ICT Usage and Perceptions of public Primary School Teachers in Botswana, case of Gaborone

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Abstract

Information and Communication Technology (ICT) is growing and taking many sectors of economy in many countries. It is seen as a desire technology to drive economy. However, this dream is hardly turned into reality and many countries have an agenda to make the dream reality. Some countries are close to making the dream reality particularly developed countries, while other countries still have long way to go. Botswana like any other developing countries have joined the race but still have long way to go. Usage of ICT for teaching in secondary schools is improving, but found to be very infant levels at primary schools. From the findings, it is clear that teachers still lack skills and do not have confidence in using ICT for teaching. However, teachers who hold degree qualification seem to use ICT more often compared to those with diploma qualifications. Some challenges resulting in low usage are due to insufficient resources, negative attitude of teachers and lack of training. Also there are no incentives that encourage usage of ICT in schools and this even demoralize those who may perhaps have interest in using ICT in teaching. Introduction of trolley approach should be considered, tested and perhaps can be a solution for improving ICT usage in schools.

1   Introduction

The use of ICT is found to be playing a very important role for improving quality of teaching and improving student's eagerness to learn. It has also been found that the use of ICT creates conducive environment for learning and teaching hence making the duo effective and efficient. This is supported by the report published by UNESCO (2005). The latter provides ICT Framework that entails guidelines for infusion of ICT into curriculums.

In realizing the benefits of ICT learning pedagogy, most of the developing countries have joined the race of infusing ICT into their education systems. The level of implementation of phenomenon varies from country to country with some countries ahead. Ministry of Education and Skills Development (MOE &SD) in Botswana has joined the race with the aim of improving the quality of education as well as providing effective and vibrant teaching and learning environment. This is done by introduction of ICT such as a television broadcasting, smart boards and radio broadcasting. Moreover, through implementation of electronic government (e-government) strategy, the ministry plans to introduce electronic learning (e-learning) in all government schools and this has been highlighted by Botswana's National ICT Policy, Maitlamo (2004). However, Al-Zaidiyeen et al (2010) emphasized that before governments can consider using ICT to enhance teaching and learning, teachers need to be fully equipped with ICT skills as they are the ones who have huge impact on making it happen. One can consider this to be true because as indicated by Gulbahar and Guven (2008), students are influenced by their teachers on whether to use technology or

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not in their learning. That is, the desire to learn and use technology is influenced by seeing their trainers and teachers using technology to teach. Development of teachers' positive attitudes toward ICT is critical for avoiding teachers' resistance to ICT use in teaching and promoting e-learning at schools. In order to develop the teacher, it is important to know their current ICT skills status and their attitude towards using ICT in their day to day teaching. Many factors have been identified to contribute to negative attitude towards ICT usage, one of them been lack of ICT skills. In order to train, it is necessary to have literature that fully informs on the specific skills that they are short off and how to carry out such trainings. The findings on skills possessed by teachers in Botswana used as an advisory tool for decision makers when planning training for teachers. This study is carried out to investigate and shed the light on the different technological skills sets possessed by teachers at primary school level.

1.1   ICT in education

Despite the growing interest in the use of technology by different countries including Botswana to easy the process of teaching and learning, it is not clear whether Botswana primary school teachers are using ICT in their day to day teaching activities. Decision makers need to know the skills possessed by their teachers and whether these teachers possess relevant skills needed (if they do, to what extends) to use ICT to support teaching and learning process and identify the barriers affecting the use of the technology. Thus, this study is conducted to provide a valid and reliable assessment of the level and nature of ICT knowledge and skills among Botswana government primary school teachers. The study also aims at establishing the extent to which teachers are integrating their ICT knowledge and skills in classrooms; to identify factors or barriers seen by teachers as impacting on the

development of ICT competence and its integration in teaching and learning; and to determine potential ICT support and development strategies to enhance effectiveness and efficiency in the future.

