alpha were considered good, while values between o.60 and 0.70 were considered acceptable and adequate. The Cronbach's$\alpha$was found 0.72 on questionnaire of teacher, which are good, reliable for each statement.

Data Collection Procedure

After selecting, the sample and conducting the questionnaire, the sample school administration was requested to takeout the required data by the help of letter of department. Researcher got the permission to collect data and then the data collection procedure was started.

I prepared the required instrument for data collection. The sample school was randomly selected by simple random sampling. After the preparation of the required instrument the secondary levels mathematics teacher was selected by researcher using random sampling technique because the study depends on opinion of secondary ' level mathematics teachers. The teacher was providing questionnaire and their response evaluate based on Likert scale for statistical analysis.

Scoring Procedure

The researcher collected data from sample and then data was tabulated by using following 5-point rating scale.

Table No. 3.1; The scoring procedure on the topic Use of ICT tools in teaching and learning mathematics.

Meaning Scales	Scores
Always (at least one time in a day)	5
Frequently (at least two or three times in a week)	4
Sometime (at least one times in a week)	3
Rarely (at least two times in a month)	2
Never (under no circumstance)	1

Weight age of 5, 4,3,2 & 1 to a statement if the response is “Always”, ‘Frequently’, “Sometime”, “Rarely” & “Never” respectively for each statement.

Procedures of Data Analysis

This is the survey research design. It is based on quantitative nature. The data obtained by above process was analyzed by statistical package for social science (SPSS) software version 21.0. To find the teacher use of ICT tools in teaching and learning mathematics, percentage and, mean, SD, and Mann-Whitney U test was applied to find the use of ICT in mathematics teaching at secondary school level. Mann Whitney U test calculated under inferential statistics for the reason of data where p testing the significant result at 95% confidence level between two and more than two independent samples respectively (Cohen, Manion, & Morrison, 2007). These inferential statics were calculated based on the sum of rating scores of online resources, mathematicalsoftware and mobile apps. The p-value ≤ 0.05 was considered as statistically significant and data were analyzed by using Statistical Package for Social Science (SPSS version 21 for window)

Chapter IV

Analysis and Interpretation of Data

This is survey study based on quantitative data, whichwas taken through questionnaire. This chapter presented the result of statistical analysis of collected data from the secondary school of Kathmandu district.

Analysis and interpretation of secondary school's mathematics teachers on Practices of ICT tools in teaching and learning mathematics

The level of ICT use among teachers is considered the basis for identifying the use of online resource, mathematical software, mobile application in teaching learning mathematics and ICT using secondary level mathematics teacher. In order to determine the level of ICT usage among teachers, means, standard deviations, rank, and percentages regarding ICT skills and its applications were calculated. To analyze the data I use statistical package for social science (SPSS) software version 21. Furthermore, an arbitrary level was identified (high, medium, low) based on the following equation:

$$\frac{\text{The scales highest value – the scales lowest value}}{\text{Number of level}} = \frac{5-1}{3} = 1.33$$

Use of Mathematical Software

Mathematical software useful for both teachers and students. While teachers can use this program to teach students and students can use to do learn mathematics. It is powerful platform that helps students learn math effectively and solve math problems on different topics that include algebra, statistics, vector, linear programming and more. In my research mainly focus on six mathematical software, which is available online open source, and free download on computer.Even though free of cost, these software are excellent in solving math problems and learn

mathematics in a much easier way .The following six mathematicalsoftware in table 4.1 are response of secondary school's mathematics teachers on use of mathematical software

Table 4.1Response of Secondary School's Mathematics Teachers on Use of Mathematical Software

Sn	Software	Mean	SD	Percentage				
				A	F	S	R	N
1	Graphic calculator	1.67	0.865	0.0	5.3	10.5	30.9	53.3
2	Mathtype	1.75	0.949	0.0	5.3	19.7	20.4	54.6
3	Mathematica	1.92	0.997	0.0	10.5	14.5	32.2	42.8
4	Microsoft Mathematics	1.67	0.795	0.0	0.0	20.4	26.3	53.3
5	Math Editor	1.82	0.988	0.0	10.5	9.9	31.6	48
6	GeoGebra	1.81	1.01	3.3	7.2	2.6	41.4	45.4
7	Total	1.77	0.93					

Level Scales value low is 1.33 to 2.33, medium 2.34 to 3.67 and 3.67 to 5.00 is high. EidAlharbi (2014)

The table 4. 1 shows that level of teachers use of mathematical software is low with overall arithmetic mean of 1.77 with standard deviation of 0.93, since the SD is relatively low and less than one, It indicates a convergence among teachers at this level.The low level was graphic calculator where the arithmeticmean had a valueof 1.67 andSD of 0.865. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response 53.3%.As above table shows that a total of more than half-

percent teachers responded on never. It concludes that almost teachers never used graphic calculator and nearly one-third percent teachers responded on rarely. This indicates that nearly one third of teachers rarely used graphic calculator but least number of teachers responded on frequently and sometimes. On average many teachers did not used this graphic calculator software.

Lowest level was use of mathematical software math type where the arithmetic mean of 1.75 and SD of 0.949. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response 54.6%.From the above table shows that a total of more than half- percent teachers responded on never. It concludes that almost teachers never used math type and one-fifth percent teachers responded on rarely. This indicates that one fifth of teachers rarely used math type and nearly one fifth of teachers sometimes used but least number of teachers responded on frequently. On average almost teachers did not used this math type software. The low level was mathematica where the arithmetic mean and SD of 1.92 and 0.997 respectively. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response 42.8%.According to the table more than one third of the total teachers responded on never and nearly one third of teachers responded on rarely and least numbers of teachers responded on sometimes and frequently. It can be concluded that nearly one-third percent of the teachers are rarely used mathematica but more than one third of teachers less aware in the use of mathematica software. The low level was Microsoft mathematics and math editor where the mean and SD of 1.67&0.795 and 1.82 &0.988 respectively.Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never

with a percentage response 53.3% and 48%.As above table shows that a total of more than half percent teachers responded on never in Microsoft mathematics and only 26.3% teachers rarely and 20.4% teachers sometimes used . It concludesthat less than one third of teachers rarely used and one fifth of teachers sometimes used Microsoft mathematics software. From this, it can be concluded that teachers has less used than average. Likewise, nearly half- percent teachers responded on never in math editor and nearly one third of teachers responded on rarely. This means most of the teachers did not used math editor and minimum number of teachers responded on sometimes and frequently that means minimum number of teachers sometimes and frequently used these software.

Furthermore, the results also show that the low level was using the GeoGebra where the arithmetic mean had a value of 1.81 and SD of 1.01. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teachers in their use. The indicating the highest response rate that was never with a percentage response 45.4% but response rate was always with percentage response 3.3% in overall mathematical software From the table more than one third percent teachers responded on never and rarely. It concludesthat more than one third of teachers rarely used GeoGebra software. Minimum number of teachers responded on sometimes, frequently and always. It means least number of teachers sometimes, frequently and always used GeoGebra software.

