Chapter 16
Reflection on ICTs in Education

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Abstract Although most teacher educators come to work in this field with some sort of experience of ICTs—as a user, a researcher, a teacher, or an administrator—anyone working in the field of ICTs is well aware that there are no established patterns and pathways in this field. As a consequence, teaching ICTs requires teacher educators in the area to learn on-the-job: we have to learn the new concepts, knowledge, and skills of how to use them and how to teach them "on-the-job", as the ICTs are changing very fast and new technologies emerge every day. This ongoing dilemma, from a practice-theory view, includes designing a relevant curriculum and preparing pre-service teachers to be "ICTs ready" from both technical knowledge and pedagogical knowledge perspectives. In this chapter, I first introduce the chapters written by the pre-service teachers in this section, and then by reflecting on using ICTs in education and teaching, I weave the students' chapters into self-reflection on my own teaching and learning experience.

Introduction

Today, we have, it seems, an inexhaustible supply of various technologies and gadgets that now actually make up a significant part of our daily lives. Think about it! Think about all of the different kinds of technology that we use in a day, and how much of this technology is information and communication technology (ICT). Almost all of us have smartphones; we all probably have a computer, laptop, or tablet. We all access the Internet, these days mostly broadband through wireless and fixed connections. We make online purchases and bookings. Our banking details and actions are all online using ICT. We use mobile devices as communication tools, as writing tools, and as information gathering and dissemination tools.

While I was trained to be a classroom teacher back in the 1990s, I was never taught or assessed on how to use ICTs in teaching other curricula. Instead, it was an experience to learn some basic technical skills, such as how to use word processing

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software and how to access and answer emails. Very limited related theories of implementing ICTs in education were ever introduced in teacher training courses, and the use of ICTs in education was never a compulsory course to study.

In fact, before owning my own PC, I only had access to computers while I was in secondary school and later in university, and my first learning experience was a 40 min per week fun time with my peers in an enclosed classroom. All we were required to learn and to be assessed on was to understand the keyboard and a basic knowledge of using some specific software. I had my first PC in the early 2000s, and that "old" computer was given like a fabulous birthday present. Although at that time the giant monitor and box with a slow processor and limited storage occupied most of my working desk, I still regarded it as a very flash tool.

In the current teaching classroom, we see completely different uses of ICTs. Classrooms are equipped with iPads, interactive whiteboards (IWBs), Internet, and other resources, such as virtual reality cameras. ICTs are not only being used in literacy and numeracy teaching and learning but also in other curriculum areas, such as science, arts, and health and physical education. Many secondary students also have their own personal mobile phones and bring them to school as an everyday tool. These students communicate with each other through social media, such as Facebook and Twitter. Drones are starting to be a popular technological and pedagogical tool in teaching earth and geography science. In this section, six narrative stories written by pre-service teachers or new graduates were chosen to represent the current or contemporary issues in relation to the use of ICTs in educational settings.

Student Chapters in This Section

In this section, I reflect on the student chapters on the topic of ICT in classrooms. Students within this chapter not only show the use of most updated ICT use in their teaching, but also look into the complicated context in using these ICTs. They have triggered me to rethink and re-evaluate my own teaching as a teacher educator.

This section includes six very interesting chapters written by successful final-year pre-service teachers or new graduates. These six chapters cover different topics from perspectives on ICTs. As a teacher educator who has been teaching the use of ICTs in education for the last decade, I found these chapters provoking in their own ways, not only by representing the current trends or issues of using ICTs in classrooms, but also by connecting with my own teaching philosophies and practice. Thus, I would like to first introduce these chapters before I embed them into my own reflective practice.

In Chap. 17, **Petros Gerakios** investigate students and teachers' opinions and attitudes in using technologies in classroom settings. Petros had personally experienced both the positive and the negative in using computers in education, especially when he was a school student. Thus, he uses his observations to determine whether technologies are helpful or distracting tools in engaging students in learning. His findings are open to further discussion rather than being conclusive: While the majority

of students did engage with technologies, more than half also agreed that they got distracted by technologies. According to Petros, one possible further direction for discussion could be that teachers, including himself, need to continue finding appropriate strategies to use technologies.

Anna Bascomb's chapter is more focused on the changes or revolutions brought about as the result of the use of ICTs in secondary schools. She starts her chapter by narrating her very limited digital technology-related childhood because she grew up on a remote farm. She then moves onto discussing her positive experience with further encountering ICTs. In addition, her observation and conversation with other teachers confirmed her opinions that ICTs can enhance students' learning. Her chapter concludes with a confirmation that more use of ICTs should occur in classrooms in future.

