A Beginner's Guide to Applied Educational Research using Thematic Analysis

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A beginner's guide to applied educational research using thematic analysis

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Interest in applied educational research methodology is growing as educators and researchers strive to seek empirical evidence about what is effective teaching within distinctive contexts. However, for beginner researchers who are interested in conducting case studies within educational settings and are looking for an appropriate starting point, there is limited literature that shapes comprehensively the theory and application of a rigorous research design. This article outlines the theoretical foundation, philosophical assumptions and application of a research design suitable for implementation in educational settings. For researchers and educators pursuing a case study approach within a specific context, an inquiry framework provides the roadmap to navigate the journey. The main components of this systematic inquiry framework include the interconnected practices for: identifying the issue; collecting the data; preparing and engaging with the data; analysing thematically the data; interpreting the data analysis; and composing the research findings and generalisations. Throughout the discussion, examples are drawn from a case study to illustrate how the innovative design and the six-stage qualitative data collection and thematic analysis were implemented to investigate the prevalent roles that teachers play in generating environments for self-regulated learning. Finally, research design considerations are discussed to reflect high standards of ethical practice for reporting research findings and interpretations that can be trusted and contribute practically, theoretically and methodologically to educational research.

It is not uncommon for educators transitioning into the role of researcher to be overwhelmed by the broad collective of literature that is littered with unfamiliar terminology used to explain the complexity of research methodology. The purpose of this article is to articulate a case study research design that implements a data collection and thematic analysis approach as an appropriate starting point for beginner researchers. The methodological design and approach are presented as an inquiry framework that offers systematic procedures for collecting data, and then for analysing the data, by generating codes and themes. To demonstrate the utility of the inquiry framework, examples from an exploratory research project are articulated. The examples are intended to guide the researcher by offering evidence of the interconnected practices and by illustrating the stages involved in the data collection and thematic analysis. In addition, the flexible inquiry framework has multidisciplinary application for educators and researchers in all fields to design and conduct research, and to analyse and interpret data.

In this article, the inquiry framework is presented as a roadmap to direct applied educational research that involves the complexities of studying the cognitive processes, behaviours, motivations and personalities of individuals and of groups of learners in varied contexts. Applied educational research is valuable for developing new knowledge about teaching and learning. Furthermore, the intention of this research design is to support researchers and educators to examine practice in context (Duran et al., 2006). Integral to the inquiry framework is a method of data collection and thematic analysis that is introduced as an approach suitable for research within the qualitative paradigm. The

philosophical assumptions that guide the decisions researchers make are discussed in terms of ontological, epistemological and axiological worldviews. An understanding of these complex terms provides the "key premises that are folded into interpretive frameworks used in qualitative research" (Creswell, 2013, p. 23). It is proposed that methodology is greatly influenced by the issue or problem that is being investigated. As such, it is not surprising that the research questions drive the inquiry and are located at the centre of the research inquiry framework. How these sequential questions interact with each of the other framework components in an iterative manner is discussed to point out the importance of methodological alignment. Following this, specific tools and processes for data collection and thematic analysis are presented with examples, drawn from a case study, that investigated teachers' practices in the context of the primary–secondary school transition years.

Finally, the discussion returns to the importance of generating and communicating this framework that supports the thoughtful and ethical conduct of research and talks about reporting research that is rigorous and trustworthy. In 2006, the American Educational Research Association (AERA) developed standards for reporting on empirical research (Duran et al., 2006). Two general principles have been recommended to reflect on empirical research reports:

First, reports of empirical research should be warranted; that is, adequate evidence should be provided to justify the results and conclusions. Second, reports of empirical research should be transparent; that is, reporting should make explicit the logic of inquiry and activities that led from the development of the initial interest, topic, problem, or research question; through the definition, collection, and analysis of data or empirical evidence; to the articulated outcomes of the study (Duran et al., p. 2).

The message from these principles is reiterated consistently in this article to reinforce that the rigour and trustworthiness of case study research is demonstrated and judged through the alignment and articulation of the philosophical assumptions and explicit logic of the research design. This agenda looks at the possibilities for conducting applied educational research through a case study approach and recognizes the limitations as future research possibilities.

A Research Design for a Case Study Approach

Proposed in this article is a research design suitable for a case study approach that can be implemented in distinctive educational settings to address research questions. Case study design is presented in the research literature as a strategy of inquiry (Denzin & Lincoln, 2011), an empirical inquiry (Yin, 2014), a comprehensive research approach (Creswell, 2013) and an intensive, holistic description and analysis of a bounded system (Merriam, 2009). Stake (2010) preferred to view case study not as a methodology but instead as an approach to researching the particularity and complexity of a unit of study. While the term case study has diverse meanings, it generally refers to "a qualitative approach in which the investigator explores a real-life, contemporary, bounded system … or multiple bounded systems … through detailed, in-depth data collection involving multiple sources of information" (Creswell, 2013, p. 97). Common to all iterations is the understanding that case study is a way to investigate an issue in depth. Accordingly, case study research is an appropriate approach for meeting the purpose of applied research intended to provide a rigorous, ethical exploration within contemporary educational contexts. As observed by Butler (2011), with reference to the alignment of practice and theory, "bridges can be built through the process of case study inquiry itself, when complex, dynamic processes are investigated within authentic settings" (p. 358). Case study, as an empirical interactive inquiry approach, has the potential to provide multiple sources of evidence that supports detailed and rich descriptions of the bounded settings (Merriam, 2009; Stake, 1995; Yin, 2014). Sources of evidence include descriptions of the relevant characteristics of the sites and participants, rationale for these choices and the processes and judgments through which they were selected (Duran et al., 2006).

