How can knowledge building communities be developed in New Zealand secondary schools?

Philippa Lorraine Mallinson

A thesis submitted in partial fulfilment of the requirements
for the degree of Master of Applied Practice

Unitec Institute of Technology, 2019

ABSTRACT

It is widely argued in education literature that pedagogy needs to change in order to meet the demands of life in the 21st century, and to adequately prepare our ākonga for life in a knowledge society (Gilbert, 2007). Knowledge Building Communities (KBC) are acknowledged as a pedagogical approach that is well suited for preparing learners to be connected, critical thinkers (Bolstad et al., 2012).

This study examines several secondary school teachers' experiences of developing KBC, contextual changes, actions taken to address these challenges, and their views around what would support further development of knowledge building (KB) in their classes. This research aims to understand the imperatives behind KB, to evaluate the challenges involved in developing KB in New Zealand (NZ), and to make recommendations for strengthening the development of KBC in NZ secondary classrooms.

In this practitioner research, I conducted seven interviews with secondary school teachers from a range of locations, and, subsequently, held one focus group interview with five of the teachers from the initial interviews. These methods were used to draw upon teachers' personal experiences of developing a KBC, their perceptions of what supported the development of KB, identifying what made KB particularly challenging in a NZ context and their views on what would support the development of KB in the future.

Key findings included the necessity of professional support, the importance of developing a learning environment that is conducive to KB, the need to reframe the foci of student assessment and how it is conducted, and the importance of developing communities at both a teacher and student level. As change is a fundamental feature of developing KBC in NZ schools, several challenges and complexities were highlighted through teachers' opinions and experiences of developing KBC, and their views about what would support the development of KBC.

This research has implications for schools and teachers. Schools should make efforts to minimise unnecessary external pressures. Furthermore, teachers will need to make significant shifts in their practice to develop KBC and professional support is essential for

facilitating the shift to KB pedagogy. Where this is not available within their own school, teachers will need to seek out like-minded practitioners to work together as a KBC.

The recommendations of this study are that the challenges in developing KBC could be mitigated by: accessing professional learning communities focused on developing KB pedagogy, the development of a local repository of practices conducive to KB, and alignment with local and national pedagogical initiatives to leverage the development of KBC.

ACKNOWLEDGEMENTS

“Ehara taku toa, he takitahi, he toa takitini. My success should not be bestowed onto me alone, as it was not individual success but success of a collective.” The completion of a master’s thesis has been an enormous undertaking and I am hugely grateful to those who have supported and sustained me along this journey. Firstly, I would like to acknowledge my principal supervisor Professor Hayo Reinders. I am incredibly grateful for the freedom granted to determine the pathway of my research and the way you balanced this with well-timed questions that supported me to think critically about the essence of the matter in my study. Your prompt feedback and generosity with your time was also greatly appreciated. I would like to acknowledge my school for giving me the support to start my learning journey by granting full-time study leave in 2018. In particular, I would like to thank my colleague Sharon McLeod, who suggested that I apply for the study award. Your encouragement was the impetus to start this journey. I must also acknowledge TeachNZ for funding my year of study leave. The opportunity to immerse myself in the research process and to consider the big picture of education was invaluable. My colleagues in my Master of Applied Practice cohort also need to be acknowledged. Your generosity in the form of sharing of ideas, peer feedback and general discussion during our master’s journey have sustained me. I would also like to thank my family. You have helped to keep this project manageable through your constant encouragement, editing eyes, words of wisdom, and other very practical assistance you provided on an ongoing basis. This has not gone unnoticed. Finally, I am extremely grateful to the teachers who took part in my study. It has been a real privilege to learn from you. Your willingness to put the time aside for interviews, share your professional wisdom and reflect deeply upon your experiences of KB was a precious taonga.

Table of figures

CHAPTER ONE: INTRODUCTION

"We may now ask what skills and other kinds of knowledge are

needed for knowledge work and what kinds of conditions facilitate it." (Bereiter, 2005, p. 181)

Context

In 2015, I started teaching online and became interested in Knowledge Building Communities (KBC), after being invited to take part in a practitioner research group, working with Professor Kwok-Wing Lai from Otago University, whose research interests lie within Knowledge Building (KB) pedagogy. I was struck by the potential for KB to support the community and develop critical thinking in my online class. However, it is very much an emergent model in New Zealand (NZ) and an incredibly challenging pedagogy for a classroom teacher to adopt, for several reasons. There is a large shift that needs to occur on several levels, given that KB calls for a classroom culture that runs counter to the way that conventional pedagogy approaches teaching, learning, and assessment. Within KB, the very roles of teachers and student are redefined. A defining feature of KB is epistemic agency (Scardamalia, 2002). Students take on the role of researcher and drive the direction of their study with authentic questions of importance to the group (Scardamalia, 2002). Another significant difference from conventional teaching and learning is the centrality of community. Knowledge is framed as belonging to the community, to be worked on and improved by the community. Furthermore, democratisation of learning is vital, with all ideas being valid and improvable (Scardamalia, 2002). Thus, the interactive nature of KB stands in contrast with the conventional approach to teaching in NZ, where knowledge tends to be treated as a commodity and the acquisition of knowledge tends to be linear and task-centred (Bull & Gilbert, 2012).

Background

The New Zealand Curriculum (NZC) (2007) envisions 'lifelong learners' (p6), 'future-focused' education (p41) and learners who 'create knowledge' (p12). Bolstad (2011) posits a 'future-focused' approach as necessary to prepare individuals for such a world. In this approach, a broad view is taken of the purpose of schooling, and its role in meeting societal needs and the real concerns that will be faced by students. In that respect, education has a responsibility to prepare individuals for a lifetime of complex, real-world problem solving (Bereiter, 2005). KBC is proposed as a possible model for navigating life in the 'knowledge age' (Bolstad et

al., 2012). Within KBC there is a responsibility to the community. The goal is progressive inquiry and improvement of ideas relevant to the community. Students pose explanation-driven ‘big questions,’ using the principles of ‘democratising knowledge’ and ‘improvable ideas’, to build a communal understanding, which ‘rises above’ initial understandings and refines knowledge, to create knowledge that is new within the group. This may involve experiments to test hypotheses, designs to test ideas, or questions that test the boundaries of a concept.

In such an environment there needs to be a profound re-envisioning of our definition of knowledge and views around what students are capable of. A recent UNESCO report (2017) emphasised the need for change, urging 21st-century educators to focus on ‘learning to be’ and ‘learning to know’ rather than ‘learning about’. Correspondingly, Gilbert (2005) argues that we need to form a new mental model of knowledge. Under this model, knowledge would be a verb, rather than a noun; something that can be acted on between people, rather than a rarefied thing (Gilbert, 2005). Similarly, Bereiter (2005) rejects the conception of the ‘mind as a container’ and outlines a definition of the mind as a system that can create knowledge.

This way of thinking about knowledge distinguishes KB from inquiry learning, or simple cooperative classroom activities such as the jigsaw technique (Aronson & Patnoe, 1997), which simply require learners to research as individuals and add their own piece of knowledge. KB is not an individual exercise, students do not just work with a group, they collectively drive the learning, working as a community of scholars on real ideas that are important to them (Chen, Scardamalia, & Bereiter, 2015); and moreover, focus on manipulating and improving others’ ideas. The community is fundamental to KB, given that all community members and their ideas are valued, and everyone has a responsibility for contributing to the goals of the community (Lai & Campbell, 2017).

This shift in thinking and practices will require the classroom teacher to change how they organise their classroom, and their approaches to learning design. It is not a simple matter of applying KB principles on top of regular classroom practices (Scardamalia & Bereiter, 1991). This is a shift that will take time and requires teachers and learners to change their practices to align with the philosophy of KB (Chen & Hong, 2016). It is critical to examine the complexities of this shift, as Feldman, Konold and Coulter (2000) point out that educational

research tends to overlook how much time and effort it takes to shift practices. Given that teachers need to adapt their teaching style and redesign their courses to align with the philosophies of KB, this is a pertinent point, as this is certainly the reality for teachers wanting to develop a KBC in NZ.

KB may run counter to the norms of the teacher's school, therefore trying to make large shifts without the support of a Community of Practice (Lave & Wenger, 1991) has the potential to be professionally isolating for teachers (Lai, Pratt, Anderson, & Stigter, 2006). The shift to KB pedagogy is made even more onerous by the fact that there are no clear local frameworks for teachers to follow; in fact, there are no NZ schools explicitly working with KB pedagogy as a school-wide approach. Hence, it is incumbent on the determined teacher to develop their own emergent approach to KB.

There are a number of ongoing challenges for teachers working with KB at secondary level. Firstly, the systemic demands of the senior curriculum make it more difficult to readily integrate a KB approach (Lai et al., 2014), though a more flexible evidence-gathering approach to the National Certificate of Educational Achievement (NCEA) assessment, as heralded in the NCEA Review document (Ministry of Education, 2018), may help to facilitate institutional shift. Secondly, perceptions suggest that it is difficult for secondary classes to develop the community needed for KB, with a major challenge being to get students to see themselves as a community of researchers when they have been socialised into an individualised way of learning for many years (Bielaczyc, 2012). Similarly, Lai et al., (2014) stress that developing trust amongst members of the community is critical for the development of KB. Thirdly, there is an assumption that secondary students will already have the skills required for collaboration, when the reality is that these skills must be explicitly taught. However, the central principle of epistemic agency raises questions around how teachers should induct students into KB practices and how much teachers should support students in the KB process. This debate will be explored within the literature review.

Rationale

My research interest is how KBC can be developed in a secondary school class, an area which is little researched in NZ (Lai & Campbell, 2017). I teach Art History through a large

eLearning cluster, which characterises itself as a community of schools. The eLearning cluster aspires to have a strong emphasis on community and connection in its online classes (Lai, 2017). However, this is a complex proposition in any NZ secondary environment due to the strongly individualised assessment system, NCEA. Furthermore, in the context of online learning, developing community is particularly challenging due to the geographic distance between students and teacher and the composition of the class, which is comprised of students from a wide variety of deciles and school cultures. I have experienced these complexities in my role as an online teacher KB provides an opportunity to grow the critical and creative thinking required to understand the rich and complex ideas in art history, and, moreover, to prepare students for a future where they might need to work collaboratively on complicated, evolving problems and ideas. However, the content-heavy nature of my subject, the specifics of its NCEA achievement standards, and my students' previous experiences of NZ education all present barriers to fostering epistemic agency and idea improvement.

Though KB has a long history internationally, with many research papers and detailed case studies illustrating how it might be implemented, it is not a simple case of resolving this issue by picking up 'best practices' from successful KB sites elsewhere. Hakkarainen and Paavola's (2007, p. 8) statement about transplanting practices rings true here: "The mature inquiry cultures ... as selected sites [in Canada] have their own histories and cannot simply be transferred from one country to another without going through corresponding developmental-historical pedagogical processes." Teachers in NZ will need to work through how to best balance the systemic demands of the curriculum and the ideals of KB.

