Mobile learning in early childhood education: Can pre-service teachers help practising teachers use new technologies in new ways?

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**Abstract:** mLearning is not widely used in early years of education, although it has been shown to be beneficial to children’s learning (Ciampa, 2014). This paper reports the initial findings of a three-year longitudinal study that is investigating the costs and benefits of implementing mLearning in early childhood education at two case study sites. The research is using a partnership model; between a School of Education within a university and two Department of Education primary schools in Western Australia. A mixed method approach was used to collect data in the form of surveys, interviews, focus groups and field observations from pre-service and practising teachers, school leaders and parents and carers. Initial findings indicate that pre-service and practising teachers increased their confidence, technological knowledge and insights into the issues associated with implementing mLearning in the classroom.

**Introduction**

Mobile learning (mLearning) is ideal for the early childhood setting because of its portable nature and relatively low cost (Hutchison, Beschorner, & Schmidt-Crawford, 2012) and has been shown to have a positive impact on student learning and to increase levels of engagement and motivation in young children (Ciampa, 2014; Chiong, Ree, Takeuchi, & Erickson, 2012), if used appropriately (Keengwe & Onchwari, 2009; McKenney & Voogt, 2012; Organisation for Economic Co-Operation and Development [OCED], 2010). However, mLearning is not widely used in the early years of education for a variety of reasons (Blackwell, Lauricella, & Wartella, 2014).

There are a number of Australian policies indicating the value that the Australian government places on Information and Communications Technology (ICT) integration in education. The Early Years Learning Framework [EYLF] (Department of Education, Employment and Workplace Relations [DEEWR], 2012), National Professional Standards for Teachers in Australia (Australian Institute for Teaching and School Leadership [AITSL], 2012), Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2013) and National Statements of Learning for ICT (Curriculum Corporation, 2006) are key National documents that teachers must use to plan their
teaching and learning programs. All these documents explicitly refer to the value and importance of ICT integration within the curriculum so that children are fully prepared for the twenty-first century.

This research explores the implementation of an ongoing longitudinal mLearning intervention in early childhood education in two metropolitan schools in Western Australia (School A and School B). A schools-university partnership model was used; participants were pre-service teachers (n=102) and academics (n=6) from a university and practising teachers (n=6), school leaders (n=6) and parents and carers (n=20) from the two primary schools. Pre-service teachers were required to present technology-rich lessons in partner schools as part of the technology unit completed in the second year of the early childhood and care teaching degree. The synergy between the pre-service and practising teachers during the authentic teaching experiences was investigated to determine the effectiveness of schools-university partnerships in the adoption of mLearning in early childhood education.

Methodology

Early childhood pre-service teachers completed a unit called Transforming Learning through ICT in semester one, of the second year of a degree. As part of this unit pre-service teachers prepared, in groups, an mLearning rich lesson that was presented to peers (peer group) or children in one of the partner primary schools (authentic groups). The early childhood teachers at the two partner primary schools were invited to attend the Transforming Learning through ICT unit alongside the pre-service teachers. There were opportunities for the teachers to have input into the curriculum prepared for the classes by the pre-service teachers. When the pre-service teachers delivered lessons, there were opportunities for the practising teachers to provide feedback. Professional development workshops were delivered to parents and carers at each school to provide parents and carers with up-to-date information regarding mLearning in early childhood education and to obtain their views about the use of mLearning in the early years of education. At the request of both schools, two further pre-service teacher visits for the purpose of the authentic teaching experience were incorporated into a second unit, Planning and Evaluation, which ran in the second semester of the year. The purpose of this was to increase the strength of the partnership.

