PALGRAVE STUDIES IN
EDUCATION RESEARCH METHODS

# Curriculum, Schooling and Applied Research

## Challenges and Tensions for Researchers

*Edited by*
Jennifer Donovan
Karen Trimmer
Nicholas Flegg

palgrave
macmillan

Palgrave Studies in Education Research Methods

This series explores contemporary manifestations of the fundamental paradox that lies at the heart of education: that education contributes to the creation of economic and social divisions and the perpetuation of sociocultural marginalisation, while also providing opportunities for individual empowerment and social transformation. In exploring this paradox, the series investigates potential alternatives to current educational provision and speculates on more enabling and inclusive educational futures for individuals, communities, nations and the planet. Specific developments and innovation in teaching and learning, educational policy-making and education research are analysed against the backdrop of these broader developments and issues.

More information about this series at
http://www.palgrave.com/gp/series/15092

Jennifer Donovan
Karen Trimmer
Nicholas Flegg
Editors

# Curriculum, Schooling and Applied Research

## Challenges and Tensions for Researchers

palgrave
macmillan

*Editors*
Jennifer Donovan
School of Education
University of Southern Queensland
Toowoomba, Australia

Nicholas Flegg
School of Education
University of Southern Queensland
Toowoomba, Australia

Karen Trimmer
Faculty of Business, Law, Education & Arts
University of Southern Queensland
Toowoomba, Australia

ISSN 2662-7345 ISSN 2662-7353 (electronic)
Palgrave Studies in Education Research Methods
ISBN 978-3-030-48821-5 ISBN 978-3-030-48822-2 (eBook)
https://doi.org/10.1007/978-3-030-48822-2

*Jenny, your voice will be heard*

# Foreword

## Reflections about Conducting Research in Teacher's Science Classrooms

My experiences conducting research with science teachers and their students in schools mirror many of the challenges and tensions of these well-articulated scenarios reported by the editors and chapter authors of this book. I can relate well to many of the topics—or should I state the issues behind the topics—in this volume such as the need to develop and maintain effective dialogue between researchers and school personnel, the care needed to effectively introduce innovative teaching methods into the school curriculum, the need to understand the often invisible (to an outsider) politics of the school system and the politics of the individual school, and the need to have a flexible curriculum so that science topics that excite and interest young children can be taught in the school curriculum. In this foreword, I illustrate how I recognise the challenges and tensions of conducting research in schools from my own experiences and comment on similar issues raised by several chapter authors.

## Gaining Access

At one level, access to conduct research in schools is becoming increasingly difficult for researchers. There are many reasons for this—the educational jurisdictions need to ensure that the proposed investigations will benefit the schools, the students and teachers involved in the research, that the time involved is not a distraction from teaching and learning of the regular curriculum and that all ethical issues have been carefully considered. Once these aspects have been satisfactorily attended to, the real communications and negotiations can begin with the school principals and teachers. These communications are generally very accommodating and the mutual respect between researchers and teachers in being involved in the research project is evident. The teachers willing to engage in the research project are keen to see that their students can improve their learning of the science topics or enhance their attitudes to science. A key element to commence and conduct the research is the need to collect all permissions from the teachers, parents and students. Often this goes smoothly, but in a recent study, in one school where we have had permission to conduct research from the school principal and teachers, a majority of parents of students in some classes did not return the permission slips. While the teachers can carry out the intended new teaching ideas to benefit the students (which they did), the researchers cannot ethically collect any data in the form of completed questionnaires or interviews from those students whose parents did not sign and return the permissions forms. In this situation, we may have been successful in helping the teachers introduce different ways of teaching an aspect of the science curriculum in their lessons for improved learning outcomes, but as researchers we were not able to collect sufficient data to be able to assess the effectiveness of the teacher intervention.