The systemic tension between the provision of rich learning opportunities and the way that assessment is administered, through NCEA was highlighted in a recent review paper (Ministry of Education, 2018). The review paper found that, although NCEA is a flexible qualification, there are systemic barriers the type of collaborative learning that fosters critical thinking and resilience. Currently, the back end of the curriculum drives teaching practices, with coverage of a broad curriculum being prioritised at a grass roots level. Promisingly, at this stage, a recommendation made, the reference group suggests a move away from a 'one size fits all' approach, towards student-driven, rich learning opportunities (Ministry of Education, 2018, p. 16).

Aims

This study aims to examine the local context of KB in NZ. Considering the face of education in NZ and its history, it will assess what is important to the development of a KB community, what makes developing KBC particularly challenging in our context, and how these challenges can be addressed.

This study does not aim to solve the problem of how an emergent pedagogy, like KB, can be sustained in the NZ context. Rather, the aim is to build knowledge with teachers about how the development of KBC can be supported, given the challenges in the NZ context, and to make recommendations for how this could be improved in the future.

This study will make a small but significant contribution to KBC research. Although it is well-researched on a global scale, KB is an emergent pedagogical model within NZ and it has not been widely researched within our local context (Lai, 2010). There is only one researcher in NZ (to my knowledge) conducting ongoing research into KBC (Lai, 2012, 2013, 2015; Lai et al., 2014; Lai, Bolton, Bennett, Campbell, & Kelly, 2012; Lai & Campbell, 2017). Furthermore, there is not a significant body of international research into the social and pedagogical challenges of KB, with the majority of research focused on KB with primary-school-aged children and a tendency of focusing on technological innovations in the KB environment. Therefore, a study into the complexities of developing KBC at secondary level will contribute to the body of knowledge on this subject, both locally and internationally.

This study was guided by a 'practitioner research approach' (Kincheloe, 2012) and was uniquely positioned, given that it is not confined to one research site, due to there being no known school-wide KB initiatives in NZ. As stated above, in NZ schools, KBC are generally driven by one or two motivated teachers and usually exist only at an individual classroom level. Therefore, engaging with a diverse range of teacher participants was a defining feature of this research project. Teacher participants came from a broad range of secondary schools; from area schools, to special character schools, to traditional single-sex schools, to online schools, to rural schools, to urban schools. Additionally, the range of subjects taught added to the diversity of the participants. The project did not draw upon one way of thinking as the group was comprised of science teachers, mathematics teachers, commerce teachers, social science teachers and art history teachers. A diversity of thinking was valued within the group.

The common thread was that teachers were passionate about developing KB pedagogy, despite the challenges; they were eager to engage with other professionals with common interests and build knowledge about how this pedagogy can work in the NZ context.

It is essential to note that this study only examined teachers' past experiences and perspectives of KB. As outlined in detail in the limitations section, the experiences and views of students, and the wider communities that teachers were working, in were not explored due to the scope and timeframe of this research project. Please note that all participants were volunteers.

Thesis outline

Chapter One - Introduction

In chapter one, I outline the background context of this study, which is articulated as the need to shift pedagogy to an active idea-centred approach such as KBC, and the challenges of shifting to this approach in the NZ secondary context. The significance of conducting research into developing KBC is justified in the rationale, due to the urgent need to develop a 'future focused' approach (Bolstad, 2011) to learning, and the paucity of research into KBC at secondary level in NZ. I then present the research aims and questions and conclude with an outline of the thesis structure.

Chapter Two - Literature Review

In the literature review, which describes, summarises, and evaluates the relevant literature, I provide a theoretical grounding for this research. Key themes explored in the literature review are: the ideological background of the NZ education system and the imperative for a new approach to learning and education in NZ; KB as a unique response to the needs of the knowledge age; fundamental aspects of developing KBC; the social aspects of knowledge work in the classroom; the pedagogical approach required for KB; and. the challenges associated with transitioning to KB pedagogy in NZ secondary schools.

Chapter Three – Methodology

In chapter three, I outline my epistemological and ontological stance, in relation to the practitioner research approach and the principles of KB. This chapter also justifies the data collection methods which were selected. I then outline how credibility and reliability were achieved and how ethical concerns were addressed.

Chapter Four – Findings

In chapter four, I present findings from the data. Throughout the chapter, I have sorted findings into categories and identified themes from the data. I summarise and highlight key findings to draw out the key points.

Chapter Five - Discussion, Conclusion, and Limitations

In chapter five, I evaluate the key findings against the relevant literature. I discuss this in two parts. Firstly, the degree of change that is required to support the development of KBC. Then, the challenges involved in making these changes within NZ secondary schools. I also explore conclusions, significance and implications for practice under these headings. Following this analysis, I discuss recommendations for schools and practitioners. Finally, I conclude this chapter by considering the scope for future research and acknowledging of the strengths and weaknesses of this study.

CHAPTER TWO: LITERATURE REVIEW

Introduction

This chapter provides a review of the literature associated with New Zealand (NZ) education and the Knowledge Building Communities (KBC) model. The literature review addresses four core themes. The first section addresses the ideological background of the New Zealand education system, its development over the last century, and the imperative of developing new approaches to teaching and education in Aotearoa. The second section outlines Knowledge Building (KB) as a learning model, including what is considered fundamental to the development of KBC. This draws upon the national literature and the wealth of international literature. The third section addresses the social dimensions of KB and the challenges associated with this aspect in the secondary sector. The fourth section examines the pedagogical approach needed for KB, and considers the complexities involved in transitioning to a new pedagogical approach. I conclude with a summary of the complexities and identify gaps in the literature regarding the development of KBC.

How the New Zealand public education system has developed: From the beginnings of mass education to today

When it comes to the topic of education, most of us would readily agree that a broad curriculum should be accessible to all. Indeed, our public education system in NZ stems from the democratic ideal of education for all. As early as the first Labour government, a report from the Director of Education encapsulated this vision (Department of Education, 1939):

> The Government's objective, broadly expressed, is that every person, whatever his level of academic ability, whether he be rich or poor, whether he live in town or country, has a right, as a citizen, to free education of the kind for which he is best fitted, and to the fullest extent of his powers. So far is this from being mere pious platitude that the full acceptance of the principle will involve the reorientation of the education system (p. 2-3).

However, Gilbert (2005) argues that public schools quickly circumvented this vision, by streaming students into vocational pathways, according to standardised testing, upon entry to secondary school, hence making education a production line, sorting and processing students for certain 'essential' skills (Gilbert, 2007) required for the national economy. Thus, commodifying, and rarefying knowledge, which was a far cry from the egalitarian ideals of the 1939 report.

There continue to be systemic barriers to implementing a rich student-centred curriculum, due to the drastic systemic reforms to the education system that took place in the early 1990s, known commonly as 'Tomorrow's Schools'. These changes resulted in the decentralisation of education and greater control of schools at a local level. Consequentially, education transformed into a competitive environment, with schools accessing funding on a per-student basis. In such an environment there is significant pressure on teachers to increase achievement and give schools a competitive edge in their local 'market'. (Wylie, 1999). O'Neill (2005) argues that Tomorrow's Schools negatively impacted teachers, with their role reduced to that of assessor against national benchmarks. Notably, O'Neill (2005) points out that the teacher's role became increasingly circumscribed. Similarly, Boyask (2010) outlines a government focus on accountability and the rise of normative testing. Relatedly, Gilbert (2010) argues that the normative structure of the education system, which privileges certain types of knowledge, ultimately is at odds with democratic ideals, such as diversity and inclusiveness. These authors seem to agree that the reforms of the 1990s led to a narrowing, and standardisation, of the curriculum. This is patently at odds with the values of the NZC (2007): "All New Zealand students, regardless of where they are situated, should experience a rich and balanced education" (p. 37). Moreover, our young people are growing up in a challenging age of complex issues; including automatization, environmental change, globalisation, and pollution, to name a few. This begs the question as to whether our education system is providing learners with the skillset and disposition that they will need for life in the modern world.

Gilbert (2005) contends that the industrial age model of education, as it stands, is hopelessly ill-equipped to prepare our young people for the knowledge age. Industrial age learning can be conceptualised as learning in a production line format (Gilbert, 2007), preparing students for particular industries and imparting certain standardised knowledge,

under which learners are, measured against, and either found to have meet the ‘national standard’ or to be deficient in knowledge valued by the system. Gilbert (2005) argues that such a one-size-fits-all approach is antithetical to the demands of the knowledge age and does not fit with the aspirations of a culturally responsive curriculum (Ministry of Education, 2007, p. 34). Furthermore, Gilbert (2010) asserts that a more personalised approach to learning is required, with an acceptance of diverse types of knowledge, beginning with the view that diverse thinking is not deficient, and it can, in fact, enrich learning.

The NZC (2007) has a vision of ‘lifelong learners’ (p6), ‘future-focused’ education (p41) and learners who ‘create knowledge’ (p12). However, in the age of increasing redundancy of industry, we cannot be sure what kind of a future we are preparing our learners for. Moreover, Bereiter (2005, Chapter 7) raises the problem of increased automation as an impetus for KB. He argues that as the level of demand for manual labour decreases, schools need to do a better job of preparing students for knowledge work, or else inequalities will continue to perpetuate.

Working papers indicate that education will need to equip young people to be innovative problem-solvers (Ministry of Education, 2010), to address the emerging societal issues that will arise throughout their lifetime. In the face of a complex, uncertain and evolving future, educators need to address questions such as the purpose of education, the future are we preparing learners for, and how to best prepare them for our changing world. Bolstad (2011) posits a ‘future-focused’ approach as necessary to prepare individuals for such a world. Within this future-focused approach, a broad view is taken of the purpose of schooling, with Bolstad stating that we must consider the role it plays in meeting societal needs and the real concerns that will be faced. Considering these factors, education has a responsibility to prepare individuals for a lifetime of complex, real-world, problem-solving. Bolstad (2011) argues that education should serve needs beyond learning content. It must consider social needs and the issues of the future. KBC is proposed as a model to serve the demands of a ‘knowledge age’. KB is an active learning model, the ultimate goal being that of “the production and continual improvement of ideas of value to a community” (Scardamalia & Bereiter, 2003, p. 1370). Such an environment requires a reframing of knowledge and what students are capable of (Scardamalia & Bereiter, 2006, p. 129).