Interest in applied educational research methodology is growing as researchers and educators strive to answer questions that emerge from practice in ways that inform practice (Dodd & Epstein, 2012). It follows, then that improvements in school performance that have been widely endorsed by Governments across the world focus on the development of evidence-based practice (Simons, Kushner, Jones, & James, 2003). However, for beginner researchers who are interested in conducting qualitative studies and are looking for an

appropriate starting point, there is a current gap in the literature. To address this, it is the aim of this article to outline the theoretical foundation and application of a research design suitable for implementation in educational settings. For educators pursuing a case study approach within a specific context, an inquiry framework provides the roadmap to navigate the journey. The main components of this systematic inquiry framework include the interconnected practices for: identifying the issue; collecting the data; preparing and engaging with the data; analysing thematically the data; interpreting the data analysis; and composing the research findings and generalisations that are ethical. The purpose in specifying these components is to provide guidance to beginning researchers about the nature of empirical research that promotes warranted and transparent outcomes (Duran et al., 2006).

The design and logic of case study research flows directly from the issue of investigation. Initially, the identified issue motivates the inquiry as it outlines what is known, what is lacking and why it is important (Duran et al., 2006). Subsequently, questions that arise are formulated to define the limits of what is to be addressed. The ways in which the researcher views the issue of study shapes the fundamental decisions about what data will need to be collected to address the research questions. In turn, this informs the methods selected for data collection and influences how the data will be analysed. Typically, empirical research entails processes of data selection, reduction or translation.

The validity of empirical research is dependant, in part, on the detailed understanding of how the data were collected and analysed (Duran et al., 2006). The processes and assumptions that underly the translations of the qualitative data occur iteratively during as well as after data collection. It is the researcher's responsibility to make known the processes for identifying patterns, constructing descriptions and developing interpretations to trace the logic of the analysis. Thematic data analysis is a widely used qualitative method where classification of data into units of analysis is integral (Duran et al.) but often lacks clarity of instruction in the literature.

This article presents a rigorous, six-stage data collection and thematic analysis process (Peel, 2017) that was influenced by four sets of prominent writers, who have contributed to the methodologically aligned literature (based on Braun & Clarke, 2006; Creswell, 2013; Merriam, 2009; Miles, Huberman, & Saldaña,

2014). Thematic analysis is described by Braun and Clark (2006) as "a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex account of data" (p. 5). Distinctive to the synthesised, six-stage approach is the researcher-active perspective that is used to describe the processes of data collection and analysis. The stages are iterative in nature to provide the required flexibility, complexity and structure for researchers to scrutinise comprehensively and to interpret systematically from the qualitative data. Analysis begins with the collection, familiarisation and management of the data. Tables and data maps aid the coding of the data as they illustrate relationships, common threads and contradictions. The codes are reduced systematically to code categories. To extend the findings, a conceptual lens is introduced that clarifies the next stage of the analysis. Themes are generated inductively from the patterns in the data that are informed by sourcing existing knowledge from the literature. To contextualise and represent the findings, the data is represented as cohesive snapshots that provide detailed pictures of the analysed data. In due course, the research questions are addressed through the interpretations, as woven patterns identified in the data. This thematic approach confirms the active role of the qualitative researcher when identifying patterns across the dataset and requires the researcher to be deliberative, reflective and thorough (Braun & Clarke, 2014). Key to the process is researcher awareness that begins with understanding and maintaining the philosophical assumptions that frame a study and determine the research methods selected for collecting and analysing the data.

The Philosophical Assumptions: Being and Knowing

Beliefs about the nature of things as they are known (ontology) and how what can be known should be conceptualised (epistemology) clarify the researcher's position in terms of philosophical orientation. For a beginner researcher, the complexity of this terminology can be quite abstract, and understanding is significant for ethical research. Decisions require considerable thought as they determine how a researcher formulates the research issue, how the issue is investigated and what meanings are attached to the data accruing from the investigation. The design of the research controls and influences the extent and nature of these meanings and as such could "limit or privilege certain types of

knowledge over others" (Macdonald, Hunter, Carlson, & Penney, 2000).

For example, the inquiry framework presented in this article uses thematic analysis and has been developed primarily for use within a qualitative paradigm. A *paradigm*, described as a "loose collection of logically related assumptions, concepts, or propositions that orient thinking and research" (Bogdan & Biklen, 2007, p. 24), represents the basic belief system that guides research. Qualitative research, such as case study, is popular for exploring issues in education as it affords opportunities to "study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them" (Denzin & Lincoln, 2011, p. 3). Hence, qualitative researchers must be clear about their intention to construct meanings by foregrounding the participants' experiences. They act as the interviewer and the observer for the data collection within the settings of contemporary educational contexts.

Through thematic analysis and interpretation of data, qualitative researchers create the rich descriptions that emanate from the data extracts, using the participants' own words to support their interpretations (Creswell, 2013; Denzin & Lincoln, 2011; Merriam, 2009). In ontological terms, an interpretivist orientation supports multiple realities from the researcher and the participants, whereby there is no one true way of seeing the world. These multiple realities are socially and experientially based and are time and context dependent. An interpretivist framework warrants multiple realities, that are utilised to interpret the complex meanings of the participants' experiences and to capture what was particular to the places and times.

From an epistemological standpoint, those involved in a study—the participants and the researcher—define what is known and what is considered to be true through constructing meaning from personal experiences. However, it is the researcher who is the one intimately involved in the data collection and the analysis that operates as the "prime filter and interpreter" (Goodwin & Goodwin, 1996, p. 111). As pointed out by Drisko (2013), "the researcher serves as a witness and also a translator of experiences and understandings across different social groups" (p. 85).

