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Using the iPAC Framework to Inform Research and Teaching Practice

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Foreword

How can mobile learning enhance our diverse students' learning experiences? And how do we prepare teachers for their technology-rich students? The simplicity of these questions belies the complexity of the answers and the many adaptations that will be required of educators and other stakeholders, including learners and their families.

Given the ubiquity of mobile devices and their rapid deployment to address current issues, this scholarly text is timely. For example, what types of online learning are evolving during the coronavirus pandemic and how can m-learning be exploited, mediated and enhanced by the iPAC Framework?

This book provides well-researched and theorised illustrations of how m-learning pedagogies can expand the learning experiences of school students and future teachers. The behaviour of teachers is pivotal as the central 'keystone species' in our educational ecosystems (Davis, 2019), so additional frameworks that can be deployed to inform pedagogy are particularly welcome. Central to the text is a succinct theoretical model called the iPAC Framework that highlights distinctive socio-cultural features of mobile pedagogies. The three main pedagogical dimensions of personalisation, authenticity and collaboration have remained robust over a decade of research with refinements to their sub-dimensions that improve clarity and usability.

Since 2008, the authors and their collaborators in Australia, Europe and elsewhere have researched mobile learning using a range of relevant methodologies, including design-based research, case study methods and a critical systematic review of relevant literature. The iPAC Framework is also set within a review of theoretical models, including the 'third space' theory as originally proposed in the wider literature of cultural theory. The blurring of boundaries and vigorous hybridity of the behaviour that can evolve when released from the constraints of tradition underlies the future potential for this perspective on mobile learning.

At the time of writing in 2020, both the authors and I recognise that we are experiencing an unprecedented change in schools and tertiary learning due to the coronavirus pandemic. Despite many previous reservations about mobile learning, most educational systems will be keen to promote online learning for many of their

students. Only this week Aotearoa New Zealand has moved quickly nationwide to implement remote learning from home for primary and secondary school students; online learning with mobile devices is a preferred mode that blends with other activities. Worldwide, school and tertiary students will also be learning with mobile devices in contexts where boundaries are blurring, not least between home and campus. The preparation of future teachers is also challenged by the limited opening of school campuses. My hope is that the iPAC Framework will strategically inform this rapid evolution of practices so as to enable educators, parents and other stakeholders to make the most of the significant investments made to mitigate the impacts of this disaster.

The authors recognise that pedagogical changes and related professional development can be speeded by iPAC mediation in the form of a mobile learning toolkit, courses and case studies in addition to this seminal book. Kearney, Burden and Schuck are to be congratulated for having made a selection available, along with a portal (https://www.ipacmobilepedagogy.com/) 'where research and case studies can be reported and publicised'. Thus, we are invited to contribute and join in the future of iPAC and that collaboration can better inform the complex and rapid evolution of education for years to come.

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Reference

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We would like to thank the teams of three major projects that were influential in the ongoing development of the iPAC Framework that is the focus of this book. In particular, we would like to acknowledge the significant role played by Professor Peter Aubusson in his leadership of the Optimising Teaching and Learning with Mobile-Intensive Pedagogies project. His insights and contributions to the development of the Framework cannot be overstated.

Teachers and project participants in the Mobilising and Transforming Teacher Educators' Pedagogies (MTTEP), Developing and Evaluating Innovative Mobile Pedagogies (DEIMP) and Optimising Teaching and Learning projects provided valuable feedback which informed a number of chapters. Thank you to all the participants in our research and users of our Framework. We cannot name you but your thoughts, opinions and insights have influenced the discussion in this book.

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About the Authors

Dr. Matthew Kearney is an Associate Professor of Educational Technology in the Faculty of Arts and Social Sciences (FASS) at the University of Technology Sydney (UTS), Australia. For over 20 years, his research projects in the field of technology-enhanced learning have investigated how new and emerging learning technologies can be used in pedagogically transformational ways, particularly in school and teacher education contexts. He has worked on a number of interdisciplinary teams with researchers from marketing, education and software engineering, and recent publications are co-authored with scholars from these fields. He has led five funded projects and has contributed as co-researcher to numerous other funded projects. Outputs include 4 major project reports and over 60 refereed publications. He is currently leader of the Initial Teacher Education cluster in the School of International Studies & Education at UTS and serves on the editorial team for the Australasian Journal of Educational Technology. He was recipient of the 2019 FASS Award for Research Impact and was part of an international team recognised for its impact in the development of the iPAC Framework and associated materials (2019 e-Learning Excellence Award).