What is unique about KB and what is required for developing KBC

With an array of '21st Century' learning models, it is important to outline the unique characteristics of KB. While there may appear to be similarities between some of the features of KB and personalised learning (Littkey & Allen, 1999), inquiry-based learning - in the Deweyan sense of learning by observation and doing (Dewey, 1910/1997), and the jigsaw classroom (Aronson & Patnoe, 1997), KB is not simply an interchangeable term for these models. A differentiating feature of KB is epistemic agency, which is the belief that students should be the drivers of the inquiry through their own authentic, explanation driven, questions to improve communal knowledge (Lai et al., 2014). Another distinctive feature is the belief that students can create knowledge (Bereiter & Scardamalia, 2014), with the artefacts of knowledge created (Popper, 1978), and captured in Knowledge Forum (KF), through a learning environment designed to support the thinking required for KB (Scardamalia & Bereiter, 2003), and by making ideas accessible to iteratively build upon and improve for the benefit of the community (So & Tan, 2014).

Epistemic agency is a crucial principle for KB. Goh, Chai & Tsai (2013) found that students in a KB class were less dependent on traditional voices of authority - e.g. teachers. This was said to be due to students being encouraged to adopt 'epistemic agency' and actively critique authoritative sources rather than being a passive recipient of ideas. Likewise, in their findings, Zhang, Scardamalia, Reeve and Messina (2009) suggested that "a flexible, opportunistic-collaboration framework can give rise to high-level collective cognitive responsibility and dynamic knowledge advancement". (p. 39). It seems that giving agency to students is linked to significant progress in their understanding, and the overall success of KBC. In parallel, Lai, et al., (2014) found in his multi-site case study that most successful cases had a shift in epistemic agency.

It is imperative to note that Lai and Campbell (2017) found that epistemic agency was a key factor in reimagining the traditional concept of teacher and student as 'thinking coach' and 'co-curators' of ideas. This shift in power relationships was viewed as allowing for authentic agency. Likewise, Bielaczyc, Kapur, and Collins (2013), make the argument that students' ideas should be at the centre and that they should take responsibility for developing these ideas. Though it must be emphasised that this proposition is challenging. Bielaczyc, Kapur and Collins (2013) identify that just because students have the opportunity to generate ideas, it does not necessarily follow that they are comfortable with doing so, particularly if they are used to the question-asking method where teachers ask the questions and control the flow of the questions, and the students' job is to respond.

These texts make it clear that developing epistemic agency is crucial for making progress within KBC. However, this demands a significant shift for teachers and students. How epistemic agency can be developed when teachers and learners are unaccustomed to such a dynamic, remains to be examined.

Another central precept to KB is the belief that learners have the ability to drive their own learning and create knowledge together and can and should be expected to take responsibility for this process even from a young age. For instance, Hakkarainen and Sintonen (2002) found that young students were able to ask explanation-driven questions and continually advance their scientific understanding. Central to this was the asking of small why-and-how questions that helped students to 'interrogate' and understand the big question. Similarly, Hakkarainen (2004) found that, given favourable conditions, it was feasible for young children to engage in genuine idea progression within KB. Likewise, Reeve and Haywood (2006) identified that very young children were able to engage in KB activities and, in fact, suggested that KB activities supported the development of literacy.

Interestingly, a barrier to fostering learning communities, identified by Yuen (2003), was the beliefs that teachers held about education. In this study, teachers tended towards a traditional view of teaching and learning, which, in turn, hindered the extent to which a learning community could be built in practice. Beliefs are influential on the practices of KBC, and the extent to which practices can be developed. It is, therefore, useful to examine how a shift in beliefs could be facilitated.

The social aspects of developing KBC in secondary schools and the complexities therein

Hakkarainen (2009) contends that, although the social dynamics of a community are implicit within Scardamalia's 12 principles (2002), the principles lack clarity about how to go about developing the social structures of a community. However, Hakkarainen (2009) infers, upon reflection on two decades of KB research, that "knowledge building IS social practice" (p. 223), and, as such, there is a need to develop an explicit theory of how social practices can be developed. KB is driven, at its heart, by the advancement of communal goals, and therefore the design of the social infrastructure needs careful consideration. Similarly, Hakkarainen (2003) states that KBC need to be "deliberately cultivated" (p. 201). In order to do this, teachers must actively and iteratively take charge of learning design (Chen & Hong, 2016). Hakkarainen and Paavola (2007) underscore the importance of

considering the social practices of a group given that “genuine inquiry cultures do not emerge without transforming the social practices” (p.9). It is essential for social practices to be put at the centre rather than the periphery, as the KF technology used in KBC will not guarantee transformation in and of itself.

On a similar note, van Aalst and Truong (2011) underscore that many studies on KB classrooms neglect to examine classroom dynamics, focusing purely on the work produced in KF notes. Their proposition is that it is necessary to also elaborate on how the social conditions for KB can be created. Moreover, they argue that "a fundamental cultural transformation is needed" (p. 493) within the classroom in order to encourage principles such as epistemic agency. Bielaczyc (2006) also argues teachers need to consider the social infrastructure of the classroom. Bielaczyc (2006) defines social infrastructure as: cultural beliefs, “the mindset that shapes the way of life of the classroom”, (p. 303); practices such as “the ways in which teachers and students engage in both online and offline learning activities”, (p. 303); socio-techno-spacial relations “The various arrangements among humans, computers, and space within a particular classroom context” (p. 304), that is the way that learners, technology, and the physical space are organised within the classroom; and, interaction with the outside world with consideration of “the ways in which students interact, online and offline, with people outside of their immediate classroom context” (p. 304). In essence, these questions centre on how students interact with authoritative sources, and whether they are engaging with expert and groups outside of their own class as part of their KB efforts. Another critical point that Bielaczyc (2006) raises is the importance of social identity. Little progress can be made if members of a KBC do not view themselves as capable of building knowledge, and do not value others in the community (Bielaczyc, 2006). Therefore, it is crucial for students to develop a sense of being knowledge workers, and to cultivate connections within the community.

Furthermore, communal responsibility is central to KBC. Members are required to look beyond individual needs and benefits to deliberately attempt to advance community knowledge (Scardamalia & Bereiter, 2003). This dynamic requires individual members to value the community. If the social aspect is a vital component of KB, this raises the question; how can a sense of community be developed among learners who may not initially have a lot in common? Oliphant and Branch-Mueller (2016) state that a sense of community can be fleeting and therefore care needs to be taken to nurture this feeling within the group. However, the development of a community is to be regarded as a team effort, requiring teacher support and a willingness, on the part of participants, to own the community.

Similarly, Kim, Glassman and Williams (2015) argue that the teacher cannot establish community values alone, they must grow authentically within the community. In contrast, So, Seah and Toh-Heng (2010) suggest that a high level of teacher participation is required to encourage community participation, particularly where students are unaccustomed to such modes of learning and simply lack the tools to inquire collaboratively. However, the social structures required for KB may go against the norms of existing structures. Bielaczyc (2006) states that [learning] designers must consider the social structures they want to create and those that already exist.

Of interest is Brunk, Molari, Napoletano and Rizzo's (2005) theory about diversity. They state that a truly self-propagating community requires a humanisation of the learning process. Essentially, the activities that take place within the KBC need to be designed in such a way that interpersonal relationships are emphasised. Brunk et al. (2005) also underline the need to recognise the differences in people and celebrate the diverse knowledge they might offer. This raises questions about how teachers can balance the assimilation of students into KBC with the democratisation of knowledge.

Cultivating a community centred around KB is a complex proposition (Lonka, Hakkarainen, & Sintonen, 2000), particularly when collaborative practices may run counter to students' experience of education (Meyer, 2014). It is clear that developing KBC is not a simple matter of simply implementing principles (Bielaczyc, 2012). Class culture needs to shift, and classroom practice must centre on the principles of a KBC (Hakkarainen, 2004). Furthermore, Bielaczyc (2012) reminds us that teachers must negotiate the underlying principles of KB pedagogy and the social realities of their local context. Moreover, Lai and Campbell (2017) emphasise that trust and positive relationships are viewed as major contributing factors to the success of KBC. Similarly, van Aalst (2015) emphasises "psychological safety" (p. 20) as a major factor for creating a learning environment conducive to KB. Likewise, Bielaczyc (2012) stresses that trust is an essential factor in developing KBC.

> "Through supporting the development of both social trust and the skills of knowledge building, the Whitman teachers' designs suggest a means of scaffolding a transition from contexts with little support for student agency and collaborative knowledge work toward the person-to-enterprise approaches involved in participating in a knowledge-building community." (Bielaczyc, 2012, p.48)

Mylläri, Åhlberg and Dillon (2010) also stress the importance of developing trust within a community. Moreover, they assert that it takes a great deal of time to establish trust. Where KB goes against the grain of existing social infrastructure, a great deal of effort must go into developing mechanisms to transition from traditional classroom norms to a community driven by KB principles (Bielaczyc, 2012).

Though developing a sense of belonging and trust are significant elements, we also need to consider how collaboration can be fostered among KBC members. Lakkala, Lallimo and Hakkarainen (2005) underline an assumption among secondary teachers, in their longitudinal study, that students already possess the skills for collaborative inquiry, and would self-regulate their inquiry. However, it was found that collaborative inquiry does not naturally occur amongst students. This raises the question as to the extent to which collaborative skills can be developed in students who have little experience with collaboration. Xiong and Toh (2015) take the position that it is possible to foster collaboration between all kinds of learners with all kinds of dispositions, however the 'pre-collaboration' stage is emphasised as being of utmost importance, as teachers need to equip students with the tools they need to transition into collaborative thinking. Likewise, Goh, Chai, Tsai (2013) suggest that teachers should gradually introduce activities that encourage self-regulation through goal setting and knowledge extension. Through regular chances to operate in this way, students may begin to associate these activities with learning in the subject. It appears that classes will need to be socialised into knowledge work and that teachers will need to put a great deal of effort into adapting their teaching approach and redesigning courses to align with the philosophies of KB.

However, Zhang, Hong, Scardamalia, Teo and Morley (2011) contend that, to develop innovative collaborative practices, attention must be paid to the teacher's professional development. They argue for immersion within an institution that supports KB pedagogy. This raises the question of how collaborative practices can be developed sustainably outside of the model KB scenario. Moreover, Fructuoso (2013) suggests that teachers must carefully weigh up the value and complexity of tasks and question the extent to which collaboration will be promoted, and whether the task is complex enough to engage students in inquiry.

Xiong et al. (2015), Fructuoso (2013), Goh, Chai, Tsai (2013), and Zhang et al. (2011), all stress the pivotal role that the teacher plays in developing and sustaining collaboration.

However, this research does not address how fledgling collaborative practices might be developed outside of the ideal institutional environment. In this respect, KB's potential to survive as a counter-cultural practice within an institution requires further examination.

Overall, the literature appears to highlight that developing a KBC is by no means easy. Community routines and tasks need to value the exploration of diverse ideas over the quick and ready provision of answers. However, the literature does not address how enculturation into the values of communal thinking might be established.

