

Introducing Accessible ICT to Teacher Candidates: A Way to Address Equity Issues

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Abstract

With the development of Information and Communication Technologies (ICT) in the forms of hardware, software and network, educational settings are increasingly utilizing technologies as a means to enhance or complement teaching and learning. However, as ICT are not only related to knowledge and skills of the implementation of technologies, but also closely related to social and economic issues (for example, the digital divide), it is necessary to create an awareness of these issues among pre-service teachers and expose them to possible solutions to such problems. The authors of this paper teach different subject areas in a teacher education program in Canada, and they introduced various kinds of accessible ICT to their teacher candidates as a way to address equity issues regarding the use of ICT.

Keywords: Accessible ICT, education, equity, teacher candidates

Background

Information and Communication Technologies (ICT), in the form of hardware, software and network, are utilized in the settings of education for the purpose of facilitating and enhancing teaching and learning (Kent County Council, 2004). These technologies have been found to be helpful for improving students' conceptual understanding (Zhou, Brouwer, Nocente, & Martin, 2005), for expanding the scope and the depth of teachers' teaching (Becker, 2001), for supporting inquiry, collaboration, or re-configured relationships among students and teachers (Committee on Developments in the Science of Learning, 2000), and for encouraging students to engage actively in their learning (Cradler & Bridgforth, 2002). The topic of ICT for education is also related to equity issues such as gender, intellectual disability, physical disability, and the digital divide (Anderson, 2009). The ability to use and to invent advanced technology is a central force in globalized economic competitiveness, thus technology literacy is a crucial element for students' future careers (Hargreaves, 2003). In order for ICT to be effectively utilized in schools, teachers need to be specifically trained such that they know how to integrate ICT into their teaching and the existing curriculum (Batane, 2004; Jacobsen, Clifford, & Friesen, 2002; Markauskaite, 2007; Mitchem, Wells, & Wells, 2003; Yildirim, 2000). Teacher candidates who have recently graduated from teacher education programs are expected to have a reasonable knowledge of how to use ICT (Gülseçen & Kubat, 2006; Montgomerie & Irvine, 2001), and the training for technology is suggested to be emphasized during teacher education programs (NEA Education Policy and Practice Department, 2008). The knowledge of ICT should not only mean "hardcore" knowledge and skills concerning hardware, software, and network, but also include equity and social justice issues related to ICT, so as to "close the gap" in the pursuit of equal outcomes (Secada, Fennema & Adjian, 1995).

Teacher education programs usually use a variety of means to expose and model the use of ICT to teacher candidates, but ICT literacy means more than the basic development of skills, as this literacy involves the development of “a full range of creative abilities to make use of digital technology, alongside the critical understandings required to make best use of digital technology” (Selwyn, 2011, p. 135). It is also found that teacher candidates’ attitudes and perspectives regarding ICT knowledge and skills are closely related to how they will use ICT in their future teaching (Sasseville, 2004).

In recent years, the infrastructure of ICT including various kinds of hardware, software and Internet access has been greatly improved in schools across Canada. However, as an example of the digital divide in Canada (O’Brien, 2001; Stephenson, 2003), schools are not equally equipped with ICT in terms of hardware, software, or Internet access. In order to prepare teacher candidates to deal with such situations, besides teaching and modeling the use of commonly used hardware such as digital cameras, digital camcorders, data projectors, and software packages such as Microsoft Windows, Microsoft Office, and Apple application software, we introduce other commonly accessible hardware and software including portable music players (e.g., iPod, mp3 or mp4 players), inexpensive video recorders (e.g., Flip video camcorders), alternative measures for interactive learning (e.g., *Wii* Whiteboard), Open Source software, and other widely available software to our teacher candidates as a way of addressing equity issues related to the use of ICT for teaching and learning. We also extend the students’ conceptual approach to commonly used software packages by demonstrating alternative repurposing of software designed for a specific task (e.g., PowerPoint can be used for desktop publishing) and challenge students to problem solve inequity through reinvention.

