Interrogating Contemporary Research in Educational Innovation

Abstract

Current educational research, policy-making and practice need to develop and sustain a rigorous understanding of and a careful attentiveness to multiple approaches to conceptualising and implementing effective educational technology innovation. This is required because it is important to avoid ossifying and standardising more traditional educational approaches and to renew and refresh those traditional approaches. This chapter presents a theoretically informed interrogation of a range of contemporary scholarship related to educational innovations with technology. In particular, the interrogation explores major issues related to establishing innovative practices. In particular, we elaborate the issues of policy, measurement, sustainability and diffusion of educational innovation. The final section of the chapter outlines the structure of the book.

Introduction

Contemporary educational issues are abundant and diverse. These issues include claims and counter-claims, debates and questions about matters ranging from national curricula (Oates, 2011; Tani, 2011) and standardised assessment of students' learning (Au, 2009; Richards, Vining, & Weimer, 2010) to parental involvement in school governance (Addi-Raccah & Ronit, 2009; Blackmore & Hutchison, 2010) and government funding of public education (Tandberg, 2010; White & Friendly, 2012) to the empowerment of so-called marginalised communities

(Chilisa & Ntseane, 2010; Morton & Montgomery, 2012) and the ethics and politics of education research (Basit, 2012; Sikes & Piper, 2010).

As this and the subsequent chapters in this book elaborate, one productive means of engaging with these and other contemporary educational issues is to mobilise the insights to be gained by focusing on educational innovations with technology. This is on the twin presumptions that, despite well-documented barriers, innovations constitute potentially new and sustainable solutions to longstanding concerns, and that such innovations are crucial for the longer-term viability of educational strategies and systems (see for example Bakkenes, Vermunt, & Wubbels, 2010).

Yet approaches to conceptualising and contextualising educational innovations with technology are as abundant and diverse as the issues that they are enlisted to illuminate. Thus, while each chapter explores the nexus between educational innovations and issues, the forms taken by that exploration vary significantly across chapters, and the understandings of such innovations and issues are equally varied and potentially contradictory. We see this as being healthy and productive, as well as reflecting the complexity and diversity associated with contemporary education constructed as a set of wicked problems that are ill-structured and for which there are no ready-made solutions (Southgate, Reynolds, & Howley, 2013; Trowler, 2012).

The purpose of this chapter is to locate the book through the introduction of a broader field of scholarship to which the chapters are also intended to contribute. This chapter is divided into the following three sections:

- Conceptualising and contextualising contemporary educational innovations,
- Issues about educational innovations with technology, and

- Rationale and structure of the book.

Conceptualising and Contextualising Contemporary Educational Innovations

Contemporary scholarship exhibits a range of conceptualisations of educational innovations, which also reflect the issues that give rise to them, as well as the contexts in which they are grounded. This section of the chapter takes up some of those conceptions and contexts, with a view to eliciting some recurring concepts and principles and to foregrounding the subsequent chapters in the book.

Education exists in an increasing changing political, financial, global and social world. Educators of the past (and future) have explored innovative practices to overcome the challenges of creating the next generation of learning. In recent times, new technologies have had a significant influence over the evolution of education. The introduction of e-learning, MOOCs, OERs, and mobile and smart devices now enable learners at all levels to engage with learning in a more flexible manner. Given such changes, educators are playing catch-up, seeking sustainable approaches to teaching and learning that best utilise these new technologies in innovative ways.

Rogers (2003) defined innovation 'as an idea, practice, or object that is perceived as new to an individual' (p. 12). Innovation by its nature is a creative endeavour, the new idea however must be translated into action. According to Denning (2004), 'an innovation is a transformation of practice in a community' and is not necessarily the same as 'the invention of a new idea or object' (p. 1). Furthermore, 'a transformation of practice in a community won't happen unless the new practice generates more value to the members than the old' (p. 2). This distinction between *invention* and *transformation* is a timely reminder of the need to consider the intended

purposes and the likely effects of specific innovations. To add an example, OECD (2008b) defined process innovation as involving 'a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. In education, this can for example be a new or significantly improved pedagogy' (p. 2).

From an explicitly educational perspective, Hargreaves (2004) wrote that in education innovation needs to be defined as 'doing things differently in order to do them better, which can mean a modest adjustment to what one has done hitherto or a much more dramatic change in that one does something new to replace previous practice' (p. 65). He raised that issue that innovation is better and cannot be assumed to considered 'inherently a good thing … An innovation is not necessarily more effective or efficient than current practice' (p. 65). He goes on to recommend that the innovation needs to be tested so to determine if 'really is an improvement, but the test is by no means always undertaken before an innovation is taken up. A corollary of this test is that because it is a real improvement it should displace some previous practice' (p. 66).