The pedagogical approach required for developing KBC in NZ secondary schools and the complexities involved in transitioning to this pedagogy

The reframing of the social infrastructure of the class necessitates a reframing of what it means to be a teacher. Within KB pedagogy the job of a teacher shifts from transmitting necessary information to developing the required disposition and "mental fitness" (Claxton, 2013, p. 100) required for knowledge work. In this model the teacher's job is that of learning coach, and to support the learning programme suited to the level of the learner, eventually helping the student to develop their own learning programme. Similarly, Gilbert (2005) argues that the purpose of education needs to shift to developing students' ability, rather than sorting based on a fixed idea of students' abilities. According to Gilbert (2005), we need to think of knowledge as a verb, considering the mind to be a dynamic network that can be built on, instead of a storage container to be filled with facts. Gilbert (2005) states that, in this model, learning subject knowledge is still important, but not as an end in itself. The critical thing is to gain an understanding of how to enquire, how to learn and how to generate ideas. Similarly, Bereiter (2005) theorises about a model where knowledge is thought of as being an entity in the world that people can "develop a relationship with" (p.437).

A key concept, therefore, is shifting our understanding of knowledge from static to dynamic. Correspondingly, Bull and Gilbert (2012) argue that we need to think differently about the purpose of schooling, and that an innovative approach needs to be taken to prepare young people with the mind-set needed for modern life. They build an argument that teachers need to take on the role of learning coach to help students develop their ability to work with knowledge in new ways. Within this argument, a key focus is the need to actively interact with knowledge, rather than passively receiving knowledge.

These texts all emphasise that on an innovative approach that will look quite different from teachers' 20th century experience of education. This requires a lot of reflective thinking about teaching and learning. Additionally, a key factor, in developing the practices required for KBC, is teachers reflecting together on their KB practices. Hakkarainen (2003) identifies ongoing deliberate reflection on the part of the teacher as being crucial to making meaningful progress with the class's KB practices. Similarly, Zhang (2011) emphasises the value of professional discussion amongst teachers to foster innovative practices. Likewise, Bielaczyc (2006) emphasises that teachers in her study worked as a KBC amongst themselves, which was a distinct factor in supporting the development of KBC in their classes. Similarly, Lai and Campbell (2017) acknowledge the enormous amount of work teachers need to put into developing practices and an understanding of KB pedagogy and the underlying philosophy. Significantly, they recognise the pivotal role of professional development and collegial support among teachers in facilitating this shift.

This leads me to the conclusion that the ongoing development of KB-centred practices requires a deeper commitment from teachers, in that they need to be actively and iteratively designing the shape of KB in their classes. In this sense, supporting knowledge work appears to require extremely agile teachers. Not only does KB require continual teacher reflection on pedagogical practices, teachers are arguably the catalyst for the KB activity. Zhang and Sun (2011) found the teacher to be a key factor in all stages of the KB process; for example, as co-knowledge builder to catalyse KB dialogue, provoking questions, modelling reading strategies, and reviewing students' questions. This effectively scaffolded students' metacognitive thinking to the effect that the teacher " helped students to realize connections between their current questions and what they had read earlier, as to enable productive use of text as thinking device" (p448). Similarly, Lakkala, et al. (2005) argue that the teacher is pivotal in modelling and structuring the inquiry process to provide students with the requisite 'tools'. However, they caution that this process must be skilfully managed, in order to avoid unintentionally stymieing student agency.

Of note is Bielaczyc, Kapur and Collins' (2013) argument that the teachers in KBC need to be very adept. Specifically, they need to become expert at acknowledging student needs and how they need to be scaffolded, supporting students so they come to understand KB strategies, and judging how to shift agency to students. The shift to developing KB pedagogy is complex and demanding for teachers and requires practices that are reflective, agile and responsive to student needs. Though a teacher's role is different in KBC, they are

still a central figure, essential to the development of KBC in terms of setting cultural norms, modelling strategies, prompting further discussion, and reflexively adjusting learning design to enable advancement of KB in the community

It is clear that the teacher is a guiding figure in the development and scaffolding of KBC. Moreover, it is apparent that transition mechanisms are necessary to assist novices with transitioning to KB pedagogy. However, this appears to be in tension with the central KB principles of epistemic agency and student-driven problem solving. Therefore, research needs to address the extent of the teacher's role in KBC. Hakkarainen, Lipponen, Jarvela & Niemivirta (1999) suggest that students need a great deal of support in order to engage with KB activities. They suggest that, for teachers, the challenge is to develop an environment that allows learners to progressively take on more epistemic agency. Likewise, Scardamalia and Bereiter (1991) reiterate the need for a transition mechanism, as "the control structure cannot simply be inverted. You cannot flip from having one teacher in control to having 30 children in control; some quite different social structure must accompany a change in the question-asking role." (p50). This is a critical point because it underscores that KB cannot just be applied over the top of regular classroom norms. A rewriting of roles and redefinition of learning culture is required, which is a challenging proposition indeed. Additionally, Stockleben (2017) cautions that teachers need to consider not just course content but the hierarchy of the overarching environment that learning takes place in. It seems that the teacher and environment can unintentionally obstruct collaboration, particularly if the learning environment lacks flexibility and opportunities for members to take ownership. While KB culture does not emphasise a didactic approach, the literature is in agreement about the teacher being a guiding figure in KB. This research highlights the dependence of a novice community on decisions made by the teacher. It would be useful to examine the extent to which frameworks and prompts are conducive to authentic KB, and, furthermore, how secondary teachers might navigate the balancing act that is the facilitation of KBC.

Collaborative modes of learning are being proposed as being a way of meeting demand from 21st century employers for the sophisticated problem-solving. (O'Riley et al., 2014, p. 6). But there is an issue around how collaborative technology such as KF can be effectively fostered by educators who were not educated in this manner themselves (Lai, 2005). Bielaczyc, Kapur and Collins (2013) reiterate this view. They state that it is quite difficult for adults, who were enculturated into a transmission model of learning, to avoid viewing KB in binary terms as either child-run or adult-run. Lai's (2014) PROCESS model is, a useful

practice model for teachers to follow when developing KBC. However, it needs to be acknowledged that the 'principles' and 'roles and responsibilities' stages of the model are highly complex and demanding to implement, as they require buy-in from the school community and a strong understanding of the underlying values, which can take quite some time to develop. Little progress can be made if the community and the broader KB principles are not valued. Collectively, these factors indicate the concept of a democratic classroom is difficult to establish, but that this notion is worth further investigation.

	Element	Explanation
P	**Principles** of knowledge building	Teacher and students understand and are committed to knowledge building principles.
R	**Roles and Responsibilities**	Community focused. Teacher to develop trust, collective responsibility, and a collaborative culture. Teacher as thinking coach, facilitator, and knowledge creator. Students as epistemic agents.
O	**Open**-ended inquiry	Teacher identifies topics that allow open-ended inquiry of authentic questions/problems. Teacher or student provides starter question. Students ask explanation-driven questions (why and how). Focus on promising ideas—develop, test, critique. Teacher may provide content and direct teaching.
C	**Conversant with Knowledge Forum**	Teachers and students conversant with Knowledge Forum (scaffolding tools). School provides infrastructural and technical support.
E	**Evaluate** progress	Teacher encourages and monitors participation, supports investigation of promising ideas, holds debriefing and milestone discussions to evaluate progress of idea creation. Formative assessment.
S	**Structure**	When to do what? Participation structure (small group/whole class). Activity structure (consult authoritative sources, online/offline dialogues, conduct experiments/field trips).
S	**Show** evidence of knowledge building	Summative assessment. Students produce epistemic products (e.g., a portfolio) to show what new ideas have been developed by, and for, the community.

Figure 1: PROCESS model

(Source: Lai et al., 2014, p17, used with authors' permission)

My view is that KB is particularly challenging at secondary level due to the systemic demands of assessment, which place boundaries on student's epistemic agency and pressure on teachers and students alike to produce certain types of knowledge. Wells (2016) points out that school culture is dictated by the requirements of the next educational stage. This is exemplified by assessment at tertiary level study dictating the need for secondary level examinations, with some universities even dictating which NCEA assessments students need to have completed in order to study at their institution. The extent to which KBC can be developed at secondary level appears to be constrained by the

requirements of tertiary institutions. Similarly, Lakkala et al (2005) indicate that, in the secondary context, supporting inquiry and authentic promotion of collaborative KB is highly problematic. The examination system in upper secondary appears to dominate teaching practices, given that it requires teachers to efficiently prepare their students for a high stakes examination. Lakkala, et al (2005) also discovered that secondary teachers found it difficult to find methods to support student inquiry efforts. Whilst these teachers were found to be innovative, designs relied heavily on individual practices. It is my view that this is a result of the individualised framework of senior secondary assessment. Likewise, Lai (2012) highlights the difficulty of developing a KB approach at secondary level, and raises doubts about how KB can be implemented within the framework of NCEA, when he states that " ... it is not clear how the knowledge-building approach and Knowledge Forum can be effectively integrated into the senior secondary school curriculum where there is far less flexibility in its implementation" (p.262). It is also imperative to note that van Aalst (2015) suggests that the existing curriculum tends to focus on "... detailed content, which tends to be examined at the lower levels of Bloom's revised taxonomy (i.e., remembering and understanding) and lacks coherence" (p. 19). My discussion of assessment, in fact, addresses the larger matter of authentic contexts and the purpose of learning, as senior assessment appears to be centred around extremely specific content, instead of assessing a student's ability to solve problems that matter to them. Indeed, it is highly likely that, until the framework of NCEA is reviewed, it will remain a challenging prospect to develop KB practices at the senior secondary level.

At secondary level, developing KBC requires teachers and students to make significant shifts in their beliefs about knowledge and learning. Lai, et al., (2014) acknowledge that the development of KBC in NZ secondary classrooms require a shift in pedagogical beliefs and an ongoing commitment to change. In other words, a reorientation of commonly held beliefs about learning is required in order to progress as a KB classroom. Similarly, Bielaczyc (2006) emphasises that 'knowledge beliefs' have a significant impact on the development of inquiry and the exploration of ideas. In short, where knowledge is viewed as fixed, students are unlikely to make much KB progress. Moreover, students' social identities are extremely significant. They need to view themselves as able to generate knowledge and to view themselves as part of a community (Bielaczyc, 2006). In a similar vein, van Aalst and Hill (2006) raise the issue of learner beliefs. A problem stressed in their study was the interpretation of KB largely in individual terms by students. In other words, students understood KB as an efficient way to learn, and to enrich their own understanding. There was little discussion within the class about the goal of creating communal knowledge, which

underlines the problem of understanding knowledge in a KBC as communal. Learner identity appears to be at the centre of these problems, which is difficult to solve when students have had years of learning being an individual enterprise

Bielaczyc, Kapur and Collins (2013) argue that the challenge that KB presents to beliefs and practices is significant and difficult for many teachers to overcome. Bielaczyc, et al., (2013) point out that this shift in practices is too large for some to overcome, with conflicts in practices being resolved by reverting to traditional classroom practices, rather than making changes. Notably, they point out that it is difficult for teachers to give up control, as control can be exerted in subtle ways without the teacher's full realisation. Similarly, Hakkarainen (2009) argues that it is extremely difficult to develop a successful KBC as social practices are not easily changed. While it is relatively easy to develop the belief that KB is worthwhile, it is difficult to get teachers and students to engage in activities that diverge dramatically from their accustomed habits and practices (Hakkarainen, 2009). I agree that it is difficult to shift social practices in the classroom, and this is a point that needs to be emphasised since many research studies examine KB in the ideal context where the required dispositions are already embedded.

