

THE TEACHERS AND THE USE OF ICT FOR PROFESSIONAL DEVELOPMENT

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Abstract: *In this age of rapid change and uncertainty, there is one thing which is very paramount and pertinent to know- teachers will need to adapt to change if they are to be relevant, survive and keep pace with new methods and technologies. The area of most rapid change is that of Information and Communications Technologies (ICT). Therefore this paper investigates how teachers use ICT for their professional development. One of the questions being asked by many teachers is: What will be the long term impact of the introduction of these technologies into the classroom? Other questions are being raised are: What kind of skills will teachers need to acquire in order to be effective in an ICT based learning environment? How does ICT impact professional development? This paper will address these important questions by highlighting the experiences of teachers using ICT in Botswana, and offering some further examples of established ICT policies and infrastructures in Botswana. The study does not leave behind the benefits of bringing ICT into a classroom. It is however, recommended among others that teacher training institutions, professional development schools, societies and public educational agencies must continue to identify study and disseminate examples of effective technology integration that answer professional development needs*

Keywords: Professional Development, ICT, Teachers

INTRODUCTION

Professional development refers to a variety of activities, both formal and informal, designed for the personal and professional growth of teachers and administrators. It includes individual development, continuing education, and in-service education or staff development, as well as, curriculum writing, peer collaboration, study groups, peer coaching or mentoring (according to the thesaurus of the ERIC database), classroom visitation, attendance of conferences, action research, publication of papers, etc. Professional development activities are varied because they have to serve teachers and administrators not only at different levels of instruction or management but also at different points in their career development. It involves a wide variety of subjects and activities to insure that teachers acquire and maintain the competencies required to face the diverse challenges involved in teaching and learning (Howell, 1996). Although like training it involves the learning of new skills, more importantly, it is concerned with the development of new insights into pedagogy and stimulates an on-going reflection into one's own practice.

A great deal of research and development has been conducted in order to bring Information and Communication Technology (ICT) to its current state of art. ICT was originally intended to serve as a means of improving efficiency in the educational process (Jones and Knezek, 1993). Furthermore, it has been shown that the use of ICT in education can help improve memory retention, increase motivation and generally deepen understanding (Dede, 1998). ICT can also be used to promote collaborative learning, including role playing, group problem solving activities and articulated projects (Forcheri and Molfino, 2000). Generally, ICT is promoting new approaches to working and learning, and new ways of interacting. Consequently, the introduction of ICT into schools has provoked a host of new questions about the evolving nature of pedagogy.

Whether or not changes in pedagogy are contingent on trends and innovations, is a moot point. The question that should be asked, however, is: What will be the long term impact of ICT on the teaching and learning process? It is well documented that ICT changes the nature of motivation to learn (Forcheri and Molfino, 2000). Another important question is: What kind of skills will teachers need to acquire in order to be effective in an ICT based learning environment and how does it affect their professional development?

Meanwhile high quality professional development has some elements, which are discussed below.

1. Professional development programs respect and encourage the leadership development of teachers. There are a variety of such roles, including, mentoring new teachers, acting as consulting teachers, coordinating alliances and networks among teachers, doing advocacy work, etc. The route of professional development should consider these roles and should not relegate teachers to just being recipients of training.
2. Professional development provides for balance between collaborative/collegial work and individual learning. Central to the development of this enterprise is a learning culture that is collaborative. Examples of collaborative activities are joint planning and problem solving, study groups, team teaching, participation in alliances. In helping a teacher craft her professional development plan, she should be helped in availing of opportunities for participating in exercises that meet her personal learning needs while at the same time enabling her to help in the learning of others in her group.
3. Build in accountability practices and evaluation of professional development programs to provide a foundation for future planning. All professional development plans have to be evaluated against data about student learning, institutional/district/division needs and goals and against teaching and content standards.

ICT impact on professional development

Technology has the potential to transform the professional environment for educators. Through the application of network technologies to research and collaborative planning, teachers can break loose from the isolating environments that the teaching profession had imposed on them in the past. Technology impacts not only on the teaching and learning process but also on the ways and opportunities educators learn. The developments in technology influence two important aspects of education.