To avoid an over-simplistic misrepresentation of the complex issue, a subjective view—described by Stake (1995) as "having meanings at least partly unique

to the individual observer" (p. 173)—emanates from personal meaning making and interpretations. Subjectivity supported by rich descriptions provides opportunities for the readers to make informed interpretations. Therefore, the conclusions, subjective through their construction and interpretation, include multiple perspectives such as existing knowledge, the voices of the participants, the researcher's standpoint and the readers' constructions as the personal meaning makers. By acknowledging that all knowledge is inter-related and value-laden, rather than being objective truths, researchers can provide a comprehensive account of the issue of investigation relative to their perspective.

In summary, it is important that researchers are self-aware and that they monitor how their experiences shape their research design and interpretations. This process of reflexivity is portrayed by Creswell (2013) as "coming to know the self within the process of research itself" (p. 183). Attention to reflexivity is the acknowledgement of personal influences and inevitable biases that are informed by past experiences with the issue of the study. Personal critical reflection guides the researcher to view consciously the values, norms and beliefs operating as axiological assumptions. This is significant for experienced educators, who are adopting the role of researchers, as it is impossible for them to escape themselves in terms of their experiences. Therefore, they need to acknowledge that their approach to applied educational research is derived from their background experiences, beliefs and values with biases evident in their selection of the issue, the research questions, the conceptual foundation and the contexts of the studies.

The Research Inquiry Framework

A rigorous inquiry framework is an essential starting point to address an issue of research. Butler (2011) describes the research framework as the "roadmap" (p. 348). The framework, presented in Figure 1, guides beginner researchers by suggesting six sequential inquiry frames, with the research questions forming the centre of the inquiry.
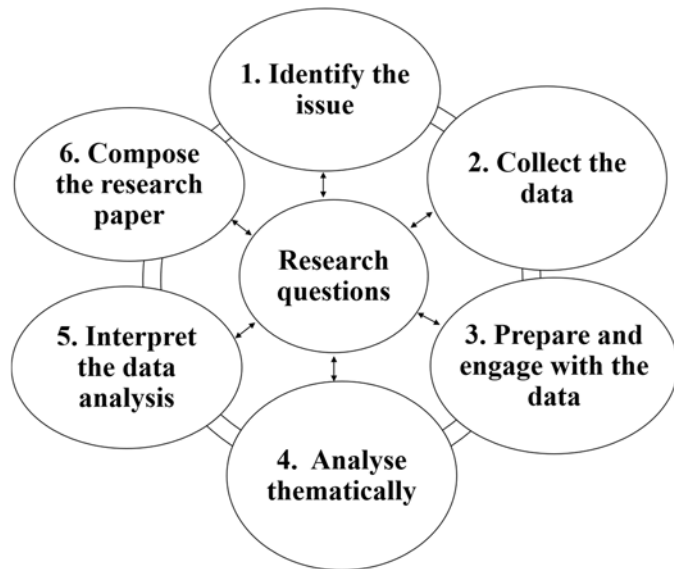
Figure 1. Research inquiry framework (adapted from Butler, 2011, p. 349)

Research commences with the identification of an issue and moves to the data collection, the preparation and initial engagement with the data, the thematic analysis, the interpretation of findings, and finally, the communication of the research. Such a linear sequential process is suitable to visualise a research project in its entirety. However, qualitative research is rarely one-directional and beginner researchers are well advised to returned continually to the research questions that are designed to maintain focus on the issue of investigation.

The Research Issue

Applied educational research is activated with the identification of an issue. Beginner researchers who are knowledgeable educators will have their own experiences to draw from that offer practical issues for investigation. In addition, a thorough review of the literature will inform these ideas and will initiate thoughts for posing the research questions (Yin, 2014). What is known about the issue already? What questions arise as the issue narrows from the central question to the identification of an underexplored aspect of significance? The research that stems from the questions should make a contribution to educational theory and practice.

A gap in the existing literature justifies the significance of an issue and its contribution to research. Researchers may suggest where future research is required. For example, Dignath and Büttner (2008) recommended that future studies explore self-regulated

learning—through collaborations between researchers and teachers reflecting on pedagogical practices—to address an identified "lack of knowledge on how to support students' self-regulation effectively" (Dignath-van Ewijk & van der Werf, 2012, p. 8). Perry, Brenner, and MacPherson (2015) identified the gap in the existing research stating: "Few programs of research have focused on how practicing teachers in general educational settings promote self-regulated learning in regularly occurring activities in classrooms" (p. 233). This issue of investigation had received limited research attention, although theory and research supported the importance of self-regulated learning for students in the middle years of schooling (McCaslin et al., 2006). Research investigating teachers' pedagogical practices lends itself to a case study design as it provides a holistic, in-depth and investigative approach to research that is situation within real-world contexts (Yin, 2014). Furthermore, the literature endorses case study as being a valuable research approach to gain new information about self-regulated learning and to bridge theory and practice (Butler, 2011).

The Research Questions

In qualitative research, the questions that develop inform the design of the research methodology for the purpose of addressing the questions. As such the research questions are pivotal as they interact with each of the other inquiry frames. For example, in the following case study (Peel, 2017), the questions build from each other to inform sequentially the data analysis:

1. How do teachers working across the primary–secondary schooling transition years talk about fostering their students' effective learning?

2. How do teachers' pedagogical practices for effective learning provide opportunities for students to regulate their own learning in the primary–secondary schooling transition years' classroom environments?

