THE ROLE OF ICT IN THE CURRICULUM
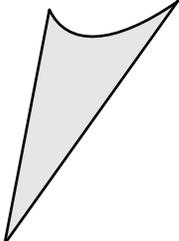
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November 2005

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ABSTRACT

This paper looks at the role of ICT in the Botswana National Curriculum, focusing mainly on primary and secondary education. The paper emphasizes computer technology and television media because of their availability in our schools and their great impact on teaching and learning processes. The objectives of this paper are to discuss the importance of ICT in education and their implication to the world of work; discuss effective pedagogical issues surrounding the use of ICT in the classroom; and highlight some changes ICT might have on the role of the teacher in the classroom.

INTRODUCTION

The inclusion of Information and Communication Technology (ICT) issues in the curriculum and provision of these technologies in our schools have raised many issues of concern to educators, parents, and politicians. Some of the most important issues are the role of the ICT in the curriculum, and how these issues should be addressed in the curriculum, and most importantly how they impact teaching and learning. The other issue of concern is the impact of these technologies in terms of increasing access to quality education. Learners in our schools today will require considerable ICT knowledge, skills and awareness if they are to be successful in the future. The economy will depend on a high level of ICT capability from its people if it is to develop technologically and to compete internationally.

The Revised National Policy on Education (RNPE, 1994) recommended the following:

- *that each student in secondary school should take a basic Computer Awareness Course (Rec. 32c)*
- *all senior secondary school teachers should acquire computer literacy and the schools should be allocated enough computers to enable all students to develop computer skills (Rec. 42f).*

The recommendations led to the development of the computer syllabuses at both junior and secondary level. In 1997 the Government also came up with a Long Term Vision for Botswana,

Vision 2016. Some of the goals of the vision state thus:

- *All schools will have access to a computer, and computer-based communications such as the Internet.*
- *By the year 2016, the people of Botswana will be able to use and apply the potential of computer equipment in many aspects of everyday life.*

(Vision 2016, 1997)

It is therefore the aspiration of the Government of Botswana to see all citizens equipped with ICT skills and apply them in their lives. Henceforth it is incumbent upon the Ministry of Education to address ICT issues in the curriculum and ensure that these technologies are available in schools, and implementers of the curriculum are equipped with the necessary skill to effectively implement these in schools.

DEFINING INFORMATION AND COMMUNICATION TECHNOLOGY

The term Information Technology (IT) has commonly been used synonymously with "computer technology", that is, hardware and software that enable users to access, retrieve, store, organise, manipulate, and present information by electronic means. The phrase Information and Communication Technology is now being used, to include telecommunications equipment through which information can be sought and accessed through the Internet, television, phones, faxes, modems and computers (Education Review Office, 2000).

IMPLICATION OF ICT IN THE WORLD OF WORK

One of the goals of the ten-year basic education is to prepare learners for the world of work, and lately, ICT has become increasingly significant in all aspects of society including work places. It expands our access to, and understanding of the world at large. It also allows people in all areas of life to benefit from the power of computers as a personal tool, to collaborate in groups and to communicate locally and globally (Learning and Teaching Scotland, 2000). Learners in schools today require considerable ICT knowledge, skills and awareness if they are to be successful in

their futures. The economy of our country will in future, depend on a high level of ICT capability from its people if it is to develop technologically and to compete internationally.

It has been observed that there is a widening global 'digital divide' between wealthy and poorer countries due to different speeds of diffusion of ICT revolution. Unless this is addressed urgently, the employment aspirations and productivity potential of millions of workers in many developing countries won't be realized. Access to the technologies, and ensuring that workers possess the education and skills to use them, are the fundamental policies that developing countries need to consider (World Employment Report, 2001). Botswana is working very hard to try and reduce the gap and a National ICT Policy referred to as Maitlamo has been developed and is still in its draft form. The policy was build on Botswana National ICT Vision which says "Botswana will be globally competitive, knowledge and information society where lasting improvements in social, economic and cultural development is achieved through effective use of ICT" and objectives which states thus