One is the way schools train prospective teachers (pre-service) and the other is how schools design continuing education for their teachers to learn on the job either at the physical workplace or at virtual learning (in-service). Universities and other teacher training institutions have an active role in professional development beyond just providing undergraduate or graduate level teaching. This is because subject matter expertise and discipline knowledge reside in the universities.

Teachers are members of learning communities; they learn from each other. Exchanging ideas with one another and solving common problems are powerful ways of learning among teachers. But the demands

of teaching have often prevented regular or sustained sharing. Fortunately, technology can provide some solutions to structural problems that serve as obstacles to sustain collaboration among teachers. Inadequate training is the most important obstacle to the effective use of technology in instruction and in professional development. If teachers did not get enough of it in pre-service, then the learning gaps must be filled through in-service training.

Justification of Study

There is currently great debate about how teachers should adapt current teaching skills and practice to accommodate the introduction of ICT. These changes are comprehensive, embracing teaching methodology, assessment of learning, student tracking, communication, and evaluation. The distributed nature of ICT learning, and the impact it creates on both learners and teachers are crucial issues. The concept of shared resources, and shared working spaces, and particularly the notion of collaborative learning may be particularly difficult for some teachers to accept. Most critically, the question of the extent to which teachers relinquish control and let learners drive their own learning may create the greatest barrier to the adoption of ICT in the classroom. Therefore teachers need to be conversant and updated with the existence and the use of ICT to become relevant professionals.

The Botswana Experience

Botswana is a small, dynamic country with visionary leadership particularly in the sector of ICTs in education. Not only does it boast a liberal telecoms policy, its education and national ICT policies are linked to a broader economic vision for the country. Moreover, in practice, Botswana arguably boasts among the highest PC penetration in education institutions in Africa. As well, all junior and senior secondary schools and government tertiary institutions have PC labs. The government has committed financial resources to improve connectivity and to promote the educational use of ICTs.

Botswana's ICT infrastructure is very good, but is not fully utilized. Internet usage, for example, stands as low as 5% of the population. There is also considerable disparity in terms of urban and rural access to ICT services. Challenges include the relatively high cost of PCs, the lack of electricity in many rural locations, and high charges for Internet usage. In addition, the Internet needs to be made more relevant to the Botswana, through the development of local on-line content tailored to the needs of the population. High international bandwidth cost between USD\$3,250 and USD\$6,000 (terrestrial) per 1 MB per month. For 128 kbps, BTC leased lines are between five and 20 times more expensive than in Namibia and South Africa. ICT is still not widely exploited by business in Botswana, although it is used extensively in the retail and mining sectors within foreign-owned companies. Botswana's ICT sector itself is small and generally focused on local market opportunities. (Shafika Isaacs 2009)

The table below provides a snapshot of the state of the national ICT infrastructure to corroborate the above assertion.

Table 1: ICT Infrastructure in Botswana: Indicator

Fixed-line subscribers	69.7 per 1,000 persons
Mobile subscribers	708 per 1,000 persons
Dial-up subscribers	6,000
Broadband subscribers	0
Internet users	7.167
Television broadcast stations	1
Radio stations	41

Botswana ranks 56th out of 115 countries on the World Economic Forum's network readiness index, ahead of Namibia, Uganda, Mali, Mozambique, and Zimbabwe. (Shafika Isaacs 2009)

The government is still in the process of liberalizing and enhancing regulation of the communications industry in a bid to attract investment as well as encourage innovation and competition. Efforts are being made to reduce communications costs in Botswana, mainly through further liberalization of the telecommunications industry. This should create more competition and ultimately result in lower tariffs for the consumer. Botswana has a very small ICT workforce. A CSO labour survey from 1996 put the total size of the workforce in the country at about one-half of one percent of the working population. Of that, only 25% was female.