## Schools Participation in the Research

Some years ago, as the main investigator on a research grant, we sought to work with science teachers to enhance secondary students' metacognitive capacities to use different ways to explain scientific concepts. We

provided the teachers with a range of strategies within a teaching/learning sequence. Unfortunately, for various reasons which I will describe, the research project was not successful in achieving the intended outcomes. We approached two educational jurisdictions who supported the research. For each educational jurisdiction, one school was recommended that would benefit from the research and improve the academic outcomes of their students. We had enthusiastic support from the school principals and the heads of science. Subsequently, as part of the planning for this grant, we worked with science staff in the two schools to find out what topics of the science curriculum they would like to improve their teaching and student learning outcomes. We conducted short workshops in each school to demonstrate the kinds of academic and affective changes the teachers could make to their teaching so that students might have greater success in their science learning. The research involved the science teachers in a teaching/learning intervention to explain science phenomena using diagrams and models and, for example in chemistry, to show the relationship between macro and micro forms and symbols in chemical reactions.

Teachers were also to teach students how to use metacognitive strategies which were assessed by a pencil and paper instrument and small group interviews. We agreed to work collaboratively with the science teachers to focus on student engagement and understanding in their classroom to improve student outcomes in science. Initially we worked with individual science teachers to increase their awareness of common student difficulties and alternative conceptions and we engaged in some co-teaching when agreed by the teachers. To ensure the program could be effective we also provided resources, materials and assessment tools to increase teacher effectiveness to facilitate student learning.

Despite agreement by the teachers to participate and as stated above with much support from each head of the science department and school principal, any consistent changes in teaching along the lines of the intervention were not sustained by most of the teachers during the year. The task of implementing the lessons, even with one of the research team being available to help with materials support, analyse tests and provide feedback the next day appeared to be difficult for the teachers to use with their student groups across topics.

Some of the problems could be that the researchers had too high a level of expectation of how the teachers may teach these lessons. However, we had much experience working with science teachers on different projects. Several years earlier we had conducted successful research in one of the schools but with different teachers. Consequently, we were aware of how to introduce ideas to teachers as part of an intervention and worked around the teachers' schedules. In the next paragraph I offer some analysis and explanations for the outcomes which became part of our critique of our research presented at the 2010 meeting of the Australasian Science Education Research Association, entitled "Why does research in schools not change the practice of science teachers?" Perhaps such a title was overstated but it provided an avenue for discussion based on our work more than a decade ago and fits very well with the many of the issues about challenges and tensions for researchers that are raised in the chapters of this book. So, the topics in this book remain current concerns for researchers conducting research with teachers and students in schools.

## Invisible Tensions

While the heads of science and school principals in both schools were very supportive of the science programs that we had helped the teachers develop, our initial observation working with the teachers in these two schools was that the schools' teaching programs in science appeared to lack coherency. In school A, while there was positive support of the science staff during one semester for a genetics topic, several of the science staff became less inclined to work directly with the researchers over the year although the head teacher did maintain enthusiasm. In school B, individually, most teachers showed strong interest and were keen to ensure that the interventions were successful. A very positive beginning was that several teachers came to Curtin University in the school holidays to develop their teaching programs along the lines of our initial workshop. However, as a result of industrial action organised by the Teachers Union during the year over a pay dispute after we commenced the study, there were problems to find adequate meeting times with the teachers. Essentially, these meeting times had to be either allocated as hours of

professional development and/or at lunchtimes so there were lost opportunities to discuss events as they occurred.

Nevertheless, several teachers in both schools participated in enacting metacognitive skills in a comprehensive way for a series of lessons. Some teachers recognised what changes they could and should make to their teaching to enhance students' metacognitive capabilities using different types of explanations and for some topics were pleased with results. However, other teachers made little attempt to change their teaching despite the data from tests and instruments administered to their students showing what these changes could be.

## What We Learned

We attempted to help teachers develop relevant teaching materials such as designed lesson plans about the particulate nature of matter or genetics and a pencil and paper test about metacognition that could be used to guide student learning. However, despite their willingness, some teachers clearly were not comfortable with researchers in their classrooms. Even some teachers interested in improving their practice seemed to not change their practice based on responses from students. During the project, there were only a few clear and convincing sources of evidence where teaching and learning improved as a consequence of the research with science teachers in these two schools.