The research used a mixed methods approach. Qualitative data in the form of semi-structured interviews, focus groups and field observations were collected and analyzed using an interpretive approach. Surveys were used to collect both qualitative and quantitative data from pre-service teachers. Pre-service teachers were surveyed three times, initially prior to commencing the project, secondly at the mid-point of the first long-term practicum between semester one and semester two and finally at the end of semester two. The surveys contained questions regarding the pre-service teachers’ beliefs about using mLearning in early childhood education, levels of technological knowledge, disposition towards teaching with mLearning in early childhood, views and intentions regarding future ICT integration into their teaching and the benefits and challenges of schools-university partnerships. Some of the questions were open-ended, and others used five-point Likert scales with answers ranging from strongly disagree to strongly agree.

Findings

Benefits for the University

The pre-service teachers in the authentic groups found the teaching experience time-consuming but richer. They all enjoyed visiting the schools and teaching the children. They did state that more work was required of them because the lessons had to work; so they had to think about the children. The benefits for the pre-service teachers were multifaceted as shown by the comments made:
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When you plan in your head, you have no idea. In reality, it takes more time. You have to make sure they [the children] are all engaged and listening.
I loved it.
It was fun.

Using the technology in the classroom enabled pre-service teachers to critically evaluate the technology as demonstrated by the following comment:

It was an advantage for us [pre-service teachers] as we now have a clear understanding of how the program would work with students, and whether it is a tool that is worth continuing. We were able to gain confidence in teaching and presenting technology to students.

In addition to learning the skills of effective technology integration, the pre-service teachers gained classroom teaching experience prior to the first extended teaching practice. Staff in the School of Education at the University had access to a set of iPads and other mLearning tools as a result of the project. The iPads were used extensively by School of Education staff for tutorials and pre-service teachers for presentations. Pre-service teachers were asked about their beliefs regarding mLearning in early childhood education before and after authentic teaching experiences. For all statements, the authentic group had more positive scores than the peer group after the experience. Figures 1 and 2 display the pre-service teachers’ positive and negative responses. The positive views expressed by the pre-service teachers before and after the authentic visits did not change much, but there were fewer negative views expressed after the authentic visits.

Figure 1. Positive statements about teaching ICT to early childhood students

Positive beliefs

% before authentic experience % after authentic experience

Beneficial to children's learning

Engages children

Important to integrate

Good for learner diversity
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**Figure 2.** Negative statements about teaching ICT to early childhood students

**Benefits for the Schools**

The main benefits for the schools was the synergy between the pre-service and practising teachers where the practising teachers had the opportunity to learn by observing the use of new technologies in their classrooms as illustrated by the following comment made by a pre-service teacher:

The teacher asked me about the story app that we sequenced with and how we put the photos on and I told her how we transferred them from the computer to the iPad and I told her the name of the app. She sat with me and the first pair [of children] that I worked with, and she was into it.

Following one of the pre-service teacher visits one of the teachers said:

The children got to do something that I have not done with them; they were all really engaged. It taught me something new. I felt it was engaging and got me out of my comfort zone.

Additional benefits for the schools access to free professional development offered by the University and the loan of mLearning equipment.

**Discussion**

**Selection of Teachers/Schools**

The schools were selected based on the proximity to the University. There was a tight timeline
to get the project up and to run so two schools were selected and approached. Both schools accepted, and partnerships commenced with these two schools. In hindsight, it might have been better to invite more schools to apply to take part to gauge the level of support and commitment.

The school principals nominated the early childhood, teachers. At School B, there were four early childhood classes. The kindergarten teacher was not able to take part because kindergarten was not full time and did not run on one of the days when the pre-service teacher visits took place. The principal at School B put forward the most technological teacher, Louise (pseudonym) who taught in the pre-primary class and a year two/three teacher new to the school, Rachel (pseudonym).