From this above analysis, the researcher has found that more than 40 % mathematics teachers rarely used GeoGebra software and least number of teachers frequently and sometimes used mathematical software.Furthermore, the researcher has found that half-percent of total teachers never used Mathematical software in their teaching and learning mathematics.

Use of Mobile Apps

Mobile technology opens a new avenue for teaching mathematics in school in 21st century. Mobile apps which takes mathematics problem and solves them with though instructions.Mobile apps are great platform to students to help trick math sets. It uses a Smartphone's camera pointed at a math problem, analysis the information and gives a detailed step-by-step answer and explanation. In my research mainly focus on ten mobile apps. We can download no charge and install these apps on our Smartphone. The following ten mobile apps in table 4.2 are response of secondary school's mathematics teachers on use of mobile apps.

Table 4.2 Response of Secondary School's Mathematics Teachers on Use of Mobile Apps

Sn	Mobile apps	Mean	SD	Percentage				
				A	F	S	R	N
1	Math Playground	1.78	0.771	0.00	0.00	21.1	36.2	42.8
2	Math solver	1.73	0.768	0.00	0.00	21.1	31.6	47.4
3	Math Helper	1.57	0.887	0.0.0	0.0	15.8	26.9	57.9
4	Equation Tree	1.73	0.912	0.0	5.3	15.8	26.3	52.6
5	Malmath	1.57	0.88	0.00	1.3	5.4	31.5	61.7
6	Math Games	1.78	0.89	0.0	5.3	15.8	31.6	47.4
7	Photomath	1.78	0.76	0.0	0.0	21.1	36.8	42.1
8	Mathking	1.68	0.92	0.0	5.3	15.8	26.3	57.9
9	Mathway	1.78	0.89	0.00	0.7	3.4	34.9	61.1
10	Equation Solver	1.80	0.99	0.00	5.3	25.7	13.2	55.9
11	Total	1.72	0.86					

Level Scales value low is 1.33 to 2.33, medium 2.34 to 3.67 and 3.67 to 5.00 is high. EidAlharbi (2014)

Above table, 4.2 shows that the level of use of mobile apps is low an overall arithmetic mean of 1.72 with SD of 0.86. Since SD is relatively, low. It is less than one. It indicates a convergence among teachers at this level. The results also show that the low level was using the math playground where the arithmetic mean of 1.78 and SDof 0.77. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 42.8%. It means most of the teachers did not used math playground apps. As analyzed above table, more than one third of teachers responded on rarely and more than one fifth of teachers responded on sometimes. It implies more than one third of teachers rarely used and more than one-fifth teachers sometimes used math playground apps.

The low level was using the math solver where the arithmetic mean of 1.73 and SD of0.76. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 47.4%.It means almost teachers did not used math solver apps. Likewise, nearly one third of teachers responded on rarely but more than one fifth of teachers responded on sometimes. It implies that nearly one third of teachers rarely used and more than one fifth of teachers sometimes used math solver apps. The low level was using the math helper where thearithmetic mean of 1.75 and SD of 0.88. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 57.9%. It means most of teachers did not used math helper. From the table 26.9% responded on rarely and least number of teachers responded sometimes.

It implies that more than one fifth of teachers rarely used math helper apps. The low level was using the equation tree wherethe arithmeticmeanof 1.73andSD of0.91. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 52.6%.It means more than half- percent teacher never used equation tree apps. Likewise, 26.3% teachers responded on rarely, 15.8 % teachers responded on sometimes, and minimum number of teachers responded on frequently. It implies that more than one fifth of teachers rarely used and least number of teacher did not used equation tree apps. The low level was using the mal math where the arithmetic mean was 1.57 and SD 0.88. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 61.7%. It means more than half- percent teachers never used mal math apps. In like manner, nearly one third of teachers responded on rarely and minimum number of teachers responded on sometimes and frequently. It concludes that nearly one third of teachers sometimes used and least number of teachers frequently used mal math apps. The low level was using the math games where the arithmeticmean and SD of 1.78 and 0.89. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 47.4%. It means nearly half percent of teachers never used math games apps. Likewise, nearly one third of teacher responded on rarely and 15.8% of teachers responded on sometimes and minimum number of teachers response on frequently. It implies that nearly one third of teachers rarely used and least numbers of teachers sometimes and frequently used math games apps. The low level was using the photomath where thearithmetic meanof 1.78 and SDof 0.76. Since the SD is relatively low. It indicates a convergence

among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 42.1%. It means most of the teachers never used photomath apps. In like manner, more than one third of teachers responded on rarely and 21.1 % of teachers responded on sometimes. It implies that more than one third of teachers rarely used and more than one fifth of teachers sometimes used photomath apps.The low level was using the math king where the arithmetic mean of 1.78 and SD of 0.92. The indicating the highest response rate that was never with a percentage response rate of 57.9%. It means more than half of teacher never used math king apps.Likewise, 26.3% of teachers responded on rarely and least number of teachers responded on sometimes and frequently. It concludes that more than one fifth of teacher rarely used and minimum number of teacher sometimes and frequently. The low level was using the math way and equation solver where the arithmetic mean and SD of 1.78&0.89 and 1.80 &0.99. Since the SD is relatively low. It indicates a convergence among teachers at this level.The indicating the highest response rate that was never with a percentage response rate of 61.1% and 55.9% respectively. It means more than halfpercent of teachers never used math way and equation solver. In the manner, more than one third of teachers responded on rarely and least number of teachers responded on sometimes and frequently in math way apps. It implies that more than one third of teachers rarely used and minimum number of teachers sometimes and frequently used math way apps.Similarly, 13.2% of teachers responded on rarely , more than one fifth of teachers responded on sometimes used and minimum number of teachers responded on frequently .It concludes that least number of teachers frequently and rarely used but one fifth of teachers sometimes used equation solver.

From this above analysis, the researcher has found that more than one third of teachers rarely used photomath, math playground, and math way and least number of teachers sometime and frequently used mobile apps.Furthermore, more than half percent of teacher never used mobile apps in teaching and learning mathematics.

Use of Online Resources

The internet is great resource students and teachers use for learning. Reasons include the ease in searching with sites such as Google, or vast collection of informative videos on YouTube. This research mainly focuses on six online resources. Mathematics can be effectively taught to students through various videos from these online resources.The following six online resources in table 4.3 are response of secondary school's mathematics teachers on use of online resources.

