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Using iPads as a learning tool in cross-curricular collaborative initial teacher education

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Introduction

AQ1 With the pace of technological change occurring at an ever faster rate, it is likely that the use of mobile technologies will become commonplace within the classroom of the future. This means that teacher education must keep pace with the use of mobile technologies. Baran's (2014, 24) review of research into mobile learning observes that in the literature on mobile learning and teacher education, the overwhelming agreement is that it is 'beneficial' to extend teachers' learning experiences by integrating mobile technology skills into their training. Naismith et al. (2004, 7) agree with the argument that mobile devices provide motivating learning experiences and they argue that these devices can be used 'dynamically, in many different settings, giving access to a broad range of uses and situated learning activities'. They propose further that the personal nature of mobile devices means they are able to engage learners in individualised learning experiences, providing increased ownership and responsibility for learners over their own work. To extend pre-service teachers' learning experiences in line with these proposals, a pilot project as reported here was undertaken with a cohort of science and English pre-service teachers at a university in the north of England, to facilitate the use of mobile technology as part of their training to become teachers.

Mobile learning; motivation, collaboration and authentic activities

One of the arguments put forward for using mobile technology in teacher education is that it has the capacity to motivate pre-service teachers. Baran (2014) identifies a number of motivating factors emerging from her review of current research into mobile learning in teacher education. Significant among these were enhancing student mobility, deeper explorations of content areas, connecting pre-service teachers with a larger community and providing teachers with personalised learning experiences. The added value of mobility allows learning to take place in authentic situations, for example as part of field work, and promotes situated learning experiences (Martin and Ertzberger 2013). Naismith et al. (2004, 13) argue that mobile devices are very well placed to provide situated learning, which 'requires knowledge to be presented in authentic contexts and learners to participate within a **AQ2** community of practice'.

One of the aims of teacher education in the USA and the UK is to encourage students to be active constructors of knowledge (Niess 2005) and the **AQ3** use of mobile technologies aligns successfully with a variety of models of learning (Naismith et al. 2004). Following the constructivist conception of knowledge, teacher educators should encourage students to discover principles for themselves, so 'we must give them an environment in which to participate in learning processes, and the appropriate tools to work with that knowledge' (Naismith et al. 2004, 12). The use of mobile technologies also aligns with the collaborative model of learning. Vygotsky posited in the 1930s that the use of language to communicate develops new ways of thinking: what we learn from our inter-mental (collaborative) experience shapes our intra-mental (individual) thinking (Vygotsky 1992). Sharples (2001, 7) argues that the use of dialogue in collaborative learning tasks, building knowledge cooperatively, is a crucial requirement of effective learning, 'the skills of *constructing* and exploring knowledge, *conversing* and collaborating with peers, and the ability to *control* one's own learning are fundamental requirements of effective learning'. It follows that pre-service teachers should be given opportunities to learn in this manner, and so it was this powerful connection between mobile technology and collaborative learning that this project sought to exploit.

Process

One of the key aims of the pilot study reported here was to develop collaborative working between English and Science subject specialist pre-service teachers, working together to produce an e-book based around a field trip to the seashore. To introduce the task, all the pre-service teachers met together and the science tutor modelled making an e-book. It contained video clips, sounds of the seashore, photographs of the organisms that could be found there, as well as the details of the task itself and the fieldtrip arrangements. The task was to research the way of life, and habitat of one alga and one animal found upon the seashore. The task was quite open-ended, in terms of the style and content of the e-book, other than being landscape in format and relating to the chosen organisms. All the pre-service teachers had an Apple iPad provided by the university, or used their own, onto which they downloaded the BookCreator app and together decided on which organisms to research.

On the day of the fieldtrip, the pre-service teachers used their iPads to record images, sound and video clips of their experiences. They used scientific principles to estimate the abundance and distribution of the flora and fauna on the upper and lower shores. Some of the scientists found this work, for the most part, within their comfort zones, whilst for the English student teachers this was a challenge and more or less completely new. The scientists had to collect and record data from the field work, using their iPads. The English pre-service teachers, in addition to working on the scientific data collection, were tasked to use their iPad to collect any details and impressions of the seashore throughout the day. They were to photograph, film or record any of the sense impressions that they could of the day (the setting, the organisms and their feelings about the day) as the basis for the subsequent activity of writing poems for the e-books.