However, we learned many things about working with educational jurisdictions, schools and teachers. Teachers do not necessarily accept support to change their teaching to improve student learning when the decision to conduct research is agreed by the school principal and head of science. At the outset, these decisions need to include those teachers who will be involved; we suspect that the latter was not the case in these two schools. Despite having a research assistant in the classroom who was an experienced senior teacher with a recent PhD degree, we underestimated the sense of threat of our presence in several of the teachers' science classrooms so much so that in school B I decided not to attend some teachers' lessons.

We overestimated several aspects about the teachers—the coherence of their teaching programs and the extent of their willingness to participate as verbally agreed. Also we may have overestimated the extent of new ideas in the intervention and our appraisal of the teachers' backgrounds and instructional competences to incorporate these new ideas. Despite previous experiences working in schools over several decades, we also may have underestimated the amount of time needed to engage the teachers. Furthermore, in school A the climate created with the industrial action did not allow for effective engagement in the form of professional development during the teaching intervention. Conducting research in schools can also have unexpected outcomes. As stated earlier, we were unsuccessful in achieving the aims of the research for several of the reasons provided. However, six months after the completion of the project, the principal from school A contacted me to state that the school science teaching programs had improved thanks to our involvement. The level of change had been noticed by the head of science but not by the researchers who no longer were going to the school.

## Links to the Chapters

*Gaining Access:* One cannot conduct research in schools without adequate ethics clearance that includes signed parental permission slips. Jennifer Donovan in Chap. 1 experienced difficulties getting permission slips returned from parents which was resolved by having the principal translate the information sheet into parent-friendly language. In our case, the issue appeared to be that the students did not see the point of the permissions and so did not adequately communicate with their parents the importance of signing and returning the permission forms.

*Who Benefits?* One of the outcomes of conducting research in schools is the consideration for whom the findings benefit. This is one of the reasons for the rigorous vetting of educational research proposals by educational jurisdictions. Rasmussen and Andreasen in Chap. 5 explain that the findings from research and innovation conducted in Danish schools tends to be for authorities and stakeholders to make decisions rather than for the schools and teachers. Similarly, Harris and Danaher in Chap. 10

comment on the tensions and contradictions with colleagues and stakeholders when putting research-based ideas into practice. Upon reflection I wonder if the teachers in the two schools with whom we worked, were not invited but were told by the school principals to participate in the study. I mentioned that in school A we had successful engagement conducting research with teachers some years ago. However, this was at a time when the researcher would approach teachers about a study; if the teachers agreed and this was supported by the head of science and the school principal, the research applications were made to the educational jurisdictions, and of course to the university research office. So at the outset the individual teachers had a vested interest in the success of the project.

*Invisible and Visible Tensions.* In discussion about the innovation policy for promoting school improvement strategies at the local level by the French Ministry of Education, Normand in Chap. 2 identifies many tensions within the different organisation levels of schooling. I suspect many of these tensions are evident in educational jurisdictions in other countries. Normand emphasises the point that French primary teachers considered that national assessments or booklets about neuroscience to explain ways to improve students' reading and writing were far removed from and did not fit their daily teaching. Having read this chapter, I wonder if the teachers in the study I described, felt the same way about explaining science concepts and developing metacognitive capabilities. While we did not provide a 120-page booklet, we did provide power point presentations and short explanations for the teachers to model as well as conceptual tests and metacognition questionnaires for the students along the line we considered needed. Nevertheless, these may not have fit the how the teachers thought about their science teaching.

Reading the chapters in this volume has reawakened my interest in the complexity of those issues needing to be given consideration when researchers work with teachers and their students in schools. I reflect on my interactions with the teachers involved in the two schools where we conducted the research. One essential point is the entry level to conduct research in schools in Australia—also described by Nicholas Flegg in Chap. 1—by first gaining permission from the Education Department or the Independent Schools administration. Essentially this direction does

not enable the teachers in the schools selected for research to bring their agendas to the task at hand. Unfortunately, requests from schools to universities to conduct research are not very common. Help is at hand—reading this book provides researchers with a deeper understanding of the tensions and challenges that need to be considered and negotiated when conducting research in schools.

