

Digital literacy in Ugandan teacher education: Insights from a case study

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This case study investigated the relationship between policy and practice with regard to advances in Information and Communication Technology (ICT) in Ugandan teacher education. Our qualitative study, conducted in 2008, focused on the experiences of six language teacher educators in an urban Primary Teachers' College (PTC). We also drew on insights from an interview with the then Ugandan Minister of ICT, Doctor Ham-Mukasa Mulira and the national ICT policy. Whilst the Minister expressed the hope that technology would transform Ugandan education, our findings suggest that the success of ICT initiatives depends largely on whether local conditions support such initiatives. Despite their enthusiasm for digital technology, the participants were challenged by the expense of Internet connectivity, inadequate training, power outages, and culturally irrelevant material. We suggest that ICT policy should address teacher educators' use of digital technology across diverse sites, and that innovations such as the eGranary portable digital library might be particularly useful in poorly resourced educational institutions.

Introduction

Information and Communication Technology (ICT) is taking root steadily in the wider Ugandan society (Andema 2009; Edejer 2000; Mutonyi & Norton 2007; Nawaguna 2005). In 2006 the Ugandan government launched a national ICT policy framework that envisioned a Uganda where national development broadly and human resource development more specifically would be achieved through efficient application of ICT and digital literacies (The Republic of Uganda 2006). In that regard, several initiatives have been launched to promote digital literacy and ICT integration in educational institutions across the country. Unfortunately, to date, very little is known about the real extent to which the ICT policy in education has promoted digital literacy amongst teachers and teacher educators so as to improve pedagogical practice (Andema 2009; James 2004; Mutonyi & Norton 2007). Researchers have stressed the need for detailed empirical studies into the ongoing ICT initiatives in schools and communities to inform policy and curriculum development, taking into account the social, cultural and political histories of different local settings (Mutonyi & Norton 2007). Mutonyi and Norton (2007) assert that the collection of empirical data is crucial for policy makers and curriculum developers to allow them to better understand how people are accessing, adopting and using ICT in particular contexts. Our study, situated at Bondo Core Primary Teachers' College¹ (hereafter Bondo Core PTC) in Uganda, addresses the relationship between educational policy and pedagogical practice. We frame our analysis within the New Literacy Studies (NLS) theoretical framework as explained in the next section.

Theoretical framework

The New Literacy Studies theoretical framework was originally introduced in the works of Gee (1996) and Street (1984), but it is now widely associated with the work of scholars from a range of disciplines who are interested in the relationship between literacy practices and the context in which particular literacy practices are performed (Prinsloo & Baynham 2008). Barton and Hamilton (2000) highlight the central characteristics of an NLS perspective as follows:

- Literacy is best understood as a set of social practices; these are observable in events that are mediated by written texts.
- There are different literacies associated with different domains of life.
- Literacy practices are patterned by social institutions and power relations and some literacies are more dominant, visible and influential than others.
- Literacy practices are purposeful and embedded in broader social goals and cultural practices.
- Literacy is historically situated.
- Literacy practices change and new ones are frequently acquired through processes of informal learning and sense making as well as formal education and training.

1. For the purposes of this article, Bondo Core Primary Teachers' College is a pseudonym.

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- The ways in which people use and value reading and writing are themselves rooted in conceptions of knowledge, identity and being. (p. 8)

Barton and Hamilton's (2000) description of the NLS perspective above provides a rich and expanded definition of literacy that challenges earlier theories of scholars such as Goody (1977) who tended to present literacy as a neutral and autonomous technology of modernity. New Literacy Studies seeks to shift our gaze from the limited psychological accounts of literacy to ones that capture the complexity of literacy practices interwoven into local ways of life. Street (1984) posits that the technologies of reading and writing (and, by extension, digital literacies) are best studied in the context of the social, cultural, historical, political and economic practices of which they are a part. Within the Ugandan context, our overarching goal has been to understand how the teacher educators 'take hold' of the new literacies and adapt them to achieve their goals. The NLS provided us the best lens through which to examine the policy context, and to document the teacher educators' accounts of their lived experiences with the use of digital technologies to better understand the challenges and possibilities of ICT integration in Ugandan teacher education.