1.2   Objectives

The survey therefore will concentrate on the following objectives:

- Investigate and find out ICT skills that primary school teachers posses
- Carry an investigative work on to what extend primary school teachers infuse ICT skills in their class room activities
- Identify barriers that hinder the use of ICT by primary school teachers in their class room activities
- Propose approach that can promote use of ICT to support teaching and learning.

1.3   Survey questions

In order to shed light on the objectives above, this survey mainly focused on the following eleven (11) questions.

1. Which ICT resources (software, instructional tools and materials) do primary school teachers possess skills on?
2. Which ICT resources (software, instructional tools and materials) do primary school teachers use?
3. How often are the ICT resources used by primary school teacher in their classroom?
4. What are the incentives that encourage primary school teachers' technology usage?
5. What are teachers' perceptions of self-efficacy in relation to ICT usage?
6. What is the barriers primary school teachers face during technology usage in the teaching-learning process?
7. Is there any relationship between awareness and self-rated expertise level

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of teachers and, between self-perception of efficacy and self-rated expertise level of teachers?

8. Is there any relationship between teachers' computer related tools usage in the classroom and self-perceptions of efficacy?

9. Is there any relationship between teachers' computer related tools usage in the classroom and level of expertise?

10. Is there any relationship between having a computer at home and the expertise level of teachers?

11. What are teachers preferred methods for professional development?

1.4   Significance of study

This survey is conducted to provide a valid and reliable assessment of the level and nature of ICT knowledge and skills among Botswana government primary school teachers. The evaluation also aims to establish to what extent these teachers are integrating their ICT knowledge and skills into the classrooms; to identify factors seen by teachers as impacting on the development of ICT competence and its integration in teaching and learning; assessing the barriers that hinder the use and to determine potential ICT support and development strategies to enhance effectiveness in the future.

- To provide a valid and reliable assessment of the level and nature of ICT knowledge and skills among government primary school teachers;
- To establish to what extent teachers are integrating their ICT knowledge and skills in classrooms;
- To identify factors seen by teachers' as impacting on the development of ICT Competence and its integration in teaching and learning;
- To determine potential ICT support and development strategies to enhance effectiveness in the future.

2   ICT initiatives in Botswana

Although benefits of ICT have been known, use of ICT in Botswana has not much been documented until a decade ago when a policy called Maitlamo national ICT policy that govern ICT in general was drafted and put to use (Maitlamo 2003). The policy's aim is to enable Botswana to become a hub of ICT infrastructure and ICT solutions that enhance sustainable socio-economic development and accelerated poverty reduction nationally and regionally. There have been several initiatives related to the integration of ICT in institutions ranging from primary schools, secondary schools, colleges to universities. The main aim has been to improve education in primary schools, secondary schools, teacher training colleges, vocational education colleges, higher learning institutions and other related institutions that deal with the provision of education. These initiatives are done at both the local level as well as at the national level. There have been several initiatives highlighted at Southern African ICT for Education Summit 2012 by Government of Botswana on its education system. To ensure that students are fully exposed to effective and vibrant education environment, the government through ministry of Education and Skills Development has tasked itself with the following:

- All government schools data network connectivity
- Development/procurement of Education Management Information System
- Provision of computers for computers for Schools and provide repair workshops
- Provide professional development for instructors
- Building of second university in the country dedicated to ICT-based skills and expertise

Equipping teachers with ICT skills is among government goals. Assessment such as this study will alert the government on where they should start, status of ICT skills on the teachers and relevant approach that can be used for up skilling the instructors. According to the report from the summit, the government plans to furnish the 235 secondary schools with ICT

infrastructure. Primary schools are also been slowly furnished with ICT infrastructure even those there are still lots of challenges. Some primary schools are found in areas where there is no electricity. While the ICT initiatives in government are applauded, little is known about the teachers' current status of ICT skills, usage, attitude and perceptions about the technology. Countries which are ahead with adoption of ICT into education system have done lots of assessments and investigations on the current skills possessed by teachers, the level that they apply the skills on their teaching activities and identification of barriers that may hinder the use of ICT (Mwalongo, 2011), (Gulbahar and Guven, 2008), (Al-Zaidiyeen et al, 2010). Investigation like this one will lay foundation and report on the status of ICT in driving education in Botswana.