This challenge is multifaceted, in that it is critical for teachers to have a good understanding of group dynamics and how to guide them, which requires skilled pedagogy and a well-developed reflective capacity. Furthermore, the problem of drawing students into the community, from the periphery, is a critical issue, particularly in the NZ context where learners are not familiar with such an active model of learning.

Overall complexities highlighted within the literature and gaps identified

The literature confirms the trajectory and pertinence of my project. Though there is a plethora of international research and a long history of KB in North America, and a growing interest in researching KB in Asian classrooms, far more literature exists about KB at a primary school level. Furthermore, there is only a small body of literature focused on the social and pedagogical challenges to KB, with the majority of literature centring on technological innovations in KB laboratory schools operating in model circumstances. Furthermore, research into KBC in NZ provides a small but focused body of work, contributed to by one main researcher. The paucity of literature surrounding my research

question necessitated a thematic examination of a small body of international and local texts pertinent to my research question.

This practitioner-research project will add a small, but significant, level of further detail to the NZ KBC knowledge base, by examining the challenges that NZ secondary teachers face in developing KB pedagogy in their classrooms. This literature review emphasises an emerging body of literature into the social and pedagogical challenges of KB. Other complexities, revealed in the literature, centre on the difficulties involved in developing KBC at secondary level and the need for support to be given to teachers to assist the development of KB pedagogy. Further research is recommended, particularly into the development of KBC outside of the model conditions of KB laboratory schools, as few teachers shifting to KB in NZ schools will be working within model conditions for KB. Furthermore, the question around how a professional learning community could be formed to support teachers' development of KBC is an important topic for research in NZ. Questions remain unanswered in terms of how KBC can be developed at secondary level, how teachers can enculturate students into the values of KBC, how teachers can develop KBC, when their practices are counter to the institutional norms of their school, and how practices to support KB can be developed. Therefore, a research investigation into the development of KBC at a secondary level in NZ is necessary.

CHAPTER THREE: METHODOLOGY

Introduction

Methodology refers to the approaches chosen for a research project and the theoretical framework that guides the research. Put simply, methodology influences " ... how the researcher thinks about a study, how they make decisions about a study, and how they position themselves to engage firstly with participants and then with the data generated/collected" (Mills, 2017, p. 33). The purpose of this chapter is to outline the underlying methodology and methods used in this research project. The theoretical basis for using the chosen methodology is outlined, then the section on research design justifies my research approach, which I follow with a detailed discussion of the data collection methods employed and the ethical issues specific to the context of this study. Finally, I discuss issues such as validity and reliability.

The project examined in this thesis involved the exploration of secondary school teachers' experiences in developing a Knowledge Building Community (KBC) in New Zealand (NZ), the enabling factors, what made the development of a KBC challenging, and the actions that teachers undertook that, in their view, made a difference.

As outlined earlier, the guiding questions for this study were:

1. What teacher actions contribute positively to the development of a KBC in NZ secondary school classrooms?

2. What are the pedagogical factors that make it difficult for NZ secondary school teachers to develop KB (Knowledge Building) pedagogy within their classes?

3. What social factors are involved in developing a KBC in a NZ secondary school classroom?

To meet the aims of the project, and best answer the research questions, the methodology selected drew upon the principles of practitioner research. This research is also grounded in a respectful understanding of local contextual factors (Hilsabeck, 2010).

Epistemology and Ontology

Before explaining the particular methodologies used and their suitability to this research project, it is imperative to outline my epistemological and ontological position, as these have influenced the chosen methods for research design. Ontology refers to a person's understanding of the nature of things. Sikes (2004) states that a researcher's ontological position informs how they view research and, indeed: how they approach the research question.

> How, in these terms, they view the social world has implications for the sorts of methodologies and procedures they are likely to consider to be 'valid' means of collecting 'valid' data that can be used to make a 'valid' interpretation, thus creating 'valid' knowledge (Sikes, 2004, p. 5)

With this in mind, it was important as a novice researcher to be mindful of my position and the methodologies that would be appropriate for my theoretical framework and research problem. Staller (2012, sec. 1) states in the Encyclopaedia of Research Design that coherent research requires alignment of epistemology, ontology and methodological practices. It was vital to clarify the filters which I view the world through and the beliefs that have informed my research.

I hold the view that, within qualitative research, an interpretivist approach is appropriate for the study of social phenomena in education. As I hold the view that our knowledge of reality is socially constructed (Staller, 2012), I am not seeking to prove, or disprove, a hypothesis or obtain generalisable findings. Instead, I am interested in a deep examination of practitioners' experiences. Though writers such as Silverman (1998) have been critical of describing qualitative research as an approach in itself, my research draws upon the qualitative tradition, which means that I need to define the key ideas within qualitative research and explain why I have selected this approach.

Specifically, my chosen approach is a qualitative study that draws upon the principles of practitioner research. Qualitative research "aims to uncover the lived reality or constructed

meanings of the research participants" (Mutch, 2005, p. 45). Qualitative research also provides a more in-depth and holistic picture of the participants' experiences and views (Bryman, 2012). Robinson and Lai (2006) frame practitioner research as being concerned with solving problems of practical interest to teachers. Campbell (2013) states that teaching practices are often audience-less, and that there is much value for teachers in the examination and recording of expert knowledge about the profession. Theirs is a specialist knowledge about the dynamics of a classroom that outsiders cannot hope to possess (Kincheloe, 2012). Practitioner research acknowledges the everyday experiences of teachers, and the issues that lie therein, and therefore has significant value in navigating the reality of teachers' practice. While this research project did not focus on my own practice, as it focused on the experiences of other practitioners working in KBC, the research topic focuses on key areas of interest for my practice. It was practitioner research in the sense that my own professional context was the site for study, and I was making meaning by collaborating with practitioners facing similar issues, reflecting the notion that "collaboration among and across participants is a key feature." (Cochran-Smith & Lytle, 2009, p. 41). I chose to include the perspectives of colleagues as I believe that those who work in particular educational contexts, or who live in particular social situations, have significant knowledge (Cochran-Smith & Lytle, 2009, p. 42).

As a practitioner-researcher, with several years of experience working with the KBC model, I was uniquely positioned to examine the complexities of developing a KBC. However, methodological humility (Kincheloe, 2012) must be kept at the centre of this research project. This humility can be understood as an acknowledgement that the researcher is not the supreme authority within the research. It was only through the examination of my colleagues' experiences as practitioners, and their innovative practices, that light could be shed on how a KBC can be developed in NZ secondary school learning environments.

Overall my desire was for the research to draw upon the expertise of practitioners, examine their experiences of factors that contribute to the development of a KBC, and to understand the complexities of developing a community of inquiry holistically. Erickson (1986) describes research in the interpretivist tradition as accommodating the local realities of the classroom. Likewise, I sought to describe the lived experiences and challenges of practitioners, rather than the model KBC classroom.

A practitioner research approach, centred around methodological humility, is congruent with my research aims and the general principles of the KBC model. That is, building the expertise of the community and an improvement in understanding ideas of value to the community (Scardamalia, 2002). In embracing the complexity, and multiplicity, of communal knowledge, the practitioner approach aligns with KB principles, which emphasise building the expertise of the community (Scardamalia, 2002) and that the ecology of ideas (Pór & Molloy, 2000) will be enriched by diversity.

Research aims

Overall my desire was for the research design to draw upon the expertise of practitioners and examine exemplary practices. Moreover, the objective was to form a holistic understanding of the complexities of developing a community of inquiry. Given these objectives, I believed that the research would be best served by triangulation of the data from a focus group and semi-structured interviews.

Data collection methods

Although a survey or a questionnaire would certainly have provided a manageable way of collecting data for a novice researcher, the chosen data gathering method best aligns with the positivist tradition of research. Using a questionnaire would have lacked the required flexibility and expansiveness. Bryman (2012, p. 271) identifies survey techniques as being problematic, for studying social behaviour, for a number of reasons. A key issue is that there is a 'problem of meaning' and 'problem of omission'; in a nutshell, there is no opportunity to clarify or probe questions and answers. Surveys and similar instruments focus on measurable rational answers and fail to take into account the experiences of participants. "Its [a survey's] degree of explanatory potential or fine detail is limited; it is lost to broad-brush generalizations which are free of temporal, spatial or local contexts, i.e. its appeal largely rests on the basis of positivism." (Cohen, Manion, & Morrison, 2007, p. 207).

To arrive at a meaningful understanding of how a KB culture develops it was critical to look at the contexts of the KB activity. Much previous research on knowledge building has focused on content analysis of computer databases which are parsed into notes or ideas within notes. Such studies do not shed adequate light on the role of collaboration and the

CSCL environment (Stahl, 2000); more information is needed about what is going on in the classroom. (van Aalst & Hill, 2006, pp. 40–41)

Focus Groups

Focus groups were selected for this research project as a way of drawing upon the reflections of practitioners who had sustained experience with the KB model. The strength of focus groups lies in their ability to facilitate free discussion of issues pertinent to the sample group (Tolich & Davidson, 2007, p. 130). The aim was, first, to discuss the factors that helped with or stymied the development of KBC in their classroom and, secondly, to evaluate actions on the part of teachers that might help to overcome the challenges of developing a KBC.

A focus group can be understood as a group purposefully selected for their knowledge and experiences, who gather to discuss a particular topic selected by the researcher (Krueger & Casey, 2015). As this research was working within a qualitative paradigm and is seeking to understand the experiences of teachers within the development of KBC, a focus group was an appropriate method. Due to the dialogic nature of a focus group, it is a method well suited for uncovering participants' thoughts and motivations (Bratton & Liatto-Katundu, 1994). Furthermore, it is a useful method for exploring experiences as themes and hypotheses can be allowed to emerge (Cohen et al., 2007). However, a common criticism of focus groups is the potential for 'groupthink' (Janis, 1972). Though, Hollander (2004) critiques this notion and argues that, from a socio-constructionist point of view, ideas are built through interaction. Given the complexities of facilitating a focus group, there needs to be careful and skilful moderation of the group to ensure quality of data, and to allow the perspectives of all participants to emerge (Hennink, 2013). Given that KBC values the communal advancement of understanding and solving authentic problems (Scardamalia & Bereiter, 2003), communal data collection is a fitting method for understanding the decisions made by teachers implementing the KB model.