Laura Checkley discusses the use of personal ICT devices for secondary school students by questioning their usefulness in students' learning. She observed that personal ICT devices being used by students distracted them away from "school content" to "non-school content" during her second placement, while in her third placement, she was refreshed by hearing completely different opinions on how ICTs can be used with positive results. At the end of her chapter, she pointed out that when students are already disengaged or bored, no matter whether they have access to technologies or not, they turn to access other content. She concludes that the solution depends on teachers providing better lessons to students.

The following chapter by **Dominic May** tries to find engaging strategies to teach students by using technologies. He noticed that while tablets have been widely used in classroom settings, currently teachers do not have enough training and knowledge in using them, in particular, the relevant pedagogical knowledge. This has a huge impact on achieving effective teaching and learning outcomes.

Matthew Froese's chapter considers a fresh new topic in ICT use: he investigated whether the use of virtual reality (VR) could engage students in history learning better than non-VR-assisted approaches. VR has only recently started to be used in classrooms, and therefore I found this chapter very timely. He investigated the topic by asking four students to compare their learning experiences between VR and written sources and concluded that VR provides high levels of engagement to students by providing a vivid visual and auditory experience for them.

In the last chapter in this section, **Emily Ford** takes the discussion from inside the classroom to outside it, questioning the experience of using mobile devices in early childhood mathematics learning and teaching. She focuses her attention on an early childhood play-based learning context. She investigated the positive experiences of using mobile devices, such as iPads, in enhancing students' knowledge in the early childhood education context.

Although the above six student chapters discussed different topics in the use of ICTs in educational contexts, they represent current pre-service teachers' experience

and opinions in this area and set up some useful perspectives for me to reflect on my own practice. Thus, I will next start my reflections by embedding some of their useful points into my own reflective practice.

The Rapidly Changing ICT World

Being a teacher educator, teaching ICTs is not easy: we are not only required to always keep ourselves updated with the fast-changing technologies, but also to grasp the related theories and knowledge and deliver them to the learners. I cannot recall how many times I repeated the following to my students at the beginning of the semester:

> This semester, let's learn together how to use existing technologies into learning and teaching settings, including schools and early childhood centres. However, please always keep in mind that we are not experts in the technology field, but please always keep our minds open and ready to learn new technologies.

ICTs are not new, but they have taken on new meaning and application as technology and society have changed. When mankind first started to use tools to help communicate, they were in a sense the beginnings of ICTs. The American Indians used drums and smoke signals to communicate across distance. The Chinese used to smoke and fire towers spread across the country to communicate information. When Samuel Morse invented the Morse code, a new medium of communication, electricity, was used. These days, they have some other "names" or "terminologies", such as "touch screen technologies", "mobile learning technologies", and "digital technologies".

I have been teaching ICTs in teacher education training programmes for at least a decade. During these years, ICTs have changed from big computer boxes to flat screen, to mobile learning, to virtual reality learning, and to voice-controlled learning. Consequently, the implementation of ICTs in teacher training courses has also gone through a lot of changes, from teaching pre-service teachers' basic computer skills to working with pre-service teachers on the selection of the best ICTs in teaching various curriculum areas.

The student chapters included in this section also discuss the changes they encountered. In Petros' chapter, he said: "not only has there been a dramatic change in equipment but also the efficiency of these new technologies". This "dramatic change" also happened to Anna Bascomb. Growing up in a country town with very limited access to digital technologies, she was more used to playing sports, riding motorbikes, or exploring their 30,000-acre farm instead of needing digital technologies to "survive". Differently, Laura Checkley seems to be a more comfortable or natural user of technologies: "I would not have been able to have achieved either of my degrees … without the use of Information Communication Technology". I feel I can reflect on all of their feeling and opinions towards the use of technologies in education: we unavoidably have to admit that ICTs are changing "too fast" in our daily

life as well as in classroom teaching; however, at the same time we also love the benefits and values they are bringing to us.