Dr. Kevin Burden is Professor of Educational Technology in the Faculty of Arts, Cultures and Education at the University of Hull, UK. Over the past 20 years, he has participated in and led many national and international technologies in education-related projects and initiatives and has secured funding in excess of £1.7m from external sources. His primary research focus and work over this period has focused on the professional development and learning of educators and the role that technology can play in mediating and supporting this learning. He has worked with a large number of national UK providers and government agencies, including NESTA, the New Opportunities Funding ICT for Teachers project, the Training and Development Agency (TDA, DfE), Becta, BBC, HEA and JISC. Many of these agencies commission Professor Burden and his research team to undertake research on their behalf, and he has considerable experience and expertise in managing large funding awards and research teams. He currently leads an Erasmus + project titled Developing and Evaluating Innovative Mobile Pedagogies (DEIMP) and recently

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Dr. Sandy Schuck was Professor of Education in the Faculty of Arts and Social Sciences (FASS) at the University of Technology Sydney until her retirement in May 2020. She is currently Adjunct Professor of Education in FASS. She was Director of Research Training in the Faculty of Arts and Social Sciences at the University of Technology Sydney 2011–2018 and a founding Director of the STEM Education Futures Research Centre at UTS. Her research interests are all related to her interest in enhancing teacher practice and preparation. They include learning and teaching with new media, the development of mobile pedagogies, teaching and teacher education futures, beliefs and practices in mathematics education, teacher professional learning, and mentoring, retention and induction of early career teachers. She has authored or co-authored over 100 publications, including the co-authoring or co-editing of six scholarly academic books and numerous book chapters and journal articles in leading journals. She has been awarded over two million dollars in competitive research grants. She mentors early career researchers and collaborates extensively with colleagues in multi-disciplinary projects. She was awarded the inaugural Researcher Developer award in the University of Technology Sydney Excellence in Research Awards in 2010 and was part of an international team awarded for its impact in the development of the iPAC Framework and associated materials (2019 e-Learning Excellence Award).

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Chapter 1
Introducing This Book

Abstract We introduce in this chapter our book on mobile learning, the iPAC Framework and its use by educators. The book presents a context for mobile learning and then introduces, outlines and develops a Mobile Pedagogical Framework, now known as the iPAC Framework. The Framework presents a socio-cultural approach to using mobile technologies for learning and also scaffolds teachers' use of mobile devices with their students in mobile learning. It was developed during two research projects on mobile device usage for education and then applied in further projects, over a decade of sustained research. The Framework was modified according to user feedback and findings from these projects. This chapter describes these research projects and then presents an outline of the book, introducing each chapter and its place in the book.

Keywords iPAC · Mobile learning · M-learning · Socio-cultural theory · Mobile pedagogical framework

1.1 Introduction

This book introduces readers to a socio-cultural framework for mobile learning and pedagogy. A socio-cultural theoretical perspective suggests that learning is affected and modified by the tools used for learning, and that reciprocally the learning tools are modified by the ways in which they are used for learning. Central to our position here is the notion that learning is a situated, social endeavour, facilitated and developed through social interactions and conversations between people (Vygotsky, 1978), and mediated through tool use (Wertsch, 1991). The content of this book is presented from a socio-cultural perspective, and this theory underpins the mobile learning framework that is central to the development of this book. The framework, initially known as the Mobile Pedagogical Framework (MPF), was developed through a decade-long research program led by the authors. The book traces the development of the Framework into its current manifestation as the iPAC Framework. It considers the context of mobile learning to the present day, develops the theory underpinning the Framework and then goes on to consider how the Framework is used by teacher educators, teachers and other educational practitioners. It outlines the development

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of related resources for researchers and practitioners to facilitate their examination of mobile pedagogies.

The use of mobile devices for learning is becoming a contested field. Experts in the mobile learning (or m-learning) field have espoused the benefits of m-learning for students, in particular, the access to experts, the ability to share with others and the autonomy afforded by these devices (Chee, Yahaya, Ibrahim, & Noor Hassan, 2017; Kearney, Schuck, Burden, & Aubusson, 2012; Schuck, Kearney, & Burden, 2017). These characteristics of m-learning are discussed in Chap. 3 of this book. The malleable nature of space and time is also a feature of m-learning environments that is valued by educators. A discussion on the 'Third Space', in which time and space are central features, is reported in Schuck et al. (2017) and developed further in Chap. 4. On the other side of the debate are those who see mobile devices as having numerous negative impacts on the well-being of students, including 'phone addiction', anxiety and cyberbullying. Often missing is the middle ground in these discussions, in which the benefits for learning are highlighted at the same time as the strategies that support students to manage the negative aspects and to self-regulate their use of devices.

The focus in this book is not on the negative aspects of mobile use but on the research reporting the educative value of m-learning. As educators, rather than psychologists, we concentrate on investigating the ways in which m-learning can expand the learning experiences of students. We also look at how teacher educators and school teachers can develop pedagogical strategies encompassing m-learning, and how teaching itself has the potential to change, given the ubiquity of mobile devices. We express concern at the rise of bans of mobile devices in schools, because m-learning can be such a positive contribution to a student's experience (Burden, Schuck, & Kearney, 2019c). The evidence we present in this book aims to encourage deeper consideration and critique of the pedagogical aspects of m-learning from a socio-cultural perspective.