Research site and research team

Our study is part of a larger collaborative research project on digital literacy and multilingual education in East African schools and colleges, being carried out by a team of researchers from the University of British Columbia in Canada, in collaboration with East African colleagues. Of increasing interest in this collaborative study is digital literacy in the Ugandan context (Norton, Jones & Ahimbisibwe 2011; Norton & Williams 2012). This article specifically reports on a qualitative case study carried out at Bondo Core PTC by the three authors: one Ugandan researcher (Andema) and two Canadian researchers (Norton and Kendrick). Norton and Kendrick have been conducting language- and literacy-related studies in East Africa for over 10 years. Andema, a teacher educator at Kyambogo University in Uganda, was an MA student at the University of British Columbia, Canada. Norton and Kendrick co-supervised him.

Bondo Core PTC is part of the network of 10 National Teachers Colleges (NTCs) and 48 Primary Teachers Colleges (PTCs) under the supervision of Kyambogo University that oversees teacher education in Uganda. It is the largest primary teachers' college in Uganda, with a student and staff population of 800 and 42 respectively. In addition to its regular programmes, the college has introduced ICT in order to promote digital literacy amongst students and staff. The course covers areas such as: Introduction to Computers and the Internet, Microsoft Office Word®, Excel®, PowerPoint®, website design and project-based learning.

Research methods

This was a descriptive qualitative case study that sought to document the personal accounts of how six teacher

educators in one primary teachers' college viewed their use of digital resources to improve pedagogical practice. The six core research participants included five women and one man, ranging in age from 34–47 years. The reason for having only six focal research participants is that we wished to focus on language teacher educators, and the college had only six of them at the site. As Duff (2007) has noted, the advantage of qualitative case study research is that it focuses more on in-depth analysis and detailed description and less on generalisation of research findings. Drawing on Duff (2007), we wanted to better understand and to represent as accurately as possible the teacher educators' accounts of their experiences with digital literacies and the meanings they have constructed as implementers of ICT policy in education. In order to protect the anonymity and privacy of our research participants, we assigned them pseudonyms. The pseudonyms of the five female teachers are Jalia, Hella, Harriet, Aisha and Janene; the male participant is Kamuli. All of the research participants were married and had extensive family responsibilities. The participants all travelled to their workplace from their homes which were located in different parts of the city.

Our fieldwork activities began with a visit to Bondo PTC in March 2008 and ended with a digital literacy workshop in November 2008. During the data collection period, we positioned ourselves as participant observers and worked collaboratively with the teacher educators, which helped us to build trust and confidence with the participants. We administered two sets of questionnaires to the participants, one in April 2008 and another in November 2008. We also held two training workshops and one focus group meeting with the participants. The participants kept reflective journals during the study and, when possible, participated in on-line group discussions. We reviewed important documents such as the national information and communication policy in Uganda, and ministerial statements and research reports in order to have a better sense of the context in which ICT and digital literacy is being promoted in the country. Andema and Norton also had a key informant interview with the Minister of ICT, Doctor Ham-Mukasa Mulira, in Kampala on 14 August 2009 with a dual purpose: to understand the Ministry's strategic vision for the promotion of ICT and digital literacy in the country generally and in education more specifically, and to brief the Minister on the goal of our research. In the following section we report the major findings of our study.

Data analysis and research findings

Our investigations were guided by the research question: 'What is the relationship between policy and practice with respect to the promotion of digital literacy amongst teacher educators in Ugandan teacher education?' As outlined in the previous section, to address this research question we used multiple data collection methods, namely, collection and analysis of documents and artifacts, questionnaires, interviews and participant journal reflections. We analysed data by triangulating the data from the multiple sources to identify patterns and themes so as to draw conclusions (Duff

2007; Yin 2003). In the next section, we present our findings under three major themes that emerged: ICT and educational policy, ICT and educational practice, and ICT use by teacher educators.

