Teacher Educators' Practices with M-learning: A Case Study of 'Far Transfer' Into Schools of Practices Learned during Preservice Teacher Education

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Abstract: A.J. Davis (2017) coined the term 'far transfer' in learning as the ability to apply knowledge and skills to novel situations, rather than the knowledge and/or skill that was originally learned, but research evidence of the occurrence of 'far transfer' is hard to find. Despite that, the goal of teacher preparation is for student teachers to learn knowledge and skills applicable to their future classrooms and thus 'far transfer' is an important goal to achieve. Therefore, today, improving our understanding of how to achieve fruitful 'far transfer' of m-learning pedagogies from preservice teacher education into field-based teaching practice in schools is particularly valuable. This paper focuses on our unexpected discovery of the 'far transfer' of m-learning pedagogies of a teacher educator, within an overarching instrumental case study of the m-learning practices of eight teacher educators who taught in one or more programmes of preservice teacher education offered by an institution in Aotearoa New Zealand. We conclude that two way 'far transfer' is an essential process in Goodlad's (1994) 'simultaneous renewal' of teacher education and schools.
Keywords: M-learning, Teacher educators, Preservice teachers, 'Far transfer'

Citation

Introduction

This research study is set in Aotearoa New Zealand context to explore the mobile pedagogical practices that teacher educators used in their courses across multiple preservice programmes within one university. Of particular interest is the m-learning or mobile learning related pedagogical strategies that were modelled and experienced during the course work and their transfer into the student teachers' teaching practice. This is important because teacher preparation programmes aim to develop the required knowledge and skills for student teachers' future classrooms; Goodlad (1994) recognized this as a need for the simultaneous renewal of schools and preservice teacher education. Given the presence of mobile technologies in K-12 education, it is valuable to discover how student teachers can be supported to transfer the m-learning pedagogies that they experience into their own teaching practice. The following literature review begins with a section on the 'far transfer' of learning before reviewing m-learning in teacher education.

Perspectives on the transfer of learning

According to Hager and Hodkinson (2009), transfer of learning is a cognitive practice whereby a learner modifies and adapts "earlier learning to handle a related situation in a new context" (p. 627). This paper adopts a perspective on transfer that is commonly adopted in teacher education and focuses on the most challenging aspect, the transfer of learning during coursework into the practices adopted by student teachers when in schools during teaching practice. A.J. Davis (2017) argued that the learner, the task, and the instructional contexts are the three crucial conditions needed to facilitate what she called 'far transfer.' 'Far transfer' is the transfer of learning that involves purposefully and consciously application of knowledge and skills to different kinds of contexts and performances, "one important skill being the ability of the student to make effective judgements in the new situation" (A.J. Davis, 2017, p. 130). Weiner and Lamb (2020) have likewise identified that when learners are engaged in opportunities that help them to transform and reconstruct what they already know, it facilitates new ways of thinking and doing that helps to shift their underlying assumptions about their current practices, hence increasing their motivation to transfer learning. 'Far transfer' thus involves a conceptual change to identify connections between topics and involves metacognitive development. Metacognition is the process of thinking about one's own thinking or learning. It is highly connected to high-order processing through reflection, which is a key practice in professional learning and development, including reflection on the role of ICT in education during preservice teacher education (N. E. Davis, 2010). Thus, it follows that student teachers' ability to transfer learning is increased when they engage in metacognitive practices such as active learning, self-monitoring and reflection-in-action. The cognitive perspective helps us to understand that transfer of learning goes beyond establishing commonalities across tasks or situations, to deploy evolving cognitive structures for an understanding of the new context.

A. J. Davis (2017) argued that when learners engage with complex tasks within social and cultural contexts, it fosters the development of metacognitive skills which aids in the successful transfer of learning; this socio-cultural view of 'far transfer' recognises the social and cultural dimensions. The social practice in which learning takes place influences learners to collectively construct knowledge through the community of practice, thus enabling the opportunity for transfer to novel contexts. This draws on Wenger's (1998) ideas of communities of practice. Wenger (1998) argued that, although mental processes are involved in learning, learning reflects the development of practices and an ability to negotiate meaning in particular environments; these include the environment for preservice teacher education coursework as well as the environments of schools. Processes occur during interaction with members of the relevant community and this can lead to identity formation. Wenger (1998) identified three characteristics of such a community of practice: (1) mutual engagement where members work together to negotiate meaning, (2) negotiation of a joint enterprise through a communal response that supports a common goal which creates relations of mutual accountability, and (3) development of a shared repertoire where members create resources that the community adopts for negotiating meaning as part of the practice. As Barak (2016) noted, peer interactions in preservice teacher education challenge the learner "to think at a higher level and move forward to the next cognitive development stage" (p. 285).