After the fieldtrip, the scientists analysed the data they had collected and produced diagrammatic representations showing both the abundance and distribution of their chosen organisms on both an exposed and a sheltered seashore. Population estimates of limpets and sea anemones were also calculated and displayed in the e-books as bar charts or pie diagrams. Additional information about the organisms' way of life was added. The English pre-service teachers used their follow-up session to create poems, after instruction from the English tutor regarding their construction. A further workshop with a professional poet enabled them to edit their poems so that they were accessible for school students aged 11–12, who were the audience for the e-books. In a final joint session, the English and science pre-service teachers worked to finalise their e-books, so that each one could be placed in a shared drop-box for future use. To conclude and celebrate the activity, the pre-service teachers presented their e-books to the whole group and other interested parties.

To explore the pre-service teachers' perceptions of this collaborative project, they were asked to complete a short questionnaire prior to the project and immediately after it had taken place. The questions asked about their perceptions of using mobile technology before and after the fieldwork. Questions were also asked about how the pre-service teachers felt about the collaboration, what they had learnt from the experience and whether this would have any impact on their future teaching.

What the project offered the pre-service teachers

Baran's (2014, 18) argument that the 'greatest added value of mobile learning vis-a-vis PC learning lies in the aspects that extend classroom interaction to other locations' was fundamental to the way in which this project aimed to extend the experiences of pre-service teachers. The pre-service teachers worked in a number of different locations, particularly at the seashore, using their mobile devices. Collaboration was also fundamental to the experience offered, as they were provided with opportunities to plan, research their specific subject, discuss their findings and share experiences with those that were knowledgeable. It gave them an opportunity to peer-mentor other pre-service teachers with lesser knowledge than themselves, which was an important first step on the teaching ladder. It was also designed to show the pre-service teachers that collaborating outside their own department or subject can provide learning opportunities that they might not have considered before.

In planning this project, attention was also paid to constructing an appropriate environment for the mobile learning project and the pre-service teachers were provided with iPads, so they had the tools for this specific model of mobile learning. Naismith et al. (2004, 12) argue that mobile devices provide 'a unique opportunity to have learners embedded in a realistic context at the same time as having access to supporting tools'. The use of mobile technologies also aligns with the collaborative model of learning, particularly in this pilot project, where the teacher trainees were working through the use of mobile devices together to create a collective outcome or 'revised knowledge and skills' (Sharples, Taylor, and Vavoula 2005, 6). The pre-service teachers were doing more than cooperate, they actively worked together to create something the sum of which was greater than if they were working alone.

The questionnaire responses (34 from 35 participants) revealed that nearly 25% of the pre-service teachers had never considered using a mobile device in this way, whilst 14% were concerned about damaging the device in the field. As a result of this work, 66% of the pre-service teachers who had not considered using a mobile device on a school trip, now considered that they would use it to a great, or some, extent in the future. 82% considered

that the use of mobile technologies provided learning strategies that might be used in their future teaching. Seventy-five per cent considered using it to capture images, 59% would use it to make video records of the trip, 25% would use it to collect data and 38% would use it to record notes.

In terms of cross-curricular working, 35% considered having another subject/perspective on the topic was valuable. 9% thought it enhanced creativity and 12% literacy skills. Forty-one per cent considered it enhanced their biology subject knowledge and skills, nearly 33% considered it provided an authentic context for poetry writing and 12% considered it enhanced pedagogy and collaborative working.

Conclusion

The pilot project, creating an e-book, across subject areas and in the field, was effective in a number of ways. The questionnaires demonstrated that there was a change in the perceptions of the pre-service teachers using mobile devices in 'authentic situations' (Martin and Ertzberger 2013). The results of the questionnaire supported the view that fieldwork can also have a positive impact upon interpersonal and social skills, confidence and self-esteem of those taking part and also on long-term memory, enhancing knowledge and skills (Rickinson et al. 2004). The cross-curricular work enhanced understanding of how collaboration can be facilitated by mobile learning, between experts in different fields. The pre-service teachers were enabled to engage with Sharples' concept of a revision of knowledge and skills referred to above through using the iPads that they could take into their placements and their own teaching. This pilot study has prepared the ground for a larger, international collaboration on the use of mobile technology in initial teacher education and the authors invite those interested in such a study to contact them.

Disclosure statement

AQ6 No potential conflict of interest was reported by the authors.

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