Table 4. 3. Response of Secondary School's Mathematics Teachers onUse of Online Resources

Sn	statements	Mean	SD	Percentage				
				A	F	S	R	N
1.	Khullakitab.com	2.31	1.08	0.00	15.8	31.6	21.1	31.6
2.	Youtube.com	2.47	1.43	10.5	21.1	10.5	21.1	36.8
3.	Mathword.com	1.84	1.13	0.0	15..8	10.5	15.8	57.9
4.	Khanaacademy.com	2.36	0.87	0.0	10.5	31.6	42.1	15.8
5.	Coolmath.com	1.94	1.19	5.3	10.5	5.3	31.6	47.4
6.	Midaseclass.com	2.73	1.29	5.3	31.6	21.1	15.8	26.3
	Total	2.27	1.16					

Level Scales value low is 1.33 to 2.33, medium 2.34 to 3.67 and 3.67 to 5.00 is high. EidAlharbi (2014)

The table 4. 3 shows that level of teacher's use of online resources is low with overall arithmetic mean of 2.27 with standard deviation of1.16. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. The results also show that the low level was using the khullakitab.com where the arithmetic mean had a value of 2.31and SD of1.08. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. The indicating the equalresponse rate that was never and sometimes with a percentage response of31.6%. It means nearly one third of teacher never used khullakitab.com online resources. As the above table more than one fifth of teacher responded on rarely and 31.6% of teachers responded on sometimes. It implies that more than one fifth of teachers rarely used but nearly one third of teacherssometimes-used khullakitasb.com.

The medium level was Youtube.com where the arithmetic mean had a valueof 2.47 and SD of1.43. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use.The indicating the highest response rate that was never with a percentage response of36.8%. It means more than one third of teachers never used youtube.com. Likewise, more than one fifth of teacher responded on rarely and frequently. It concludes that more than one-fifth ofteachers frequently and sometimes used youtube.com. The lowest level was use of mathword.com where the arithmetic meanof 1.84 and SD of 1.13. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use.The indicating the highest response rate that was never with a percentage response of57.9%. It means more than half- percent teachers never used mathword.com. According to the table, 15.8% of teachers responded on sometimes and frequently but least number of teachers responded on rarely. It implies

that minimum number of teachers frequently, sometimes and rarely used mathword.com.The medium level was khanacademy.com where the arithmetic mean and SD of 2.36 and 0.87 respectively. Since the SD is relatively low. It indicates a convergence among teachers at this level. The indicating the highest response rate that was rarely with a percentage responseof 42.2%. It means more than one third of teachers rarely used khanacademy.com. From the table,nearly one third of teachers responded on sometimes but least number of teachers responded on frequently and never. It implies that least number of teacher frequently and never used khanacademy.com.

The low level was coolmath.com where the mean and SD of 1.94&1.19. Since the SD is relatively high and greater than integer, one, which highlights a significant disparity among teacher in their use .As above table nearly half percent of teachers, responded on never but nearly one third of teachers responded on rarely. It concludes that nearly one third of teachers rarely used but nearly half percent of teachers never used coolmath.com. Likewise, least number of teachers responded on always, frequently and sometimes. It implies that least number of teachers always, frequently and sometimes used coolmath.com. The medium level was midaseclass.com where the arithmetic mean had a value of 2.73 and SD of1.29. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. The indicating the highest response rate that was frequently with a percentage response of36.1%.It means more than one third of teachers frequently used midaseclass.com .In the manner, more than one fifth of teachers responded on sometimes and never but least number of teachers responded on always and rarely. It implies that least number of teachers always and rarely used but more than one fifth of teachers sometimes and never used midaseclass.com.

From this above analysis, the researcher has found that more than one third of teachers rarely used khanacademy.com but least number of teachers always used youtube.com and midaseclass.com Moreover nearly one third of teachers rarely used online resources.

Practices of ICT Tools Usage

ICT tools are becoming the most important tools for interaction among people, where everybody can share, exchange, comment, discuss and create information and knowledge in a collaborative way. To achieve the second objectives of study 152 secondary school's mathematics teacher were selected. The questionnaire is given in (Appendix) and their responses are tabulated and calculated by using five-point rating scale. The obtained data are presented below

Table 4.4 Responses of Practices of Secondary School's Mathematics Teacher on ICT tools usage

Statement	**A %**	**F %**	**S %**	**R %**	**N %**	**Mean**	**SD**
1., I use ICT (computer, laptop with internet) to search for information during my lesson plan and prepare teaching materials.	16.4	7.2	11.8	28.9	35.5	2.41	1.44
2. I use ICT (Interactive whiteboard/projector) to arouse and direct my learners' attention/make the lesson interesting	11.8	9.2	12.5	22.4	44.1	2.22	1.40
3.I use email or web discussion to communicate with students	2.6	8.6	11.8	26.3	50.7	1.86	1.09
4. I use social networking sites to communicate with students.	19.7	19.7	10.5	32.2	17.8	2.91	1.42

5. I post homework for the students on the school/ collage websites.	29.6	25.7	14.5	21.1	9.2	3.46	1.33
6. I use or download online materials as a learning and teaching resources	7.2	22.4	13.2	27.6	29.6	2.5	1.31
7. I create a weblog or websites for students to share their activities.	9.2	23	21.1	16.4	30.3	2.65	1.35
8. I refer to my students to use different ICT tools for encounters mathematical problems	23.7	23.7	20.4	21.1	11.2	3.27	1.33
9. I give opportunity to the students to use ICT tools inside the mathematics classroom.	13.2	23	28.3	20.4	15.1	2.98	1.25
10. I use different ICT tools by demonstrating and using in the classroom.	19.1	22.4	25	23	10.5	3.16	1.27
11. I use different ICT tools to solve abstract and simple mathematical problems.	11.2	10.5	18.4	21.7	38.2	2.32	1.35
12.I use ICT tools for mathematical works demonstrate by projector.	12.5	8.6	17.8	19.7	41.4	2.33	1.41
13. Total						2.67	1.32

Level Scales value low is 1.33 to 2.33, medium 2.34 to 3.67 and 3.67 to 5.00 is high.

Eid Alharbi (2014)

The table 4. 3 shows that ICT tools usage level was medium with overall arithmetic mean of 2.67 with standard deviation of 1.32 . Since the SD is relatively

high and greater than integer, one which highlights a significant disparity among teacher in their use.Also shows thatstatement 1 is significant and mean, SD value are 2.41 and 1.44. It is indicating that medium level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. A total of 16.4% teachers responded on always , 7.2% of teachers responded on frequently ,and 11.8% of teachers responded on sometimes , 28.9% teachers responded on rarely and 35.5 % of teachers responded on never. It implies that more than one third of teacher never used but more than one fifth of teachers rarely used and least number of teachers always and frequently used ICT(computer, laptop with internet)to search for information during his lesson plan and prepare teaching materials.

Similarly statement 2 significant with mean and SD value are 2.22and 1.40. It is indicating that medium level.. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. A total of11.8% teachers responded on always, 9.2% of teachers responded on frequently, 12.5% ofteachers responded on sometimes, 22.4% of teachers responded on rarely and 44.1 % of teachersresponded on never. It concludes that more than one fifth of teacher rarely but more than one third of teachers never and least number of teachers always, frequently and sometimes used ICT (Interactive whiteboard/projector) to arouse and direct his learners' attention/make the lesson interesting . Therefore, this result reveals that most of the teachers never used ICT (Interactive whiteboard/projector) to arouse and direct his learners' attention/make the lesson interesting.

