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Ghanaian Mathematics Teachers' use of ICT in Instructional Delivery

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Abstract

Purpose-The purpose of the study was to investigate the extent of ICT use among Ghanaian mathematics teachers in their instructional delivery.Design/methodology/approach: A cross-sectional survey design was adopted in the present study. A stratified sampling technique was used to select 120 mathematics teachers from 24 public Senior High Schools (SHS) with 12 schools each located in the rural and urban areas respectively. The study employed questionnaires in data collection.Findings: The findings of the study indicated the use of Word Processing, Internet and Calculators as very high. The study also revealed that mathematics teachers had favorable attitudes towards the use of ICT in teaching mathematics.

Index terms— teachers, mathematics, information communication technology, instructional delivery, senior high school (SHS).

1 Introduction

catch phrase in education today is Information Communication and Technologies (ICT) use. The rapid growth in ICT have brought remarkable changes in the twenty-first century, as well as affected the demands of modern societies. The call to integrate ICT in education has become a major concern to many countries all over the world. Until recently, the primary teaching resources available to teachers were the books in libraries. However, ICT has provided a new kind of support for instruction through the development of facilities that supports the teaching and learning process.

According to the Ministry of Education, Youth and Sports (MOEYS) and Ghana Education Service (GES) **??**2002), integrating technology in classroom instruction ensures greater motivation, increases selfesteem and confidence, enhances good questioning skills, promotes initiative and independent learning, improves presentation of information/outputs, develops problem solving capabilities, promotes better information handling skills, increasing focus time on task, and improves social and communication skills.

Several studies have revealed that ICT plays important role in teaching and learning mathematics. For instance, Becta (2003) assert that the use of technology in mathematics classroom allows the students to focus on strategies and interpretation of answers rather than spend time on tedious computational calculations. ICT use in mathematics instruction assists the learner in visualizing the process and concept role of symbols, which reaches great heights in calculus **??**Tall & Ramos, 2004). Ittigson and Zewe (2003) also opine that technology improves the way mathematics should be taught and enhances students understanding of basic concepts. It deemphasizes algorithmic skills resulting in an increased emphasis on the development of mathematical concepts.

Integrating ICT tools such as computers and scientific calculators in mathematics instruction have the potential to change pedagogical approaches radically and to improve individual student learning outcome by transforming the classroom social practices (Forgasz& Prince, 2004;Goos, 2005). It is therefore essential for Senior High School (SHS) mathematics teachers to use ICT tools in teaching and also urge students to use ICT tools in learning mathematics. This will enable the students to better understand the mathematical concepts taught.

2 II.

3 Statement of the Problem

A Design/methodology/approach: A cross-sectional survey design was adopted in the present study. A stratified sampling technique was used to select 120 mathematics teachers from 24 public Senior High Schools (SHS) with 12 schools each located in the rural and urban areas respectively. The study employed questionnaires in data collection.

Findings: The findings of the study indicated the use of Word Processing, Internet and Calculators as very high. The study also revealed that mathematics teachers had favorable attitudes towards the use of ICT in teaching mathematics. The study further showed that most teachers were competent in the use of ICTs such as Microsoft office word (???????? = ??. ??), PowerPoint(???????? = ??. ð ??"ð ??"), Excel (???????? = ??. ð ??"ð ??"), and Calculators(???????? = ??. ??). The findings showed that there is a positive correlation between mathematics teachers' use of ICT and competences (ð ??"ð ??" = ??. ??????, ?? $<$ 0.05).

Research Limitations/Implications : In common with others, the study is limited to public SHS mathematics teachers in the Central Region of Ghana. The results may differ if replicated in private SHS and other geographies.