> Educational innovations should not be a net addition to what teachers do. For
> teachers *innovations* have sometimes become synonymous with centre-led,
> top–down *initiatives*, which have indeed often been an addition to what
> teachers do rather than a replacement, and this explains in part why some of
> them have been resisted and treated as a burden. (Hargreaves, 2004, pp. 66;
> emphasis in original)

To add to this discussion of what is innovation, Washor (2009) claimed that 'innovation means first different, then better' (para. 4). In his explanation, 'innovating is a fundamentally different way of doing things that result in considerably better, and perhaps different, outcomes. Both the"different" and the "better" must be significant and substantial' (para. 4). Putting these

notions in the context of education, Washor (2009) argued that '[e]ducators need to think of innovating as those actions that significantly challenge key assumptions about schools and the way they operate. Therefore, to innovate is to question the 'box' in which we operate and to innovate outside of it as well as within' (para. 4). It is not a matter of creating or doing different. Rather, it is about the working with the current structures (e.g., the box) and outside of it to do things that are significantly different and substantial better. The challenge is how do we measure these two factors?

In an educational context, to meet the needs of the profession and improve the quality of contemporary learning requires innovation and leadership from within the profession at all levels. Heppell (2010) commented that we cannot use the thinking and solutions we used in over the last decades to solve educational problems we are faced with today. To move beyond a good idea to the development, implementation and sustainability of the idea requires creativity and leadership. Leadership to facilitate innovation in education should include a positive vision for the future, a supported culture of risk taking, and the development of new and emerging pedagogies and approaches to learning which result in enhanced outcomes (Fraser, 2007).

Although the term *innovation* has a positive valence, it is not necessarily constructed unanimously in that light by all participants and stakeholders. Moreover, educational innovations are situated in contentious and politicised terrains, with perceived winners and losers. Likewise, the educational issues that innovations are developed to address are often complex and diffuse, with sometimes widely divergent effects on different individuals and groups.

Some conceptualisations of educational innovations appear to derive from a technicist paradigm and reflect, with varying degrees of explicitness, the assumption of a seemingly direct and linear relationship among innovation development, adoption and use, even when challenges

confronting that relationship are acknowledged (Minocha, Schroeder, & Schneider, 2011). A broadly similar position evidently underlies a view of innovation as exhibiting 'a predictable, evolutionary life span of creativity and experimentation, overreaching and entropy, and survival and continuity' (Giles & Hargreaves, 2006, p. 125). The emphasis on linearity and predictability might facilitate research and analysis, but it does not necessarily align with the complexity and messiness of contemporary social life and educational provision.

A different approach to conceptualising educational innovations is to eschew deficit views of learners and educators and instead to see them as agential and creative shapers of new educational alternatives and futures. While this approach generates useful insights (see for example Craft, 2013), it runs the risk of potentially idealising students and teachers. It also downplays the structural and systemic barriers to envisioning and enacting innovations that engage effectively with educational issues.

Issues about Educational Innovations with Technology

We live in a time of profound technological change where wireless networks, mobile devise and digital media are interwoven in the fabric of today's educational landscape. The P-12 and higher education learning environments have been greatly influenced through the integration of information and communication technology that is allowing access to a wealth of information accessible anywhere and anytime.

Thomas and Brown (2011) asked the question, 'What happens to learning when we move from the stable infrastructure of the twentieth century to the fluid infrastructure of the twenty-first century, where technology is constantly creating and responding to change?' (p. 17).

Digital and social technologies have changed how people of all ages learn, collaborate, play, socialize, access resources and services, and connect. A participatory classroom is one in which students make choices about what they learn and negotiate how they learn. In a digitally connected environment, they seek out, choose, and play with rich online resources, build ideas, work on projects, and design solutions with local and global peers, and publish creations in local and online spaces. (Jacobsen, Lock, & Friesen, 2013, p.16)

With the introduction of any educational innovation with technology, how does it influence learning? How do we know the impact that innovation has on learning and education? Further, what role and influence does policy have on the innovation and its impact? These types of questions begin to identify some of the issues that are associated with how we view and understand educational innovation.