Semi-structured interviews

The second method of data collection was semi-structured interviews. Neuman (2011) refers to less-structured interviews as being "closer to a friendly conversation" (p. 451). Semi-structured interviews can be understood as interviews guided by key questions, which are

worked through in an open-ended way (Mutch, 2005, p. 126). As such, a semi-structured interview was deemed an appropriate method for elaborating on the themes that emerged from the focus group. Ellis and Loughland (2016) note that focus groups are an effective way of collecting rich and in-depth data due to their open structure.

Opie (2007) points out that less-structured interviews are a powerful way of illuminating the world of the interviewee, rather than trying to understand it from a predetermined perspective. Additionally, given that interviews are a quite involved process and require a considerable time commitment from teacher-participants and teacher-researchers alike (King, 2004), semi-structured interviews are a suitable way of collecting data where it is unlikely that the researcher will have more than one chance to interview participants (Bernard, 1988), as they allow for flexibility and the participant's own voice is able to emerge (Barker, Nancy, & Elliott, 2015). However, Silverman (1998) argues that interviews are an over-used tool and are too concerned with participants' subjective perceptions. On the other hand, Nowell, Norris, White and Moules (2017) make the argument that semi-structured interviews allow meaningful issues to emerge. As I was interested in understanding teachers' practices and their experiences of developing a KB culture, I considered open dialogue to be the best way for complex classroom dynamics to be understood. As Kvale and Brinkman (2009) state: "If you want to know how people understand their world and their lives, why not talk with them?" (p. xvii).

Analysis of data

Hatch (2002) declares that, "Data analysis is a systematic search for meaning" (p.148). However, it is a complex process that must be carefully considered by the researcher. In fact, Thorne (2000) identifies data analysis as the most complicated phase of research, the most ill-understood, and the stage that is least considered in the literature. Nowell, Norris, White and Moules (2017) emphasise that clarity, about the steps the researcher took to analysis the data, is critical to the trustworthiness of the study. It is not enough to simply identify the method of analysis in broad terms (Guest, MacQueen, & Namey, 2014b). Thorne (2000) critiques the tendency of some researchers to omit details of what happened between collecting the raw data and extracting the findings. A researcher's paradigm guides their approach to research, from their methodology, to data collection, to analysis; it informs their decision-making throughout the life of the research project (Guba & Lincoln,

1994). It is, therefore, vital to be clear about my research paradigm and to ensure that the selected methods of analysis are congruent. Thorne (2000) says that a researcher's theoretical position, their judgements about what constitutes relevant data, and the strategies used to collect, or build up, data are all analytical activities that influence the data. However, Ryan and Bernard (2003) describe the task of text analysis as discovering theories, consolidating theories into a manageable few, establishing a hierarchy within the themes and linking to theories (p. 85). As my epistemological position is that meaning is socially constructed, and best served by an inductive approach, I elected to interpret the data using thematic analysis.

Thematic Analysis

I chose to undertake a thematic analysis, which is well-suited to determining significant themes in a rich, and nuanced, set of data (King, 2004). Given that I sought to gather rich data, and inductively derive meaning based on the experiences of individuals, a simple lexical content analysis would not have been appropriate. Although this would generate manageable, and somewhat useful, data, a lexical content analysis would not have best aligned with a qualitative approach. “The notion of counting and calculating percentages assumes a kind of standardization in data collection that is rarely found in qualitative work” (Hatch, 2002, p. 170). I took an inductive approach to analysis, allowing pertinent themes and theories to emerge from the data (Mutch, 2005, Chapter 9), rather than working with a pre-existing coding scheme. “Analysis becomes a creative rather than technical process, a result of the researcher's engagement with the dataset and the application of their analytic skills and experiences, and personal and conceptual standpoints” (Terry, Hayfield, Clarke, & Braun, 2017, p. 7). Thematic analysis is not without its critics though. Nowell, Norris, White and Moules (2017), critique the method as being ambiguous for the novice researcher, due to the lack of literature in comparison to other qualitative methods, which might leave the researcher unsure about how to undertake thematic analysis with rigour. However, Terry, Hayfield, Clark and Braun (2017) state that thematic analysis is a useful approach for a novice researcher, as it is flexible in terms of the types of data sets and use of theoretical frameworks. Furthermore, King (2004) suggests that novice qualitative researchers may find thematic analysis relatively easy to understand, because there are few set procedures.

In anticipation of the generation of rich and complex data, and in preparation for a thematic analysis, the focus group and interviews were video recorded. Additionally, during these

processes, keywords and phrases were noted to aid in the analysis of data, which is a practice suggested by Campbell, McNamara and Gilroy (2010) to contextualise interviews. The first step in working with my data sets was to transcribe them in a Word document. I used automated transcription software initially, and then performed a manual partial focused analysis of pertinent moments in each interview.

Coding

Given the dialogic nature of these methods, the data collection activities produced a significant amount of rich data (Terry et al., 2017) to work with. As a novice researcher, I required a systematic approach to make sense of the data. Bryman's (2012, pp. 576–577) steps for coding offered a rigorous path from raw data to the analysis of codes. This initially entailed reading through the data sets until I was quite familiar with the content of the data, and, subsequently, beginning to create codified categories to indicate meanings. To begin developing themes with these initial codes, I then looked to Ryan and Bernard's techniques (2003) for identifying themes (2003, pp. 89–94). These include identifying and analysing: word repetitions, in vivo categories, keywords in context, compare and contrast, metaphors, transitions, linguistic connectors, and missing data. After identifying themes, I reviewed where the codes overlapped and connected with each other and developed my own general theoretical ideas that were grounded in literature. For example, as demonstrated in Figure 1, after reading through the focus group transcript until I was thoroughly immersed in the data, I made annotations about the significant ideas and key terms within the text. I noticed that participants talked about the idea of community frequently. I developed the code 'community' which I used to identify significant chunks of text (2012). I then conducted a review of this code using memoing to draw out the pertinent sub-themes. Memoing is a useful tool for clarifying the meaning of codes (Shwandt, 2011), developing theories about the relationships between codes and theories (Groenewald, 2012), reflexively asking questions of the data (Corbin, 2011), or, simply, for the researcher to orient their self to the development of the research project (Lempert, 2011). In the process of memoing, I noted 'developing a safe space' and 'social presence' as reoccurring ideas. This led me to identify the development of relationships as a key theme. This then came under the umbrella of 'Aspects which support the development of KBC'. Memoing was used throughout the analysis process as a strategy to guide the refinement of the themes and underlying theories. The practice of memoing was vital to keep the data analysis intelligible and manageable, as a common criticism of thematic analysis is that its flexible nature can lead

to inconsistency and unintelligibility (Holloway & Todres, 2003). However, despite its limitations, I considered a thematic analysis to be the most appropriate tool for analysis, as my research sought to closely examine the perceptions and practices of teachers and needed an open framework.

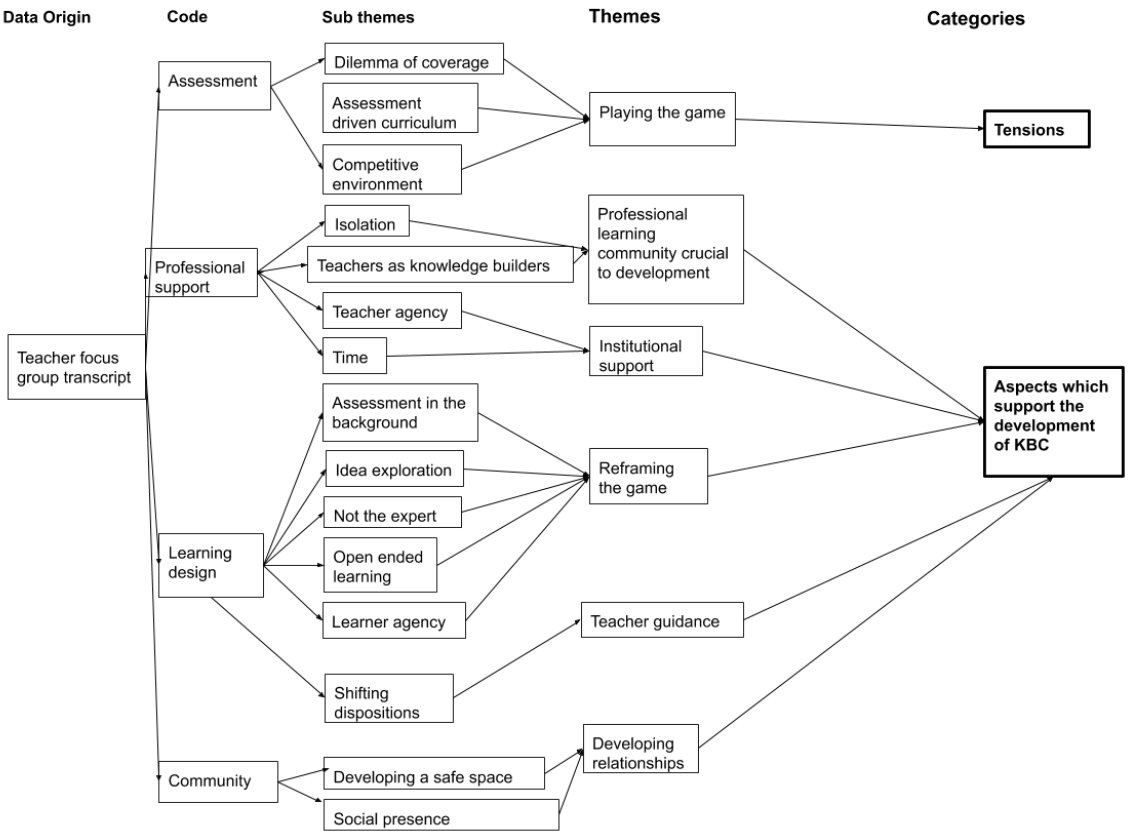


Figure 2: Concept map of focus group themes

Validity

Davidson & Tolich (2007) state that validity can be determined by 'internal validity' (p32), which can be understood as consistency within the research design, methods, and findings - simply put, are these elements congruent? However, within the qualitative paradigm, good research is more concerned with convincing the reader that the study is to be trusted (Mutch, 2005, p. 114) than with questions of validity and generalisability. The complexity of the data gathered within my project meant that, as the researcher, I had to be aware of my own biases and their potential impact on the trustworthiness of the findings (Greene, 2014).