Louise was perceived by the University lecturers to be a gatekeeper to the project. She had a dominant personality and during the first year did little to enable the project. After one group of pre-service teachers had delivered a poor presentation using little of the technology shown at the University, Louise was reluctant to be interviewed. At this point, Louise indicated to her principal that it was more of a practicum opportunity for the pre-service teachers than anything else. Louise and Rachel were interviewed together which made it difficult to gauge Rachel’s true perspective. Louise had very fixed ideas about using technologies in early childhood education and was only in favor of using free applications (apps). The University’s perspective was to use technology that best supported the curriculum and in most cases free apps were not deemed the most suitable. The University wanted the partnership to include parents and carers and when Louise expressed to her principal the desire to work with the University and organize a parent workshop it was not successful. The principal later stated that Louise had not taken the necessary steps to encourage parents and carers to attend.

Rachel was enthusiastic but lacked technological knowledge. Her “light globe” moment was when she realized that she had been using new technologies in old ways and that there were new pedagogies to match new technologies:

I have been using new technologies in old ways.

Rachel’s confidence increased during the first 12 months of the project although she repeatedly commented that she was time poor:

I am limited by getting everything done in the classroom, ideas and professional learning. I am only limited by what I can get done, cost, just knowing more about the things that you already have and no lack of interest. I see it (mLearning) as the new way.

When interviewed without Louise during the second year of the project Rachel was open to the suggestion of co-presenting a parent workshop to showcase the digital books that her class had made with the pre-service teachers. Unfortunately, Louise was not open to this idea and as a member of her schools’ parent council she requested that the University provide some professional development on cyberbullying and use of social media.

At School A, there were three teachers involved in the first two years. The pre-primary teacher, Jessica (pseudonym) was involved in 2013 and 2014. Jessica proved to be an ideal candidate for the partnership. She was an experienced early childhood teacher and the team leader for early childhood education at School A. At the start of the project her technological knowledge was limited as illustrated by her comments:

What is a URL?
What is a wiki?

In the first year, Jessica requested that the pre-service teachers create digital storybooks with her class because digital stories were a requirement of the new English curriculum, and she had no idea how to go about creating one. When the pre-service teachers visited her class, Jessica sat down with groups of pre-service teachers when they were working with children and asked many questions. After the pre-service teacher visits, Jessica made comments indicating that she had learned by watching and
engaging with the pre-service teachers:

I liked how I was able to ask the students [pre-service teachers] a question, and they were all willing to help and give me advice. I have gained a lot of ideas from these sessions, and I have realized that using ICT in the classroom is quite simple.

Wow, book creator is so easy to use and a great way for children to be involved in making a digital book.

Jessica organized a workshop for parents and carers in the first year of the partnership. The workshop was well attended and provided an opportunity to showcase the digital books the children had created with the pre-service teachers. Parents and carers had the chance to experience firsthand what their children had completed illustrating good use of mLearning in early childhood education. The parent workshop was attended by three teachers at School A in their planning time. Despite the fact that School A had only two iPads in the school Jessica presented professional development sessions to her colleagues sharing her newly acquired technological knowledge. Jessica gave up time in her holidays to attend a summer intensive ICT course at the invitation of the University and used what she learned in her class. In the term following the summer intensive, Jessica’s pre-primary class made an iMovie trailer, created digital books, word clouds and created avatars using create my wildself. Jessica’s confidence and technological knowledge grew in the first year of the study. She embraced the partnership taking up the ICT lecturer’s offer to work one on one with her in the first year to assist her create a class blog. At the start of the year, Jessica invited the University colleagues to attend her initial parent meeting to introduce parents and carers to the mLearning partnership. Jessica was enthusiastic about collaborating with the University and readily took up offers to borrow equipment and collaborate with planning of future parent and carer workshops.

The other participating teachers at School A were Kelly (pseudonym) in 2013 and Angel (pseudonym) 2014. Kelly was a mature age graduate who was willing and enthusiastic, but limited due to lack of resources. On several occasions, Kelly stated that it was not lack of interest or enthusiasm that stopped her using mLearning in the classroom. Kelly arrived at the school at the start of the school year to an interactive whiteboard that was not working. It was not repaired over the summer break and was not working for her as an interactive board until the start of term three. When sharing this information, she said:

Schools are busy places.