3   Method

Simple random method of sampling was used. Names of all primary schools in Gaborone were written in pieces of paper, folded and put in a bowel and mixed. At random a pieces of paper was picked, unfolded and teachers for those schools were given questionnaire to fill. 120 teachers in 10 primary schools in Gaborone were used for the survey. The survey was composed of five parts. The first part of the survey consisted of 24 items regarding teachers' software use, as well as other instructional tools and materials. The purpose of this part was to find out the self-expertise level of the social studies teachers. The second part consisted of 9 items about preferences for professional development on information gathering and support. The subsequent part consisted of 8 items about factors that encourage teachers' usage of technology. In the fourth part of the survey there were 18 items related to teachers' perceptions of self-efficacy. Finally, the last part was composed of 19 items regarding the barriers

that teachers faced during technology utilization in the teaching-learning process.

4   Results

ICT resources used by primary school teachers

The majority of primary school teacher in this study, 83.33% have access to a computer at their respective schools and among them only 44.44% have access to the Internet. Daily computer usage of primary school teachers is shown in Figure 1. As shown, 22.22% of all teachers who participated never use computers at all. 44.44% uses a computer for less than one hour, 22.22% uses a computer for between 1 and 3 hours, no one uses a computer for between 3-5 hours and 11.11% uses a computer for more than five hours a day.
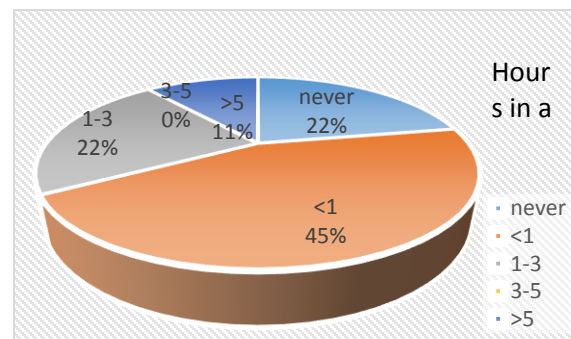

Figure 1: Computer usage per day

Primary school teachers specified their level of expertise on thirteen types of computer software by using a three point likert-type scale (that is, 1=Good, 2=Average and 3=None) (α=0,88). Slightly under 30% of the participants rated their skills as average or high at word processing, spreadsheets, presentation software, and computer aided instructional software, web browsers, search engines, electronic mail, chat/forum, electronic encyclopedias and instructional films. Primary school teachers indicated their usage of eight types of instructional tools and materials by using a three

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point likert-type scale (1=Frequently, 2=Sometimes and 3= Never) (α=0,82). The mostly used instructional material and tools are as follows; printed materials at 64.71%, followed by use of television/video at 38.89%, Video camera at 33.33% and Radio Cassette Recorder at 31.58%. Usage of other tools is very low, with less than 20% of participants frequently using them.

Teachers preferred methods for professional development

Primary school teacher's preferences for professional development, namely accessing knowledge and support services were taken through 5 questions. A three-point likert type scale (1=I prefer, 2=Neutral and 3=I don't prefer) (α=0.49) was used. Figure 2 shows the preferences of teachers on how they want to be given training for acquiring ICT skills. Participants development preferences are as follows: In-service development = 83.33%, internet = 78.95%, printed material and self-experience preferred by 73.68% as well as participating in seminar or taking course. On the other hand, the majority of teachers favored every kind of support service: experienced teachers (78.94%), colleagues (78.84%), technical support group within the school (73.68%) and teachers from other schools getting low of 36.84%.