The above discussion is not to say that we reject the risks that have created the panic that leads to banning, but rather, we suggest that the experiences of students using mobile devices cannot be simply designated as good or bad. If used appropriately, these devices can enhance students' learning. If used inappropriately, they have the potential to cause some harm. And so, one of the purposes of this book is to present evidence of how, with the support of our Framework, teachers' pedagogies can be enhanced to benefit their students' m-learning. For further discussion of the worth or dangers of student mobile device use, we refer to a dispassionate and evidence-based article by Turvey and Pachler (2018).

1.2 Our iPAC Framework: A Decade of Research

The first iteration of the iPAC Framework was developed through the implementation and findings of two initial projects in which the authors were involved. The first project was called *Mobagogy,* which came about when a team of Australian teacher

educators was funded to develop their skills in mobile pedagogies (Schuck, 2015; Schuck, Aubusson, Kearney, & Burden, 2010), that is, pedagogies which include ways of teaching and learning that can only be done with mobile devices. The authors researched the implementation of this 18-month project and theorised what they saw happening in the project. During the same period, another project, titled *A Bird in the Hand,* was developed and funded by the Teacher Development Agency in the UK to support pre-service teachers to use mobile devices to enhance their teaching in schools. Using the findings of these two research projects, Kearney et al. (2012) developed the first iteration of the Mobile Pedagogical Framework (MPF). Chap. 5 of this book reprises the process.

Once the Framework was developed, two small-scale funded research projects underpinned by the Framework were implemented. The first was a component of the Australian Teaching Teachers for the Future (TTF) project in 2012, investigating m-learning in mathematics teacher education (Kearney & Maher, 2013). The second project investigated mobile-intensive pedagogies more broadly in schools, using two case schools in Sydney, one primary and one secondary (Maher, Schuck, & Perry, 2017).

The Framework was also applied in a series of major projects, two led by The University of Hull, UK, and one led by UTS in Australia, as shown in Table 1.1. An Erasmus + project called *Mobilising and Transforming Teacher Educators' Pedagogies* (MTTEP, see http://www.mttep.eu/) was a 3-year research and teaching project, exploring the impact of m-learning on pedagogies and teacher education. It aimed to create a sustainable m-learning network and a toolkit for educators to use based on our Framework. A survey to help teachers identify how they were using the Framework in a particular task was developed, and an m-learning toolkit was developed. This toolkit is discussed in Chap. 9. The MTTEP project researched how the toolkit was used and how the pedagogies of teacher educators and teachers might have changed as a result of working with the Framework. Case studies from the MTTEP project illustrating how the Framework was used are discussed and presented in Chap. 13.

Table 1.1 Authors' funded projects relating to the iPAC framework (*denotes major projects)

Title	Years	Lead institution
Mobagogy	2009–2010	UTS
A Bird in the Hand	2008	Hull
M-learning in Maths Teacher Education	2012	UTS
*Mobilising and Transforming Teacher Educators' Pedagogies (MTTEP: mttep.eu)	2014–2017	Hull
Investigating mobile-intensive pedagogies in schools	2014–2015	UTS
*Optimising Teaching and Learning with Mobile-Intensive Pedagogies	2015–2019	UTS
*Developing and Evaluating Innovative Mobile Pedagogies (DEIMP: deimpeu.com)	2017–2020	Hull

During the period of implementation of the MTTEP project, the Framework underwent a few changes and became known as the iPAC Framework. These changes and amendments are detailed in Chap. 7.

Another major project which used the iPAC Framework was funded by the Australian Research Council (ARC). Titled *Optimising Teaching and Learning with Mobile-Intensive Pedagogies* (subsequently abbreviated to *Optimising Mobile Pedagogies*), this project investigated how schools could enhance their students' learning in mathematics and science through m-learning (Bano, Zowghi, Kearney, Schuck, & Aubusson, 2018). A scale was developed to research how teachers perceived their integration of iPAC in their typical m-learning tasks. Discussion of how mathematics and science teachers varied in their use of iPAC from teachers of other subjects is discussed in Chap. 12. A student survey was also developed. A final output of this project was a study of the four scales developed thus far and the evaluation of iPAC use in typical and specific m-learning activities for both teachers and students (see Kearney, Burke, & Schuck, 2019). The findings from this part of the study are expanded in Chap. 11.

The most recent project which informed aspects of this book is the research and teaching project, *Developing and Evaluating Innovative Mobile Pedagogies* (DEIMP, see http://www.deimpeu.com/), which is in its final stages at the time of writing. The DEIMP project is an Erasmus + project. Its focus is on innovation and investigates how mobile pedagogies might be developed that show characteristics of innovative practice. In Chap. 14, we consider how the associated principles discussed in Burden, Kearney, Schuck, and Burke (2019b) align with iPAC dimensions.