- Creation of enabling environment for the growth of an ICT industry in the country;
- Provision of universal service and access to information and communication facilities in the country; and
- Making Botswana a Regional ICT Hub so as to make the country's ICT sector globally competitive

According to the World employment Report (2001) it was found that ICT can have a far-reaching impact on the quality of life of workers in poorer countries if the right policies and institutions are in place, and serve as important spurs to development and job growth;
It can promote jobs and entrepreneurship in such industries as data processing and call centers; and the potential to provide jobs for women and improve their lives. Women generally continue to earn lower incomes, suffer higher employment and are often concentrated in less-skilled jobs (gender digital divide). It is becoming very difficult to find jobs in Botswana nowadays and the number of unemployed people has increased tremendously. The worst hit being our women folks. This paper argues that adopting ICTs is one component of general economic and social

development strategy. It will contribute towards poverty reduction.

THE IMPORTANCE OF ICT IN LEARNING

One of the most critical questions asked by educators is: What is the long term impact of the introduction of ICT in the curriculum? Computers, in particular, have positive effects on learning and are motivating for learners (Reeves, 1998). They are accepted by more teachers than other technologies and are widely supported by administrators, parents, politicians, and the public in general. Reeves argues that computers increase equity of access, and reduce the time needed to accomplish a given set of objectives. One of the goals of the Ministry of Education is equity of access to quality education for all, hence this technology is essential if we are to achieve this goal.

According to Reeves (1998) computer-based cognitive tools such as databases, spreadsheets, communication software, etc., have been intellectually developed to function as intellectual partners to enable and facilitate critical thinking and higher order learning. When using these tools learners are able to represent and express what they know. They function as designers using the tools for analysing the world, accessing and interpreting information, organising their personal knowledge, and representing what they know to others.

Hunt (2004) argues that because of the phenomenal rate at which the volume of available information increases, and access to an increasing range of sources, it is becoming clearer than ever that the ability to find appropriate information and use it effectively is of greater value than being able to remember facts. The skills of locating, evaluating and using information effectively from a range of sources constitute the Information Skills which are needed for people to become Information Literate, enabling them to engage in effective decision making, problem-solving and research. Therefore the importance of ICT cannot be over emphasised as it offers the education process one of the most potentially powerful learning tools available. Not only can computers support learning across the whole curriculum, but communication networks also provide the learner with fast and searchable access to vast amounts of information. It also supports a wide range of broader educational objectives including independent learning, collaboration with others

and communication skills (Hunt, 2004). It is thus of vital importance that all children in schools have adequate access to ICT and that they develop the necessary skills, taking advantage of the learning capabilities that ICT offers.

Hangland (2000) argues that children of all ages are capable of using computers at school and home and would benefit a lot from the use of these technologies. However there are three important factors that can maximise the educational benefits of young children using computers. These are access, availability and parental collaboration. In Hangland's terms, access relates to where computers exist so that children might use them, while availability concerns whether or not children are permitted to use the computers that exist at school or home. It is still a challenge in Botswana to provide adequate computers and other related technologies to schools. However, at secondary level the Ministry of Education embarked on a project referred to as Computerisation Project which aimed at equipping all secondary schools with computers and related facilities such as labs. Almost all the junior and senior secondary have been equipped with these resources. Below is information stating the standard equipment and facilities found in secondary schools:

- Computer laboratory
- 20 x PC computers
- 1 x Network printer
- 1 x multimedia projector
- 10 KVA UPS
- Local Area Network
- Linux Server
- Star Office or Apple Works application programmes. Some schools have recently been given Microsoft XP

Primary schools on the other hand are ill-equipped with computers and other important technologies. Computers that are found in some schools were donations and are only used for administrative purposes. The Ministry of Communications, Science and Technology together with the Ministry of Education are embarking on a project of refurbishing obsolete and donating

these to primary schools. Although this is a positive move towards providing quality education to pupils at this level, there are challenges in this endeavour. These are:

- **Physical barriers such as remoteness and lack of electricity supply** – Some primary schools are in very remote areas far away from the power lines. Computers, photocopiers, fax machines, etc. need electricity. The Ministry would have to find ways of providing these with power. One way is equipping such schools with generators. Generators which can supply enough power for these technologies are very expensive! Therefore a lot money running into a couple of millions would be needed.
- **Lack of funds** - especially for maintenance
- **Lack of ICT skills for staff** - primary school teachers have no skills whatsoever in ICT, let alone having basic training in computers. The challenge facing the Ministry if it were to include ICT issues in the primary school curriculum is to address lack of ICT skills by teachers.
- **Insufficient and inappropriate software** –suitable software will have to be acquired if desired skills which are in line with curriculum needs are to be developed.