3. How does the exploration of teachers' pedagogical approaches inform a primary–secondary schooling transition pedagogy for self-regulated learning?

The research questions were designed to explore pedagogical practices intended for students' effective learning. It was essential that the exploration was open to draw broadly on the teacher participants' practices for

fostering effective learning to avoid a restricted focus on their knowledge of self-regulated learning. The case study then preceded as an emerging approach of inquiry to collect data in natural settings. The preliminary review of the literature guided the placing of this applied educational research contextually in the primary–secondary schooling transition years of education (from Years 5 to 9 in Australia) to address the gap in the literature. Limited research had focused on how practicing teachers in the primary–secondary schooling transition years provide students with opportunities to self-regulate their learning in regularly occurring classroom activities.

Data Collection: Context, Participants and Tools

To address the research questions, sources of evidence are collected that refer to both the characteristics of the context for the research and the participants of the study. Thus, reporting on sources of evidence includes the specification and selection judgments of participants and sites, and a rationale for these choices (Duran et al., 2006). As case study researchers will spend considerable time becoming acquainted with the contexts and the participants, beginner researchers are best advised to "pick cases which are easy to get to and hospitable to our inquiry" (Stake, 1995, p. 4). The reason for the selection of the context for the data collection presents important decisions for achieving open, reliable and co-operative settings. Communication is essential to building relationships and productive research environments in educational contexts.

In the example case study (Peel, 2017), the sites and participants for the case study research aligned with the purpose of the research which was to address the research questions. The school communities valued the opportunity for participation in the research. Similarly the teacher participants were available and open to reflecting on their pedagogy. Four teacher participants from both the primary school and the secondary school, volunteered to be involved in the research. To suit the study, the total of eight teacher participants had varying years of experience in the teaching profession, and a diversity of backgrounds and specialties. Observations were conducted in the natural classroom environments rather than creating an environment for the research purpose. When research is designed to include prolonged engagement in the educational setting for direct data collection, the researcher develops a feel for the culture and establishes a trust with the participants.

Rapport is established and the roles are determined by the researcher and participants during the access, selection and consent processes (Duran et al., 2006). An Interview Protocol should be designed that introduces the researcher formally to the participant and explains the nature of the study. In this introduction, the researcher should disclose any personal interest in the research and the research background may be shared. An explanation of the envisaged data collection processes—usually by a Participant Information Sheet—is followed by obtaining the participant's signed consent to discuss the topic with the researcher and for the discussion to be recorded and transcribed. In the example case study (Peel, 2017), all the stakeholders—the school principals, the designated site coordinators and the teacher participants—where provided with the necessary information so that they could make informed decisions about and plan for their involvement in the study.

Qualitative research, particularly case study, employs multiple sources of evidence to guarantee descriptive detail for a rich, in-depth discussion and robust interpretation, and to avoid the common criticism of a perceived lack of cross-referenced data for credibility (Creswell 2013). Triangulation of evidence from different sources can confirm the warranted claims (Duran et al., 2006). In the example case study (Peel, 2017), there was a threefold collection of data, utilising semi-structured interviews with teacher participants, classroom observations and subsequent follow-up interviews for clarification. Each element of the triadic dataset was not viewed as being a separate unit but instead it was considered from a holistic perspective to enhance the understanding and the credibility of the data. As such, the initial semi-structured interviews were connected with the classroom observations and were used to inform the follow-up interviews.

Semi-structured interviews are guided by open-ended questions that are designed around a set of themes or guiding topics rather than as a sequence of pre-planned questions (Glesne, 2011; Merriam, 2009). The aim of semi-structured interviews is to elicit understandings from the participants, not to tell them what to say, but rather to offer pathways to conceptualise issues and to make connections that "coalesce into emerging responses" (Holstein &

Gubrium, 2004, p. 123). General topic discussions are guided by questions that assist in focusing the discussion, advancing tentative explanations and working the identified areas into the conversation. Most importantly, as the interviewer, the researcher needs to know how to listen, rather than dominate the conversation (Cousin, 2009). In the example case study (Peel, 2017), five topic questions were composed and presented in the Interview Protocol that included: personal life history; contemporary professional experience; personal pedagogy; knowledge about student learning; and perceptions of successful learners in the transition years. Rather than posing a structured regime of questions, the teacher participants were encouraged to talk so that the topics were not introduced in any particular order but instead they evolved throughout the conversations.

Naturalistic observations within educational settings provide the opportunity for the researcher to see first-hand the experiences that were discussed in the interviews in action. In addition, observations also support the researcher to notice pedagogical practices implemented in their specific contexts that routinely could have escaped the awareness of the participants (Merriam, 2009). These could then be discussed, along with other identified areas of clarification, in the follow-up interviews that conclude the data collection process. The follow-up interviews provide the researcher with a process to question and confirm understandings and provide opportunities for participants to discuss the data and to clarify any misunderstandings that may have otherwise contributed to the researcher's observation biases.

The Thematic Data Analysis Approach

The basic function of the thematic data analysis approach that is presented in this article is to organise and simplify the complexity of the data into meaningful and manageable codes, categories and themes. This thematic data analysis approach suggests that the data collection and preliminary analysis occurs simultaneously, with the analysis becoming more intensive as the research progresses (Merriam, 2009). During data collection, the thematic analysis operates iteratively as "a flexible and useful research tool, to provide potentially a rich and detailed, yet complex, account of data" (Braun & Clarke, 2006, p. 4). The proposed data collection and analysis process provides systematic procedures that have been drawn from four

sets of prominent writers; (1) Braun and Clarke (2006), who offered a six-phase thematic model; (2) Creswell (2013), who presented the four procedures of data analysis as a spiral; (3) Merriam (2009), who proposed that data analysis occurred at three levels and was "primarily inductive and comparative" (p. 175); and (4) Miles, Huberman and Saldaña (2014), who explained how the process of data analysis connected four concurrent nodes of activity. The rigorous, six-stage data collection and thematic analysis process is presented in Table 1.