In addition, the statement 3 is significant with mean and SD values are 1.86&1.09.It indicating that low level. Since the SD is relatively high and greater than

integer, one which highlights a significant disparity among teacher in their use. A total of 2.6% teachers responded on always , 8.6% of teachers responded on frequently , 11.8% teachers responded on sometimes , 26.3% of teachers responded on rarely and 50.7 % of teachers responded on never . This shows that maximum teachers never used and more than one fifth of teachers rarely used but least number of teachers always, frequently and sometimes used email or web discussion to communicate with students. Now the statement 4 is significant with mean & SD are 2.9 and 1.4 .It isindicating thatmedium level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. A total of 19% teachers responded on always , 19.7 % of teachers responded on frequently ,10% of teachers responded on sometimes ,32% of teachers responded on rarely and 17% of teachers response on never . From the response of the teachers, it is said that nearly one third of teachers rarely used, social networking sites to communicate with students.

From the statement 5 significant with mean and SD are 3.46&1.33. It is indicatingthat medium level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. In the statement 5 a total of 29.6% teachers responded on always ,25.7 % of teachers responded on frequently , 14.5% teachers responded on sometimes,21.1% of teachers responded on rarely and 9.2% teachers responded on never .It implies that most of the teachers always posed but minimum teachers sometimes, frequently and rarely posed homework for the students on school websites. From the statement 6 significant with mean and SD are 2.5& 1.31. It is indicatingthat medium level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. In statement 6 a total of 7.2% teachers

responded on always , 22.4% of teachers responded on frequently , 13.2 % of teachers responded on sometimes used ,27.6 % of teachers responded on rarely used and 29.6% of teachers responded on never . It means most of teachers neverused but least number of teachers always, frequently and sometimes used or downloaded online materials as a learning and teaching resources.

Also statement 7 significant with mean and SD are 2.65& 1.35. It is indicating thatmedium level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. A total of 9.2 % teachers responded on always , 23% of teachers responded frequently ,21.1% of teachers responded on sometimes , 16.4% of teachers responded on rarely but 30.3% of teachers responded on never .This show that most of the teachers are never created but more than one fifth of teachers sometimes and least number of teachers always and frequently created a weblog or websites for students to share their activities. From the statement 8 and 9 significant with mean and SD are 3.27 & 1.33and 2.98& 1.25 It indicating thatmedium level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. In the statement 8 total of 23.7 % teachers responded on always ,23.7 % of teachers responded on frequently but 20.4% of teachers responded on sometimes 21.1 % of teachers responded on rarely and 11.2% of teachers responded on never .In the statement 9 total of 13.2 % teachers responded on always , 23% of teachers responded on frequently ,28.3% of teachers responded on sometimes ,20.4% of teachers responded on rarely and 15.1% of teachers responded on never . Therefore, most of the teacheralways referredto his students to use different ICT tools for encounters mathematical problems. Moreover, maximum teachers are sometimes given opportunity to the students to use ICT tools inside the mathematics classroom.

From the statement 10 and, 11significant with mean & SD value are 3.16& 1.27 2.32& 1.35 Itis indicatingthat medium level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use. In the statement, 10 10.5% teachers responded on always, 22.4 % of teachers responded on frequently, 25% of teachers responded on sometimes, 23% of teachers responded on rarely and 10.5 % teachers are never used. It means one fourth of theteachers are sometimes used but nearly one fourth of teachers frequently used ICT tools by demonstrating and using in the classroom. Similarly in the statement 11 total of 11.2 % teachers responded on always ,8.6% of teachers responded on frequently ,18.4% of teachers responded on sometimes ,21.7% of teachers responded on rarely used and 38.2% of teachers responded on never used . It meansmore than one third of the teachers are never used but more than one fifth of teacher rarely and least number of teacher different ICTtools to solve abstract and simple mathematical problem.

From the statement 12 is significant with mean of 2.33 and SD of 1.41. It is indicating that low level. Since the SD is relatively high and greater than integer, one which highlights a significant disparity among teacher in their use.In the statement 12 total of 12.5 % of teachers response on always ,8.6% of teachers response on frequently ,17.8% of teachers on sometimes 19.7% of teachers response rarely and 41.4 % of teachers repose on never This shows that more than one third of teacher never used but nearly one fourth of teachers rarely used and least number of the teachers always, frequently sometimes-used ICT tools for mathematical works demonstrate by projector.

From the above table shows that only few statement have more than one fourth percentage of teacher using ICT in daily whenever required and that

percentage is very poor in maximum statement which indicates that maximum of them are poorly using it in their daily activities in school. So almost secondary school's mathematics teacher has minimum practices in ICT tools.

Significant Difference on Use of Mathematical Software

This study was to examine difference on socio demographic difference between use of mathematical software in relation to school types, gender, teaching experience, job position types and ICT using time. To verify the hypothesis, mean and SD of different categories tabulated and analyzed below.

Table-4.5: Significant Difference on Use of Mathematical Software

Socio demographic variables	Categories	Number	Software		p-value	Level of significant
		N (%)	Mean Rank	SD		
School types	Private	96(63.2)	74.27	0.50	0.725	No significant
	Public	56(36.8)	77.06	0.49		
Gender	Male	105(69.1)	78.05	0.53	0.142	No significant
	Female	47(30.9)	66.40	0.38		
Teaching Experience	less than a year	40(26.3)	72.00	0.51	0.128	No significant
	1-5 years	96(63.2)	69.16	0.47		
	6-10 years	16(10.5)	84.40	0.47		
Job position	Part time	74(48.7)	75.74	0.46	0.865	No significant
	Full time	78(51.3)	74.53	0.52		
ICT using experience	Less than a year	24(15.8)	77.14	0.51	0.311	No significant
	1-2 year	96(63.2)	66.6	0.52		
	3-4 years	32 (21.1)	69.16	0.47		

Above table 4.5 shows the significant mean difference in between private and public schools on used of mathematical software. The mean and SD scores of private and public schools are found as 74.27, 0.50 and 77.06, 0.49 respectively. From p-value (p= 0.72), It can be observed that there is no significant mean difference between private and public school on teachers use of mathematical software. This is not significant at 0.05 levels. Hence, the null hypothesis there is no significant difference in the use of mathematical softwarebetween private and public schools is accepted on these variables.It is concluded that private and public school's teachers both have no difference on using mathematical software in teaching and learning mathematics.That is, public school teachers and private schools teachers both have same using mathematical software in teaching and learning mathematics.

Above table 4.5 shows the significance mean difference between male and female groups on utilization of mathematical software. The mean and SD values of male and female groups on teacher use of mathematical software got scores as 78.05, 0.53 and 66.40, 0.38 respectively. The p- value (p= 1.14) says that there is no significance influence on gender by teacher use of mathematical software. Hence, the null hypothesis there is no significant difference in the use of mathematical software between male and female group is accepted on this variables.It is concluded that male and female teachers both have no difference on using mathematical software in teaching and learning mathematics.That is, male and female teachers both have same using mathematical software in teaching and learning mathematics.