Kostoff (2003) revealed that 'innovation reflects the metamorphosis from present practice to some new, hopefully, 'better' practice' (p. 388). Increasingly innovative practices have been used to solve educational issues. However, no common conceptual framework exists to guide practitioners in innovative development. The World Bank created a conceptual framework for the promotion of innovation in developing countries (Aubert, 2005). Aubert (2005) reminds us that *one size doesn't fit all* when comparing developed and developing countries. The same could be said for differing educational contexts where the imposition of a common model across different educational contexts is not likely to be successful. Innovative practices tend to build on the current capabilities and resources within individual contexts, this results in a broad range of innovative practices even when the context are trying to solve the same issue.

A simple Internet search of 'innovation in education' revealed over two million scholarly

papers available through Google Scholar dating back to the 1960's. Interestingly the most cited

works are those from the 1960's. This section of the chapter explores the major issues

surrounding educational innovations with technology from the literature which examines the

following four areas: innovation and policy, measuring innovation, sustainability of innovation,

and diffusing innovation. (Refer to Figure 1.1)
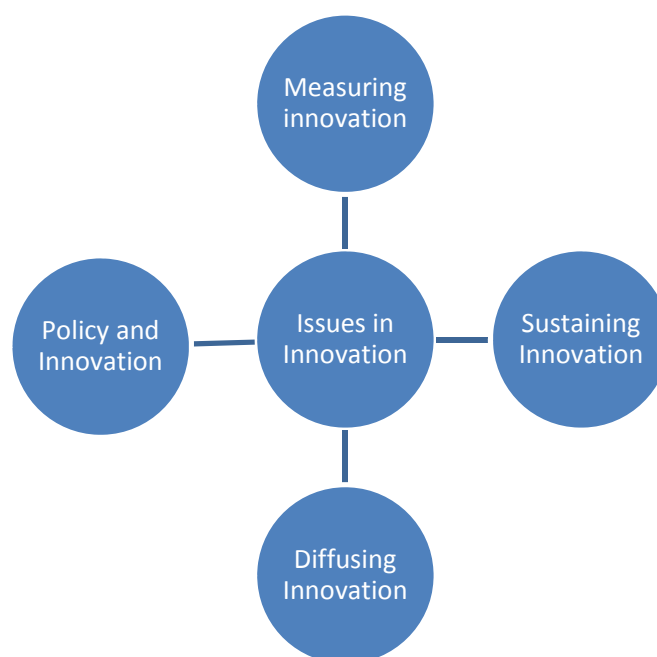
Figure 1.1: Four issues in educational innovation

Innovation and Policy

In their review of innovation policy from 27 different countries, the OECD (2004) has found that

a 'high innovation performance is directly related to an active innovation policy' (p. 2). Policy

promotes the development and diffusion. They also suggested that the application of policy

should be contextualised; meaning that policy from one context cannot be applied in a different context without modifications.

The Victorian Department of Education and Early Childhood Development (2009) discussed the role of innovation in building knowledge and capacity, impact on policy and practice. They see this as a cyclical process with policy being regularly analysed and reviewed to create and align with current priorities and projects where resource investment is occurring. Research and innovation outcomes of the projects are shared and inform future policy and practice. The goal is to identify the benefits of innovation to explore how they contribute to policy and resulting practice.

Measuring Innovation

During the 1960's, Miles (1964) noted that innovation was not regularly evaluated. Over the last 50 years very little has changed in the area of assessment or evaluation of educational innovations, that is, systematic evaluation of educational innovation is not common practice. Nor are their principles of practice to assist those who would like to try to. Further, the OECD 2009 discussion paper forewarns that

> [m]easuring innovation in education is in its infancy. Despite the relative wealth of indicators in education, no single indicator has been developed to date to measure the innovation capacity of performance of the education system. This lack of available data can jeopardise our understanding and monitoring capacity of innovations in education (OECD, 2009, p. 8).

Educators often use teachers or students' reactions or responses as assessment of the innovation rather than the collection of hard data relevant to the problem the innovation was

introduced to address. Miles (1964) contends that enthusiasm and advocacy of those involved is often deemed as evaluation. In contrast Blouin, Riffee, Robinson, Beck, Green, Joyner, Persky, Pollack (2009) have suggested that innovation in education 'rarely waits on evidence of worth, and demonstrating worth does not guarantee adoption of innovation' (p. 9).