Kelly was on one year fixed term contract in 2013 and lost her position when School A had to lose a member of staff in 2014.

Participant changes are unavoidable in longitudinal partnerships, but it would have been preferable to have a teacher involved who was likely to be there for more than one year. Kelly missed one of the pre-service teacher sessions due to a graduate professional development session that she was required to attend. The school initially proposed putting a relief teacher in Kelly’s class that would mean that the learning opportunity for School A would become lost. At the last minute, the principal agreed to put the relief teacher in another class and allow a permanent teacher at School A to sit in Kelly’s class. The teacher who sat in on Kelly’s class, Angel subsequently became a participant the following year. Angel was an experienced teacher who was keen to use mLearning in her classroom. She was already using her iPhone to take photos and videos in her classroom and stated that she would love a set of iPads.

Recommendations

For future partnerships, a recommendation would be for teachers to have a few years teaching experience and likely to be with the school for the next few years, not graduates or teachers on a
one-year contract. Ideally teachers should not be new to the school because the pressure of a new job means that teachers would have less time to engage in the project. In small schools with a limited number of early childhood teachers, this may not always be possible. Teachers should be open to learning new technologies and new pedagogies, they should be willing and expected to share their acquired knowledge with colleagues and liaise with the University regarding collaborative professional development with the aim of sharing best practice in mLearning in early childhood education. To assist schools with a selection of teachers a manual for principals providing information about the aims of the partnership and how schools and the University can best work together to achieve aims should be distributed. A guide for participating teachers outlining the requirements for the pre-service teacher visits would also be a recommendation. In the first year of the study three of the practising teachers were able to come to the University, meet the pre-service teachers, attend one of their ICT sessions alongside them, share details about their classes and provide curriculum for the pre-service teachers to plan for their classes. The pre-service teachers commented that they valued the teachers coming to the University so it became a priority that this could happen in subsequent years. Schools were unable to cover the cost of teacher relief but in both school the principals and deputies covered the teachers so that they were able to come to the University and meet the pre-service teachers.

The teachers were asked to provide the pre-service teachers with pedagogical feedback. In the first year, the teachers were given a rubric to complete. The rubric was replaced with open-ended pedagogical feedback for the second year as the rubric was deemed too complicated and took the teachers away from engaging with what was happening in the classroom.

**Allocation of Support**

Maintaining a partnership was time-consuming for the University. The University participants involved in maintaining the partnership in addition to the researcher were the ICT coordinator and ICT lecturer. The key issues that arose from the findings were the time taken to research and purchase equipment, ongoing maintenance of the equipment, administrative tasks such as removing unwanted photographs from iPads, managing Wi-Fi passwords, purchasing apps and collection and picking up equipment. The iPads purchased for the project were stored in a locked cabinet at the University. The pre-service teacher visits required staff and pre-service teachers to be at schools early in the morning. University staff were not allowed to take home the iPads for insurance reasons, so staff were required to collect the iPads from the University before going to partner schools.

The researcher acted as a liaison between the schools and the University. The idea of a partnership is that it is mutually beneficial for all partners. When a school requested staff professional development from the University, the researcher organized university colleagues to facilitate, equipment and organizational details. The researcher, ICT coordinator and ICT lecturer facilitated three parent and carer workshops, three one-on-one sessions with teachers and two professional development sessions at the partner schools during the first year of the study. The researcher spent three days attending a summer ICT intensive at the University alongside one of the participating teachers to maximize the outcomes for that teacher. There was no time or remuneration for such additional tasks that were key partnership building activities.