Practical implications: A number of significant implications are drawn from this study, for example using,the Curriculum Research Development Division (CRDD) of the Ghana Education Service in collaboration with the related agencies in the Ministry of Education should carry out research to review critically the mathematics curriculum and revise the existing syllabus to explicitly state what ICT tools must be used and how it should be used in the teaching and learning process. Social Implication -The teaching institutions should endeavor to make the necessary provisions for more females to pursue mathematics in their pre-service education and also train them to develop the skills in ICT in order to integrate it in their instructional delivery.

Originality/ value : The paper provides valuable insights, from the key educational stakeholders' perspectives, into the use of ICT in instructional delivery. It has empirically shown the extent to which Ghanaian mathematics teachers use ICT.

provisions to ensure that Senior High School (SHS) students get access to quality education which takes into accounts the integration of ICT in instruction (MOESS, 2010). In view of this, education stakeholders and policymakers have made a remarkable step towards the introduction of ICT in SHS that will contribute to knowledge production, communication and information sharing among students and teachers in the school system. For instance, there has been an ICT for Accelerated Development (ICT4AD) policy which seeks to provide a framework in which ICT will be used to transform the educational sector, allowing all Ghanaians to pursue quality life-long learning opportunities regardless of their geographicallocation (Republic of **??**hana, 2003). Besides, the new educational reforms in Ghana, there is also high emphasis placed on the integration of ICT in all subject areas (MOESS, 2010).

Also, there has been a sudden increase in computer laboratories at all levels of the school system and this testifies to the potency of the use of ICT in education delivery (Yidana & Asiedu-Addo 2001). Furthermore, ICT has currently become a compulsory (core) subject for every SHS student in Ghana. Preservice mathematics teachers are trained to integrate ICTs in the teaching and learning of mathematics with practicing teachers been trained through workshops (to promote acquisition of technological pedagogical content knowledge (TPACK) (Mishra & Koehler 2006).

With such an increased emphasis on ICT and a large investment in its infrastructure, teachers are expected to be competent and effective in using it. However, with teachers' increasing knowledge of and familiarity with ICT and there being infrastructure to support it, many mathematics teachers are still not effectively and efficiently integrating ICT into their teaching (Buabeng-Andoh, 2015).

Evidence from other countries in the world, however, reveals that such commitments and investments in ICT in education do not lead to technology adoption **??**Gulbahar, 2007). Rather, technology adoption in educational settings is a complex process that is influenced by many other factors such as teacher-level, school-level, and systemlevel factors (Balanskat, Blamire & Kefalla, 2006). Sherry and Gibson (2002) argued that technological, individual, organizational, and institutional factors should be considered when examining technology adoption in educational systems.

There has been quite a number of research to investigate Ghanaian mathematics teachers and students' use of technology in teaching and learning and the factors that support or inhibit their effective integration into classroom practices (Boakye and Banini, 2008; **??**mollo, 2011, Agyei andVoogt, 2011). However, Mereku, Yidana, Hodzi, Tete-Mensah, Tete-Mensah, and Williams (2009) asserted that for Ghana, and Africa as a whole, to be able to fully integrate ICT into teaching and learning there is the need for frequent collection and analysis of data on ICT usage. It was therefore essential to conduct an empirical study to investigate ICT use among Ghanaian SHS mathematics teachers. Besides, the researcher also intended to investigate factors that influence ICT use in teaching mathematics at the SHS level.

4 III.

5 Purpose of the Study

The purpose of this study was to determining the extent of ICT integration in the teaching of mathematics at the SHS level in Ghana. Investigating ICT use in teaching and learning SHS mathematics was crucial because this knowledge could provide guidance for ways to enhance technology integration and encourage greater use of technology in teaching and learning mathematics.

6 Research questions 1. To what extent do SHS mathematics teachers use

ICT in teaching and learning mathematics? 2. What are the attitudes of mathematics teachers towards the use of ICT in teaching and learning of mathematics? 3. How competent are mathematics teachers in using ICT? 4. What factors influence the use of ICT in teaching and learning of mathematics?

IV.