As a contribution to methodological knowledge, the resulting six-stage data collection and analysis process includes: (1) collecting; (2) engaging with; (3) coding; (4) generating the code categories; (5) conceptualising the themes; and (6) contextualising and representing the findings. The flexible stages for qualitative data analysis offer an accessible approach to manage the complex processes of moving between the concrete descriptions and the abstract interpretations that are informed by the literature (Merriam, 2009). Braun and Clarke (2006) highlighted the recursive nature of data analysis "where you move back and forth as needed, throughout the phases" (p. 16). Merriam (2009) concurred that "analysis begins with the first interview, the first observation, the first document read" (p. 165) and that it involves "consolidating, reducing and interpreting in the process of making meaning" (p. 175). The non-linear approach was described by Creswell (2013) as a procedural spiral "moving in analytical circles" (p. 182) and by Miles, Huberman and Saldaña (2014) as moving "among the four nodes" (p. 14) of activity.

An Example of a Thematic Data Analysis Approach for a Case Study

Demonstrations are drawn from the example case study (Peel, 2017) discussed earlier to illustrate how the research design and thematic data analysis approach were implemented to investigate the prevalent roles that teachers play in designing, instructing and organising environments for learning. As the researcher interacted with the teacher participants through the interviews and conducted observations of the classroom environments the data corpus expanded (Braun & Clarke, 2006). Systematic management was required to organise the collected and transformed data. The system included a network of folders on the computer to store electronic files with a backup storage system to protect the valuable data. Following the first interview, the researcher

Table 1. The six-stage data collection and analysis (Braun & Clarke, 2006; Creswell, 2013; Merriam, 2009; Miles et al., 2014)

Six-stage data collection and analysis	Braun and Clarke (2006) Recursive phases	Creswell (2013) Procedural spirals	Merriam (2009) Levels of analysis	Miles et al. (2014) Concurrent nodes
1. Collect the data	Refer to all the data collected as the data corpus.			Shift among the nodes iteratively during data collection.
2. Engage with the data	Become familiar with the data by reading and re-reading transcripts, listening to audio-recordings and noting any initial observations.	Manage the files by transcribing the data, organising the text files and reflecting in relation to the research questions for a sense of the issue.	Scan transcripts and jot down notes, comments, observations and queries as memos.	
3. Code the extracts from the data	Generate initial codes and labels to represent important features of the data relevant to the research questions.	Form a list of tentative codes that expand as the data are reviewed and re-reviewed.	Identify units of data that are potentially meaningful segments to reveal information relevant to the research questions.	Code the data extracts and write analytical memos.
4. Generate the code categories from the codes	Identify ideas and concepts that inform the semantic content of the data.	Reduce codes to categories in the process of categorical aggregation.	Name categories that are abstractions derived from the data to reflect the data.	Generate categories to condense the data.
5. Conceptualise the themes from the categorised coded extracts	Search for themes as coherent and meaningful patterns in the data and define the nature of each theme in relation to existing literature.	Interpret the data to abstract beyond the categories to the larger meaning of the data by linking the raw data with the research literature.	Consolidate and reduce data to make meaning by linking interrelated elements in the data.	Develop themes.
6. Contextualise and represent the findings	Weave together the analytic narrative and vivid data extracts to inform the findings.	Present a detailed picture of the analysed data.	Interpret to make meaning and develop a model of interrelationships to build a framework.	Compress meanings that emerge from the data and assemble the information using tables and networks.

engaged with the data. The interview audio-recordings were transcribed, and the handwritten observation notes were converted to text files. This was the beginning of the organisation of the data that progressed to sorting the data into manageable, connected chunks of related synergies.

Coding the extracts from the data

The coding stage commenced by identifying extracts of significance in the transcripts and by generating initial codes. *Data extract* is a term that refers to a potentially meaningful segment of data, revealing information possibly relevant to the research questions (Braun & Clarke, 2006; Merriam, 2009). At this stage, the analysis relied on the researcher's interpretations of the data and inferences about what the data were saying about instances.

Codes are the building blocks for identifying patterns of meaning in the data, underpinned by a central organising concept (Clarke & Braun, 2017). The analysis process involved identifying codes to give meaning to the data extracts so that the codes emanated from the transcribed data. This inductive method was preferred rather than coding from a developed priori template of codes that had been constructed to form expected answers to the research questions (Crabtree & Miller, 1999; Fereday & Cochrane, 2008)). The list of tentative codes expanded as the data were reviewed and re-reviewed (Creswell, 2013). This stage of the analysis was recurring, and it gradually involved the entire data corpus (Braun & Clarke).

Because this case study was exploratory in nature, the inductive coding method invited the researcher to focus initially on what the teacher participants were saying, and on the descriptive observation notes, to identify the underlying ideas and assumptions. At times, this involved moving from the semantic content of the data extracts to recognise latent explanations that form the initial codes (Braun & Clarke, 2006). During the creation of the code list, it was essential to consider suitable code labels and to write comprehensive descriptions to represent the codes so that the connotations associated with each of the codes were made clear. Code labels to represent the data analytically came from the actual words and the behaviours signified in the data. For example, one participant expressed how pleased she was that a group of students in her class exhibited the confidence to ask questions during mathematics lessons:

> *I was a bit surprised …. My three boys that are low academic achievers in maths, they actually ask the most questions. So I was really impressed with them …. They're not afraid and they just want to learn how to do it.* (S, Interview 2)

The researcher coded this as *safe learning* and described the code as when teachers value students feeling non-threatened and comfortable in the classroom environment.