The Context and Activities

The context of this paper is a teacher education program at a mid-sized Canadian University. The consecutive teacher education program is 36 weeks long with 12 weeks devoted to teaching practice, organized in three or four blocks. This pre-service program, at least in recent years, has had an immensely diverse student population. These teacher candidates are enrolled in divisions of Primary/Junior (P/J), Junior/Intermediate (J/I), and Intermediate/Senior (I/S). The pre-service teachers' age range is between 20s and 50s. All of the teacher candidates possess a bachelor's degree and some have completed a Masters or higher degree, prior to enrolling in the pre-service program. The percentage of teacher candidates who have attained degrees from countries other than Canada has been steadily increasing, and their presence in the pre-service program provides a reminder for the need of inclusion in an increasingly global society. Based on the authors' observations of the teacher candidates, there is a wide variety in terms of their knowledge regarding creative and innovative uses of ICT (Bennett, Maton & Kervin, 2008), even though those of a younger age appear to be more fluent in terms of ICT use.

Teacher candidates in the J/I and I/S divisions are required to take an "Instructional Technology (Computer Methods)" course, which comprises a balance of theory and praxis. The course offers an introduction to influential theories related to the implementation of ICT in education and practice in application of ICT during practice teaching placements. In addition to this mandatory course, all subject areas within the pre-service program are expected to model the use of ICT. The P/J division does not offer a specific course on ICT, but as in the J/I and I/S divisions, instructors are expected to integrate ICT into their courses while modeling different uses of technologies. The authors of this paper teach in the fields of

ICT, Visual Arts and Second Language and Cultural Diversity, and their courses are offered to different divisions of the pre-service teacher education program.

Besides introducing widely used hardware devices and software packages, we also expose the teacher candidates to the use of different kinds of accessible ICT, with the aim of helping the teacher candidates to understand how commonly accessible ICT, such as portable music players, inexpensive image or video recording devices, Open Source software packages, online synchronous and asynchronous communication tools (e.g., social networking software, mobile phone), can be used for teaching and learning purposes, and how these usages can help address equity issues in different schools. The following is a brief description, with some examples, of how we implemented these technologies within the teacher education program.

Widely accessible or inexpensive hardware devices

Portable digital music players (or mobile phones with music playing functionalities) are ubiquitous among school students, and these devices can be used not only for entertaining purposes, but also as valuable learning tools. By demonstrating to our teacher candidates how free audio or video podcasts on various topics can be obtained from the Internet and subsequently listened to or watched over and over again on their portable devices, we helped broaden the teacher candidates' perception of options for these devices. In their post-practicum reflections, a number of teacher candidates reported that they encouraged their students to utilize the podcasts for learning during their teaching practica and received positive feedback. Besides discussions on topics related to inclusive education, teacher candidates in second language and cultural diversity classes learn how to produce video clips of different scenarios as a measure to get an in-depth understanding of inclusive education.

Through our demonstrations of the easily accessible devices, teacher candidates realized that they could take advantage of inexpensive video recording devices (e.g., Flip video camcorders or mobile phone with cameras) to make video clips and then edit them in Windows Movie Maker or iMovie to make short movies for their class presentations. Most of the classrooms in the teacher education program are equipped with interactive whiteboards (SmartBoards), as it is believed that “Classroom-based technologies such as interactive whiteboards are now widely felt to provide teachers with opportunities to alter their styles of teaching and modes of delivery” (Selwyn, 2011, p. 119), and some local schools also have such equipment available. However, the many schools do not have the funds for expensive equipments such as interactive whiteboards, so we demonstrated an alternative device introduced by All Together We Can. (2011), a “virtual interactive whiteboard” that is created by using an \$8 LED light pen, a \$40 Nintendo Wii Remote, and some free software. With the help of the step-by-step tutorial created by Sennott (2009), a few groups of teacher candidates created their own alternative interactive whiteboard for their after-class projects. It is observed that the quality of such alternative devices, more often than not, may not be found very satisfactory, or the process of making it work may be a challenging experience, but by presenting possibilities for alternatives, we raise the awareness of the teacher candidates that the creative use and reinterpretation of ICT can help to address equity issues in education settings.