Curtin University, Bentley, WA, Australia David Treagust

# Acknowledgements

The editors are very grateful to the following individuals without whom this book would not have been published:

- Rebecca Wyde, Eleanor Christie and the editorial team at Palgrave Macmillan for all their work in getting this publication to press
- Katrina Wilson for her dedication and attention to detail in copy-editing the manuscript
- Professor David Treagust for writing the Foreword and Associate Professor Judy MacCallum for the Afterword
- The chapter authors for their respective chapters and for engaging wholeheartedly with feedback from editors and peer reviewers
- The scholars who provided double blind peer reviews of one or more submitted chapters:

  – Emilio A. Anteliz, Faculty of Engineering, Central University of Venezuela
  – Professor Patrick A. Danaher, University of Southern Queensland, Toowoomba, Australia
  – Associate Professor Roselyn M. Dixon, University of Wollongong, NSW, Australia
  – Dr Yvonne S. Findlay, University of Southern Queensland, Toowoomba, Australia

- Our colleagues for their continuing encouragement and interest
- Our families and friends for their inexhaustible love and support.

Jennifer Donovan
Karen Trimmer
Nicholas Flegg

# Contents

# List of Contributors

**Karen E. Andreasen** Aalborg University, Aalborg, Denmark

**Clayton Barry** University of the Sunshine Coast, Sippy Downs, QLD, Australia

**Michael Christie** University of the Sunshine Coast, Sippy Downs, QLD, Australia

**Patrick A. Danaher** University of Southern Queensland, Toowoomba, QLD, Australia

**Roselyn M. Dixon** University of Wollongong, Wollongong, NSW, Australia

**Jennifer Donovan** University of Southern Queensland, Toowoomba, QLD, Australia

**Nicholas Flegg** University of Southern Queensland, Springfield, QLD, Australia

**Carole Haeusler** University of Southern Queensland, Springfield, QLD, Australia

**Don Harris** Queensland Department of Natural Resources, Mines and Energy, Dalby, QLD, Australia

**Marlene M. Hurley** Monmouth University, West Long Branch, NJ, USA

**Judith MacCallum** Murdoch University, Murdoch, WA, Australia

**Jannah Nerren** Stephen F. Austin State University, Nacogdoches, TX, USA

**Romuald Normand** University of Strasbourg, Villeurbanne, France

**Fernando F. Padró** University of Southern Queensland, Toowoomba, QLD, Australia

**Harsha N. Perera** University of Nevada, Reno, NV, USA

**Palle Rasmussen** Aalborg University, Aalborg, Denmark

**David Treagust** Curtin University, Bentley, WA, Australia

**Karen Trimmer** University of Southern Queensland, Toowoomba, QLD, Australia

**Grady Venville** Australian National University, Canberra, ACT, Australia

**Irina Verenikina** University of Wollongong, Wollongong, NSW, Australia

**Natasha Williams** Fairholme College, Toowoomba, QLD, Australia

**Susan Wilson-Gahan** University of Southern Queensland, Springfield, QLD, Australia

# List of Figures

# List of Tables

# 1

# Educational Innovation: Challenges of Conducting and Applying Research in Schools

Karen Trimmer, Jennifer Donovan, and Nicholas Flegg

## 1.1 Introduction

Our school students' world is constantly changing, driven from both inside and outside the educational arena. Although teachers in schools are accustomed to having to accommodate such change, however difficult it might be for them to resolve it within the classroom context, researchers within this field are required to search for ways to minimise the impact whilst maximising the effectiveness of educational change so that they add meaning and provide specific assistance for teachers. Rather than standing still, this challenges us to be innovative and to make learning ever more relevant, challenging, inclusive, and rewarding. In this context, educational innovation refers to application of contemporary educational research to classroom curriculum and pedagogical practice. At the same time, it is appropriate to acknowledge that often teachers are not the researcher as their own school world provides little breathing