While reviewing the data transcripts and writing the memos (Miles et al., 2014), the researcher chunked sections of the data as the extracts, and questioned—"What is this about?"—before assigning a provisional code. For example, during a follow-up interview, one participant commented: "You have to make connections constantly because maths is relevant in life and in the real-world" (R, Interview 2). Drawn as an extract from the transcript, this comment was coded *linked learning* as it made reference to how the teacher participant makes learning connections for students between the concept of time zones from mathematical and geographical perspectives.

The tentative list of codes expanded as the researcher built new codes and refined former ones. From the identified extracts, each of the code labels and descriptions progressively generated a code list. More importantly, during the process, the researcher described the intent of each code from the participant teacher's perspective for the purpose of clarifying the code's meaning for future coding consistency. As a structure for the code descriptions, each description began with teachers as the subject, followed by the action or behaviour and then the object of the action. For example, the code labelled *linked learning* was defined as *teachers explaining why a learning task is chosen and how it connects with students' other learning and life*.

Having a detailed description for each code ensured accuracy in associating the extracts with a code, re-coding and recognising the need for a new code. At times, an extract was suited to more than one code and it was included consequently in a number of codes. Where to include an extract was decided predominantly by considering the match connecting the teacher participants' words and actions with the descriptive statements that defined the codes. When the extract was identified as representing an already established code, the description was re-read to ensure that the newly coded extract of data matched the originally intended meaning of the code. If no existing codes were appropriate, a new code was created and described.

Exploration of the data when choosing the extracts required the researcher to write memos, as the researcher considered the disconfirming and confirming evidence,

the absences and silences, and the subtle language use such as metaphors and figures of speech (Cousin, 2009). During the process of reading, re-reading and identifying the codes to find what was of key importance in the data, it was not necessary nor was it appropriate to code every word and sentence within the transcripts. However, the researcher was careful to avoid over segmentation of the transcript, cherry picking quotations to make a point, or using the frequency of a code alone as the credibility of its worth (Cousin).

The iterative data analysis process meant that the transcripts needed to be reviewed many times. As new codes emerged, previously coded data were checked to ensure that the original coding did not conflict with the establishment of newer codes. The codes continued to build throughout the data collection and analysis. Once all the transcripts were initially coded, a code list of 96 codes with clear code descriptions was established. A final review of the transcripts provided the researcher with the reassurance that many of the meanings had been represented in the codes.

HyperRESEARCH 3.7.3 (Researchware Inc, 2014) software provided a vehicle for the manual highlighting and organising electronically of the considerable number of qualitative data that this case study had generated. HyperRESEARCH is a *code and retrieve* research tool that provided a convenient way to build the codebook and review the case interview transcripts. Figure 2 presents a screenshot that shows the basic layout of transcribed and coded interview data from the example case study in the HyperRESEARCH program.

Using the HyperRESEARCH tools, the complex links within the coded data could be explored further to identify patterns. The reports generated from this database were able to be exported to the Microsoft Excel program, which provided a filter option to view the data in different patterns and alignments.

Generating code categories from the codes

The next stage in the data analysis involved categorical aggregation (Creswell, 2013) and it presented an opportunity to address the first research question. At this stage of the analysis, the researcher was required to reduce the codes and to generate the code categories. *A code category* represented "a collection of similar data sorted into the same place, and this arrangement enables the researcher to identify and describe the characteristics of the category" (Morse, 2008, p. 727). Therefore, the researcher reviewed the extensive code list, the codes' descriptive statements and the coded extracts to identify emerging patterns and correlations. Through this largely intuitive coding process, the researcher generated six code categories (Peel, 2017) that represented the teacher participants' pedagogical practices intended for fostering students' effective learning.
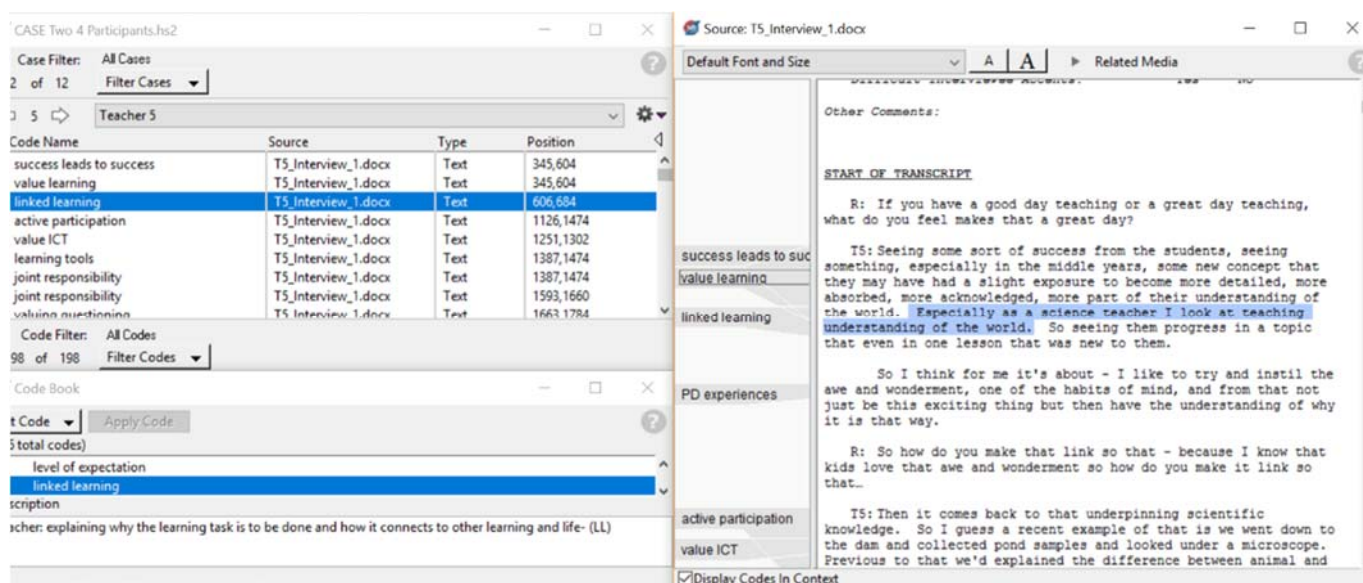