OTHER TECHNOLOGIES

There are other technologies available in primary schools that could be taken advantage of, these are the television and video equipment. Primary schools were equipped with televisions, video cassette recorders, and satellite dishes through the Talk Back programme. Talk Back is a one-hour programme aired on Botswana television on Tuesdays during school days. It aims to teach and equip teachers with knowledge and skills of infusing HIV and AIDS issues in the classroom. Since the equipment is available in schools teachers are at liberty to use it in their lessons to help them achieve some of the objectives in the syllabus. The advantages of television media are that it is audio-visual so learners tend to learn and retain more; and is able to show learners things that they would never experience in real life.

According to Seels et al (1996) most studies show that there are no significant differences in effectiveness between live teacher presentations and videos of teacher presentations. Johnson (1987) says there is strong evidence that television is used most effectively when it is intentionally designed for education and when teachers are involved in its selection, utilisation, and integration into the curriculum. Since video recorders (VCRs) are available in schools teachers can record programmes related to their topics and use them whenever they like. Perhaps one of the challenges facing the Department of Teacher Training and Development is to equip primary school teachers with skills of selecting suitable video material, integrating and using this technology effectively in their lessons.

EFFECTIVE PEDAGOGICAL PRACTICES

It is one thing to provide schools with ICTs, and yet another to implement these, that is, use them effectively in teaching and learning to realise their impact. Teachers require more knowledge of, and confidence with ICT, and a better understanding of its potential to help pupils' learn. This suggests that further substantial support for continuing professional development is necessary in order that teachers integrate these technologies and infuse ICT issues in the teaching to improve pupils attainment (Cox et al., 2003).

The pedagogical practices of teachers using ICT can range from only small enhancements of practices using what are essentially traditional methods, to more fundamental changes in their approach to teaching. According to Cox et al (2003) the most effective uses of ICT are those in which the teacher and the software can challenge pupils' understanding and thinking, either through whole-class discussions using an interactive whiteboard or through individual or paired work on a computer. If the teacher has the skills to organise and stimulate the ICT-based activity, then both whole-class and individual work can be equally effective.

In Botswana we have adopted the integration and infusion strategy across the curriculum. The premise being to develop pupils' ICT capability and provide them with a range of knowledge, skills and attitudes applicable across the curriculum. This strategy allows teachers and learners to

develop ICT in context, while at the same time using its capability to contribute to learning within other curriculum areas (4-5 National Guidelines, 2000).

To effectively infuse and integrate ICT into teaching and learning teachers need to use a range of practices that are essential pedagogical frameworks (Cox et al., 2003). These are:

- understanding the relationship between a range of ICT resources and the concepts, processes and skills in their subject
- using their subject expertise to select appropriate ICT resources which will help them meet the specific learning objectives; this includes subject-specific software as well as more generic resources
- being aware of the potential of ICT resources both in terms of their contribution to pupils' presentation skills, and their role in challenging pupils' thinking and extending their learning in a subject
- developing confidence in using a range of ICT resources, via frequent practice and use beyond one or two familiar applications
- appreciating that some uses of ICT will change the ways in which knowledge is represented, and the way the subject is presented to and engages pupils
- knowing how to prepare and plan lessons where ICT is used in ways which will challenge pupils' understanding and promote greater thinking and reflection
- recognising which kinds of class organisation will be most effective for particular learning tasks with ICT, for example, when pupils should work on their own, how working in pairs and groups should be organised, and when to use ICT for whole-class teaching.