'Complex processes occur when a potential user makes a subjective evaluation of the potential rewards and costs of an innovation' (Miles, 1964, p. 652). The lack of innovation assessment can occur due to lack of criteria, difficulty, cost, lack of control of the environment and difficulty to measure outcomes (Miles, 1964). The success or failure of an innovation is often a subjective judgement or relies on comparisons. Does failure to evaluate an innovation mean a failure of the innovation? If we are unable to measure if the innovation achieved its objective, is this a failure? Is an innovation a failure if it is not widely adopted? If the innovation has solved the initial problem it was introduced to solve is that success? In contrast because an innovation has been adopted more broadly does that signify success?

One of the difficulties is deciding what should be measured and by what means (Bloudin et al., 2009). Due to the complex nature of education it is difficult to claim a simple cause effect relationship between many innovative practices and the outcomes. Some fundamental measures for judging innovation success include: inputs, outcomes, outcome and impact, benefits beyond the initial problem, use of sections of the innovation elsewhere, dissemination of the innovation, improved attitudes or skills, motivation of others to try innovation, promotion of those involved in the innovation (OECD, 2009; Miles, 1964). The key outcome of an educational innovation with technology however should be related to enhance learning and teaching outcomes, these are very different measures than those used in business innovation. Blouin et al., (2009) suggested that '[t]here is no simple relationship between the documentation of benefits and changes in

educational practice' (p. 9). Nor is there a premise, as Lilly (1973) wrote, 'that the technical soundness of an innovation as demonstrated by educational research is seldom necessary and never sufficient to guarantee adoption of that innovation by educational practitioners' (p. 227). Therefore, care needs to be taken to determine what is measured when judging the innovation.

Sustainability of Innovation

Sustainability of innovation is important to ensure that it is seen as a boarder solution to the problem and to go beyond pockets of innovation in individual classrooms or educational institutions. The term sustainability may refer to economic, environmental/ecological, or social outcomes/dimensions. For the purposes of this chapter and book, sustainability refers to the capacity to endure, in that the innovation is successful if it can be maintained and can continue to solve the problem until a superior solution can be developed or the problem no longer exists. Sustainability is a key driver for innovation (Nidumolu, Prahalad, & Rangaswami, 2009).

For an innovation to be sustained it must be diffused or spread widely. This is the process where an innovation is communicated to and adopted by others over time. Commence with Rogers (2003) there is a common flow for generations of innovations. Starting with the recognition of a problem or need (real or perceived); research into the problem; invention of innovation to solve the problem; broader development of innovation; communication to potential adopters; beginning and larger scale adoption of the innovation; and consequences of the innovation or the changes that occur as a result of the adoption of the innovation.

The goal is to have the educational innovation sustained. '[T]here is need to understand more profoundly the nature of innovation and to focus on its encouragement and sustainability' (OECD, 2008a, p. 7). The adoption of the innovation may be with a few at the start, but the goal

is to have the majority of people embrace and implement the innovation in their practice. For this to occur, requires allocation of appropriate resources and supports, as well as, time to ensure the necessary conditions are in place to support both the adoption and sustainability of the innovation.

Diffusing Innovation

Hazen, Yun, Sankar, and Jones-Farmer (2012) suggested that the diffusion or adoption of an innovation by those not involved in the development of the innovation is influenced by the characteristics of the innovation itself, the characteristics of the dissemination audience (future adopter) and the context or conditions that the adopter is working in. The factors that influence diffusion of an innovation appears to change depending on the phase of the innovation. Even when innovation practices are disseminated or communicated to others in relevant contexts they are not necessarily taken up or diffused in other locations for reasons such as leadership, commitment, skills, structure, training, support, and organisational capacity, resourcing requirements, and the characteristics of the innovation and innovators. (Wandersman et al., 2008; Wejnert, 2002).

To move beyond pockets of innovation and to gain critical mass benefits from innovative practices in education, innovation needs to be disseminated. Having said that, the literature suggested (Hazen et al., 2012; OECD, 2004) that there is difficulty in taking an innovation from one context and transplanting it into another. That is, the factors and contextual characteristics influencing the success of an innovation may not be able to be generalised.

In addition, Mayer and Davidson (2000) suggested there are three components of the diffusion phase of innovation. Firstly, adoption is where a decision is made to use an innovative

practice. Secondly, implementation involves processes put in place to use the innovation are often on a trial basis. Finally, institutionalization or routinisation is where the practice becomes 'part of business as usual' (Mayer & Davidson, 2000, p. 422). Complete diffusion of innovative practices requires all three components to be completed.