Table 4.5 shows that the significant mean difference between less than a year ,1-5 years ,6-10 years' experience on utilization of mathematical software. The mean and SD values on teacher use of mathematical software is presented as 72.00, &0.51,

69.16&0.47and 84.40, 0.47 respectively. From the p- value (p= 0.12) clears that there is no significance result. It means that the teaching experience is not significantly differed on teacher use of mathematical software. Therefore the null hypothesis there is no significant difference in the use of mathematical software between less than a year, 1-5 years, and 6-10 years experiences is accepted on this variables.It is concluded that teaching experience of teachers have no difference on using mathematical software in teaching and learning mathematics.That is less than a year 1-5 years and 6-10 years' experience of teachers have same using mathematical software in teaching and learning mathematics.

Table- 4.5 shows that the significant mean difference between part time and full time jobposition types on utilization of mathematical software. The mean and SD values on teacher use of mathematical software is presented as 75.74& 0.46 and 74.53&0.52 respectively. From the p- value (p= 0.86) clears that there is no significance result. It means that the job position type is not significantly differed on teacher use of mathematical software. Therefore, the null hypothesis there is no significant difference in the use of mathematical software between part time and full time is accepted on these variables.It is concluded that part time and full time of teachers both job positions have no difference on using mathematical software in teaching and learning mathematics.That is, part time and full time of teachers both job positions have same using mathematical software in teaching and learning mathematics.

Table 4.5 shows that the significant mean difference between less than a year, 1-2 years and 3-4 years of ICT using experience on mathematical software. The mean and SD values on teacher use of mathematical software is presented as 77.14&0.51,

66.6&0.52 and 69.16&0.47 respectively. From the p- value (p= 0.31) clears that there is no significance result. It means that the ICT using experience is not significantly differed on teacher use of mathematical software. Therefore, the null hypothesis there is no significant difference in the use of mathematical software between less than a year, 1-2 years and 3-4 years accepted on these variables.It is concluded that of ICT using experience of teachers have no difference on using mathematical software in teaching and learning mathematics.That is, less than a year's 1-2 years and 3-4 years ICT using experience have same using mathematical software in teaching and learning mathematics.

From the above analysis, there is no significance difference between use of mathematical software in relation to school types, gender, teaching experience, job position types and ICT using experience. Therefore, the nullhypothesis accepted on these variables.That is, school types, gender,teaching experience, job position and ICT using experience have same using mathematical software in teaching and learning mathematics.

Significant Difference on Use of Mobile Apps

This study was to examine difference on socio demographic difference between use of mobile apps in relation to school types, gender, teaching experience, job position types and ICT using time. To verify the hypothesis, mean and SD of different categories tabulated and ana

Table-4.6: Significant Difference on Use of Mobile Apps

Socio demographic variables	Categories	Number	Software		p-value	Level of significant
		N (%)	Mean Rank	SD		
School types	Private	96(63.2)	76.12	0.36	0.341	No significant
	Public	56(36.8)	68.06	0.38		
Gender	Male	105(69.1)	74.08	0.38	0.661	No significant
	Female	47(30.9)	77.59	0.27		
Teaching Experience	less than a year	40(26.3)	77.01	0.37	0.10	No significant
	1-5 years	96(63.2)	72.34	0.34		
	6-10 years	16(10.5)	77.56	0.38		
Job position	Part time	74(48.7)	66.96	0.26	0.519	No significant
	Full time	78(51.3)	77.84	0.36		
ICT using experience	Less than a year	24(15.8)	73.19	0.36	0.740	No significant
	1-2 year	96(63.2)	75.71	0.41		
	3-4 years	32 (21.1)	73.08	0.36		

The table4.6 shows that significant mean difference in between private and public schools on used of mobile apps. The mean and SD scores of private and public schools are found as 76.12,&0.36 and 68.06& 0.38 respectively. From p- value (p= 0.34), It can be observed that there is no significant mean difference between private and public school on teachers use of mobile apps. This is not significant at 0.05 levels. Hence, the null hypothesis there is no significant difference in the use of mobile apps between private and public schools is accepted on these variables.It is concluded that private and public school's teachers both have no difference on using mobile apps in teaching and learning mathematics.That is, public school teachers and private schools teachers both have same using mobile apps in teaching and learning mathematics.

Above table4.6 shows the significance mean difference between male and female groups on utilization of mobile apps. The mean and SD values of male and female groups on teacher use of mathematical software got scores as 74.08, 0.38 and 77.59, 0.27 respectively. The p- value (p= 0.66) says that there is no significance influence on gender by teacher use of mathematical software. Hence, the null hypothesis there is no significant difference in the use of mobile apps between male and female group is accepted on these variables.It is concluded that male and female teachers both have no difference on using mobile apps in teaching and learning mathematics.That is, male and female teachers both have same using mobile apps in teaching and learning mathematics.

Table4.6 provides the significant mean difference between less than a year, 1-5 years and 6-10 years experience on utilization of mobile apps. The mean and SD values on teacher use of mobile apps is presented as 77.01, 0.37, 72.34& 0.34 and77.56&0.38 respectively. From the p- value (p= 0.10) clears that there is no significance result. It means that the teaching experience is not significantly differed on teacher use of mobile apps. Therefore the null hypothesis there is no significant difference in the use of mobile apps between less than a year,1-5 years and 6-10 years experiences are accepted on these variables.It is concluded that teaching experience of teachers have no difference on using mobile apps in teaching and learning mathematics.That is less than a year 1-5 years and 6-10 years' experience of teachers have same using mobile apps in teaching and learning mathematics.

Table4.6 provides the significant mean difference between part time and full time job position types on used mobile apps. The mean and SD values on teacher use of mobile apps is presented as 66.96, 026 and 77.84, 0.36 respectively. From the p-value (p= 0.51) clears that there is no significance result. It means that the job position

types are not significantly differed on teacher use of mathematical software. Therefore, the null hypothesis there is no significant difference in the use of mobile apps between part time and full time is accepted on this variable.It is concluded that part time and full time of teachers both job positions have no difference on using mobile apps in teaching and learning mathematics.That is, part time and full time of teachers both job positions have same using mobile apps in teaching and learning mathematics.

Table4, 6 provides the significant mean difference between less than a year,1-2 years and 3-4 years ICT use time of mobile apps. The mean and SD values on teacher use of mobile apps is presented as 73.19, 0.36 & 75.71, 0.41 and 73.08 &0.36 respectively. From the p- value (p= 0.74) clears that there is no significance result. It means that the ICT using experience is not significantly differed on teacher use of mobile apps. Therefore the null hypothesis there is no significant difference in the use of mobile apps between less than a years,1-2 years and 3-4 years is accepted on this variables.It is concluded that ICTusing experience of teachers have no difference on using mobile apps in teaching and learning mathematics.That is less than a year 1-3 years and 3-4 years ICT using experience of teachers have same using mobile apps in teaching and learning mathematics.

From the above analysis, there is no significance difference between use of mobile apps in relation to school types, gender, teaching experience, job position types and ICT using experience. Therefore, the null hypothesis accepted on these variables.That is, school types, gender, teaching experience, job position and ICT using experience have same using mobile apps in teaching and learning mathematics.