7 Significance of the Study

The study is significant because it provides insights into teachers ICT use at the SHS level that is sustainable and transferable to other levels in educational ladder. The study provides empirical evidence on ICT use among mathematics teachers at the SHS level in Ghana. This might provide guidance for policy makers and stakeholders in education when structuring and introducing ICT integration policies in Senior High Schools. The study also adds to knowledge by providing new evidence about ICT use among mathematics teachers in Ghana.

8 a) Theoretical Framework

In a bid to understand the ICT use among Ghanaian mathematics teachers, the Diffusion of Innovations theory put forward by **??**ogers (2003) guided the study. The Innovation Diffusion Theory seeks to explain how innovations are taken up in a population. An innovation is an idea, behavior, or object that is perceived as new by its audience. ICT use by mathematics teachers and students is an innovation whose use depends on several considerations.

The theory, as mentioned above, purports to describe the patterns of usage, explain the mechanism,Year 2017 Volume XVII Issue VIII Version I (G)

and assist in predicting whether (and how) a new invention will be successful making it a more fitting theory in this context. Achieving complete success (if at all) in the adoption of a new innovation might usually take a considerably long time and sometimes this adoption is met with a lot of resistance from certain quarters of the society in which the innovation is to be diffused. Niccolo Machiavelli (1513) succinctly explains: "There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of a new order of things?" The "old order" of things in academic insofar as knowledge dissemination goes is the teacher standing in front of a class facing the students and imparting knowledge (Kuh 2001). The teacher in this old order is the "all-knowing" custodian of knowledge and the student the passive receiver or in some instances just a knowledge repository. In this old order, the use of chalk and talk method, variously referred to as the exposition method of teaching, has been the predominant way of this kind of knowledge dissemination.

The use of ICT in teaching and learning therefore is a relatively new innovation in this regard within the educational sector and indeed a fundamental change in the way SHS teachers and student conduct their core activities qualifying it to be "the new order of things" **??**Rogers 2003). SHS are known to be systems that are virtually hard to change. This is not only because of their inherent characteristic of bottomheaviness but also for the fact that the latter usually find themselves stuck in path dependencies and historical legacies that they try to uphold and protect making change in the way they conduct their core activity an evolution and not a revolution; a process rather than an event **??**Clark 1983). Notwithstanding this characteristic of being resistant to change, there has been a proliferation of ICTs in most if not all campuses around the world (Selwyn 2007; Adam 2003).

9 b) Conceptual Framework

According to Ogula, (1998) conceptual framework is a description of the main independent and dependent variables of the study and relationship among them. The study was conceptualized on the variables used in the objectives. This study isolated teacher and school factors as the main factors that may influence integration of ICT in teaching and learning of mathematics in particular (Becta, 2004). Teacher related factors are those that directly influence teachers' use of ICT in the teaching-learning process and include: teachers' knowledge and skills in the use of ICT, attitudes of teachers towards teaching using ICT and teacher's experience, among others. School factors on the other hand, refer to factors influenced by the institution. They include: support given to teachers by the school management which has a bearing on access to ICT facilities, school ICT policy, technical support in terms of availability of experts, spare parts and software required to keep the ICT tools functioning. Government policies influence both the adoption of new technologies by the teachers and the schools, which in turn, will affect the extent of integration of ICT in teaching and learning of mathematics. Figure **??** summarises the conceptual framework for this study Adoption of ICT in teaching and learning will depend on both the

teacher and school factors. For instance, if a teacher has the necessary skills and knowledge on how to integrate ICT in pedagogical practice, then he or she will be willing to try out this innovation and with time, he or she becomes confident in using ICT in teaching. Moreover, the teacher's pedagogical beliefs will influence the teaching strategy adopted when teaching a given lesson. The attitude of the teachers towards integrating ICT in classroom instruction could be influenced by the level of support by the school management. This study investigated how teacher and school related factors influence the use of ICT in the teaching and learning of mathematics.