Figure 2. A computer screenshot of the basic case layout in HyperRESEARCH

The convergence of the codes into the code categories was imagined by Baxter and Jack (2008) as braiding various strands of data together to promote a greater understanding of the case and to strengthen the findings. The various strands of data were braided to form the code categories that were named from the voices of the teacher participants in the transcribed data. In addition, the researcher described each code category by identifying the prominent features of the pedagogical practice informed by the code descriptions and the data extracts.

Using a similar structure to the code descriptions, the code category descriptions utilised a teacher/action/object statement. They were written beginning with the teacher's actions and the pedagogical intention. For example, the description for the code category labelled *design meaningful learning* began with: *Teachers design learning from the distinctive and conceptually aligned curriculum subject learning areas that provide topics ...* — and continuing with the intended influence of the teachers' actions— … *for the students to experience meaningful learning and to transfer their learning into different contexts.*

Conceptualising themes from the codes and the code categories

To extend the findings, literature was used to create a conceptual framework (Peel, 2019) that informed and guided the thematic data analysis. The researcher identified conceptually the interconnections evident in how the teacher participants talked about their pedagogical intentions to foster their students' effective learning in relation to the significant constructs that were prominent in the self-regulated learning research and theory. The findings from this data were used to address the second research question. Subsequently, four data generated themes laid the foundations of a pedagogical model for self-regulated learning (Peel, 2018). The themes represented the teachers' approaches to *connect, facilitate, diversify* and *socialise* the learning for students to be empowered as resourceful learners.

Contextualising the data to represent the findings

The interpretations that were formed from the data and informed by the literature were then contextualised to address the third research question. Graphic networks associated the teacher participants' pedagogical approaches, presented as the themes, with the five learning needs of young adolescent students— challenge, curiosity, responsibility, capability and

belonging (Peel, 2017)—and six transition principles (adapted from Duncan et al., 2009). These principles were developed in previous research that was conducted in the context of the first-year students' tertiary experience (Nelson & Kift, 2005).

In this final stage of data analysis for the example case study, the researcher was able to braid together the data that were supported by extracts, organisational tables and data maps to apply the findings. By extending the data analysis, the findings were substantiated to construct a practice-based pedagogical framework (Peel, 2020) for self-regulated learning in the primary–secondary schooling transition years. The inquiry design and the techniques used in the data analysis at iterative stages reflect how the data fitted together in relation to the issue of investigation, the research questions, the data collection and the data analysis.

Research Ethics, Rigour, Trustworthiness and Limitations

Qualitative research often involves a close liaison between the participants and the researcher. Field relationships develop from time spent together, and it is the responsibility of the researcher to ensure that the rights of the people involved in the research are valued and that an atmosphere of mutual respect is maintained (Glesne, 2011). Shank (2005) described the spirit of the ethical researcher as being open, honest and careful, and as doing no harm.

Research Ethics

Generating an ethical framework supports the thoughtful conduct of applied educational research and the credibility of the findings. As a protective function for the researcher and the research participants, the ethical orientation of a study should consider the facilitation of the research process as being to identify any potential risks (Cousin, 2009). It is essential that the researcher endeavours to avoid and overcome the potential ethical issues associated with applied educational research by: adhering to ethical principles; thinking consciously about protecting the participants; and committing to the ultimate goal of education being to improve student outcomes. The planning process involved in obtaining ethical approval for a study ensures a proactive approach to addressing the ethical issues.

While the personal demands on the teacher participants in the case study example were not excessive, a requirement of the study was that the researcher was to be included in the environment of the schools and in the teacher participants' lives. This involvement included site attendance, email correspondence, interviews, classroom observations and discussions. In addition, the teacher participants were asked to give up their own time for interviews to share their personal views and circumstances. Stake (2000) highlighted, "Those whose lives and expressions are portrayed risk exposure and embarrassment" (p. 447), and the researcher was required to be aware of this element of risk. In addition, classroom observations were aimed at causing minimal intrusion and disruption. As noted by Stake (2005), "Qualitative researchers are guests in the private spaces of the world. Their manners should be good and their code of ethics strict" (p. 459).

Research Rigour and Trustworthiness

The rigour of research is demonstrated through its alignment with and the articulation of the philosophical assumptions that guide the research methods. This alignment of the design endorses the trustworthiness of the methods and substantiates the findings to assure the reader about the rigour of the knowledge claims (Merriam, 2009). Furthermore, the inquiry framework ensures that empirical research provides adequate evidence to justify findings and that the transparent design articulates explicitly the logic of the inquiry (Duran et al., 2006). These principles of sufficiency, described as warrant and transparency (Duran et al.), are intended to promote empirical research reports that allow researchers and educators to understand one another and extend the research practically, theoretically and methodologically.