Significant Difference on Use of Online Resources

This study was to examine difference on socio demographic difference between use of online resources in relation to school types, gender, teaching experience, job position types and ICT using time. To verify the hypothesis, mean and SD of different categories tabulated and analyzed below.

Table-4.7Significant Difference on Use of Online Resources

Socio demographic variables	Categories	Number	online resources		p-value	Level of significant
		N (%)	Mean Rank	SD		
School types	Private	96(63.2)	73.67	1.92	0.524	No significant
	Public	56(36.8)	78.76	1.96		
Gender	Male	105(69.1)	77.95	0.41	0.159	No significant
	Female	47(30.9)	66.68	0.39		
Teaching Experience	less than a year	40(26.3)	71.61	0.40	0.266	No significant
	1-5 years	96(63.2)	79.50	0.41		
	6-10 years	16(10.5)	69.99	0.38		
Job position	Part time	74(48.7)	90.74	0.45	0.934	No significant
	Full time	78(51.3)	74.64	0.45		
ICT using experience	Less than a year	24(15.8)	75.23	0.37	0.035	significant
	1-2 year	96(63.2)	79.49	0.42		
	3-4 years	32 (21.1)	62.76	0.32		

Above table 4.7 shows that significant mean difference between private and public schools on the use of online resources. The mean and SD scores of public and private schools are found as 73.67, 1.92 and 78.76, 1.96 respectively. From p-value [p=0.53] it can be observed that there is no significant mean difference between private and public schools on use of online resources. This is not significant at 0.05 level of significant. Hence the null hypothesis there is no significant difference in the use of online resources between private and public schools is accepted on this variable.It is concluded that private and public school's teachers both have no difference on using online resources in teaching and learning mathematics.That is, public school teachers and private schools teachers both have same using online resources in teaching and learning mathematics.

Above table4.7 shows that significance mean difference between male and female groups on the use of online resources. The mean and SD values of male and female groups on teacher use of online resources got scores as 77.95, 0.41 and 66.68, 0.39 respectively. The p- value (p= 0.15) says that there is no significance influence on gender by teachers use of online resources. Hence, the null hypothesis there is no significant difference in the use of online resources between male and female group is accepted on this variablesIt is concluded that male and female teachers both have no difference on using online resources in teaching and learning mathematics.That is, male and female teachers both have same using online resources in teaching and learning mathematics.

Table 4.7 provides the significant mean difference between less than a year, 1-5 years and 6-10 years experiences on use of online resources scale. The mean and SD values on teacher use of online resources is presented as 71.61, 0.40, 79.50& 0.41and 66.99&0.38 respectively. From the p- value (p= 0.26) clears that there is no

significance result. It means that the teaching experience is not significantly differed on teacher use of online resources. Therefore the null hypothesis there is no significant difference in the use of online resources between less than a years,1-5 years and 6-10 years experiences is accepted on this variables.It is concluded that teaching experience of teachers have no difference on using online resources in teaching and learning mathematics.That is less than a year 1-5 years and 6-10 years experience of teachers have same using online resources in teaching and learning mathematics.

Table 4.7 provided the mean and SD values of part time and full time job position types are shown as 90.74&, 0.45 and 74.64&, 0.45 respectively. The value (p= 0.93) clears that there is no significance score. It explains that the use of online resources is not significantly differed on these variables. Hence, the null hypothesis there is no significant difference in the use of online resources between part time and full time of job position types is accepted on this variables.It is concluded that part time and full time of teachers both job positions have no difference on using online resources in teaching and learning mathematics.That is, part time and full time of teachers both job positions have same using online resources in teaching and learning mathematics.

Table 4.7 provided the mean and SD values of less than a year, 1-2 years and 3-4 years ICT use time are shown as 75.23& 0.37, 79.49&0.42 and 62.76, 0.32 respectively. The value (p= 0.035) clears that there is significance score. It explains that the use of online resources is significantly differed on this dimension. Hence, the null hypothesis there is significant difference in the use of online resources between less than a year, 1-2 years and 3-4 years ICT using experience is rejected on this

variable.It is concluded that ICT using experience of teachers have difference on using online resources in teaching and learning mathematics.That is less than a year 1-3 years and 3-4 years ICT using experience of teachers have no same using online resources in teaching and learning mathematics.

From the above analysis, there is no significance difference between use of online resources in relation to school types, gender, teaching experience and job position types. Therefore, the null hypothesis accepted on these variables.That is, school types, gender, teaching experience and job position have same using online resources in teaching and learning mathematics but there is significancedifference between uses of online resources in relation to ICT using experience.Therefore, the null hypothesis rejected on this variable.That is ICT using experience of teachers have no same using online resources in teaching and learning mathematics

Significant Difference of Practices of Use of ICT Tools

This study was to examine difference on socio demographic difference between practices of use of ICT tools in relation to school types, gender, teaching experience, job position types and ICT using time. To verify the hypothesis, mean and SD of different categories tabulated and analyzed below.

Table-4.8: Significant Difference of Practices of Use of ICT Tools

Socio demographic variables	Categories	Number	Usages of ICT tools		p-value	Level of significant
		N (%)	Mean Rank	SD		
School types	Private	96(63.2)	77.10	0.39	0.318	No significant
	Public	56(36.8)	69.08	0.42		
Gender	Male	105(69.1)	71.08	0.40	0.062	No significant
	Female	47(30.9)	86.05	0.36		
Teaching Experience	less than a year	40(26.3)	75.50	0.41	0.870	No significant
	1-5 years	96(63.2)	74.34	0.39		
	6-10 years	16(10.5)	76.60	0.37		
Job position	Part time	74(48.7)	69.97	0.47	0.941	No significant
	Full time	78(51.3)	75.33	0.40		
ICT using experience	Less than a year	24(15.8)	74.79	0.40	0.64	No significant
	1-2 year	96(63.2)	71.04	0.41		
	3-4 years	32 (21.1)	85.79	0.36		

Above table 4.8 shows the significant mean difference between private and public schools use of ICT usages level. The mean and standard deviation scores of public and private schools are found as 77.10& 0.39 and 69.08 &0.42 respectively. From p-value [p=0.31] it can be observed that there is no significant mean difference between private and public schools on use of ICT Tools. This is not significant at 0.05 level of significant. Hence, the null hypothesis there is no significant difference in the

use of ICT usages level between private and public schools is accepted on this variables.It is concluded that private and public school's teachers both have no difference on practices of ICT tools in teaching and learning mathematics.That is, public school teachers and private schools teachers both have same practices of ICT tools in teaching and learning mathematics.

Above table 4.8 shows the significance mean difference between male and female groups on use of ICT usages level. The mean and SD values of male and female groups on teacher use of ICT usages level got scores as 71.08& 0.40 and 86.05& 0.36 respectively. The p- value (p= 0.062) says that there is no significance influence on gender by teachers use of ICT tools in the mathematics teaching. Hence, the null hypothesis there is no significant difference in the use of ICT tools between male and female group is accepted on this variables.It is concluded that male and female teachers both have no difference practices of ICT tools in teaching and learning mathematics.That is, male and female teachers both have same practices of ICT tools in teaching and learning mathematics.