10 Methodology a) Research design

The study used a cross-sectional survey to collect information on ICT use among SHS mathematics teachers and the factors that influence its' usage. Lavrakas (2008) opines that cross-sectional data are usually collected from respondents making up the sample within a relatively short time frame (field period). In a cross-sectional study, time is assumed to have random effect that produces only variance, not bias. Creswell (2012) argues that cross-sectional survey design has the advantage of measuring current attitudes or practices. Cross-sectional survey was preferred as a method of data collection over others in this particular study due to the fact that many questions were asked and it was possible to reach the entire SHS mathematics teachers within a short period of time **??**Fowler, 2002).

11 b) Population

The population of the study comprised of all public Senior High School (SHS) Mathematics Teachers in the Central region of Ghana. Central region was chosen for this study because on of the researchers has been teaching in the region for the past seven years and is familiar with the academic environment in the region. Mathematics teachers were used in the study because the mathematics curriculum in particular emphasizes the use of ICT in the teaching and learning process.

12 c) Sample and sampling technique

Stratified sampling technique was used to select 120 mathematics teachers from the Central region of Ghana. According to Mason, Lind and Marchal (1999) a stratified random sampling is when the population is first divided into subgroups, called strata. A sample is then selected from these subgroups and then the sample for the study is thus selected from the stratum. Stratified sampling technique was used in this study because most of the SHS in Central region are located in both rural and urban districts. Therefore to be able to get equal representatives of SHS from both rural and urban settings, stratified sampling technique was employed. The distribution of the sampling procedure is presented in Table 1. After a careful review of appropriate literature, questionnaire was chosen as the instrument to collect data to answer the questions set for this study. Questionnaire was chosen because it took less time to administer them and also ensured the anonymity of respondents (Fraenkel & Wallen, 2000).

13 VI.

14 Data Analysis

All the questionnaires were checked to ensure they had all been correctly filled. Then the data collected was coded appropriately and then analysed using Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive statistics including percentages, means and frequency tables were employed in the analysis. This was used to find out the extent to which SHS mathematics teachers use ICT in teaching mathematics, mathematics teachers IC competence and the attitudes of teachers towards the use of ICT in teaching of mathematics.

To identify the factors that influence ICT usage in teaching of mathematics, Pearson Product Moment Correlation was used to find the relationships between dependent variable and independent variables. This is one of the two mainly used measures of association or correlation among variables in educational research (Cohen et al., 2011).

15 VII.

16 Results and Discussion

17 a) Background Information of Mathematics Teachers

The background information regarding the mathematics teachers is presented in Table 2. The result of the study it indicated that 72.5% and 27.5% of the mathematics teachers in the sampled schools were males and females respectively (see Table 2). This skewed ratio is a reflection of the low population of girls pursuing mathematics at the tertiary level of education. Pertaining to the age of the teachers as shown on Table 2 Total 24 120

subject is important because it could contribute to good content mastery by the teacher. This study showed that all mathematics teachers in the sampled schools are professionally qualified with 67.5% and 21.7% having Bachelors and Masters Degrees respectively. This is an important aspect since according to Allison (1997) skilled and knowledgeable workforce is closely linked with successful implementation of technology. The study showed

that 60.0% of the teachers in the study sample have interacted with computers for between one and six years while 40.0% have computer experience of more than six years (Table 2). From Table 2, a good proportion (77.5%) of the teachers in the sampled schools have been trained on use of computers. Some of the teachers were trained during their pre-service teacher training since computer studies are offered in teacher training institutions and universities as a service subject. The study showed that 85.0% of the mathematics teachers in the sampled schools have been trained on how to integrate ICT in the teaching and learning of mathematics.

18 b) Extent of ICT integration in Teaching and Learning of Mathematics

The first research question raised in this study was to find out the extent to which SHS mathematics teachers use ICT in teaching and learning of mathematics. To answer this question, the mathematics teachers' use of ICT in teaching mathematics was examined. The mean ratings were interpreted using the guide; 2.25 < ?? ? 3.0 (Very high), 1.5 < ?? ? 2.25 (high), 0.75 < ?? ? 1.5 (moderate) and 0 < ?? ? 0.75 (low).