Information and communication technology and educational policy

Our understanding of the ICT policy landscape in Uganda was informed by our interview with the Ugandan Minister in charge of ICT, as well as by an analysis of a range of national policy documents including ICT Policy in the Education Sector (The Republic of Uganda 2006), Education Standards Agency (2004), and Farrell and Shafika (2007). During the interview, the Minister explained the importance that the Ugandan government attaches to the promotion of ICT for national transformation. According to the Minister, the Ugandan government recognises that there have been many advances in ICT at a global level, but the challenge is how Uganda can harness it to capitalise on the country's natural and human resources in order to improve the quality of life for Ugandans in a sustainable manner. The Minister regarded technology as a tool, and viewed the new technologies as part of the evolutionary process to meet human needs. As he said:

'You see, technology is just a tool and the most basic technology of man say during the Stone Age – was his stone. When he shaped it, he could use it for anything and then as it evolved he made hammer. Now we are looking at these modern communication tools. On their own, they are of no use. The question is how do we apply them? In this case, how do we apply them in education and literacy? Education is so fundamental because today we are looking at the most fundamental requirement for national transformation and development – to have [an] educated human resource base.' (Samuel Andema and Bonny Norton. Interview with Dr. Ham-Mukasa Mulira. 14 Aug. 2009)

The Minister further explained the importance that the government of Uganda attaches to ICT for national transformation:

'As you go out you will see the vision of the Ministry – 'a knowledge-based society.' How do we do that? We do that by making society knowledgeable. It means having a society which knows its environment, which can help it adopt and adapt its own environment, and therefore moves from one stage of living to another stage of living. That is a knowledge-based economy, because we cannot make wise decisions unless you know, unless you have a knowledge base. That is why we are moving from data to information to knowledge to wisdom, yes, and action. So, we are moving in phases to have a knowledge-based society, not only knowledge about what is happening in the rest of the world but also what is happening around us.' (Samuel Andema and Bonny Norton. Interview with Dr. Ham-Mukasa Mulira. 14 Aug. 2009)

We found the Minister's remarks very useful in seeking to understand the strategic vision of the Ministry of ICT and that of the Government of Uganda. He spoke with confidence about government's commitment to transform the country from a subsistence peasant society into a knowledge-based modern country through ICT application. This is further highlighted in the following remarks by the Minister, who

also underscored the significance of research on ICT in education:

'How do we get communities to understand the environment and use it well? That is when you said you are researching at the grassroots in PTCs and primary schools; that is where it should start. Those youths or those children of today are the managers of society tomorrow and when they come to manage society, it should not be an option but an inevitability to know ICT. Those are the two points. One, how do we use ICT to develop their knowledge base and not only in ICT but geography, history, biology, science, mathematics etc.? Secondly, how do we do it so that they are ICT-enabled?' (Samuel Andema and Bonny Norton. Interview with Dr. Ham-Mukasa Mulira. 14 Aug. 2009)

The Minister's comments provided useful insights into the strategic vision of the government with respect to the role of ICT in social transformation and national development. He explained that the Ugandan Government is committed to promote ICT in order to help Uganda evolve into a knowledge-based society. He encouraged us to view ICTs as tools that can be shaped in a variety of ways to meet societal needs, which is the same argument the New Literacy Scholars such as Barton and Hamilton (2000), and Street (1984) have made of literacy. Street (1984) particularly encourages us to focus more on how people take hold of literacy in specific contexts. The Minister also argued that for ICTs to be able to function well in a given community, they must be able to adapt and be adopted to fit into the local context.

According to the Minister, ICTs only become useful when they are applied to serve societal needs. His perspectives on ICT are consistent with the official government position articulated in the National ICT policy framework. The government's strategy is to:

- (a) Integrate ICT in mainstream educational curricula as well as other literacy programmes and provide for equitable access by pupils and/or students at all levels.
- (b) Include ICT education in curricula from primary to university level. Establish computer labs in schools. Setup e-learning programs in schools to ensure broad use of ICT for training in education institutions. (The Republic of Uganda 2006:13)

From the policy perspective, it can be argued that Uganda has an elaborate policy and a clear vision for ICT application. However, the study is concerned with the translation of policy into practice. The question is to what extent do the teacher educators apply technology in their classroom practices? What are the institutional practices that facilitate or impede the use of digital resources as pedagogical tools? Thus, in the following section, we now report on our findings regarding ICT and educational practice at the college.