Table 4.8 provides the significant mean difference between Less than a year ,1-5 years and 6-10 years experiences on use of ICT tools. The mean and SD values on teacher use of ICT tools is presented as 75.50,&0.41, 74.34&0.39 and 76.60&0.39 respectively. From the p- value (p= 0.87) clears that there is no significance result. It means that the teaching experience is not significantly differed on teacher use of ICT tools. Therefore, the null hypothesis there is no significant difference in the use of ICT usages level between below ten years and above ten years experiences is accepted on these variables.It is concluded that teaching experience of teachers have no difference on using practices of ICT tools in teaching and learning

mathematics.That is less than a year 1-5 years and 6-10 years experience of teachers have same using practices of ICT tools in teaching and learning mathematics.

Table 4.8 provided the mean and SD values of part time and full time job position types are shown as 69.97&0.47 and 75.33&0.40 respectively. The p- value (p= 0.94) clears that there is no significance score. It explains that the use of ICT tools is not significantly differed on these variables. Hence, the null hypothesis there is no significant difference in the use of ICT tools between part time and full time job position types is accepted on these variables.It is concluded that part time and full time of teachers both job positions have no difference on using practices of ICT tools in teaching and learning mathematics.That is, part time and full time of teachers both job positions have same using practices of ICT tools in teaching and learning mathematics

Table 4.8 provided the mean and SD values of less than a year, 1-2 years and 3-4 years ICT usages time as 74.79& 0.40, 71.04&0.41 and 85.79&0.36 respectively. The value (p= 0.64) clears that there is no significance score. It explains that the use of ICT tools is not significantly differed on these variables. Hence, the null hypothesis there is significant difference in the use of ICT tools between less than a year's, 1-2 years and 3-4 years of ICT usage is accepted on this variables.It is concluded that ICT using experience of teachers have no difference on practices of ICT tools in teaching and learning mathematics.That is less than a year 1-3 years and 3-4 years ICT using experience of teachers have same practices of ICT tools in teaching and learning mathematics.

From the above analysis, there is no significance difference between practices of ICT tools in relation to school types, gender, teaching experience, job position types and ICT using experience. Therefore, the null hypothesis accepted on these

variables.That is, school types, gender, teaching experience, job position and ICT using experience have same practices of ICT tools in teaching and learning mathematics.

Chapter V

Findings, Conclusion and Recommendations

After the analysis and interpretation of collected data as per the design of study and the research question, in the chapter and attempt has been made to derive important conclusion. This chapter represents major finding and conclusion. Finally the last section present recommendations for the future study.

Findings of the Study

From the analysis of those collected data, the following were the major findings of this study.

- More than 40% of total mathematics teachers rarely used GeoGebra software and few number of teachers frequently and sometimes used mathematical software. Moreover, half-percent of teachers never used mathematical software in their teaching and learning mathematics.
- More than one third of teachers rarely used photomath, math playground, and math way and few number of teachers sometimes and frequently used mobile apps. Moreover, more than half-percents of teachers never used mobile apps in their teaching and learning mathematics.
- More than one third of teachers rarely used khanacademy .com and few number of teachers always used youtube.com and medaseclass.com. Moreover, nearly one third of teachers rarely used online resources.
- More than one fourth percents of teacher using ICT in daily whenever required and that percentage is very poor in maximum ICT tools which indicates that maximum of them are poorly using it in their daily activities in school.

- Maximum secondary school's mathematics teacher has minimum practices in ICT tools.
- The null hypothesis there is no significant difference in the use of online resources between private and public schools, male and female age groups, less than a year 1-5 years and 6-10 years experiences, part time and full times job position types is accepted on this variable.
- The null hypothesis there is significant difference in the use of online resources between less than a years,1-2 years and 3-4 years ICT using experience is rejected on this variables
- The null hypothesis there is no significant difference in the use of mathematical software between private and public schools, male and female age groups, less than a year 1-5 years and 6-10 years experiences, part time and full times job position types is accepted on this variables.
- The null hypothesis there is no significant difference in the use of mobile apps between private and public schools, male and female age groups, less than a year 1-5 years and 6-10 years experiences, part time and full times job position types is accepted on this variables.
- The null hypothesis there is no significant difference in practices of the of ICT tools between private and public schools, male and female age groups, , less than a year 1-5 years and 6-10 years experiences, part time and full times job position types is accepted on this variables.

Conclusion

On the basis of finding presented in the previous section, some significant conclusions were drawing in the use of ICT in teaching mathematics. Here I found that most of the mathematics teachers less use ICT of it in teaching and learning.

From above analysis it can be concluded that almost number of teachers are poorer in technological features. There is no significant difference between online resources , mobile apps and mathematical software between private and public school, male and female age group ,less than a year,1-5 years and 6-10 years, part time and full time job position types. By these results, we can say that school, guardians, governmental and nongovernmental sector, policy maker and other related stakeholders need to makeeffectiveplan for the improvement of learners ICT skill for their future development. Inaddition, inclusive and equitable access of ICT needs to be provided for all the students of our country to increase the quality of ICT education and to develop the skill. Most of the teachers have no proper ICT knowledge, so they should be trained. Likewise, there is no easy access of internet in school, so Ministry of Education & Ministry of Communication Information Technology should provide free access of internet in schools, to teachers and students. Moreover, newly advanced ICT tools should be used to make teaching and learning mathematics more effective.

Recommendations

Since the present study was limited in the secondary school with in the Kathmandu district, so finding of the study may be generalized for the same district but it can't be generalized to all whole country. Due the limited resources, after analyzing the conclusion, the researcher has prepared the following recommendation for education implication

- The similar study should be done regional wise as well as national wise in order to establish the findings of the study
- The similar study should be done to find out the use of ICT tools in teaching mathematics.

- The government should provide the ICT lap for every secondary school to use the ICT in teaching mathematics.
- Government of Nepal should develop ICT related mathematics course and provide training for all community schools mathematics teachers
- The national level of training should be provided for all mathematics teacher about how to use ICT in teaching mathematics at secondary school
- The mathematics teacher should use of ICT any kind of secondary schools for positive manner
- Ministry Of Education should develop effective ICT tools for teaching and learning mathematics.

References

Acharya, T. R. (2015). *Effectiveness of GeoGebra software on mathematics teaching.* Unpublished Master's Thesis, Department of Mathematics Education T.U. Kirtipur, Kathmandu.

Alharbi, Eid. (2014). *A study on the use of ICT in teaching in secondary schools in Kuwait.* Cardiff school of education Cardiff Metropolitan University.

Bature, B. (2016). The Role of Information and Communication Technology as a Tool for Effective Teaching and Learning of Mathematics. *Applied & Computational Mathematics*, 1-3. doi:10.4172/2168-9679.1000333

Bhatta, S. D. (2008). Tackling the problems of quality and disparity in Nepal's school education: The OLPC Model. *Studies in Nepali History and Society, 11*(1).