Use of word processing, Internet and Calculators were rated very high (mean ratings = 2.33, 2.73, and 2.41respectively). This is consistent with the findings of Becker, Ravitz and Wong (1999) who established that word processing and World Wide Web (WWW) browsing software were the most commonly used applications by teachers regardless of the subject they taught. The use of PowerPoint, Excel, Computer and Mobile Phones were rated high (mean ratings = 1.76, 1.94,1.99 and 2.10 respectively). The use of the other ICT tools, including Projector and Educational CDs were rated moderate (mean ratings = 1.32, and 1.31 respectively). This could mean that teachers are yet to realise that Projector and Educational CDs s were useful ICT tools that could be used in the teaching and learning of mathematics. The use of Radio, Television, Digital Camera and Video camera were rated low (mean ratings = 0.22, 0.41, 0.34 and 0.44 respectively).

19 c) Attitudes of Mathematics Teachers towards the Use of ICT in Teaching and Learning

The second research question raised in this study was to find out theattitudes of mathematics teachers towards the use of ICT in teaching of mathematics. To answer this question, the mean scores Ghanaian Mathematics Teachers' use of ICT in Instructional Delivery of positive and negative statements were calculated. The mean scores (??) ranged from 3 < ?? ? 5 for favorable feelings and 1 < ?? ? 3 for unfavorable feelings for positive statements and vice versa for negative statements. Tables 4 shows the mean ratings for both positive and negative statements. From Table 4, the mean ratings for all the positive statements were in the range 3 < ?? ? 5while those for the negative statements were in the range 1 < ?? ? 3. This implies that mathematics teachers in the sampled schools have favorable attitudes towards the use of ICT in teaching mathematics. However, this positive attitude towards use of ICT in teaching mathematics is not reflected in actual use of ICT especially in lesson delivery. This revelation is inconsistent with other findings which have reported that teachers' actual ICT use is related to their perceptions **??**Altun, Alev&Yigit, 2009;Keengwe & Onchwari, 2008;Lau & Sim, 2008). This finding, on the other hand, is in confirmation with Eugene (2006) who explored the effect of teachers' beliefs and attitudes towards the use of ICT in classrooms. The study revealed that there was inconsistency between teachers' beliefs and their actual use of technology in classroom. Teachers' beliefs and teaching practices were found not to match. The inconsistency between teachers' actual use of ICT and perception can be attributed to inadequate supply of ICT resources, lack of access to the right kinds of technology, inadequate ICT pedagogical training and insufficient administrative support.

20 d) Mathematics Teachers' ICT Competency

The third research question raised in this study was to find out mathematics teachers' ICT competence. To answer this question, the mathematics teachers' ICT competence in teaching mathematics was examined. The mean score (??) for competence was calculated based on the items in the questionnaire and interpreted based on the guide; 3.4 < ?? < 4 ? excellent, 2.4 < ?? < 3.4 ? very good, 1.4 < ?? < 2.4 ?good, 0.4 < ?? < 1.4 ?fair and 0 < ?? < 0.4 ? poor. Table 5 shows the results.

The study showed that most of the teachers perceive themselves as very good in use of software such as Microsoft office word (???????? = 2.9), PowerPoint(???????? = 2.6), Excel (???????? = 2.6), and Calculators(???????? = 3.1). They also rated themselves as being very good in use of computer (???????? = 2.4. The result is in agreement with Jegede et al., (2007), and Lau and Sim (2008) who found teachers to be more proficient in word processing than the other computer applications. This could mean that teachers lack skills in other computer application programmes. Evidence reveals that teachers' mastery in ICT skills is critical to successful integration of ICT into teaching **??**Rosenfield et al., 2005). Most of the teachers are fairly competent in use of the computer as an ICT tool. However, most of them seem to be less skilled in the use of essential ICT tools such as digital and video cameras, and projectors which could be used together with a computer when integrating ICT in teaching mathematics. Most of the teachers rated themselves as 'very good' in using Internet (???????? = 3.4) which is an important ICT tool. Using Internet, teachers can access up to date information on various concepts in mathematics and ways of teaching some concepts perceived to be challenging by teachers.