K. Trimmer (✉) • J. Donovan • N. Flegg
University of Southern Queensland, Toowoomba, QLD, Australia
e-mail: karen.trimmer@usq.edu.au; jennifer.donovan@usq.edu.au


J. Donovan et al. (eds.), *Curriculum, Schooling and Applied Research*, Palgrave Studies in Education Research Methods, https://doi.org/10.1007/978-3-030-48822-2_1

space for the academic challenge needed, even though they are always at the forefront of any data collection and of putting ideas into practice. Hence researchers may be formulating information without being at the cutting edge of where their work will be utilised; that creates many issues of its own. Educational researchers within the school context, whether teachers or not, are required to have data-driven and evidence-informed solutions to resolve the issues so that teachers can get on with the job of leading learning. The challenge is how to continue to encourage and support teachers, who are at the heart of the educational system, to be responsive to the needs and demands of their multiple stakeholders.

In researching and applying educational innovation, both researchers and teachers additionally encounter influence from policy makers and educational systems in the conduct of their work with and in schools that creates a source of tension between parties. Such influence may be felt during the design stage in formulating questions and methodology that will have relevance and value to researchers, educational systems, schools and classroom teachers. It may be in the ethics process as anonymity can be complex when research is being conducted and then implemented within a classroom context. It can occur when system level priorities limit access to schools for the purpose of research or how the findings may be implemented. Researchers are approaching their work from the perspective of contributing to knowledge and generally are seeking ethical, objective and rigorous approaches to their study. Teachers and schools are looking for innovative evidence-based practices that they can apply in the school or classroom to enhance academic or social outcomes for students. Whilst these are by no means mutually exclusive, there are disconnects that create challenges for both researcher and schools as each has vested interests in the conduct and outcomes of the research. The power and control that is held by the various stakeholders throughout the research process impact the decisions made about what to research, how to research and what outcomes may be achieved as a consequence in practice.

Against this backdrop, this book presents a careful selection of contemporary research into different ways in which researchers go about both helping teachers navigate the complex process of managing change within the classroom and suggesting possible new approaches to current practices based on educational research fully based within the school

system itself. The book traverses a wide range of conceptual, disciplinary, methodological, national and sectoral boundaries with a focus on investigating the tensions that impinge on research-based change and how to integrate innovative changes into the education system and individual classrooms. The aim is to promote understanding of the possible effects of educational change on curriculum and pedagogy within the classroom, how teachers might know whether their innovations are effective, and what broader stakeholders may perceive to have been the impacts of the applied research.

## 1.2 Literature Review

Agendas, scope and purpose for research vary considerably and whilst traditionally may have been based on development of knowledge and theoretical contribution to academe, globally there is increasing consideration of the application of contemporary educational research in schools and also the conduct of action research within schools by teacher researchers. The conduct and implementation of the research in both cases is impacted by systemic policy and decision-making processes. On the one hand, schools are under pressure to implement curriculum improvements to demonstrate improvement in student outcomes, but they are often not consulted or involved in the decision-making processes that determine what research is conducted or what initiatives will be promoted for inclusion across schools at a systemic level. In the United Kingdom national reports have recommended "that research be made more relevant for the members of the education community, to better disseminate good quality results towards users and the public, to contribute to solidify the existing body of knowledge, to strengthen links between research, policy and practice" (Normand, 2016). Similar concerns are raised in Part 1 of this volume in relation to France, Denmark, and the United States of America. Researchers themselves also want to have a positive impact on practice (Buxton, 2011; Meagher, Lyall, & Nutley, 2008), but the application of research findings to policy and then to practice is complex, involving challenges and tensions for researchers and schools (Bastow, Dunleavy, & Tinkler, 2014), and is difficult to measure (Doyle & McDonald, 2016;