Chrysanthou, I. (2008). *The use of ICT in primary mathematics in Cyprus: the case of GeoGebra* (Master's thesis). *University of Cambridge, UK*.

Cohen, L., Manion, L., & Morrison, K. (2007). Research Methods in Education (6th ed.). London and Ne

Creswell, J. W. (2014). *Research Design* (Fourth ed.). Los Angeles/ London/ New Delhi/ Singapore/ Washington DC: SAGE Pulication LTD.

GON. (2017).*Education in figures 2016 at-a-Glance. Ministry of Education, Science & Technology*.

Ibrahim, N. (2016, November 15th). The influence of ICT tools in teaching and learning activities. *The 2nd International Multidisciplinary Conference 2016*, (pp. 496-502). Retrieved from https://jurnal.umj.ac.id/index.php/IMC/article/viewFile/1235/1111

Joshi, D. (2016). *Status of use of ICT by secondary school students of Nepal.* International Journal for Innovative Research in Multidisciplinary Field.

Keong, C. C. Horani. S.& Daniel, J. (2005). *A study on the use of ICT in mathematics teaching. Malaysian Online Journal of Instructional Technology*. (MOJIT), 2(3), 43-51.

Kislenko, K., Grevholm, B., &Lepik, M. (2005). Mathematics is important but boring": Students‟ beliefs and attitudes towards mathematics. *Relating Practice and Research in Mathematics Education, 4,* 349-360.

Mahara, M. S. (2017). *Using ICT tools in teaching: perception and practice at secondary teacher.* Unpublished Master's Thesis, Department of Mathematics Education T.U. Kirtipur, Kathmandu.

Muijs, D. (2004). *Doing Quantitative Research in Education with SPSS.* London, Thousand Oaks, New Delhi: Sage Publications.

Sha, S. K. (2017). *Teachers attitude of media in teaching mathematics.* Unpublished Master's Thesis, Department of Mathematics Education T.U. Kirtipur, Kathmandu.

Sha, S.K(2021). *Effectiveness of GeoGebra in teaching learning geometry at secondary level*. Unpublished Master's Thesis, Department of Mathematics Education T.U. Kirtipur, Kathmandu

Shrestha, R. (2015). *Starus of ICT use in teaching/learning mathematics.* T.U Kirtipur, Kathmandu: Unpublished Master's thesis Deparment of mathematics education.

Samuel,O.A.(2014 Comparative Analysis of Information and Communication Technology(ICT).Application by Male and Female Academics in Africa.*Journal of Information Engineering and Application*,4(5),37-50

Timilsena, T. R. (2017). *Attitude of teachers of ICT in teaching mathematics.* Unpublished Master's Thesis, Department of Mathematics Education T.U. Kirtipur, Kathmandu.

Timalsina, N.R(2021). *Effectiveness of GeoGebra in teaching mathematics at secondary level.* Unpublished Master's Thesis, Department of Mathematics Education T.U. Kirtipur, Kathmandu

UNESCO (2007). *The UNESCO ICT in education programme*. United Nations Educational, Scientific and Cultural Organization (UNESCO): Bangkok, Thailand retrieved from www.unescobkk.org/education/ict.

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Appendix

Date: /…. /....

Dear sir/ Madam

I am Bal Krishna Banskota, an M.Ed. student at the Department of Mathematics Education, Tribhuvan University, Kirtipur, Kathmandu Nepal. This survey questionnaire has been designed to collect teacher's perspectives about Information Communication Technology (ICT) in teaching mathematics, especially in secondary education of Kathmandu .This questionnaire has been prepared in order to accomplish a research work entitled " **Practices of ICT Tools in Teaching Mathematics** " for the thesis of M.Ed. in Education in Mathematics as a requirement of the course 'Thesis Writing' (Math Ed. 544) - instructed by Bed Raj Acharya Head of the Department. The research is being carried out under the supervisor of Mr. Krishna Prasad Adhikari, at the Department.

Your cooperation in responding the questionnaire and your responses will have great value accomplishing my research. I appreciate your honest opinion and assure you that your responses will be completely anonymous. I promise that strict confidentiality will be maintained in my study ahead.

Thank you for your patience and cooperation in advance

Researcher

Bal Krishna Banskota

balkrishnabanskota38@gmail.com

Department of Mathematics Education

University Campus Kirtipur Kathmandu

Name: ……..

Institute: …….

Address: ……

Qualification/Specialization……

Sex: ☐ Male ☐ Female

Teaching Level: ☐ Primary ☐ Secondary

☐ Higher Secondary

School types: ☐ Public ☐ Private

Job Position: ☐ Part Time ☐ Full Time

Teaching Experience: ☐ Less than a year ☐ 1-5 years

☐ 6- 10 years ☐ above 10 years

1. Do you have any technology Department/ ICT unit at your school?

☐ Yes ☐ No

If the response is "No" have you ever talked to the authority to launch it?

☐ Yes No ☐

2. How long have been using ICT tools for your mathematics-teaching classroom?

☐ Less than a year ☐ 1-2 years

☐ 3-4years ☐ above 5 years

3. How often do you use the following ICT tools for mathematics teaching at school? Please give tick mark (√) which you feel the best option where, A= Always (at least one time in a day), F= Frequently (about once a week), S= Sometimes (once a month), R= Rarely (at least two times in a month) and N= Never (under no circumstance)]

ICT tools	A	F	S	R	N
Software					
GeoGebra					
Mathematica					
Graphic calculator					
Microsoft mathematics					
Math Editor					
Math type					
Other (specify) …….					
Apps					
Equation solver					
Math playground					
Math solver					
Photomath					
Math helper .					

Mal math					
Math games					
Math way					
Math king					
Equation tree					
Other(specify) ……					
Online resources					
khulakitab.com					
youtube.com/education					
mathword.com					
khanacademy.org					
coolmath.com					
midaseclass.com					
Other (specify)…….					

4. Practices of ICT tools in teaching mathematics

Statement	**A**	**F**	**S**	**R**	**N**
1.,I use ICT(computer, laptop with internet)to search for information during my lesson plan and prepare teaching materials .					

2. I use ICT (Interactive whiteboard/projector) to arouse and direct my learners' attention/make the lesson interesting					
3.I use email or web discussion to communicate with students					
4. I use social networking sites to communicate with students.					
5.I post homework for the students on the school/ collage websites.					
6. I use or download online materials as a learning and teaching resources					
7. I create a weblog or websites for students to share their activities.					
8. I refer to my students to use different ICT tools for encounters mathematical problems					
9. I give opportunity to the students to use ICT tools inside the mathematics classroom.					
10. I use different ICT tools by demonstrating and using in the classroom.					
11. I use different ICT tools to solve abstract and simple mathematical problems.					
12.I use ICT tools for mathematical works demonstrate by projector.					

Thank you for your patience and participation. your response are much appreciated.

USE OF ICT TOOLS IN TEACHING MATHEMATICS

By: BAL KRISHNA BANSKOTA

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