Open Source and commonly accessible software

Guided by the notion that ICT are not merely related to knowledge and skills of technologies, but are also related to social and economical issues, we introduce Open Source software, such as Linux, as something “not technical but sociological” (Raymond, 2001, p.

194) to emphasize the importance of collaboration among members in certain communities. We discuss topics on ICT and social issues and ask teacher candidates to do small research projects to acquire in-depth understanding of such discussion topics.

Most teacher candidates use Microsoft Office Suite as their primary application package, but some local schools have StarOffice or OpenOffice on their teaching computers instead of Microsoft Office. As an integral part of our education topic on ICT and equity issues, we introduce Open Source programs such as the Linux operating system ubuntu, and application packages such as StarOffice, OpenOffice, gimp, and audacity, which have similar functions of brand name commercial software applications but are significantly lower in price or free. We noticed that most of the time teacher candidates use computers for word processing or presentations, so through workshops, teacher candidates learn how to use easily accessible ICT for their schoolwork. As the netbook computers become popular and more wireless networks become available, we have found that it is useful to introduce Google Documents to our teacher candidates, which they can use to work collaboratively on their group projects without worrying about compatibility between different versions of software programs they have on their computers, or having to be in the same place at the same time. One teacher candidate commented in the formative evaluation on the course website that:

Since we learned about Google Docs, we've been using it for our group projects. I also introduced it to my students during my practicum and the Associate Teacher and students were really impressed and said that they loved the idea of using such available programs they hadn't known about before. (Student reflection)

Teacher candidates are also taught how to use Dreamweaver, which is available on the computers in the teacher education program, to create Web pages or WebQuests, but the majority of the teacher candidates do not have this program at home. This barrier is overcome

through the introduction of alternative applications (i.e., Composer on SeaMonkey) instead of a reliance on commercial software programs. The following statement represents the opinion of many teacher candidates enrolled in the classes:

Before I thought webpage creation was a mystery and we had to use expensive software to do it. Actually we usually only need to make basic webpages or make simple changes to them, so it's so good to know that such jobs can be done with free software. (Student reflection)

We also introduce the teacher candidates to the core programs that are provided within the Windows operating system such as WordPad, Paint, and Windows Movie Maker for simple word processing, image manipulation or video editing. Multi-modal communication is promoted throughout the pre-service program and cross-curricular projects provide the arena for setting for practice (Adobe Systems, George Lucas Educational Foundation and the New Media Consortium, 2005).

Social Networking Software

Social networking software such as blogs, wikis, MySpace, FaceBook and YouTube are quite widely used among students of all ages. These systems have the potential pedagogical values for creating an online learning environment to facilitate learner reflections and peer commenting (Mason, 2006). In this environment, if the learners are motivated to actively participate or engage in the space, then an online learning community can be built in which all the members can potentially benefit from learning together and learning from one another (Palloff & Pratt, 1999; Wenger, 2006). We demonstrate to our teacher candidates how these programs work and conduct in-class discussions as to how these spaces can be used for educational purposes. Some classes include the creation of blogs for teacher candidates to

complete case studies in small groups, and we have also introduced wikis as useful tools for language students to do peer editing. Most teacher candidates have their own FaceBook profile for social purposes, but some also use it for their professional development and networking. We do not only promote the educational uses of this online communication space, but also emphasize the issues related to the use of this space among young students, such as safety in the cyberspace, cyber bullying (Siegle, 2010), and equity issues caused by the digital divide. Especially among the younger teacher candidates, many preservice teachers take advantage of YouTube videos for their learning and incorporate them into their teaching. We have our teacher candidates discuss the pedagogical values and the proper use of such resources, and found that when teacher candidates get a substantial understanding of how to use social networking software for teaching and learning (especially for commonly used tools such as blogs, wikis, FaceBook, and YouTube), they become interested in exploring effective ways to motivate their students to involve in the potential learning community. It is within this context that the participants become active learners who do not only passively receive knowledge, but also actively and critically inquire (Steinweg, Trujillo, Jeffs & Warren, 2006).