Support Resources

Figure 2: The preference of teachers on how should be trained

The incentives that encourage primary school teachers' technology usage

The participants used a three-point likert-type scale (i.e. 1=Important, 2=Neutral and 3=Not Important) to rate their level of importance on 8 statements about incentives for adoption. All the statements were rated as important incentives by over 63% of the teachers except investment of institution in instructional technologies which was at 47.37%. (α=0.52). The rating were as follows for the incentives that encourages technology usage: Rewarding the technology usage effort in teaching activities is support by 66.67% of teachers, investing in institutional infrastructure to support teaching using technology supported by 63.16%, in-service education programs for instructional technologies is supported by 68.42% of the participants, also 68.42% of teachers supported that studies need to be done on how technology can be infused into curriculum at schools and the workload for teachers need to be reduced so that they can have enough time to learn and use technology in the teaching activities.

Teachers' perceptions of self-efficacy in relation to ICT usage

The participants used a three-point likert-type scale (i.e. 1=Agree, 2=Neutral and 3=Disagree) to specify their perceptions on 18 statements about using computers and instructional technologies (α=0.79). The results showed that teachers believe that technology will bring to them advantages, but they lack the basic skills of computer usage, and they also feel that their skills are lacking for other technologies which could also be used as an aid in the classroom. 73.7% of the participants do not use computers as much as any other resources, 57.9% only knows what to do when using computer for instructional or teaching purpose, 78.9% are

aware of the opportunities provided by computer in instructional environment, 15.8% can answer the questions about ICT that learners may ask, 38.9% are not sure whether they are computer literate, 15.8% do not want to use computers in their teaching activities, 47.4% think they can effectively use instructional technologies in their daily teaching activities, 63.2% believe that communication tools such as emails can easy interaction with learners and colleagues, 88.9% agree that use of technology to support teaching will make learning more effective, 83% believe that use of technology increase student's interest towards learning the subject or course and 33.3% find it hard to explain use of computers to their students. In average, 61.3% have positive attitude towards using ICT to support teaching and learning process, 26.3% are neutral, do not sure whether support or do not support use of technology and 12.4% have negative attitude.

Barriers primary school teachers face during technology usage
The participants used a three-point likert-type scale (i.e. 1=Agree, 2=Neutral and 3=Disagree) to rate their level of agreement on 19 statements about barriers to adoption (α=0.87). Of the 19 statements, 17 have been rated by more than 50% of the teachers as major barriers to adoption of technology into the teaching-learning process. Of these 17 statements the top three are; (1) inefficiency of teachers' technical knowledge to prepare materials based on technology, (2) inadequacy of the technology courses offered to students and (3) lack of incentives for encouraging technology usage.

Relationship between qualification, technology usage and perception
100% of those teachers with degree qualification use a computer at least one hour a day. More teachers with degree tends to use spreadsheet over word processor in contrast with trends

observed in most of the countries. 100% use emails software for emails.

5   Discussion

There are few studies that have analyzed how ICT is used in delivery of educational material to learners at early educational stages such as primary school level in developing countries such as Botswana. Studying teacher's perspectives on ICT allows the suggestion of methods that perhaps can help in successful integration of ICT into teaching and learning procedures. This is the first study carried in Botswana, allowing primary school teachers to asses themselves and discovering how teachers are integrating ICT into their teaching approaches.

Perceptions and skills in relation to ICT have been globally recognized as an important factor in the success of technology integration in education. It is clear from the findings of this study that primary school teachers understand the benefits and advantages of ICT usage in education. Teachers considered computers as a viable educational tool that has the potential to bring about different improvements to their schools and classrooms. The findings of the study have further shown a very strong positive correlation between teachers' attitudes toward ICT in education and their perceptions of the advantages of the use of computers. However, teachers' perceptions of the compatibility of ICT with their current teaching practices were not as positive. Teachers pointed out that the class time is too limited for ICT usage. Hence, the introduction of ICT innovations into education requires promoting structural, pedagogical and curricular approaches.