Information and communication technology and educational practice

At the institutional level, we found that the college administration at Bondo was committed to promoting ICT in their institution. With the support of the Ministry of Education and donor agencies, Bondo PTC has established a computer lab equipped with computers and Internet connectivity so

as to promote digital literacy amongst students and staff. The administration has established an ICT department and appointed a tutor to head the department. At least one laboratory assistant has been employed to assist in training students and staff in ICT use. Records also indicate that ICT has been included on the teaching timetable, copies of which were displayed on the notice boards at the staffroom and in front of the office of the academic registrar.

However, whilst the college has made considerable efforts to promote digital literacy, many of these initiatives had not accomplished their goals. In the section that follows we examine the ICT training our participants have received; their use of ICT for both professional and personal uses; and the challenges they have experienced in using digital technology.

Teacher educators' response to Information and communication technology training

Through the use of semi-structured questionnaires, the teacher educators were asked to state whether they had received any formal training in ICT. From their responses, we learnt that five of the six participants at Bondo PTC had received some formal training in ICT. The sixth participant revealed to us that he had learnt to use the computer through a friend who trained him informally from an Internet café in town. This underscores the importance of informal networks and the need to incorporate them into the new initiatives to build a sense of ownership and to guarantee the sustainability of such initiatives (Barton & Hamilton 2000).

In order to have a better sense of the kind of training the participants received, we asked the participants to provide examples of the ICT training they had received. Two participants reported that they had received introductory computer courses; three had received training under Connect-Ed, which was a three-month training programme for teacher educators and students at PTCs; four reported that in addition to the Connect-Ed training, they had also taken ICT as a course unit during their Masters degree programmes at Makerere University; and two said that they had attended the Harvard Education online course.

From their responses, it was clear that the participants at Bondo PTC were committed to ICT training. They not only enrolled in ICT training programmes designed for them as teacher educators at Bondo PTC but they also took advantage of other ICT training programs offered at universities and other institutions of learning. Even more interesting to note was the fact that the teacher educator who missed the regular training organised for teacher educators at the college was prepared to take personal initiative to train himself in ICT with the support of friends and people around him. From their personal accounts it was clear that the teacher educators were committed to embracing ICT. However, whilst the participants' positive response to ICT training programs was crucial in preparing them to implement the ICT policy, it could not explain adequately how ICT was being used in the

local context. In that regard, we had to examine the tutors' use of ICT for professional reasons, as reported on below.

Information and communication technology use for professional reasons

Through the use of questionnaires and journal reflections, participants were asked to draw from their personal experiences and describe if and for what professional reasons they use ICT. From the information gathered, we learnt that most of the teacher educators at the college use ICT mainly for preparing their own lecture and teaching notes. Examples of the participants' use of the Internet for professional reasons are summarised in Table 1.

From Table 1 it can be seen that high on the participants' list of Internet use for professional reasons was supplementing or updating teaching notes. The participants' use of Internet resources for teaching is further explained by one of the participants as follows:

'My participation in the use of ICT has changed my attitude and ways of teaching language. I realised that I don't need to go to the library to read each day and every book related to a topic which may not even be there, but there is a simple and quick way of getting the 'wanted' information on the net.' (Hella, Journal entry, 21 June 2008)

Hella's remarks help explain her commitment to technology. She feels her participation in the use of ICT has not only changed her attitude toward her profession but it has also changed her ways of teaching language. She reveals that her participation in the use of ICT has relieved her of the burden of having to always search for books, which are seldom available in the library. Indeed, when we visited the PTC library, what we found was a small reading room with hardly any useful books for students or staff to read. In such situations, the teacher educators have limited options other than to use the Internet to get more information to update their teaching materials. She also expresses the frustrations teacher educators face in looking for resources to facilitate their teaching. She describes the option of getting information from the Internet as 'simple' and 'quick'.

