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Using mobile phones to augment teacher learning in environmental education

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This study contributes to the professional development of teachers in the use of mobile phones to inform their pedagogy. The focus is on how action learning sets helped pre-service teachers (PST) to effectively use mobile phones to augment their understanding of the impact of their teaching of an environmental education unit in local primary schools. These school-based, action learning sets consisted of groups of four to six PST allocated to the five schools that participated in the study. For six weeks the twenty-two participating PST worked in pairs to teach a class for two hours per week. During this time the PST had access to mobile phones that had an inbuilt camera, Excel, Word, audio recording, video recording, Internet, email and other web features. These phones were used to support and inform the teaching of an environmental education unit that had as its focus waste and energy management. The findings indicated that in this context, the action learning sets provided a vehicle for sustained and targeted professional growth. Besides providing evidence of teacher learning and a record of teaching dilemmas that arose, the mobile phones were used to send supportive SMS messages among PST immediately before or after teaching.

Keywords: mobile phones, action learning, teacher learning

Introduction

For the first time in history many pupils are more adept than their teachers in using a variety of technologies to acquire and transmit knowledge (Kirschner & Selinger, 2003). Jonassen (2000) claims that these pupils are often prolific and fearless users of technology and can assimilate new software and hardware as if it were second nature. Further, Paul Kirschner and Michelle Selinger assert that 21st Century pupils are 'light years ahead' of their parents and teachers with respect to the possible uses of information and communication technologies (ICT). Much to the dismay of their teachers and parents, some of these 'net generation' pupils rapidly become bored and frustrated with school. Therefore school and other education systems feel challenged to provide teachers with the knowledge and skills to effectively use ICT in the classroom and to work in technology-supported partnerships with their pupils (Kennedy, Krause, 2007). However, if the goal is simply to use technology to appeal to disenfranchised youth who may or may not belong to the so-called 'net generation', then the chances of success are, at best slim.

For more than a decade it has been asserted that teachers cannot just be provided with the technology and left to their own devices; they need visions of the potential opportunities and to apply them. This requires just-in-time support, and the time to experiment (Office of Technology Assessment for the US Congress, 1995; *Preparing Tomorrow's Teachers to Use Technology*, 2002; Ison, Hayes, Robinson, & Jamieson, 2004).

Therefore the focus of this paper is the use of mobile phones as a tool to augment the developing pedagogy of pre-service teachers in primary schools. Action learning (Revans, 1982) was adopted as a professional development framework as the approach typically involves a small group of colleagues solving workplace problems utilizing their own processes of sharing, reflection and facilitation. These groups, known as action learning sets, formed the basis for pre-service teachers to plan and design learning environments where the mobile phones could be used in their different contexts to record and support their classroom practice.

Teacher as learners with technologies

While school systems have focused on the use of mobile phones to communicate information for administration (e.g. attendance, homework, security alerts, communication with parents) as well as support for student learning (e.g. surveys, testing, audio recording, video recording, web browsing), there has been less attention paid to the professional development of teachers with such technologies as mobile phones are seen as ubiquitous in teachers' lives. But, the ever-presence of mobile phones, does not necessarily mean that teachers are willing or capable of integrating such technologies into their classroom

practice. Education systems cannot assume that teachers can or want to become as proficient as their students in using new technologies.

Bennett, Maton and Kervin (2008) assert that there is a need to integrate appropriate technologies into existing education systems. Their view supports the previous work of Ison et al (2004) who reported that during the Txt Me project the pre-existing technology skills of teachers were less important than their teaching and learning philosophy. They argued that professional development programs need to focus not only on the technology, skills and knowledge required to implement mlearning strategies, but also on the skills and knowledge needed to support a blended learning environment that makes appropriate and targeted use of technologies that support the overall learning goals. Hoban (2005) reported that it has been well documented that action learning is an effective methodology for many effective teacher professional development programs but it needs to be supported by a facilitator whose role is to engage the practitioners in a collaborative learning environment using a combination of face-to-face, online and mobile synchronous and asynchronous communication strategies.