THE ROLE OF THE TEACHER IN THE USE OF ICT

The effective use of ICT has great impact on teaching and is definitely changing the role of the teacher in the classroom. According to Jenkins (1999) ICT changes teaching and learning through its potential as a source of knowledge, a medium to transmit content, a means of interaction and dialogue. The role played by these technologies in the classroom provide a

challenge to teachers because they make them change the way they have been doing things. Teachers are now becoming facilitators of learning – organising teamwork and managing classroom activities.

Jenkins highlights some of the changes in the teacher's role as,

- Change in relationship with pupils
- Change in the role to facilitators and managers who support learning
- Change in the content and scope of teaching

Wheeler (2000) argues that it is no longer sufficient for teachers to merely impart content knowledge. These technologies can actually do this part, and therefore it is crucial that for teachers to encourage critical thinking skills, promote information literacy, and nurture collaborative working practices to prepare children for a new world in which no job is guaranteed for life, and where people switch careers several times. The Internet enable students and teachers to communicate with each other, learn flexibly, and collaborate with others around the world. In other words, geographical distance is no longer a barrier, and 'borderless' provision of education to all can be achieved (THES, March 2000). Teaching strategies and resources can be shared through communication with other educators and may be integrated across the curriculum.

SUMMARY

It has been observed that ICT has a significant role to play in improving the standards in education hence its inclusion in the curriculum is a step in the right direction. Learners in schools should acquire ICT knowledge, skills, and awareness if they are to be successful in their futures. Botswana being a developing country will in future depend on a high level of ICT capability from its people if it is to develop technologically and compete internationally. As discussed in this paper ICT has the potential of promoting jobs and entrepreneurship, improving lives of women, and contributing towards the socio-economic development of the country as a whole.

Amongst the ICTs computers are the most preferred because they have positive effects on learning and are motivating to learners. Computers are capable of increasing equity of access to quality education which the Ministry of Education aspire to achieve, and also reduce the time needed to accomplish a given set of objectives. Computers support learning across the curriculum and communication networks provide learners with searchable access to vast amounts of information. It also supports a wide range of broader educational objectives including independent learning, collaboration with others and communication skills.

Although primary schools are ill-equipped with computers, the television and video equipment available can be utilized in the teaching and learning processes. Teachers can record programmes related to their topics and use them in the classroom. Studies also show that there are no significant differences in effectiveness between live teacher presentations and videos of teachers presentations (Seels et al, 1996).

The Ministry of Education policy says ICT should be infused/integrated across the curriculum so as to develop learners' ICT capability and provide them with a range of knowledge, skills and attitudes applicable across the curriculum. This paper argues that in order for teacher to effectively infuse and integrate ICT into teaching and learning they need to understand the relationship between a range of ICT resources and the concepts, processes and skills in their subject; use their subject expertise to select appropriate ICT resources; develop confidence in using a range of ICT resources; and know how to prepare and plan lessons where ICT is used in ways which will challenge pupils' understanding and promote greater thinking and reflection. This therefore challenges the Department of Teacher Training and Development to ensure that teachers in the field are equipped with these skills. The role of a teacher in the classroom is bound to change when ICT learning resources are used in schools. Since these resources can be sources of knowledge, a medium to transmit content, and a means of interaction and dialogue, teachers will become facilitators of learning.

RECOMMENDATIONS

1. The Ministry of Education should come up with clear guidelines on how ICT issues

should be infused across the curricular if we are to achieve the positive impact of these in teaching and learning. (CD&E, TT&D)

2. Support Instructional Materials, i.e, textbooks, teacher's guides, etc. should ICT issues and provide guidance to teachers on how to infuse ICT and integrate these technologies in their lessons (CD&E, Publishers).

3. In-service training workshops should be run to teachers in the field to equip them with skills of selecting suitable ICT resources and using these effectively in the classroom. The starting could be primary school teachers who have television and video equipment in their schools

4. The Ministry of Education should consider providing training courses or running in-service workshops for primary school teachers so that when the refurbishment project is completed teachers would be in a position to use the computers.

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