**Recommendations**

Time for partnership development and liaison is required for sustainable partnerships. Schools are busy places and school-university partnerships are not likely to be a high priority for schools, however when a school does think to contact the University to request professional development, it is vital that the University makes every effort to be accommodating. In this study requests from schools were usually at very short notice. The professional development sessions run on school sites by the University served to grow the partnership with no direct benefits to the University. The cost to the University was time.
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The issues with lack of technical support in the partner schools were mirrored in the University. There was no time allocation for staff to manage the resources and the iPads in particular, did take up the time of the researcher, ICT coordinator and ICT lecturer. The iPads, which were purchased for the research project were used extensively by ten staff members in the School of Education at the University for tutorials. Pre-service teachers also requested to borrow the iPads for presentations. The recommendation would be for a time to be allocated to one or more staff members for partnership liaison and maintenance of ICT equipment.

Structure of the Pre-Service Teacher Visits

The pre-service teacher visits to the partner schools were placed in high esteem by the pre-service teachers and the lecturer; however the workload and stress associated with the authentic visits was extremely high. Feedback from the ICT lecturer regarding the authentic visits in the first year illustrated the value of the authentic visits:

[The standard of the presentations that were taught to the kids, I actually cannot put them in the same comparison. They were on a different level completely. An understanding of where the kids are, the way the ICT is embedded, the authentic nature of the environment. Not one of them did research and present it as a power point that I had with the quite a few in the peer group.]

Pre-service teacher comments included:

I now believe it's a positive resource that should be used if it can enhance the learning or be a source of information, but if it doesn't have a particular purpose or do any of the above then I think it shouldn't be used.

I loved it. You got to see what you were doing and if it worked with children.

Going out into classrooms is realer. If it is not working, you have to change it. Lecturers can see how we cope in the classroom.

You get to see how to use it with kids. It is better with kids.

In the first year of the study, the structure of the pre-service teacher visits was that each tutorial group of approximately 20 pre-service teachers was split between two classes at each school. Half the pre-service teachers were required to present their mLearning rich lessons in the first week and the other half present sequential lessons in the second week. The difficulty with this was that at the conclusion of the first week the lesson for the second week often had to be completely rewritten to accommodate the outcomes of the first week. The sequential nature of the lessons was very stressful for the pre-service teachers. At the end of the first year of the project, the structure of the pre-service teacher visits was reviewed to make it more manageable for both pre-service teachers and the lecturer. The changes were such that the lessons did not need to flow on from one week to the next.

The lecturer had to balance giving the pre-service teachers the freedom and ensuring that their choices demonstrated best practice using mLearning in early childhood education. The proposed structure of the pre-service teacher visits for the third year was to use the curriculum suggested by the teachers but to provide pre-service teachers with suggested mLearning tools and or suitable apps. Pre-service teachers at the beginning of the second year of their degree demonstrated that they did not have the ability to critically evaluate mLearning tools or apps, so explicit guidance from lecturers would result in a more positive experience for both pre-service and practising teachers and the children. In the first two years of the study, some pre-service teachers selected closed apps that did not model...
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best practice or add any value to the lessons. The assessment of the unit would need to be reevaluated to compensate for the additional guidance received by the pre-service teachers, but also the additional work associated with presenting a lesson in an authentic setting.

Recommendations

When this study commenced, the schools had been selected, and the teachers were put forward by the principals. At the end of the first year it was clear that the process of school and teacher selection could be better thought out, however the structure of the pre-service teacher visits was something that could be changed by the University. The feedback from the pre-service teachers and lecturers was used to make changes to alleviate concerns. The following three recommendations were implemented for the third year of the study.

- Compensate pre-service teachers by reducing the workload in other aspects of the ICT unit. Reducing the workload might mean reducing the reading requirements.
- Give pre-service teachers content for mLearning lessons well in advance with suggested tools and apps.
- The lecturer matches the curriculum to mLearning tools reducing the stress on both the lecturer and the pre-service teachers.

Conclusion

This paper has discussed early findings of a study into the costs and benefits of implementing mLearning in early childhood education. Initial findings from the research have indicated that school-university partnerships can provide early childhood pre-service and practicing teachers with the opportunity to gain a deep knowledge of effective ways of using mLearning and to better understand the issues that prevent teachers from successfully integrating mLearning into their teaching.

References


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