
Reviewed by Kelly Edmonds

Reviewer

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Howard Middleton’s edited book derived from his desire to publish extensive monographs focuses on research methods and techniques aimed specifically at technology education. Middleton, from Griffith University in Australia, specializes in curriculum development, educational psychology, and educational technology. His book is the third in the International Technology Education Series by Sense Publishers; the first two edited books focused on best practices in technology education, and the development of technology education over the last two decades. In Researching technology education, Middleton offers writings on research methods and techniques for examining technology education from many angles. Within the chapters new and variations of existing research methods are offered which range in ideology, at times conflicting, such as with comparative analysis, case studies, action research, cultural-historical activity study, and cognitive research. Each chapter presents a research study written by a research primarily from the United Kingdom, New Zealand or Australia, providing an international perspective. The studies in each chapter aim to inform teaching and learning strategies, curriculum development, policy making, research proposal writing, and further research in technology education.

The main argument presented in the book is in order “for us to understand technology education we need to use research methods that are appropriate for technology education … and justify the research approaches” (Middleton, 2008, p.1). Fleer (chap. 5) sums up the message of the book by stating “constructivist theory has provided researchers and practitioners with important directions, but new research methodologies are needed if technology education is to move forward” (p.89). Savenye and Robinson in D. H. Jonassen’s Handbook of Research on Educational Communications and Technology (2004) claim “educational research methods are changing as new questions and concerns arise … and new technologies may also require that we ask new questions in new ways” (p. 1045, 1048).

In the following two sections, an overview of each chapter is presented along with examples of diverse methods used to study technology education. For the purpose of organizing the wide range of methods and techniques presented in the book, the review of chapters are presented within either the section on qualitative or quantitative methods. Seven chapters offer qualitative methods, and four offered quantitative methods.

Qualitative Research Methods
Qualitative methods presented in the chapters focus on either studying student performance or methods that examined practice and policy. Chapters 5, 6 and 10 focus on examining student design performance and interactions. In Chapter 5, Fleer draws on Vygotsky’s work and suggests using a cultural-historical framework to examine conceptual formation in technology education that considered the relationship between students’ everyday knowledge, academic knowledge and the environment. Through this method, Fleer draws on a rich perspective to study dynamic social processes. However, it offers little description of the study purpose, methods, data collected, analysis or outcomes which makes it difficult to determine its usefulness or validity.

Kimball (chap. 6) conducted a large-scale research project that examined electronic portfolios (e-portfolios) to assess students’ architectural designs created in various grades. Students commented and reflected on their design work, which were hand-built diagrams and designs captured with photographs and notes, through oral recordings creating “dynamic conversational e-portfolios” (p. 114). To assess e-portfolios, Kimball refers to the work of Thurstone (1927) and Pollitt (2004) on comparatively judging against other portfolios, producing seemingly valid and reliable judgments. However, the judgment process Kimball offers is complex involving expert judges and data analysis software, leaving questions about whether educators could feasibly use this method.

Chapter 10 focuses on a stimulated recall technique. In this chapter, Walmsley shares a large-scale study involving 500 Australian and 500 American high school students which aimed to understand complex interactions between students and teachers as well as higher order thinking during classroom activities using technology. It was found by combining video with oral responses from stimulated recall interviews, themes were discovered that depicted teaching tactics that supported or did not support higher-order thinking. Yet, it left this reader wanting more explanation on the connections made between the literature, theory, examined practice, and concepts of higher-order thinking.

Chapters 1, 2, 7 and 9 examine practice and policy. In Chapter 1, McCormick provides an overview of case study methodology as a way to examine performance in technology education. He argues for the use of case studies to study complex activities and multiple sources of evidence as from the observations of technology education classes. In Chapter 2, Banks offers an international collaborative case study where a graphical framework was developed as a tool to help pre-service teachers in technology education determine their different knowledge types, such as subject, pedagogical, school, and personal. He found that novice technology teachers in various countries used the framework differently, yet all reflected on the knowledge types they perceived having in regards to technology education. Nevertheless, Chapter 1 offers sparse examples of using the case study method with technology education, and it was uncertain whether the method presented in Chapter 2 had a global application for research as proposed, or was more useful as a tool to create discussion.

In terms of comparative analysis, Pavlova (chap. 7) draws on comparative education to research technology education in four countries to determine how the subject is interpreted theoretically and practically. As such, Pavlova provides a rich research technique advising to first determine the theoretical and practical level of technology education, such as whether it is used for developmental or instrumental reasons. Also, she suggests increasing the validity in cross-cultural studies by using multilevel analyses to examine the impact of criteria such as international influence, national and personal perspective, and universal and local dimensions on technology education.

Focusing on a stimulated recall technique in a multi-case study, Stevenson (chap. 9) is concerned with how to judge and contextualize knowledge with activities involving technology in order to inform vocational
education strategies. Front office hotel staff members were observed on how they handled tasks using technology, and participants provided an account of their own practice and experience through interviews using stimulated recall technique. It was discovered that general actions could be taught without including underlying, contextual knowledge, though terminology, knowing and action varied and is situational at each site. It would have been helpful had Stevenson clearly stated how observations could determine what is considered knowing and what is considered action.

Quantitative Research Methods

Quantitative studies presented in four chapters examine either how creative work advances from a novice to an expert level, or how to assess the performance of students while using technology. Chester (chap. 4) and Middleton (chap. 11) examined novice and expert knowledge while using think aloud protocols to determine participants’ procedural knowledge. More specifically, Chester employed a screen capture program with voice recording capabilities to combine think-aloud protocols with the computer-based design work of student and expert participants. He provides a well-explained procedure on capturing rich verbal and visual data using technology, while offering a sound theoretical argument, useful methodology, and critical review of the findings. Middleton used video recordings to capture each participant speaking aloud while designing a house using paper and pencil. His study reveals an interesting notion that visual mental images closely resemble internal perceptions and cognitive experience. Middleton carefully explains how to conceptually frame design activities, analyze cognitive functions, and address validity issues.

Bjorklund (chap. 3) used a Repertory Grid Technique to examine student design performance and their tacit knowledge, skills and habits of mind. His approach, subjective and focused on behavioural psychology, had teachers define bipolar constructs when evaluating students’ creative work, thus unpacking teachers’ views of good and poor quality. However, Bjorklund’s chapter is fragmented and neglects to connect issues such as theory, the literature, application and merit, leaving this reader unclear about this method.

Stables (chap. 8) shares a well-detailed description of an observation framework for studying the actions of high school students engaged in technology design. Four students were observed at one time for five minutes with pre-coded elements used to record learners’ actions. As a large-scale study, a sample percentage of students were drawn from each phase of the project. Data were represented in data maps that showed patterns of performance such as the work habits and motivations of various students, and the levels of teacher direction for each age group. The findings helped determine how students of varying age groups generate ideas. However, this chapter does not provide a theoretical rationale for the observations conducted or why data was collected in a certain way.

Conclusion

The book’s eleven chapters are presented in no particular order. Each chapter places different emphases on aspects of research methodology such as theory, procedures, findings and validity issues. The diverse emphasis in each chapter gives the book an uneven presentation leaving this reader wondering about common themes, universal theories, dependable procedures, and the validity of research methods and techniques for technology education.

It may have been helpful to compare or contrast the methods and techniques in this book with popular research practices to better understand the evolutionary claims, especially the claim to be more appropriate for studying
technology education. Though a number of chapters offer interesting research designs, as presented above, addressing, synthesizing and evaluating the individual methods and techniques collectively might have presented a stronger argument for new approaches to technology education.

References