Hella's comments resonate well with De Roy (1997), who recognises the potential ICTs hold to transform education in Africa where schools and the education system are in crisis, but he goes on to assert that in order for their transformative potential to be realised, they must be responsive to the local

TABLE 1: Professional reasons for using Information and communication technology ($N = 6$).

Reasons for using the Internet	Number of participants
To prepare teaching notes	6
To conduct action research	4
To keep a question bank	4
To keep professional development portfolio	1
To carry out reflective practice	1
To research new methods of teaching	1
To know more about other fields of study	1
To update website	1

realities. For example, according to Hella, ICTs will serve her well if they are quick and simple.

Hella's fascination with the use of ICT in her professional practice was echoed by her colleagues in the study. For instance, Aisha had this to say with regard to her use of ICT in her professional practice:

'ICT has enhanced my work as far as teaching is concerned because before I go to teach, when I have something missing in my content, I usually visit the computer lab to do some surfing, and get at least some knowledge about what I am going to teach. And normally when I have prepared some work on the computer, students get access to them in their free time and do their supplementary reading.' (Aisha, Questionnaire 2, 20 November 2008)

Similar enthusiasm regarding the use of the Internet for teaching was also expressed by Jalia, who reported:

'I use Internet to find resources for reinforcing/enriching my presentations, to create resources (notes, questions) and update my website ... I can present a lecture using power point/overhead projector. I can upload information and refer students to it.' (Jalia, Journal entry, 09 April 2008)

Jalia's emphasis on revealing her ability to make a presentation using PowerPoint® needs to be put in perspective. In the Western context (European and North American), it would be relatively simple for a teacher educator to make a presentation using PowerPoint®; in Uganda, however, it is not as simple because PowerPoint® projectors are still largely a preserve of those fortunate enough to be working in international organisations and powerful Ministry headquarters, urban churches, and media organisations. Many university lecturers in Uganda have never used PowerPoint® to make a presentation. It is therefore a great achievement for Jalia to be able to use PowerPoint® for presentations.

Being able to master modern technology seems to enhance Jalia's identity and self-worth, giving her the status that comes with being able to use ICT for professional practice. From the ability to use PowerPoint®, Jalia appears to have derived a new identity, which has changed her status from that of an ordinary teacher educator to a more versatile contemporary professional. It was not surprising that she turned out to be the most active member of the group in Bondo PTC. She regularly volunteered to take minutes during our meetings, and also prepared the minutes and sent them to the members of the group via email. She would photocopy documents at the photocopying machine at the computer lab by herself. She was also the first participant to register for the online Google group discussions. She even managed to post articles online for discussion, and eventually she became the coordinator of the group. Her colleagues relied on her for support whenever they needed assistance with ICT.

Another practice that was high on the list was using the computer and the Internet for building a 'question bank' for easy access. What this means is that the participants used computer technology to store a set of examination questions from previous years to be used for setting another

examination. Over time, the teacher educators accumulated a stock of examination questions that they could use to set examinations with ease. This is a common practice in schools and colleges in Uganda, where the system of education is mainly driven by examinations (Muwanga *et al.* 2007; Ssekamwa 1997; The Republic of Uganda 1992, 2004). Teachers in Uganda are under enormous pressure to produce good grades in examinations instead of focusing on developing skills, values and attitudes in young people. An example of the kind of pressure teachers have to endure from the community can be seen in an article written by Fred Muzaale (Muzaale 2013) which appeared in the *Daily Monitor* of Wednesday 30 January, 2013, with a headline '70 school heads face demotion!' The article reads in part:

At least 70 head teachers of government-aided primary schools in Kayunga District whose schools failed to score at least two first grades in last year's Primary Leaving Examination results face demotion, authorities have said. The district was ranked among the 10 worst performers with schools in Bbale County failing to score any first grade. 'We shall sit to decide the fate of these head teachers next week. They signed the contracts and they know what is coming,' Mr Ouma said. While appearing at a talk show on Radio Kayunga, the district LC5 chairperson, Mr Steven Dagada, blamed the poor performance on teachers. (n.p.)