Operating effectively in this changing world involves new knowledge, knowing, and know-how (Vorster and Quinn 2015); teaching ICTs also involves teacher educators coming to grips with existing histories, memories, and other narratives, if in a new context (Peseta and Barrie 2017). Let me reflect on this change in more detail in my teaching practice. My teaching focus has moved swiftly across the use of emails to social Webs, from the use of mobile messages to mobile learning, from understanding online learning to develop online learning communities, from working with the first government-funded laptops for students to the use of virtual reality technologies in classrooms. This progress towards knowledge and understanding (Perkins 1997) of new concept and context includes ICTs teachers' previous experience, successes, and desires both in expected and in unexpected ways. In 2017, a new curriculum "digital technologies" was introduced in the Australian Curriculum for school students. No doubt, these changes require pre-service teachers, and teachers after graduation, to not only have adequate knowledge and skills about ICTs but also to keep updated with newly emerging ICTs and how to use them in their teaching. This new requirement spans both general capabilities and specific subject areas of the Australian Curriculum, and it is a mandatory component of the Australian Professional Standards for Teachers.

Therefore, teacher educators are required to provide opportunities for pre-service teachers who have a background in teaching to develop and deepen their understanding of the critical role that digital technologies have in the twenty-first-century education while also providing opportunities for them to further develop their ICT skills. In the end, pre-service teachers will need to understand the fundamental concepts relating to established and emerging theories of ICT-based pedagogy and consider plausible futures that might help signal and guide the kinds of responses needed by skilled educators into the future. We pay close attention to the processes in our working context and make a substantial scholarly effort to address, investigate, theorise, and make sense of the underlying unpinning of this practice.

Engagement and Enjoyment in Using ICTs

Since I started teaching, I found students are always easily engaged in using ICTs. The colourful interface, different animations, and recently all sorts of interactive use of screens can all contribute to high engagement and enjoyment in using ICTs.

This engagement is mentioned in Anna's chapter. In her chapter, ICTs are no longer a tool only accessible in classrooms, and they have also revolutionised the way teachers teach in the classrooms. The contemporary ICT tools include computers, the Internet, iPads, and virtual reality in various educational settings. New technologies are developing non-stop, they continue to grow and change, and it is difficult to predict how digital technology will expand and alter over time. However, as a teacher educator, I have also noticed the level of engagement is also changing

over the years. Ten years ago, the interaction between young children and ICTs was deemed impossible. Most of the technologies at that time were not designed for young children, such as babies, toddlers, and pre-schoolers. No wonder that when I was teaching pre-service teachers in junior primary schools, I noticed there was a "gap" in the possible use of different ICTs among young children. In 2008, I tried to use Wii games to reduce young children's obesity rates and improve their fitness and further their well-being. While piloting the study, I eventually noticed that Wii games were not designed properly for young children: the box was too big and made no sense to them.

The situation started to change with the popular use of iPad and other touch screen technology since 2009. I started to notice that the gestural interface can easily be used and engaged by young children. Classroom practitioners started to show their interest in using this technology, and even now many classrooms and schools have already purchased it for daily learning and teaching. Instead of watching a big screen or sharing a mouse with a group of other children, young children can use an iPad easily. They can use fingers to navigate their learning, and knowledge is just a swipe away. Emily in her chapter discussed how iPads could satisfy the individual learning needs of different children.

Interestingly, all the student chapters mentioned that students in all age group enjoyed using ICT tools. Enjoyment refers to a "pleasurable effective response to a stimulus" (Green et al. 2004). There are strong correlations between high engagement and enjoyment. Therefore, the use of ICT tools to engage children also has strong links to children's sense of fun. At the same time, the next discussion point seems never to go away: Are we focused only on students' engagement and enjoyment? Are they really learning any new skills while playing? Are ICTs distraction or engagement tools?

Distraction or Engagement

When I was teaching ICTs in education in teaching training courses, one of the hottest debates about the use of ICTs was whether ICT is a distraction or an engagement tool in the learning and teaching process. In the new digital age, educators have access to and use a wider range of technological devices to enhance and build on children's experiences and develop their own pedagogical practices (Cholker 2011); however, not all educators welcome the integration of ICTs in education (Blackwell et al. 2013; Ficken 2013). It is therefore not surprising that Laura studied the use of personal ICT tools for year 9 students. In her journal, she noticed that students used laptops on browsing websites instead of focusing on their work. Anna also mentioned the ways students misused ICTs in learning. Petros' chapter also investigated ICT's effects on students learning in a classroom setting. He described his view of ICTs as a "love–hate" relationship with the technology. In his investigation, he also found that his students were either engaged in learning with the use of ICTs or distracted by them. However, Petros also found the students who were disengaged with learning

were also not focused without the use of ICTs. Those students were disengaged no matter whether ICTs were used or not.