This study also examined the extent to which teachers have access to ICT equipment and the frequency with which they use computers for

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various activities in schools. The results showed that teachers mostly prefer tradition teaching using white/black boards, printed materials, and television/video and radio cassette recorder for instructional aims.

Those teachers with ICT skills and their schools are connected to internet mostly use computers for accessing information on the Internet, communicating electronically, doing word processing and spreadsheet. It is surprising that no teacher have shown that they use PowerPoint for presentation and demonstration in their classroom delivery. However, some reasons conversed are that there are no projectors in classrooms and computers that can be used during presentation times. The most favored approach is printed materials and educational software are less used as more than 72% do not use any educational software, in fact it is observed that teachers are not aware of such software although some of them are open source. When asked about preferred ways of acquiring ICT skills, primary school teachers highly supported seminars and workshops with above 79.1% followed by Internet resources by 78.95% and Printed materials and self-study at 73.68%. The approaches coupled together may be highly beneficial and decision makers should consider using them together to give teachers necessary ICT skills. Another dimension of interest was about teachers exchanging ICT skills within themselves. When asked about this dimension, teachers favored three support service: experienced teachers sharing ICT skills was supported by 78.94%, colleagues from same schools supported by 78.84%, technical support group within the same school supported 73.68%. This shows that when given the environment to acquire ICT locally in their respective schools, teachers are highly interested and they can participate in learning and acquiring ICT skills exercise.

Teachers pointed out the need for some sharing of experiences and discussion of new technologies and contemporary issues, so that teachers receive support in trying to keep up with new developments in ICT. In addition to longer practical work, teachers needed more resource materials such as supplementary workbooks and a resource center where they could find teaching materials and ideas. While Botswana has pertinent initiatives of having the resource centers in place around the country which lead to establishment of Sesigo project (Sesigo project 2010), it is pointed out that centers are still scares and it will take time for the centers to be available and fulfill the needs of teachers in Botswana. On the positive side, majority of teachers acknowledged the importance of using ICT in their own teaching. However, the same majority particularly those without degree reported a lack of confidence in applying ICT in their teaching. This shows that there is at least desire of applying technology in teach but the hindering factor is confidence to use the technology when is available. In fact, from the findings it is shown that teachers maintained an increased enthusiasm to apply ICT in their teaching in every circumstance. Based on these results, the training course for giving the teachers enhanced skills in pedagogical and technical use of the ICT-based learning, program components and an increased motivation for using ICT is needed. The self-expressed feeling of primary school teachers, that they lacked the "technical knowledge to prepare materials based on technology", showed the importance of in-service training and paralleled the result on instructional tools and materials usage. Moreover, teachers appear to be unaware of possible technologies that could be helpful in the teaching processes and the majority does not use ICT. On the other hand, all kinds of professional development preferences and support service opportunities were highly rated, showing the willingness of teachers to

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learn and highlighting the lack of in-service training opportunities.

There were no supplementary measures to enable educators to develop positive attitudes toward the new tools and to use them. This has often resulted in ad hoc approaches to implementation. It is necessary for teachers to have the appropriate skills, knowledge and attitudes to integrate ICT into the curriculum. That is, teachers should become effective agents to be able to make use of technology in the classroom. Ultimately, teachers are the most important agents of change within the classroom arena. This results may be compared to the findings by Gulbahar and Guven (2008): perception and usage of ICT by social studies teachers in Turkey. Although the some similarities may be observed, but some factors such as resource limitations are not challenges in Turkey as schools are fully equipped with ICT infrastructure. Botswana can however benchmark from such countries as they were in the same situations in the past as Botswana now.

 A strong relationship between teachers' level of qualification and teachers' computer usage is observed as all teachers with degree qualification use computer for at least one hour every day. Looking into this, one may argue that if most of the primary school teachers could be trained up to degree level, ICT usage at primary schools may perhaps significantly improve. The lack of confidence in using ICT in teaching, as observed in this study, could be as a result of factors such as less exposure to ICT during teachers training at colleges of education in Botswana, less resources at schools to support ICT usage and more importantly lack of in-services training as some teachers verbally expressed concerned about lack of in-service training. In order to solve these problem, it could be suggested that in-service courses be organized on the basis of introductory problem based–learning workshops, where teachers could learn and practice the method to be used during the implementation of the learning program. The results showed that although teachers are willing to use ICT resources and are aware of the existing potential, they are facing problems with accessibility to ICT resources and lack of in-service training opportunities.