It is therefore understandable that the teacher educators were using modern technologies primarily to make lesson notes and accumulate examination questions because of the importance ascribed to them by the system and the community. As long as the structure of education in the country remains pyramidal, and as long as the examination results continue to be the only measure of success in schools, the transformative potential of digital literacy to engage students and teachers to generate knowledge might not be easily realised.

Our study also examined the participants' personal use of the Internet in order to have a sense of their digital literacy practices across diverse sites. We next report on our findings regarding ICT use for personal reasons.

Information and communication technology use for personal reasons

Through the use of questionnaires, the participants were asked to state if they used the Internet for personal reasons. They all answered in the affirmative. All six reported that they used the Internet for sending and receiving emails, and three of them said that they used the Internet for getting news updates. One participant said she used the Internet for receiving health-related information and one reported that she used the Internet for entertainment (music). Table 2 shows how the participants responded:

High on the list of Internet use for personal reasons was email communication. Participants reported that they used the Internet to send and receive mail from relatives, friends and colleagues, locally and internationally. Their preference for using email compared with other forms of communication such as the ordinary postal mail and telephone was attributed

to it being fast, quite cheap and convenient. Second on the list of ICT use for personal reasons was reading the news, with three of the six respondents reporting that they used the Internet for this purpose. This was not surprising, considering the fact that, by Ugandan standards, many people find the cost of a newspaper at 1200 Ugandan shilling (\$0.66) rather expensive. Where they have free access to the Internet, the participants normally prefer to read online, especially the local newspapers. One participant reported that she also used the Internet to access information on health. Interestingly, the Ugandan Ministry of Health is beginning to use the Internet for health awareness campaigns on different health problems (Nalumaga 2007).

Understanding the digital literacy practices of teacher educators in their everyday lives is useful if the integration of ICT in teacher education is to succeed in the Ugandan context. The participants' responses appear to highlight their readiness to use the Internet to look for information that is of relevance to their immediate and personal needs. Further, it can be deduced that the participants' preference regarding use of the Internet for personal reasons is linked to the consideration of cost, relevance and convenience. This indicates that free access is important in motivating teacher educators to use the Internet. The more exposure users have to the Internet in their daily lives outside the classroom, the more ICT skills they will develop, which they can transfer into their classroom application. The question that needs to be asked is the extent to which policy makers recognise and build on these non-formal digital literacy practices amongst participants in order to consolidate ICT programs. As Hull and Schultz (2002) assert, there is clearly a complementary relationship between personal and professional ICT usage.

Challenges teacher educators face in using Information and communication technology

To further understand how ICT was functioning at the college, we investigated the challenges the teacher educators faced in trying to use ICT. The evidence shows that the teacher educators faced many challenges in their professional practice. These included the points discussed below.

Limited access

The greatest challenge reported by all the teacher educators was the problem of having limited access to ICT facilities, especially the Internet. The only Internet access point at the college that was readily available to both students and staff was the one at the computer lab. Yet, for the whole of 2008, the Internet connection at the college had been cut off due to non-payment of the connection fee, which the college was

TABLE 2: Personal reasons for using Information and communication technology (N = 6).

Reasons for using the Internet	Number of participants who reported
To receive and send mails	6
To read news	3
To listen to music	1
To access health-related information	1

expecting to receive from the Ministry of Education, but to no avail. Participants found the lack of Internet connection to be very frustrating, as echoed by Harriet:

'Previously I used to give students some links where they could get relevant information such that they could read on their own but due to lack of Internet service at the college this is not possible now.' (Harriet, Questionnaire 2, 20 November 2008)

Lack of easy access to ICT facilities also arose from the fact that the time scheduled for staff to have access to the computer lab was not always convenient, because the teacher educators usually have tight schedules at the college. This is how Hella articulated the problem in one of her reflections:

'Access to resources is still a problem in the college because sometimes the computer lab is open when I have classes, then during my free time it can be locked or it is fully occupied.' (Hella, Journal entry, 21 June 2008).