Goldspink et al. (2008) explain that engagement is the level of participation and intrinsic interest that a student displays, and involves both behaviours (such as persistence, effort, attention) and attitudes (such as motivation, positive learning values, enthusiasm, interest, and pride in success). Measuring learners' engagement during environmental interactions allows the researcher to measure child outcomes as well as programme quality (Kishida and Kemp 2006). Another term for engagement is involvement. Vygotsky (1978) explains that a person who is totally involved in their activity works to the limits of their abilities within their zone of proximal development (ZPD). Laevers (2000) argues that involvement only occurs for children when the activity meets the capabilities of the student. One of the primary distinctions within appropriate pedagogical tools for learning is that it is the content that matters, not necessarily the manner in which it is delivered. Content is mediated in the manner educators utilise digital and non-digital tools for education purposes; accordingly, the inappropriate use of digital technologies will not prove effective as a teaching tool (NAEYC and Fred Rogers Centre 2012). Therefore, educators must consider the manner in which they can utilise digital technologies for children's learning, communication, and engagement (Blackwell et al. 2013; Lee 2015; Rosen and Jaruszewicz 2009).

Digital Age or Post-digital Age?

Children who grow up in this digital age are used to living in a world of technologies or the post-digital age. Here, I do not just mean generation X, Y, or Z; I am trying to discuss the "after Z" generations. Federal government initiatives such as the National Innovation and Science Agenda highlight how Australian should be "embracing the digital age" and that investing resources into children's digital skills will ensure that the "next generation of students has the skills needed for the workforce of the future … ensuring Australia's future prosperity and competitiveness on the international stage" (Commonwealth of Australia 2016).

In order to make sure we are providing good services and training for future teachers, we teacher educators will need to possess advanced technical skills and relevant pedagogical skills. About ten years ago, I was involved in a research project about current school teachers or educators' opinions about their own technical skills. It was found they were showing lack of confidence in using the digital technologies. However, the following pre-service teachers' chapters show that our current school teachers and our future teachers are a lot of more confident and competent in using all the technologies. For example, Dominic's chapter stated he was quite confident and a very experienced technology user. When I turn my eyes back to the teacher educators in higher education institutions, the situation is not the same. A lot of current university educators are not used to online learning or not competent in using online learning technologies, and some of them show bias or reluctance in trying or

using new technologies. I believe, however, this situation will have to change to suit the needs of the new generation and the post-digital age.

In addition, during my time as a pre-service teacher I never imagined myself using iPads or VR in classrooms, and now in this digital age, I accordingly cannot predict what other new technologies are to become a "popular" tool to be used in learning and teaching in different educational settings. I am, however, very certain that the use of technologies will always be a focus on the study of pedagogy. Nevertheless, with all these developments and new technologies, some questions about the use of ICTs will always exist in teaching and learning.

Conclusion

Throughout the last decade, as a teacher educator, I have experienced changes in digital devices and the digital capabilities of children, curriculum, and pedagogies in ICTs in education. The Gonski (2018) Report Version 2.0 discussed how improving outcomes is critical to future economic and social opportunity, and equipping every student to grow and succeed in a changing world is one of the strategies for achieving educational excellence in Australian schools. However, when I am trying to be a reflective teacher on the use of ICT in classrooms, I found there was a "lack" of theoretical foundations through which I could reflect on my practice. While there are a few frameworks to comprehend my practice, such as the Technological Pedagogical Content Knowledge [TPACK] framework (Mishra and Koehler 2006), I found limited theoretical frames from which to analyse my practice. Furthermore, there is a need to keep updated with recent developments in educational technologies, forcing educators to keep surging ahead and not necessarily taking the time to slow down and think deeper regarding children's ICT literacy development.

As a reflective teacher, I am and will always be learning to have a fuller understanding of ICTs in education, and what our pre-service teachers' role is concerning both teaching about and using ICTs in education. This process is not stable. Instead, it is dynamic. To improve my ability to be reflective and self-evaluating, I must understand I will not be equipped with all the technical skills and knowledge needed for the next decade or two, but with the right attitudes towards the use of ICTs and learning "on-the-job", I am developing my own knowledge and understanding as always. This learning process is not easy for many ICTs teacher educators. It requires us to be risk takers, experimental, and non-biased in engaging in learning and teaching. It is part of being a reflective teacher. I am sure this will be an exciting pathway for all of us.

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