Reflections from Instructors and Students

Our purpose of introducing accessible ICT in our teacher education classes is to create an awareness among the future teachers that ICT can be used to not only enhance teaching and learning in different subject areas, but also connect social development and address equity issues. As teacher educators from different disciplines, it is not easy to integrate ICT in specific subject areas, but by discussing and sharing as a group during course planning, we are able to generate ideas on how to make meaningful connections between ICT and subject

areas. We are also able to make efforts to model the use of ICT for various situations, and attentively draw students' attention to topics that are related to broader social issues.

When discussing with teacher candidates on what we did about accessible ICT and equity issues in the past few years, we were glad to see positive feedback from our teacher candidates. In class discussions and course reflections on the online course management systems, a number of teacher candidates expressed their appreciation for the introductions to the use of accessible ICT to address equity issues, saying that such introductions helped them realize that ICT have many more uses than they had understood before. In many occasions, equity issues do not get adequately addressed due to a lack of advanced and up-to-date equipment, but also due to a lack of knowledge and skills as to how educators can take advantage of what is already available.

Discussion and Conclusion

Educators are increasingly using ICT to enhance teaching and learning, and in various settings ICT are employed to address equity issues. However, the availability of ICT does not necessarily serve the purpose of overcoming or minimizing educational inequities (Warschauer, Knobel & Stone, 2004). We need to take all possible measures to create an awareness among teachers regarding the relationship between ICT and educational equity, and train them how to creatively utilize available ICT to solve the inequity issues that continue to exist in education. As teacher educators, we should introduce and model the use of ICT as an enhancer for the effective learning of diverse student population, while also introducing widely accessible ICT that create an awareness among teacher candidates as to how these types of ICT can be used to address equity issues.

Because of the current university and school policies, we do not pay much attention to

some of the technologies that are ubiquitous in everyday life today (i.e., iPods, webcams, palm devices and cell phones). We realize that there is an obvious need to introduce teacher candidates to how they can integrate these more prevalent types of ICT for educational purposes. Without doing so, teacher candidates may not be motivated, as what we teach does not closely relate to the reality of everyday life; this may limit their knowledge deepening and knowledge creation (UNESCO, 2008). Educators and administrators should continue to make adjustments to policies that, for example, forbid the use of cell phones in classes, so as to allow for their responsible educational use.

The practices we share in this paper reflect what we have done to address equity issues in a teacher education program in Canada through the use of ICT. Our purpose for doing this is to create awareness among colleagues who value ICT as an enhancer for teaching and learning, but also find difficulties to implementation that are caused by factors such as the diversity of the student population and the digital divide, that employment of alternative software could be one of the possible solutions for such equity issues.

We also hope that this sharing of our experiences may help our colleagues who would like to use ICT but are in the initial stage(s) of developing their ICT competence to realize that ICT mean more than audio/video or CD/DVD playing and PowerPoint presentation. If teacher candidates recognize pedagogical values of commonly used technologies, they may feel better motivated to embrace them, since it is possible for us to employ commonly used software systems to serve many teaching and learning situations.

Our experiences over the past few years convinced us that in regards to the utilization of ICT in educational settings, “the fundamental barriers to employing these technologies effectively for learning are not technical or economic, but psychological, organizational, political and cultural” (Dede, 2003, p. 9). If teacher candidates have a good understanding of issues related to the accessibility of ICT for their teaching and learning, they may make

efforts to find ways to decrease limitations caused by socioeconomic reasons and increase their personal confidence for solving technical problems.

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