Internet can facilitate collaboration among mathematics teachers and hence creating a platform where they share ideas on how to teach mathematics better. Generally, the mathematics teachers in the sampled schools are fairly competent in the use of various ICT tools.

21 e) Factors Influencing the use of ICT in Teaching of

The last research question raised in this study was to find out the factors influencing the use of ICT in teaching mathematics. To answer this question, the correlation between ICT use and the factors that influence its' usage were examined. The main factors which came out as responsible for influencing teachers in the use of ICT in teaching were: perception, competency, teaching experience, access to ICT facilities and experience in computer use. Table 6 shows correlation matrix based on the teachers responses (?? = 120). The findings showed that there is a positive correlation between mathematics teachers' use of ICT and competences (?? = 0.421, ?? < 0.05). Newhouse (2002) found that many teachers who lacked the knowledge and skills to use computers were not enthusiastic to use them in teaching. The analysis revealed a low positive correlation between mathematics teachers' perceptions and ICT use, although not statistically significant. The study further revealed a positive correlation between mathematics teachers' access to ICT tools and use of ICT (?? = 0.372, ?? < 0.05). This is in support of Empirica's (2000) European study which found that lack of access is the largest barrier to using ICT in teaching.

The study also showed positive relationship (although not statistically significant) between computer experience and ICT use. Petrogiannis (2010) examined 396 kindergarten teachers' perceived preparedness for computer use in the pre-school classes and the potential difference between computer experienced and non-experienced teachers. They concluded that computer experienced teachers were more ready to use ICT in their classes than non-experienced teachers.

Finally, the study revealed inverse correlation between ICT use and teaching experience although not statistically significant. This finding supports Van Braak et al., (2004), Inan and Low ther (2010), Roberts et al., (2003) assertions that ICT use falls with teaching experience and that younger teachers integrated ICT into their teaching more than experienced teachers. This study also revealed inverse correlation between teaching experience and competence. Therefore, the veterans' less use of computers could be attributed to limited computer competence (Bingimlas, 2009).

22 VIII. Conclusions and Recommendations a) Conclusions

This study investigated the extent of ICT integration in the teaching mathematics. In addition, the study established a number of factors that influence the integration of ICT in teaching mathematics in the sampled schools in the Central region of Ghana.

On the extent of ICT integration in teaching of mathematics, this study revealed that ICT use in instructional delivery was minimal despite the fact that most of the mathematics teachers in the sampled schools had been trained to integrate ICT in their profession. ICT will benefit both the learners and teachers if it is made use of during lesson planning, lesson delivery and in assessment. For this to be realised, all the factors identified should be taken into account, especially provision of relevant training on how to integrate ICT in lesson delivery. The following factors were identified to influence ICT integration in the teaching of mathematics.

The possession of the necessary skills and knowledge in use of ICT is an important consideration that determines the extent of ICT integration in teaching mathematics. Although a good proportion of the mathematics teachers in the sampled schools rated themselves as 'good' in the use of ICT tools, they moderately employed ICT in the teaching and learning process. This could mean that mathematics teachers lack the skills to integrate ICT in actual lesson delivery.

The attitude of teachers towards use of ICT in teaching mathematics influence ICT use in teaching mathematics. Mathematics teachers were found to have positive attitudes towards use of ICT in teaching although this was not reflected in actual use. The mismatch between the actual use of ICT by mathematics teachers and positive attitude could be due to other barriers such as lack of inadequate ICT facilities, lack of time, inadequate skills among others.