Reflexivity was important in order to keep the biases arising from my values and background in check (Dowling, 2006). This involved locating my epistemological and ontological position, and continually reflecting through the practice of memoing as data collection and analysis progressed.

Trustworthiness and Credibility

Practitioner research validity is framed around the trustworthiness of a research project (Blair, 2016; Herr & Anderson, 2005; Kincheloe, 2012), rather than issues of generalisability. When the research problem is concerned with examining participants' experiences, it is critical to triangulate findings. Davidson and Tolich (2007) outline this concept as the use of different research methods in order to examine an issue from different angles (p.34). It is important to recognise that qualitative methods may not generate generalisable results, however, the findings should be a true reflection of the thoughts of study participants (Davidson & Tolich, 2007, p. 34). Guba (1981) talks in terms of trustworthiness, rather than validity. For Guba, the study should have ‘truth value’ for the members, ‘applicability’ to similar contexts, and ‘dependability’. Simply put, the key issues are whether the findings ‘ring true’ for participants, whether another researcher could reasonably follow the research design and arrive at similar results, whether the methods used by the researcher to arrive at their findings are clear, and whether congruent and incongruent findings have been interpreted. Within this project, trustworthiness was established by ‘member checks’ with participants being given the opportunity to review, and challenge, the key themes highlighted within the interview transcripts.

Transparency of processes is vital for a study to be credible (Guest, MacQueen, & Namey, 2014a). In short, what did I do as a researcher to ensure validity and trustworthiness? Additionally, how can I be sure that my findings reflect my participants' experiences? In this respect, “A study is credible when the researcher’s interpretation corresponds to a participant’s view of reality” (Blair, 2016, p. 61).

Ethical considerations

Research is necessary to advance professional practice; however, every care must be taken to minimise potential harm to participants (Cohen et al., 2007, p. 51), and “[…]

researchers need to be prepared to think ethically throughout the life of their study" (Birch & Miller, 2012, p. 12). This obligation is not to be taken lightly, as the integrity of the researcher is central to ensuring the trustworthiness of the research process and findings (Holian & Coghlan, 2013).

Informed Voluntary Consent

Hesse-Biber and Leavy (2011) define informed consent as a matter of human rights. That is, the rights to know and to be protected from harm. Informed consent in this research project included informing the adult participants of the aims of the study, the scope of their commitment, how data would be gathered, and the ways in which their data might be used. Participants were also informed that they could choose to not participate, or withdraw from the research, without any detrimental consequences. Written consent was sought once participants had been given this information, understood it, and had the chance to ask further questions about the project.

Sample selection

The literature indicates that the sustainability of KB in schools requires constant effort to develop the workplace culture (Chen & Hong, 2016; Zhang et al., 2011). However, it is not the norm for KB to be a schoolwide pedagogy in NZ secondary schools. How individual teachers are able to develop KBC, despite their professional isolation, is worthy of examination. I, therefore, elected to examine the experiences of a small group of NZ secondary teachers who had a sustained experience with KBC. The type of sampling used in this project was purposive: "Sites, like organizations, and people (or whatever the unit of analysis is) within sites are selected because of their relevance to the research questions" (Bryman, 2012, p. 418). In this regard, NZ secondary school teachers who had sustained experience of one year, or more, with the KBC model were invited to participate in both the focus group and in individual interviews. This kind of sampling can be regarded as *a priori* purposive sampling, and "With an *a priori* purposive sample, the criteria for selecting participants are established at the outset of the research." (Bryman, 2012, p. 418). In order to ensure a representative sample, that provided a range of teachers with the opportunity to participate (Beitin, 2014), an advertisement was shared with secondary teachers through a variety of professional forums.

The research project was not confined to one physical research site. This was for practical reasons, as there are no known school-wide KB initiatives in NZ. In NZ, KBC are generally driven by one or two motivated teachers and usually only exist at an individual classroom level. Therefore, the seven participants within this sample came from a variety of locations, as concentrating on only one site would not have generated a large enough sample. Due to the geographic dispersal of participants, data collection through focus groups and interviews took place via video conferencing which opened up access to my research site (Mann & Stewart, 2011b).

Transparency

Part of the ethical process involved checking in with participants about the accuracy of data collected from focus groups and semi-structured interviews, and the codified meanings within. Furthermore, participants will receive a digital copy of the findings and the published thesis.

Confidentiality and Anonymity

Snook (2003) emphasises that researchers must take absolute care to maintain the confidentiality of participants. In my study, measures were taken in the recording, data analyses and publication, to protect the identities of participants. Pseudonyms were applied to the data, analysis and discussion within the thesis. The data, and subsequent analysis, were stored in an encrypted password-protected format, which could only be accessed by me and my thesis supervisor. It was explained that any data pertaining to the identity of the participants will be kept, in encrypted digital form with password protection, for ten years. Participants were asked to sign a confidentiality agreement for the focus group, to ensure that each individual's privacy was respected, and that a free and frank discussion of practitioners' challenges could take place. However, within the context of NZ - given the small population and relatively small number of teachers working with KB pedagogy - it is difficult to guarantee that individuals will not be identifiable. It was therefore disclosed to participants that while every care would be taken with their identities, total anonymity could not be guaranteed realistically.

The ethical implications of digital-data-gathering methods

Researchers using an online space for data collection must contend with issues arising from the digital context, beyond the ethical concerns faced by researchers working within a physical site. Mauthner et al. (2014) suggest that the use of digital technology in research and dissemination is simultaneously advantageous and risk-laden. While technology can make it easier to access a more representative sample (Mann & Stewart, 2011a), Tiidenberg (2018) warns that digital researchers can often find themselves in ethical grey areas. For example, my participants were, for the most part, well-known to me, and we had frequently interacted in an equal, and informal, way on various online professional forums. Within this project, I had to carefully balance the roles of colleague and researcher, given that care must be taken to maintain separate identities (Hesse-Biber & Leavy, 2011). Although developing a warm rapport with participants was important, I also had to attend to my ethical obligations to keep research practices as professional as possible. At this juncture, my job was to actively listen to my participants and probe their responses, as to interject with my own opinions would have unduly biased the data (Persaud, 2012).

Further to the ethical grey areas involved in accessing the research site via digital means, the researcher needs to attend to the practical implications of working within a digital research environment. For instance, the security of data must be considered from the outset. To minimise the risk, I selected a programme that made recordings privately available to only me. Specifically, the video files were saved with password protection and stored locally on my hard drive, which was also password protected. This was clearly outlined to participants in the consent form.

While digital data collection methods made it easier to access a more representative range of participants, digital data collection is commonly accused of creating distance between the researcher and participants (Mann & Stewart, 2011b). To ameliorate this effect, open-ended conversation starters designed to engender connection were built into the beginning of the focus group and the individual interviews.

As I was making digital recordings, informed consent was vital (Jacobson, 1999). Participants had the right to know when, and how, they were being recorded. This was addressed all by participants being informed when the recording had begun, was paused,

or stopped. All participants were also offered the opportunity to listen to a copy of the video/audio recording of their individual interview to ensure that they were comfortable with the content of the interview, and to clarify any details discussed. Participants were informed that they could withdraw from the study, or correct what they had said in the interview, within three weeks of receiving the recording file.

Conclusion

As a practitioner-researcher, I have a responsibility to be reflective (Costley, Elliott, & Gibbs, 2010). In hindsight, the overall methodological approach could have been strengthened by collaborating more closely with practitioners throughout the life of my study. Though I assumed that it was normal for a teacher-researcher to conduct solo research for a master's project, this was a challenging undertaking and, on reflection, this approach was in tension with the principles of a KB community of practice (Wenger, 2000), which values the communal advancement of knowledge (Scardamalia, 2002) and "continual improvement of ideas of value to a community" (Scardamalia & Bereiter, 2003, p. 1370). Ideally, the very research problem itself would have been developed from the concerns of the community, rather than my own hunch.

To understand how a learning community is developed, the barriers and factors that positively impact on the development need to be examined in partnership with teachers (K. H. Campbell, 2013). Kaupapa Māori principles would have been useful in guiding this exercise. In parallel with the principles of practitioner research, Kaupapa Māori emphasises the importance of questioning of the hegemony of roles, within the research, and rejects the researcher's rarefied role as a supposed expert and neutral observer. In this respect, "The research process is participatory as well as participant-driven in the sense that it is the concerns, interests, and preferences of the whanau that guide and drive the research processes." (Bishop, 1998, pp. 204–205). There are lessons to be learned here for the researcher who does not aspire to position their self as the expert. In particular, the Kaupapa Māori concept centred on 'whānau of interest' (Bishop, 1998) would be particularly applicable. Additionally, the metaphorical whānau (Bishop, 1998), as a location for communication and constructing common meanings, would have been a useful framework for exploring the complex dynamics of developing a KBC with colleagues in my Community of Practice (Wenger, 2000). However, it must be acknowledged that this would

have been a very challenging undertaking given the timeframe for, and scope of, a master's study, considering that this study dealt with teachers at multiple sites and the difficulty of scheduling meetings to collaborate with busy teachers.

It would have also been useful to triangulate findings by interviewing students about their experiences of being a member of a developing KBC, as van Aalst and Hill (2006) argue that, to understand a KBC, it is necessary to also look at the classroom and how students interpret what is needed for a KBC. However, this approach would add another layer of ethical issues. For example, Mutch (2005) lays out the need to be very careful to avoid the coercion of young people in research studies. Students should not feel obliged to participate because of their teacher's, or the researcher's, interest in the study. Truly informed assent must be actively gained by the researcher throughout each stage of data collection, and it is paramount that the information is provided in language that is comprehensible to the participants (Cohn, 2012). This must be coupled with the informed consent of any minor's guardian (Cohn, 2012).

Nevertheless, despite the shortcomings of the study, overall, I am confident that this study utilised methods that aligned with an inductive interpretivist paradigm and practitioner-research methodology, and that the work presented is true to what is stated in this chapter. Ethical approval was given by the Unitec Research Ethics Committee (UREC). No significant ethical dilemmas occurred during the study, and the findings have been validated by participants and the triangulation of data, insofar as the time frame of the research project would allow.

CHAPTER FOUR: FINDINGS

Introduction

The findings for this study came from data gathering activities, using a sample of secondary teachers working with the Knowledge Building (KB) approach across New Zealand (NZ), comprised of seven semi-structured interviews and a subsequent focus group with five of the teachers from the initial interviews. The interviews aimed to draw upon teachers' experiences of developing Knowledge Building Communities (KBC), how they worked to develop these communities, the challenges that they experienced, and what they did to address these challenges. The focus group aimed to explore the aforementioned themes, as well as the participants' perspectives with regards to what might support the development of KBC. The purpose of the focus group was to triangulate themes identified within the interviews. This study centred on practitioner research, and all participants shared the problem of how to develop a KBC within their practice. Despite this commonality, they were, however, from a range of school contexts, from traditional single-sex special character schools, to area schools, to urban schools, to online teaching. The participants were all experienced teachers, with expertise in mathematics, science, religious studies, economics, accounting, history, art and art history, respectively.