Academic institutions are being asked to deliver graduates who are more suitably equipped to meet the demands of the next level of education, training or the modern workplace. Educators and educational contexts need to understand the potential and limitations of prospective innovations. The possible costs and benefits are often difficult to predict prior to piloting or trialling an innovation. Innovation to practice can be risky and not all risks pay off.

Rationale and Structure of the Book

Our students' world is ever-changing, especially with the access and use of digital technology. Educators are accustomed to such change, which requires them to search constantly for innovative ways of maximising the impact and effectiveness of their educational practices within technology-enhanced learning environments. Educational innovation with technology is about looking beyond our current practices to identify new ideas for tomorrow and putting them into practice today. Rather than standing still, the changes are challenging us to be innovative and to make learning ever more relevant, challenging, inclusive and rewarding with technology-enabled learning environments.

At the same time, it is appropriate to acknowledge that different educational issues often force educators to forego innovation in order to respond to more immediate pressures of changing educational landscapes. The broad range of issues confronting learners and educators today requires us to have data driven and evidence informed solutions to resolve the issues and

get on with the job of leading learning. From that perspective, today's educators take up the work of teaching and learning as inquirers, problem solvers and reflective practitioners who embrace the work of research in and of teaching. The challenge is how to continue to encourage and support innovators who will help the educational system to be responsive to the needs and demands of its multiple stakeholders.

Against this backdrop, *Educational Innovations with Technology* presents a careful selection of contemporary research into different ways in which groups of learners and/or educators go about the complex process of designing and implementing technology innovations directed at addressing specified issues in learning, teaching and educational research. The book traverses a wide range of conceptual, disciplinary, methodological, national and sectoral boundaries. The shared focus is on investigating the intersections between innovations and issues in education and educational technology, and thereby on understanding how educational innovations arise, how users of innovation know whether they are effective and what their short- and longer-term impact might be.

This book is collated into three sections using eight chapters that bring both a national and international perspective to educational innovation with technology. Section one is entitled Education Innovations and Contemporary Technologies. In Chapter 2, Cain explores two contexts in which instructors used video conferencing to bring both online and on-campus students together for shared class sessions. From this work, the role of the technology navigator emerged as an innovation that sustains new and complex course designs and pedagogical strategies. In Chapter 3, Sawaya introduces Wearable devices. In this work, she discusses how wearable devices can enhance teaching and re-shape learning.

Educational Innovations and Technologies and Particular Groups of Learners is the title of the second section. In Chapter 4, Flegg reports a study that examined maths anxiety associated with the use of calculators in Years 7 & 8, the current Queensland transition years. The findings unexpectedly demonstrated that some students had poor calculator skill levels and classroom innovations were suggested to address this issue. In Chapter 5, Murphy shares a study on the introduction of a standalone Learning Management Systems (LMS) for students without internet access. She found that technological innovations require sound pedagogy if there is to be a shift from the individualistic learning prison culture towards a collaborative learning culture. This is followed by Chapter 6 where Sri Wuli Fitriati provides an exploration of an innovation of bilingual education in Indonesian schools.

The third and final section is entitled Educational Innovations and Technologies and Teacher Education. In Chapter 7, Redmond and Lock present an international online learning experience where secondary pre-service teachers inquired into Indigenous perspectives. Through an online collaborative initiative, pre-service teachers engaged with peers, practicing teaches, teacher educators and other educators to explore their questions, address their assumptions and gain insights into designing learning that honours Indigenous perspectives across all discipline areas. Finally, in Chapter 8,, Midgley, van Rensburg and Tamatea present an innovative research project that engaged Bachelor of Education students in Australia with professional 'learning partners' in other countries. They investigated the perceived effectiveness and usefulness of this form of international learning partnership program for international education.

Conclusion

This book intends to encourage inquiry into different educational innovations with technology. The adoption of innovative technology practice is impacted by contextual characteristics. They are resourced differently, diffused at different speeds, difficult to evaluate, they have different goals and are difficult to transplant. All education contexts are being challenged to gain enhanced learning and teaching outcomes. This requires them to enter into a process of 'identifying and harnessing a particular approach to innovation and system change to recreate the parameters of teaching, learning, participation and organisation' (OECD, 2008a, p. 8)

Educational Innovations with Technology shares a series of contemporary research initiatives that explore and examine the complex process of designing and implementing innovations with technology designed to address issues in learning and teaching. Through the chapters, authors have interrogated the intersections between innovations and issues in education, and new understanding of educational innovations with technology and sustainable have been discussed.

Acknowledgments

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