This study contributes to the professional development of teachers in the appropriate use of mobile phones to enhance their pedagogy by focusing on how action learning helped pre-service teachers to use mobile phones to enhance their understanding of the impact of their teaching.

Methodology

During this study action learning was used as an educational process whereby the participants studied their own actions and experience in order to improve their performance as a teacher. This is done in conjunction with others, in small groups called action learning sets. Each action learning set was located in one of the five participating schools. Four of the five participating schools had sets of four pre-service teachers and one had a set of six as there were a total of 22 pre-service teachers involved.

This following section is divided into five parts the equipment, the participants, training, teaching and the data gathered. Where applicable the key aspects of action learning that were applied are described.

Equipment

During this study the participants had access to Palm™ Treo mobile phones. These devices function as a mobile phone but also have email, messaging, and web access. In addition they can be used for contacts, calendar, photos, audio and video recording and playing back songs (MP3 & Internet radio). The Treo also supports Word, Excel, PowerPoint and PDF files.

Participants

The 22 participants (1 male, 21 females) were third year pre-service teachers enrolled in a Bachelor of Primary degree. Mobile phones were used in an elective subject that focused on Environmental Education. The major assessment task for this subject required pre-service teachers to work in pairs to prepare, implement and evaluate a unit of work about waste, water and energy management to a class of year five or six students (10 to 12 years of age). In each of the five host schools, pairs of pre-service teachers were allocated to a class to teach for two hours per week for six weeks. During this time each pair of pre-service teachers shared a mobile phone that they could jointly use, but also allow their students to use it. As funding was insufficient to supply free SIM cards, the pre-service teachers were asked to insert their own SIM card into the phone.

Training

All training took place in a computer laboratory that contained 20 computers. The pre-service teachers were organised into school-based action learning sets to discuss how they could use the issued mobile phones to record and reflect on their teaching. In addition, they were instructed to consider how they could use the mobile phones with the pupils in their classes. These ideas were then shared with other action learning sets. It was recognized that the use of the phones with pupils might be restricted by school policy so this requirement was optional.

When the mobile phones were issued the facilitator conducted a two-hour session about how to use the mobile phone. A user-friendly manual had been prepared and this was used as the basis of the training session. After the session the PST took the phones and spent the intervening week practicing the skills they had learnt. The following week they re-met in action learning sets to demonstrate the skills they had practiced and learnt. At this meeting each action learning set was to demonstrate a new application of a feature that they had learnt themselves. During this second two-hour session pre-service teachers were supplied with a USB card reader and they were shown how to use it to transfer video and digital photographs captured with their phone.

Teaching

Teaching commenced the week after the second session. At the conclusion of each teaching session action learning sets were required to meet in the computing laboratory to download files and to share their teaching experiences. The facilitator attended these meetings where further ideas about using the phones were shared and additional training was provided on a just-in-time basis by a combination of peer teaching, facilitator teaching, and on one occasion, by an academic who had expertise with all features of the phone taught the group.

Data gathered

Each week a pair of pre-service teachers was allocated the task of leading the follow up discussion with their action learning set as this provided valuable professional development experience for them and allowed the researcher/facilitator to act more as an observer. Another pair of pre-service teachers from each action learning set was assigned to act as recorders and at the end of each meeting their summary was emailed for sharing among action learning sets. In the interim SMS messages were sent among members of the action learning sets to arrange meetings. At the end of the teaching experience an open-ended survey was used to follow up key themes that emerged from the emailed summaries. These data were also supplemented by the final assignments (a reflective e-record of their teaching) and the pupil PowerPoint presentations that occurred at a combined school culmination meeting. The audience at this meeting consisted of parents, teachers and pupils from participating schools and the researcher.