ICT Policies in Botswana: Vision 2016

Vision 2016 is a national manifesto of the Botswana government that articulates the long-term economic goals for the country including strategies to meet them. ICT is a key component of the first goal, which is to be an educated and informed nation. The long-term vision is that Botswana will enter the information age on an equal footing with other nations. The country will seek and acquire the best available information technology and become a regional leader in the production and dissemination of information. ICT is also a major focus of the country's economic agenda, the National Development Plan 9 (NDP9), and significant investment has recently been made in upgrading Botswana's communications networks to facilitate new technologies. In 2002 Botswana established a government ministry dedicated to ICT, the Ministry of Communications, Science and Technology which is to coordinate and promote technology development in the country.

Revised National Policy on Education-Botswana

A government policy entitled the Revised National Policy on Education, released in 1994, highlighted the need for all learners to be taught computer skills at all levels of school. It also recommended the introduction of computer science as a subject option in senior secondary schools and computer awareness for the three years of junior secondary school. As a result, a new curriculum for computer awareness has been developed and piloted in 11 junior secondary schools. The curriculum aims to equip learners with computer skills that can be applied in all subjects. A strong focus is also placed on tertiary education, with proposals to increase university enrolment.

In line with the above revised National Policy on Education in Botswana, a professional development programme will involve training a group of teachers who will serve as ICT managers or coaches in their respective schools. This will be followed by an intensive training programme focused on basic computer use and maintenance, use of the Internet and school network, and basic ICT education. Later phases will broaden the number of teachers who have basic skills to integrate ICTs into all aspects of the curriculum.

What ICT Brings to the Classroom?

Many are predicting that ICT will bring about several benefits to the learner and the teacher. These include sharing of resources and learning environments as well as the promotion of collaborative learning and a general move towards greater learner autonomy. I shall briefly discuss each of these benefits in turn, offering some examples.

Networking resources. One of the most striking examples of ICT in action in Botswana and other countries like America schools is the opposite use of video systems to transmit television programmes and information throughout an entire school and even between schools in the same district. For example in the recently concluded interdisciplinary conference at BOTHO College in Botswana, this integrated approach to the international sharing of learning resources and e-presentation of lead paper was used to minimize expenditure, time wasting and risk of travelling from long distance. Delegates, presenters and students enjoy the facility to share information. Television monitors provide details of the papers while presenting and it facilitates question and answer session.

Shared learning spaces. Networked computing facilities create a distributed environment where learners can share work spaces, communicate with each other and their teachers in text form, and access a wide

variety of resources from internal and external databases via web based systems through the Internet. In Botswana, students use networked software to communicate with each other and their teacher, some are conversant with the use of e-mail. Using these shared systems, students develop transferable skills such as literary construction, keyboard techniques and written communication skills, whilst simultaneously acquiring knowledge of other cultures, languages and traditions. Furthermore, children are able to make links between internal thinking and external social interaction via the keyboard, to improve their social and intellectual developments in the best constructivist tradition (Vygotsky, 1962). Children are quickly mastering the ability to communicate effectively using these new technologies because the experience has been made enjoyable in an unthreatening environment, and there are immediate perceived and actual benefits.

The promotion of collaborative learning. Reil (2000) argues that much of what we now see as individual learning will change to become collaborative in nature. Reasoning and intellectual development is embedded in the familiar social situations of everyday life (Donaldson, 1978) so the social context of learning has a great deal of importance. Collaborative learning is therefore taking an increasing profile in the curricula of many schools, with ICT playing a central role. Institutions in Botswana are already starting to use discussion lists, and other forms of computer mediated communication (CMC) to promote collaboration in a variety of learning tasks and group projects.

The move towards autonomous learning. At the same time, computers - and the power they bring to the student to access, manipulate, modify, store and retrieve information - will promote greater autonomy in learning. Inevitably, the use of ICT in the classroom will change the role of the learner, enabling children to exert more choice over how they approach study, requiring less direction from teachers. Students will be able to direct their own studies to a greater extent, with the teacher acting as a guide or moderator rather than as a director (Forsyth, 1996). This facilitation will take on many facets and will also radically change the nature of the role of the teacher as we currently understand it. Hence, teachers feel more professional at this level. For example the students at some private schools in Botswana are able to use software based music laboratory in their lunch hours to write, record and produce their own music CDs. Microphones and keyboards have been purchased to encourage the creativity the children are discovering within these self-driven extra-curricular activities. Minimal teacher management is required.