M-learning approaches in preservice teacher education

There has been a call for investigations of teacher educators' exemplary m-learning approaches (Burden & Kearney, 2017). Naylor and Gibbs (2018) argued that if student teachers experience the use of mobile technologies during their coursework, then they will be aware of the value of mobile technologies for education, and more likely integrate mobile technologies into their practices. However, there has been minimal research investigating how teacher educators integrate mobile technologies across multiple preservice programmes in pedagogically innovative ways (Burden & Kearney, 2017) that could support student teachers to adapt and adopt these uses into school classrooms. This is particularly relevant in New Zealand, where the majority of state schools

started to implement creative ways to integrate m-learning into their practices along with the redesign of school classrooms as innovative learning environments (ILEs), including many BYOD initiatives (Ministry of Education, 2016; Benade, 2017; Fletcher, Mackey & Fickel, 2017; Nelson & Johnson, 2017). Therefore, New Zealand is one of the countries that is a practical site to research how teacher educators can effectively prepare students teachers to use mobile technologies in their future classrooms.

Research with a focus on m-learning practices in preservice teacher education has mainly examined the use of iPads and smartphones within specific discipline areas and/or preservice programmes (e.g. Kearney & Maher, 2013; Mac Mahon, Grádaigh, & Ghuidhir, 2016; Naylor & Gibb, 2018; Vasinda, Ryter, Hathcock, & Wang, 2017). Much of the research into the experiences of student teachers has investigated how they use mobile devices to support learning during coursework, but not during teaching practice (e.g. Naylor & Gibbs, 2018; O'Bannon & Thomas, 2015; Tolosa, 2017). In contrast, there is limited attention to how teacher educators implement related innovations in their classrooms (Tondeur et al., 2019) and teacher educators have been identified to be the least often studied participants (Burden & Kearney, 2017). Consequently, Baran, Bilici, Sari and Tondeur (2019) recommended more research to examine "teacher educators' use of strategies, challenges, and exemplary practices that connect teacher education courses with field practices" (p. 368). Therefore, by exploring how student teachers use mobile technologies during their coursework and teaching practice, this study aims to respond to Baran's et al. (2019) recommendation by taking an explicit focus on one teacher educator's practices with mobile technologies.

Investigating teacher educators' practices with a range of mobile technologies, using multiple sources of data, and in-depth perspectives of teacher educators and student teachers have previously received little research attention (Burden & Kearney, 2017). Research is needed into the pedagogical strategies that teacher educators use to prepare student teachers to integrate mobile technologies into their learning and teaching. Therefore, the purpose of this case study was to explore how teacher educators used mobile technologies to influence the learning and teaching experiences of student teachers. In particular, the study sought to investigate the pedagogical strategies that teacher educators used to prepare student teachers to integrate mobile technologies into their teaching. In particular, this article focuses on unexpected findings related to the 'far transfer' of m-learning pedagogies.

Methodology

This single instrumental case study of eight teacher educators' practices with mobile technologies in one institution in New Zealand was analysed from multiple data sources from both teacher educators and student teachers. Data was collected through semi-structured interviews with eight teacher educators who taught multiple courses across four preservice programmes. Furthermore, online and face-to-face teaching practices of three teacher educators were observed and four focus groups were held with a total of 20 student teachers. Survey data of student teachers' perceptions of their learning with mobile technologies were obtained from 110 student teachers enrolled in 1-year preservice programmes and analysed using descriptive statistics. The data was analysed according to emerging themes and four interrelated themes emerged: collaboration, authentic learning, align coursework with school practices and learn technology by design. Given space restrictions, this paper mainly focuses on one of the eight teacher educators studied.