This section has outlined how research projects in which the authors engaged over the last decade have led to the development of the iPAC Framework, informed its use and subsequent amendments, and supported the development of tools to both assist in research on teacher use of m-learning and guide teachers' pedagogical practices with mobile devices.

The next section outlines the structure of the book.

1.3 An Outline of the Book's Structure and Contents

This book is divided into four parts, each focusing on a particular theme. The first part, which comprises Chaps. 2, 3 and 4, sets the context for the remainder of the book. It considers the role of technology in education and then focuses on mobile technologies and m-learning in particular. It examines the characteristics of time and space that are features of m-learning. Chapter 2 investigates the role of technology-enhanced learning. It considers how prepared teachers are to implement educational technologies in their pedagogies. It proposes benefits of technology-enhanced learning, noting the constraints and barriers that might operate. Chapter 3 then focuses on mobile technologies and m-learning. It describes the pedagogical affordances of m-learning and their potential contributions to students' learning experiences. Chapter 4 deconstructs the notion of a third space for mobile learning and shows how this third

space bridges the binaries formerly articulated in concepts of virtual versus physical, classroom spaces versus home or social spaces, and formal learning versus informal learning.

These three chapters set up the context for the remainder of the book, which focuses on m-learning and the use of the iPAC Framework by teachers, teacher educators and students. Part II, comprising Chaps. 5–8, moves into the theory-building concerning m-learning. The section articulates the development of the Mobile Pedagogical Framework (Chap. 5), outlines research on how an earlier version of the authenticity dimension of this Framework was challenged in teachers' understandings of authenticity (Chap. 6) and explicates amendments to the Framework based on further research and reports its consequent naming as iPAC (Chap. 7). The contexts and contributions of other mobile frameworks that existed prior to and after the iPAC Framework are also discussed (Chap. 8).

In the third part, we consider the tools developed for investigating m-learning using the iPAC Framework. These tools are covered in Chaps. 9–11. Chapter 9 outlines the Mobile Learning Toolkit developed in the MTTEP project, showing how it was used by participants in the project. Chapter 10 investigates two new initiatives for evaluating education apps that were developed in the MTTEP project, including a pioneering rubric that supports teacher educators' and teachers' pedagogies. Chapter 11 discusses the validation of four surveys, two for teachers and two for students, investigating the typical and specific m-learning tasks that teachers implemented with their students. The validated surveys serve as both research tools and scaffolds for teachers in the use of iPAC.

The fourth part comprising Chaps. 12–14 provides the findings from the *Optimising Mobile Pedagogies* project, the MTTEP project and the DEIMP project. It outlines the findings on the use by stakeholders of the iPAC Framework and the accompanying surveys. Chapter 12 considers the results of surveys given to teachers nationally in Australia regarding their use of iPAC and m-learning tools more generally. It distinguishes between use by mathematics and science teachers and teachers of other subjects and compares their mobile pedagogical practices. Chapter 13 investigates the perspectives of teachers and teacher educators who participated in either the MTTEP project or other opportunities to use the iPAC Framework. It provides case studies of their practice, noting the experiences and responses of participants. Chapter 14 considers the principles for innovative practice identified in the DEIMP project and investigates their alignment with the iPAC dimensions.

Chapter 15 concludes the book with a discussion on what we have learned and future directions for research on the iPAC Framework.

1.4 Conclusion

This chapter has set the context for this book and provided a rationale for it. It outlines the research projects that underpinned and informed the work covered in this book, as well as the structure and content that the reader will encounter in each chapter.

Readers are able to access a website with details of the Framework, as well as tools and links to the projects discussed in this book, via https://www.ipacmobilepedagogy.com. We hope that this book will stimulate interest in the tools and resources available on this website and will enhance m-learning practice and understanding.

M-learning offers emerging and sometimes unprecedented opportunities for innovative educational practices (Burden, Kearney, Schuck, & Hall, 2019a). This book was completed during the global pandemic of 2020, a time in which remote learning occurred at scale throughout the world. We hope the iPAC Framework and associated ideas and resources presented in this book prove useful for educators adapting to online learning and teaching during and post the pandemic period (Kearney, Burden & Schuck, 2020). The iPAC Framework identifies some of the important characteristics of m-learning from a socio-cultural perspective and acts as a lens for educators seeking to exploit these opportunities. We trust that the readers of this book will gain ideas on how to use the iPAC Framework and evaluate their own practices with m-learning. We believe and hope that this book will contribute to the work of policy-makers, teachers, teacher educators and educational researchers. Our aim is for the richness of m-learning to become apparent to all who read this work.

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Part I
The Current Context