Results

The results are presented in three sections: how the mobile phones were used by the pre-service (PST) teachers and pupils, the strengths and weaknesses of the phones as a tool are presented and finally the data that supports the use of mobile phones to augment the developing pedagogy of PST are presented.

Teacher and pupil use of phones

The most successful pre-service teacher use of the mobile phones was as a video recording device or as a digital camera. In both cases the pre-service teachers captured episodes from their lessons that illustrated the impact of their lessons on pupil learning. While the audio function was seen as useful when teaching, the difficulty in transferring audio files to a computer limited its use as a follow-up tool for reflection. Some of the other tools such as the cut down Microsoft Office suite of applications were of limited use as the size of the keyboard was seen as a problem for rapid data entry. Instead pre-service teachers used standard computers that were available at their schools for these purposes. Email and web browsing functions were not used as it was cheaper to use existing university facilities and cost was a factor.

The pupils focused on episodes that reflected the achievements that they were proud of. For example the posters they created, a role-play or their design of an earthworm farm. They also enjoyed the audio recording facility and used this feature to conduct peer interviews about events such as the construction of their worm farm or a brief survey of members of their group. They used the playback function during lessons and were not concerned about downloading their recordings to a computer. However, they did want to download their digital photographs into PowerPoint presentations that they could use at school so their pre-service teachers borrowed some USB card readers to do this. The quality of the PowerPoint presentations was high and these were not only presented to peers but also to parents. This allowed the school to showcase its work in the area of recycling and this was clearly appreciated at the parent meeting observed by the researcher.

Strengths and weaknesses of mobile phones

All PST responded that they found the phones easy to use and it was easy to transfer photographs and video to computer for later review. The size of the device made them convenient to use for just-in-time recording of a significant event during their teaching. However, sound files were difficult to transfer to computer. Those that persisted re-recorded on an iPod and transferred this file, but this created an additional layer of complexity. Also some also had difficulty turning the phone off (the off button needed to be pressed for an extended period of time).

Use of mobile phones to augment the developing pedagogy of PST

PST recordings and photographs typically included exemplars of a successful teaching episode, an example of a student misconception that they had to address (e.g. often children link ozone depletion and global warming), an unsuccessful teaching episode (usually related to a classroom management issue) or

a creative student work (e.g. a poster, table of data in excel, PowerPoint slide or excerpt from pupil's journal). The presentation of exemplars from successful teaching episodes were kept to a maximum of five minutes as this enabled all set members to share experiences during meeting times. The exemplars included explanations, conservation games, activities such as composting and recycling, pupil led activities such as weighing and recording paper waste and pupil plays. The misconceptions presented related the greenhouse effect, ozone depletion, evaporation and condensation, and energy transformation – in particular the understanding that when energy is transformed the process is not 100% efficient. Classroom management issues could be categorised into two themes; those that related to the management of the lesson and those that related to behaviour management of individual pupils. The second was mentioned less because of the nature of the schools who participated. Management issues arose when the PST worked in less formal settings with a variety of unfamiliar equipment and much of what was presented related to inexperience in such contexts. Over time these problems were less evident and it seemed that the support and advice of set members contributed to this developing pedagogy. The recordings and photographs helped to focus discussion and to provide a context and it could be argued that a digital camera would have been just as good. However, the mobile phones enhanced the supportive network that developed among set members and SMS messages were used to follow up on issues raised in set meetings and to briefly share lesson outcomes.

Conclusions

There are some generalisations that can be made about the professional learning that took place and the lessons that may apply in other contexts. First, in this context action learning provided a vehicle for sustained and targeted professional growth that focused on short-term, clearly defined goals that would be reported on in the following meeting. Second, the phones provide a means of providing evidence of this growth as well as evidence of problems that may have arisen. In addition the SMS function allowed for almost immediate affirmation of success or for a call for help from a supportive peer. Third, the meetings allowed the PST to develop and share appropriate learning strategies that may or may not have included the use of mobile phones.

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