Illustration of 'far transfer' of learning in preservice teacher education

Although many New Zealand schools are implementing ILEs (flexible learning environments), not all student teachers were guaranteed teaching practice opportunities in ILEs. Pedagogical approaches that underpin learning in ILEs include personalised learning, collaborative inquiry, co-teaching in student-centred flexible/open learning spaces, and ubiquitous learning facilitated by digital technologies (Fletcher et al., 2017; Nelson & Johnson, 2017). Given ILEs are a

Ministry policy, all student teachers needed to be prepared to work in such environments. Therefore, the way teacher educators set up their learning communities was to facilitate the discussion that included practices in ILEs. This helped all student teachers to begin to understand some of the ways mobile technologies could be used, both for working with school students and in collaborative teaching relationships.

This paper focuses on the practices of one teacher educator to provide insights into how eight teacher educators were working through this curriculum challenge. The teacher educator, pseudonym Paul, prioritised relevant apps being used in local school contexts to bring coherence between teacher education and the practices in schools. Through this intentional approach to aligning the selection of apps and strategies to the local contexts where the student teachers were undertaking their teaching practice, Paul appeared to enable the conditions in which 'far transfer' was more likely to occur. One student teacher said, "I think that there have been things that the course has introduced to me, things like Kahoot and Padlet to use for learning." Student teachers provided detailed explanations of how they implemented, in a more meaningful way what they had learned from their coursework, as indicated in the following two examples. "We used Kahoot at uni [university] and I had never heard of it before, so when I went to school during my placement I used it. It's quite an easy way to get on board with it and engage students." "My junior classes loved Kahoot, and I would often do them at the start of the lesson."

Student teachers' learning to use the apps was an on-going process during their programmes. Some student teachers were more active than others and built up on their prior knowledge. They explored more apps which they had not been exposed to during their coursework. Thus, this study provided evidence that being able to generate personal meaning in the use of apps motivated 'far transfer' of learning to school classrooms. As A. J. Davis (2017) argued, creating personal meaning is a key feature of metacognition which supports 'far transfer.' For example, a student teacher decided to use Voice Thread to annotate his photos so that he could compare it with Jing, which they used in their science class. The student teacher also said that he was confident he could use Voice Thread in his own classroom. Making comparisons between one's concepts leads to a deeper understanding, implying a high level of conceptual growth occurs which facilitates educational transfer. Such an active process of abstraction in learning, according to A. J. Davis (2017), facilitates positive transfer results since learners can abstract principles of knowledge and understanding to other novel contexts.

Paul employed different teaching strategies such as interactive demonstrations, experiential learning, align theory and practice, authentic learning, and collaboration. He guided student teachers to use mobile technologies for authentic, project-based learning that often included a flipped classroom. The teaching activities ranged from student teachers' thinking about concepts, solving real-life problems, learning new skills, and developing artefacts. He modelled the use of mobile technologies to support learning and teaching, especially when performing scientific experiments. Besides watching the demonstrations, Paul encouraged student teachers to design their learning resources that incorporated technology and were granted the opportunity to choose the right technology for their learning tasks.

Paul explained how he prepared student teachers to effectively use mobile technologies in their future classrooms by first allowing them to understand the basics, and guiding them using school classroom examples that were general:

> The best thing that I do is start getting them to become very conversant with some of the technologies that are used in general, so that when they go out to schools they can then understand how to use them. So, for example, the first assignment could be a theory assignment, which is written reflections, so we know we've got the theory measure, we understand the principles. Then I tell them this is now about the practical one, and they love doing it because it's open-ended. But it still has to be scaffolded . . . I just give them a list of things they can create and a whole list of mobile apps they can use. And they do.

It seems student teachers understood the process of designing experiments using mobile technologies. One of student teacher said during a focus group, "in our subject [science] our lecturer uses the technologies so that we might be able to use them in our practice . . . he's introducing us to things that we can use them in future." Another one expressed a similar view, "we were shown how to use the technologies in a way that you could easily show someone else how to do it."

Paul facilitated collaborative group projects which seemed to motivate student teachers to construct knowledge with their peers through social interactions, and support learning conversations. Student teachers engaged in discussing their assignments which required inquiry. They developed their own concepts which enabled them to acquire a deeper understanding of the content and problem-solving skills. The findings illustrate that Paul empowered student teachers to take control of their learning, and gain new perspectives from their peers. Using mobile technologies enabled Paul to provide student teachers with greater autonomy of where they wanted to learn, and how they wanted to learn. Apart from student teachers and their devices being mobile, the tasks that Paul designed seemed to also provide a m-learning experience.