The primary school teachers under rated the item "Investments by the institution on infrastructure of instructional technologies". For the schools considered to be highly equipped with ICT resources, primary school teachers pointed out that one of the main barriers to technology implementation is insufficiency of teachers' technical knowledge to prepare materials based on technology. This may enlighten decision makers that equipping schools with ICT is just not enough for attaining educational change. The introduction of ICT into education would require an equal level of innovation in other aspects of education. The inadequacy of the technology courses offered to teachers in colleges and the lack of incentives for encouraging technology are further barriers to ICT usage. As mentioned by Gulbahar and Guven (2008), "teachers' attitudes toward computer technologies are also related to teachers' computer competence. Teachers' computer competence is a significant predictor of their attitudes toward computers. Teachers who have difficulty using ICT maintained that the main barriers were lack of knowledge and skills with computers that would enable them to make informed decisions".

The results related to self-efficacy validated the findings of both inefficient use of technology due to lack of knowledge and strong belief in the potential of using technology in and out of class activities. Besides these, results once more indicated that most of the primary school teachers are computer-illiterate and they need in-service training. As government is planning to introduce e-service as stipulate in Maitlamo ICT

national policy, primary education should not be left behind. The good start is to train teachers teaching at the primary level. Usage of ICT in education is a complex process where many agents play different roles. Forces that may influence or impede ICT usage outside formal schooling should be taken into consideration. Contrary to this fact, much of the early research on computer use in education has ignored teachers' attitudes toward the new technologies. Studies focused on ICT and their effect on teacher's competence; thus overlooking the psychological and contextual factors involved in ICT applications. However, it should not be forgotten that successful implementation of educational technologies depends largely on the attitudes of educators, who ultimately determine how they are used in the classroom: teachers' attitudes are the major determining factor in the adoption of technology.

6   Conclusion and recommendations

Ministry of Education and Skills Development should have a clear goal understood by all stakeholders of education to infuse ICT into Botswana education system. The starting point in the phenomenon is to ensure that all teachers are competent enough with ICT. Resourcing schools and necessary infrastructure in place is also important. By far, schools particularly primary schools still lack ICT resources that can allow complete use of ICT in education. The study was focused in Gaborone city where schools are considered more resourced. In some of the parts of the country particularly in rural areas, resource shortage may be extreme. The best part though is that the Ministry of Educations and Skills Development has plans to heavily invests in ICT and improve the quality of education by encouraging use of technology. Concepts like adapt school have been introduced to allow business community, capable individuals and any interested organizations

which can afford resources to help schools across the country in endowing with resources including ICT infrastructure. The state of the resources by far do not allow teachers even those who possess ICT skills to use them in their teaching activities. It is observed that classrooms do not have resources such as projectors that can be used as a delivery tool.

To address the issue of ICT resources shortage, the study proposes an approach called basket. On the approach, teachers carry laptops or desktops from one class to another using a mobile trolley. These computers are used and shared by different classes at different times. A teacher who knows that they are going to use computers carries the trolley with computers to class and the class will use computers. In some schools, if the computers in the trolley are not enough, students will share in pairs of two. This approach may also work in Botswana scenario. The issue of lack of skills also needs an attention. Most of schools (junior and senior secondary) have ICT professionals. These professionals need to be further trained so that they can hold workshops to train their colleagues on the closer primary schools. This will give them work to do as some idle and feel they are under used. The workshops can be held every month in primary schools across the country. This issue of negative attitude and perception can be addressed by training of teachers and once they have skills then the negative attitude will fade.

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Biography

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