Because case study research is context specific and situationally time bounded, the emphasis of trustworthiness for this type of research is not on showing that the findings can be duplicated. Instead, transparency demands an audit trail as a chain of evidence during data collection and analysis (Merriam, 2009). The logical design of coherent interconnected practices in the inquiry framework presented in this article indicates that the findings and interpretations can be trusted. The research inquiry framework connects the related components to each other and traces the path from the initial statement of the issue, the research questions, the methodology guiding collection and

analysis of evidence, and the interpretation of findings. In addition, the steps taken during data collection and analysis clear the way for careful, comprehensive interpretation and reflection. Thematic data analysis involves making auditable decisions because "clarity around process and practice method is vital" (Braun & Clarke, 2006, p. 7). In the case study example (Peel, 2017), this was achieved by tabulating coded extracts of data systematically and by providing explicit code and category descriptions and thematic elaborations.

Furthermore, whether specific generalisations from case study research are intended or not, transparency makes clear the specific context of the research and evidence that permits readers to draw the necessary comparisons and applicability to their own contexts of interest (Duran et al., 2006). Generalisation is a process of transforming context-bound data into transferable evidence (Hughes, Pennington, & Makris, 2012). Therefore, the focus is on guiding the design of research that generates new knowledge about practical issues within a specific context that may well contribute to the bigger picture of teaching and learning.

As proposed by Geertz (1973), Stake (1995) recommended that writing using "thick descriptions" (p. 39) permits the reader to enter the research context, making the transferability of elaborations and theories possible. While the presentation of evidence remains closely connected to the situation in which it is established, comprehensive descriptions that are illustrated with concrete examples, such as snapshots, present opportunities for collective interpretations that act as a validity filter for acceptance of the findings. It follows then that interpretations presented as rich descriptions provide readers with a platform to assimilate between the findings and their own experiences. In the example case study (Peel, 2017), the researcher directed the conversations to draw out descriptions of the teacher participants' tacit knowledge (van Manen, 1977). Many of the teachers' practices were implicit to them and they were communicated most effectively when the teachers recounted what they did when working with the students in their classrooms. For instance, the teacher participants were open to share what they thought were the characteristics of students who were learning effectively in their classroom. One participant shared her image of a student who is learning effectively:

> Someone who is willing to take a risk and make a mistake. Someone that will have a go. Someone who is willing to ask for help. Someone who can ask the right questions. Someone that can actually achieve something in their time. That someone is effective because they use the resources that are available to them. (N, Interview 1)

As with this data extract, data snapshots were presented in the findings to substantiate the researcher's interpretations of the data. Therefore, the descriptive richness of the snapshots strengthened the potential transferability of the example case study's findings. Accordingly, the criterion of transferability rests with the reader who relates to the research through the descriptive, articulated findings (Lincoln & Guba, 1985).

To reinforce the strength of the findings, it is essential that researchers understand the alignment of the philosophical assumptions of the research. Empirical research warrants critical, self-reflexive questions and justifiable assumptions drawn from thoughtful and credible analyses (Duran et al., 2006). Memos recorded as reflective decisions to action changes to research procedures could be discussed with other educational professionals to assist in answering the self-generated reflexive questions. In the case study example (Peel, 2017), the research design accommodated the philosophically aligned practices of the researcher (Lincoln & Guba, 1985) and, as such, the perspective of the researcher influenced the collection and analysis of evidence. The discussion and recommendations from the research included statements of how claims and interpretations addressed the three research questions, connected to supporting literature by extending and challenging what was already known, and endorsed implications for practice, theory and future studies.

Research Limitations

The possible limitation of case study research is associated with the small-scale nature of the design. However, this bounded approach enables the researcher to cross diverse disciplines and investigate complex issues in depth. It follows, then that often the aim of qualitative research is to contribute to knowledge that develops ideas for further investigations. Furthermore, the thematic analysis approach to qualitative research is most suitable when addressing research questions that require a deliberative, reflective and thorough tool that

is flexible and accessible for researchers to use in distinctive contexts (Braun & Clarke, 2014).

Qualitative, case study research does not serve every purpose. Researchers need to clarify how their formulated research questions define the limits of what can be addressed and the extent to which they wish to investigate the issue when making methodological and theoretical choices. To reflect the highest standards of ethical practice, both with respect to the participants and the execution of professional conduct, the chosen research approach must be true to the philosophical assumptions that underpin the intended research.

Conclusion

Educators and researchers require the knowledge and skills to choose a research design and analysis approach ultimately that suit the issue that they wish to explore, the research questions, the research context, their researcher experience and preferences, and the intended audience of the research. The aim of this article is to guide beginner researchers who are interested in designing and conducting applied educational research. The inquiry framework offers a case study research design for the purpose of exploring real-life, contemporary issues in-depth within a bounded system. The alignment of the philosophical assumptions of the research with the qualitative paradigm positions researchers to implement a data collection and thematic analysis approach for a diversity of topics, issues and contexts. Furthermore, implementation of the six sequential inquiry frames involves qualitative data collection from multiple sources of information and a manageable, flexible thematic analysis process that identifies patterns of meaning within data for interpretation. The inquiry framework is intended to provide clear guidelines that support practically beginner researchers to visualise and design research projects suitable for their distinctive contexts.

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