Paul modelled approaches used in ILEs which supported the transfer of knowledge from courses to school classrooms, since what student teachers learned became meaningful and relevant when they were in schools. He emphasised that collaborative learning supported the development of student teachers who can learn together as professionals and teach in ILEs. This finding resonates with Nelson and Johnson (2017) who argued that teacher educators should find anchoring practices that contribute to alignment with ILEs so that they can support student teachers to learn how to teach in ILEs. Student teachers who were in schools with ILEs indicated that the relevance was clear to them and consequently they felt more ready to teach. One student teacher stated that she never believed collaboration would work until when she tried it during teaching practice and found that it worked well. This evidence indicates her misleading preconception of the irrelevance of collaboration to her future teaching was challenged by her experience in coursework and in schools. In this case, 'far transfer' occurred because she linked her current situation to prior exemplars she had observed during coursework.

Paul was one of the eight teacher educators and from the interviews, it became apparent that they seem to recognise to achieve 'far transfer' of learning, the creation of coherence between preservice programmes and practices in schools was fundamental so that student teachers could understand the underlying concepts and/or pedagogies in ILEs. For example, Paul worked with science teachers in schools to keep himself well-informed with issues relevant to the courses which made him more aware of the current practices in schools (citation removed due to confidentiality). Admiraal et al. (2017) argued that successful integration of technology into learning and teaching is enhanced when practices in preservice programmes and schools are congruent. Examining how student teachers applied technology in secondary schools after their graduation, Admiraal et al. (2017) found that both mentor teachers and teacher educators acting as role models motivated 'far transfer' of learning to school classrooms. In this case study, student teachers also discussed how mentor teachers integrated mobile technologies into the classrooms which further informed their practices since they were able to draw from multiple and divergent practices.

Conclusion

This study provides insights into what 'far transfer' of learning entails. It adds to the limited research into teacher educators' m-learning practices that can strengthen the potential for transfer to school classrooms. Although the profound changes underway in schools pose significant challenges to teacher preparation, evidence from this study suggests that teacher educators designed their courses and taught in ways that provided opportunities for 'far transfer' of m-learning.

The study found that teacher educators engaged student teachers in learning with mobile technologies to develop professional knowledge, skills and dispositions, as well as modelling pedagogical skills and practices that could be implemented in current and future school classrooms. The findings revealed that allowing student teachers to use mobile technologies for their own learning, including collaborative reflection, as well as seeing teacher educators use them in the classrooms supported student teachers to bring into their awareness of how that understanding might be adapted to new contexts. For example, teacher educators created learning environments that were relevant and reflected the real-world by prioritising use in their practices of the apps, websites, and web-based software that were being used in schools. Teacher educators provided student teachers opportunities to purposefully discuss the educational value of various apps to support the metacognitive thinking about their own practices, which facilitates 'far transfer' results since learners can abstract principles of knowledge and understanding to other contexts (A. J. Davis, 2017).

Student teachers' experiences with mobile technologies during their coursework influenced their practices in schools during teaching practice. Preparing student teachers in ways that support their successful engagement in novel situations is essential since their preparation should improve their performance in schools. It describes ways that teacher educators can provide student teachers with opportunities to learn with mobile technologies during their coursework that transfer to their teaching practice and, in doing so, provides a rare illustration of the 'far transfer' of learning. It is likely that the teacher educators who developed these strategies are themselves also modelling and revealing their 'far transfer' of learning from teachers in the field. This is because teacher educators learn by observing and critiquing student teachers and many also research current practices in schools and early childhood education and they can and do use the new knowledge that they gain to continually redesign their courses and programmes. Although this is a fundamental process in teacher education, which is necessary for "simultaneous renewal" of the practices in preservice teacher education and in schools (Goodlad, 1994), we recognise the outstanding practice of the teacher educators who collaborated with this research, particularly Paul, and we give them our thanks. Further research is recommended into 'far transfer' of learning between preservice programmes into K-12 schools including 'far transfer' by teacher educators, which we recognise as essential for the effective preparation of future teachers.

Acknowledgements

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