Small computer lab

Participants also reported that the small size of the computer lab at the college was an impediment to their use of ICT in their professional practice. For example, according to Hella:

The computer lab is very small. It cannot accommodate the big number of students at the college. (Hella, Journal entry, 21 June 2008)

Harriet concurs with Hella on her concerns over the problem of inadequate infrastructure:

'Due to large classes, a significant concern revolving around infrastructural or equipment accessibility especially by students was a big challenge. Many times I gave students practical activities like building blogs but they were let down by lack of equipment and poor access.' (Harriet, Journal entry, 02 May 2008)

As seen from the responses of the participants, the ICT infrastructure at the college was still fragile. As a result, the teacher educators had limited access to the Internet at the college. Only two of the respondents (Aisha and Hella) had personal computers, but they had no Internet connectivity. During the study, we tried to support the teacher educators with funds to enable them to access the Internet at Internet cafés or elsewhere in the city; again, some had no Internet cafés close to their places of residence. Even when others could drive back to the city to have access to the Internet, they could take hours to reach due to traffic jams.

Electricity outages

There is also the problem of unreliable electricity from the national grid, and frequent blackouts. As such, even if a participant made it to the Internet café, he or she might still have difficulty accessing the Internet.

Inadequate training

After interacting with the teacher educators at Bondo PTC for months, our team also came to realise that the training the teacher educators received was too basic to enable them to use ICT competently and confidently in their professional practice. Participants felt they were not given enough hands-on experience during training. Consequently, they struggled

to remember the skills they were introduced to during training. For example, when we asked participants to register for the online Google group discussions, most of them found it difficult to follow the registration instructions online. When we asked Janene, the Deputy Principal at Bondo PTC (who was also one of the participants) to explain why some teacher educators had not registered for the online discussions by the agreed date, she looked at us, started laughing, and whispered to us in low tone:

'Some of us lack the skills. We have not been practising these things. We still need assistance.' (Janene, Interview, June 2008)

When we asked the participants to state in their reflective journals their reasons for not participating in the online discussion, Kamuli simply put his reason as:

'...inadequate knowledge and skills on how to use the Internet services.' (Kamuli, 12 June 2008)

Hella made a similar disclosure when she said in her response that:

'There is a weakness with ICT use due to lack of skills by both students and myself. For example the other day I opened some information on the Internet, suddenly, it disappeared. I was puzzled. Then I realised I must have touched a key, which I could not restore. I lost the document.' (Hella, Journal entry, 26 June 2008)

Irrelevant material

The teacher educators also reported that most of the materials they found on the Internet were not relevant to the local situation, which they find very discouraging in their efforts to use the Internet resources to teach. This is how Harriet narrated her personal experience:

'One of my most challenging experiences in language teaching using ICT resources was when I needed some information about language and culture – I got a lot of information but when I read through, I realised it wouldn't be applicable for my student – there was no way I could relate this information – I could not see the relevance. All the information I got, talked about language and culture in a different context. I therefore decided to change the heading and typed 'relationship between culture and language' I got a lot of information but still it was not leading me to what I wanted. I got a bit disappointed; I had spent almost an hour on the computer, yet I was not getting exactly what I wanted.' (Harriet, Journal entry, 15 June 2008)

In view of the challenges associated particularly with the Internet we made some effort to explore alternative resources. In the following section we report the participants' perspectives on the use of an alternative digital resource known as the eGranary digital portable library.

eGranary as a pedagogical resource

To address the challenges outlined above, we introduced the participants to the eGranary digital portable library. This technological innovation, developed by the WiderNet Project (n.d.) at the University of Iowa in the United States of America, is an offline digital library that comprises of a 750 GB hard drive with specialised browsing software, which can be attached to a personal computer or a local area network. It contains approximately 10 million educational documents, including websites like Wikipedia, which can be

browsed like the Internet. Although electric or solar power is needed to run the system, there is no need for connection to the wider Internet, and the costs are limited. This 'Internet in a box' is thus ideally suited to poorly-resourced communities. Not only does eGranary provide a wealth of information for users, but users can also develop digital skills, such as browsing and searching, without connectivity. Furthermore, the system can be updated and includes software that enables users to upload local content and distribute it to other users.