The study revealed inverse relationship between teaching experience and ICT use. This implies that the older the teacher, then the less they are likely to integrate ICT in their lessons. The study further established inverse relationship between teaching experience and competence. This means that the older teachers are less competent in use of ICT and therefore they use less of it in their lessons. This could be due to the fact that when the older teachers were being trained in colleges, use of computers had not picked up in educational institutions and therefore they did not get the opportunity to interact with computers.

23 b) Recommendations

A number of recommendations were made in this study. Some of the recommendations are for action by stakeholders in education while others are for further research. ? The Heads of the institutions should make budgetary allocations annually to maintain, replace and expand ICT facilities and resources in the schools in order to promote effective integration in the teaching and learning process. ? The Ministry of Education should endeavor to equip both rural and urban SHS with well-furnished computer laboratories to enable both the teachers

and students to get high access to technology resources. ? The teaching institutions should endeavor to make the necessary provisions for more females to pursue mathematics in their pre-service education and also train them to develop the skills in ICT in order to integrate it in their teaching.

24 d) Recommendations for Further Research

It is suggested that this study should be replicated to include Form one students in Ashanti region.

? It is recommended that this study should be replicated to include private SHS in the Central region of Ghana. [1]

1

Source: Field Data, 2017
d) Instrument

Figure 1: Table 1 :

2

Variable	Category	Frequency %	
	Male	87	72.5
Gender	Female	33	27.5
	Total	120	100.0
	20-30 years	58	48.3
	31-40 years	50	41.7
Age	41-50 years	11	9.2
	51-60 years	1	0.8
	Total	120	100.0
	Less than one year	9	7.5
Teaching Experience	1 -3 years 4 -6 years 7 -10 years	25 42 31	20.8 35.0 25.8
	11 years and above	13	10.8
	Total	120	100.0
	Diploma	13	10.8
Professional	Bachelor's degree	81	67.5
Qualification	Masters	26	21.7
	Total	120	100.0
	Less than one year	4	3.3
Experience using Computers in	1 -3 years 4 -6 years 7 -10 years	12 56 31	10.0 46.7 25.8
	11 years and above	17	14.2
	Total	120	100.0
Training on Computer Use	Yes No Total	93 27 120	77.5 22.5 100.0
Training on ICT	Yes	102	85.0
Integration in	No	18	15.0
Mathematics	Total	120	100.0

Source: Field Data, 2017

Figure 2: Table 2 :

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3

ICT Tools	N	Mean (?????? = ??)	Std. Deviation
Word (or equivalent software)	120	2.33	0.96
PowerPoint (or equivalent software)	120	1.76	1.02
Excel (or equivalent software)	120	1.94	1.07
Calculators	120	2.73	0.73
Projector	120	1.32	1.09
Internet	120	2.41	0.92
Educational CDs	120	1.31	1.03
Radio	120	0.22	0.54
Television	120	0.41	0.85
Computer	120	1.99	0.99

Figure 3: Table 3 :

4

ICT Tools

Figure 4: Table 4 :

5

Extent of Knowhow in use of	N	Mean (?????? = ??)
Extent of Knowhow in use of Word (or equivalent software)	120	2.9
Extent of Knowhow in use of PowerPoint (or equivalent software)	120	2.6
Extent of Knowhow in use of Excel (or equivalent software)	120	2.6
Extent of Knowhow in use of Calculators	120	3.1
Extent of Knowhow in use of Projector	120	1.7
Extent of Knowhow in use of Internet	120	3.4
Extent of Knowhow in use of Computer	120	2.4
Extent of Knowhow in use of Digital camera	120	1.6
Extent of Knowhow in use of Video camera	120	1.4
Overall mean = ??. ????		
		Source: Field Data, 2017

Figure 5: Table 5 :

6

1	2	3	4	5	6

Figure 6: Table 6 :

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Figure 7:

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