Inventing the New Role of the Teacher

Teachers have been polarized in their acceptance of the new technologies. Whilst some have enthusiastically integrated computers, and the Internet into the classroom, other have been cautious in their welcome, and some have simply rejected the technologies. With the inevitable proliferation of ICT in the classroom, the role of the teacher must change, and here are four key reasons why this must happen:

Firstly, the role of the teacher must change because ICT will cause certain teaching resources to become obsolete. For example, the use of overhead projectors and chalkboards may no longer be necessary if learners all have access to the same networked resource on which the teacher is presenting information. Furthermore, if students are distributed throughout several classrooms - which is becoming more common place - localized resources such as projectors and chalkboards become redundant and new electronic forms of distributed communication must be employed.

Secondly, ICT may also make some assessment methods redundant. Low level (factual) knowledge for example, has been traditionally tested by the use of multiple choice questions. In an ICT environment, on-line tests can easily be used which instantly provide the teacher with a wide range of information associated with the learner's score. Comparisons of previous scores and dates of assessment for example, will indicate a child's progress, and each student can be allocated an individual action plan data base stored in electronic format into which each successive test's results can be entered automatically.

Thirdly, the role of the teacher must change in the sense that it is no longer sufficient for teachers merely to impart content knowledge. It will however, be crucial 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. One of the most ubiquitous forms of ICT - the Internet - gives access to an exponentially growing storehouse of information sources, almost unlimited networks of people and computers, and unprecedented learning and research opportunities. The Internet is a network of networks, providing opportunities for inquiry-based learning where teachers and students are able to access some of the world's largest information archives. Students and teachers are able to connect with each other, learn flexibly, and collaborate with others around the world. Generally speaking, geographical distance is no longer a barrier, and the age of the 'borderless' provision of education is upon us (THES, March 2000).

Teaching strategies and resources can be shared through communication with other educators and may be integrated across the curriculum. The Internet provides a wealth of information to the extent that it is now impossible to comprehensively track the amount of information available. Unfortunately, misinformation and inaccuracies are similarly present in great numbers on the Internet so one of the new roles of the teacher within the electronic classroom will be to separate out quality information from misinformation. Identification, classification and authentication of electronic information sources will be critical new tasks for teachers. This emphasizes a crucial aspect of their professional development.

Finally, teachers must begin to reappraise the methods by which they meet students' learning needs and match curricula to the requirements of human thought. The Internet can be an excellent way to adapt information to meet the characteristics of human information processing. Traditional methods of imparting knowledge, such as lectures, books and this conference paper, are characterized by a linear progression of information. Human minds are more adaptable than this, using non-linear strategies for problem solving, representation and the storage and retrieval of information (Collins and Quillian, 1969; Collins and Loftus, 1975).

One thing we can be certain of is that ICT technologies will inevitably proliferate, possibly to the point where they become personal technologies, in a similar fashion to the Sony Walkman or the mobile telephone. Indeed, the third generation of mobile telephones will connect via low orbit Iridium satellites, and will have the capability not only to connect from anywhere on the planet, but also to receive high quality video and gain quick access to the Internet. These technologies will truly usher in the age of 'any time, any place' learning.

Recommendation and Conclusion

Rapid changes in technology will ensure that ICT will proliferate in the classroom. It is predicted that there will be many benefits for both the learner and the teacher, including the promotion of shared working space and resources, better access to information, the promotion of collaborative learning and radical new ways of teaching and learning. ICT will also require a modification of the role of the teacher, who in addition to classroom teaching will have other skills and responsibilities. Teacher training institutions, professional development schools, societies and public educational agencies must continue to identify study and disseminate examples of effective technology integration that answer professional development needs. Many will become specialists in the use of distributed learning techniques, the design and development of shared working spaces and resources, and virtual guides for students who use electronic media. Ultimately, the use of ICT will enhance the learning experiences for children, helping them to think and communicate creatively. ICT will also prepare our children for successful lives and careers in an increasingly technological world.

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