The participants were introduced to the eGranary Digital Library in a one-day workshop held at Bondo PTC in November 2008. After the workshop, they were asked to describe if and how the eGranary digital library could best be incorporated in their teaching. Participants gave interesting insights, as highlighted in a sample of their responses below:

'The eGranary is a very useful avenue to getting as much information as one could. The problem we have encountered is that our college in particular is not connected to the eGranary yet, and if it could be incorporated into the teaching, students would benefit from a lot of information.' (Aisha, Questionnaire 2, 20 November 2008)

Aisha's opinions on the benefit of incorporating eGranary into teaching are echoed by Jalia in the following commentary:

'eGranary Digital Library is a welcome venture. It has a lot of information and [is] detailed in most cases. Since the college is unable to provide connectivity to the lab the eGranary will be very useful and it will motivate tutors to search for new information. When we still had connectivity tutors actively and meaningfully visited the lab and their lesson presentations were improved! I believe we shall get more information to enrich our teaching and also improve on our professional growth. Members can access information related to their research topics much easily and also encourage them to be more innovative in their areas of specialisation.' (Jalia, Questionnaire 2, 20 November 2008)

Indeed, as Jalia has pointed out, the eGranary digital library offers unique advantages that make it ideal for the Ugandan situation. Some of the advantages include: it is easy to install; it is fast, up to 5000 times faster than satellite connection; it can cut Internet connectivity costs; it looks and functions like the real Internet; users need no additional training; content and software are updatable via a subscription to the eGranary Digital Library Update Service. A serious shortcoming, however, is that emails cannot be sent and received on this system.

Ethical considerations

In order to maintain high ethical standards, the proposal for this study passed through the behavioural ethics review and approval process of the University of British Columbia. Participants voluntarily signed consent forms to participate in the study. We agreed to use pseudonyms instead of participants' real names in order to guarantee confidentiality and to protect their privacy. A member check was also completed; each participant was provided with an opportunity to read and respond to the draft report to ensure accuracy in reporting.

Limitations of the study

Considering the fact that this was a case study based on the experiences of only six research participants in one college, the findings of the study may not be used to make generalisations on a wider scale. However, they provide useful insights into the challenges and possibilities of ICT integration in similar contexts.

Conclusion and implications

Our study, though limited in scope, sought to investigate the relationship between ICT policy and professional practice in Ugandan teacher education, and what insights could be drawn for the promotion of digital literacy in developing countries. Whilst we agree with the framers of the ICT policy that ICT may have the transformative potential to radically improve the quality of education in Uganda, our findings suggest that the success of such ICT initiatives will largely depend on the extent to which the local conditions are favourable to the introduction of such initiatives. Despite their enthusiasm for digital technology, the teacher educators in our study struggled with access because the PTC found Internet connectivity unavailable or prohibitively expensive; their training was inadequate; power outages were frequent; and material on the Internet was not always relevant to Ugandan needs. However, where possible, the participants made use of the Internet for both professional and personal purposes, particularly with regard to preparing teaching notes, keeping past paper questions, and sending and receiving emails.

We conclude that ICT policy should address people's use of digital technology across diverse sites, and that innovations such as the eGranary portable digital library might be particularly useful in poorly-resourced educational institutions.

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Competing interests

The authors declare that they have no financial or personal relationship(s) which may have inappropriately influenced them in writing this article.

Authors' contributions

The study reported in this article is part of a larger, multi-site project led by B.N. (University of British Columbia) and M.K.

(University of British Columbia). Although S.A. (Kyambogo University and University of British Columbia) was the primary researcher for the site reported on in this article, all three authors contributed to the study design, data collection, and analysis. The manuscript was written collaboratively, with S.A. (Kyambogo University and University of British Columbia) taking a lead role.

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