By investigating KBC with teachers who were experienced in KB pedagogy, I sought to identify aspects of teaching practice that were either conducive or unfavourable to the development of KBC in NZ secondary schools, with the objective of ascertaining how teachers overcome these challenges and what might support its development in the future. Data analysis was informed by a thematic approach, which I discussed in detail in the methodology chapter.

Both the interviews and the focus group produced similar themes, which appears to have happened for two reasons. First, the interview and focus group questions followed a comparable structure and sought to elicit similar information. Secondly, the five participants in the focus group had all participated in individual interviews. It is no surprise, then, that similar issues were discussed in the two data collection activities. Due to the similarities in themes, the findings from these two data collection activities have been examined concurrently.

Barriers to developing a KB approach

This section focuses on the barriers to developing KBC in secondary schools. When asked about the challenges to developing a KB approach, common concerns were highlighted across all seven interviews. These concerns centred on the competitive nature of assessment, coverage of curriculum, and ideological differences between KB and learners' experiences of NZ education. On a similar note, within the focus group, participants underscored the competitive environment of secondary education and the 'dilemma of coverage'.

The Competitive nature of education

Four, out of seven, interviewees discussed the competitive nature of secondary schooling, which was also reflected by the focus group as a significant barrier to developing KB. Interviewees also indicated that intense competition between schools is a major barrier to following an innovative KB approach. In particular, Calvin[1] described the pressure to produce favourable results at their school:

> Because education is now a competitive environment, especially in […]. We have so many schools. So, our NCEA statistics and results become an advertising tool. So, the pressure is on the principal to get good NCEA results and that flows through. So why would you want to embark on something that is harder, to get the same outcome.

A highly competitive environment resulted in a drive towards efficient ways of achieving the school's goals. This created barriers to KB and, more generally, a hesitance to take risks with teaching practice. Likewise, in the focus group, the issue of competition between schools was stressed as a barrier to taking risks with teaching practices. Furthermore, students' aversions to taking risks in the classroom led to anxiety amongst students about developing new ideas. Three interviewees indicated that students' fear of failure presented

[1] Pseudonyms have been applied to all participants' names.

a barrier to KB. Calvin suggested that this was a destructive influence on his KBC, as some of the students lacked the resilience to engage with, the KB process of, idea improvement:

> … they can't engage they see it as failure. That's a mindset problem that came with them. So, they've got a, they call it nowadays, fixed mindset. That I'm dumb I can't do this. That is a challenge.

Maia recognised that students tended to view mistakes negatively, which was associated with failure and fear. This perception is incongruent with the KB principle of idea improvement and is a major barrier to engagement. Additionally, Stephanie saw the scrutiny that was placed on teachers, in terms of achievement data, as an obstacle to innovative practices:

> When you're being judged on people's achievement, in external exams, it puts the kibosh on any sort of original ideas.

These findings underline that external pressures within schools can present significant barriers to developing KBC. Within such environments, teachers will need to be exceptionally motivated to persevere with the agile and innovative approach required for KB pedagogy. However, despite the institutional barriers to KB, both Calvin and Stephanie saw great value in the KB approach. Stephanie summed up her motivation to persevere with KB as bringing the subject to life.

The notion of education as a competitive game also emerged as a common thread in the individual interviews. Kyle emphasised that students have learned to 'play the game' in education, with the sense that they feel they must keep knowledge to themselves. Kyle observed that the game, as students knew it, was incongruent with the core values of KB:

> This idea of working together as a community to advance our understanding, didn't, sometimes was a conflict.

Similarly, Maia observed that students perceived education to be a competition:

> We actually train students that the knowledge they gain is somehow competitive. And that if they want to do well, they need to keep that knowledge to themselves.

Similarly, in the focus group, when the group discussed developing KB within NCEA-level classes, a theme emerged about 'playing the game'. Participants agreed that students were very motivated by the external rewards derived from assessments and were very adept at manipulating the system. When the rules of the game shifted, this was often disorientating for students and initially resulted in 'push back'. This interpretation of education as an individual competitive enterprise was viewed as undermining KB efforts. These themes demonstrate that ingrained ideas and practices could be a barrier to the communal development of ideas.

Curriculum coverage

When asked about the challenges involved in developing KB, three interviewees described a tension between coverage of the curriculum and granting agency to develop ideas in KBC. As these were secondary school teachers, the pressure to cover content to fulfil the demands of NCEA assessments was significant. For instance, when reflecting on the very beginning of his KB journey, Kyle stated:

> … the dilemma of coverage. There was that tension. I knew was content to be covered, and that sort of almost was at variance with taking ideas and understanding and growing them in whichever way they happen to grow.

For him, the demands of NCEA assessments created an internal conflict with the values of KB which he was trying to instil in the class. This conflict was perceived as a barrier to innovative and creative thinking. Along slightly different lines, Stephanie underlined that her school's expectations, about the amount of curriculum content she should deliver, made it

difficult to fit KB into her teaching practice. She felt that the need to deliver over and above other teachers in her department, in order to make KB work, as illustrated in the following comment:

> The biggest challenge in my school is that we have a very full curriculum. Um, so it was slightly in competition with what I had to achieve. The knowledge that they had to have to get their success in their exams at the end of the year. I had to sort of speed them through that so that I can make time to do some knowledge building.

In contrast, one interviewee, Maia, reflected on her shift away from content coverage, in order to support the development of KB practices and create opportunities for authentic learning.

> I had to stay away from, you know the demands of X amount of content in a certain amount of time … Because, you know, jamming through content doesn't equal learning. It just means content covered.

For this teacher, it was more important that students were deeply engaged with ideas and learning than achieve full curriculum content coverage. The distinction between content coverage and learning is crucial, and teachers within the focus group acknowledged the pressure to cover a large amount of content within the senior curriculum. They noted that it was difficult to cover the full breadth of curriculum content and also make the time for KB, and one focus group participant summarised this challenge:

> It’s not that we don't want to be teachers who have knowledge building in our classrooms. But the tension between the assessment and learning. They are not exactly the same thing.

Interestingly, Maia noted that a different approach to assessment was required:

> How I tackled assessment became really different, as well. In terms of how to stop the tail wagging the dog, how to reframe learning and knowledge and understanding, and the actual journey of learning is the most important part of the learning enterprise.

The tension between assessment and learning showed that expectations about curriculum coverage will need to shift, in order to make room for authentic learning within KBC. However, this is a challenging prospect for teachers working within the expectations of their school and the national assessment system.

Challenge of aligning NCEA with KB

Five interviewees reported the challenge of developing a KB approach that would align with the requirements for NCEA achievement standards in their subject areas. A major challenge was simply picturing how to structure KB within particular subjects and account for the subject's assessment requirements. As an interviewee Miriam stated:

> Because how do you fit it into what you are doing, how does it work with the ideas that you would need to put across. And the whole, how do I even fit this into an assessment. You know, because I have still got to do my NCEA assessments whether I like it or not.

Charlotte also emphasised the challenge of figuring out how to foster meaningful and worthwhile contributions to the KBC that would feed into assessments within her subject. Interviewees reported that this was a major problem due to the lack of clear examples of, or research into, KBC case studies at secondary level. In the absence of a clear framework, for developing KBC in a way that is congruent with the requirements of NCEA assessments, developing an innovative KB approach is a challenging prospect for secondary teachers.

Another interviewee, Maia, recalled spending a great deal of time working through the NCEA assessment demands of her subject area, through designing scaffolds for her students to examine the overarching ideas within the assessments:

> So, what I did was spend time going through the achievement standards, working out what the big questions were. So, what is the why question behind this achievement standard that's actually being asked of students.

Similarly, Calvin reported scaffolding students' KB inquiries with guiding questions that directed them toward ideas they would need to develop a knowledge base for assessments:

> It was about asking good questions that guided the students down the line that they needed to learn. Going down the line that reflected the knowledge or, sorry, the information they needed to learn. With the hope, that they would then through the process create the knowledge.

Drawing out the purpose of the assessment for the student is a useful strategy for aligning KB with NCEA requirements. However, this is not a generalisable approach, as teachers of mathematical and scientific subjects reported that the assessment requirements in their areas were rather inflexible and exacting. For example, Stephanie reported an incongruence between the innovative thinking required for KB, and the way that Science subjects operate at secondary level:

> And that's hard in a subject like Science, I mean not in a true Science thing, True scientist to come up with new ideas. But the Science we're trying to get them to pass and exams with is just regurgitating old scientists' ideas.

For Stephanie the way Science is taught within New Zealand secondary schools prohibits the creative thinking required for high level scientific exploration and presented a barrier to KB.

Individualised Learning and Assessment

Three interviewees reported a problem regarding the framing of learning, and assessment, at senior level as an individual pursuit. Charlotte pointed out the individualised nature of assessment and suggested that this had a flow-on effect to how learning is framed:

> NCEA has set up this great big scenario where it's assessment of the individual and it can't be anything else, and therefore your learning has to be individual and it can't be anything else.

This was reported as being a major barrier to the communal development of ideas, as it represented a complete shift in practices. On a similar note, David stressed the lack of student experience with collaborative approaches:

> They're just not used to it at all. They tend to stress the individual and individual work. And this idea of actually collective responsibility, yeah, it's quite a difficult thing for them.

KB presented significant challenges to students' mental model of learning and what is required of them as learners. Within the focus group, it was acknowledged that breaking down students' current models of learning and fostering the principle of communal responsibility, within a KBC, required concerted, and ongoing, efforts from teachers. On a related note, Miriam talked about the challenge of students who preferred to "stay standing back and want to be an individual". It was a challenge to draw these students into the community and the development of ideas. Overcoming the individual mindset, and setting the scene of a KBC, was viewed as paramount by all interviewees. Of note is David's comment about the importance of the entire community buying into the KB approach:

It only takes two or three to start dropping off, and you're losing it.

The importance of buy-in shows that KBC are dependent on all the members having a communal mindset about their learning. It is difficult for KBC to make any progress if the members do not view themselves as a community of knowledge builders. This finding suggests that the teacher must continue to direct the focus of the class towards working as a community, to develop their collective knowledge.

In a wider sense, these findings suggest that there is a plethora of challenges for teachers who are working to develop KBC in their classes. A great deal of input is required from the teacher in order to develop the necessary disposition for KB in students, as KBC represents a substantial divergence from the learner's experience of education. Furthermore, it is highly challenging to develop a KB approach to learning design in some subject areas, where it is congruous to the requirements of NCEA. Where teachers reported success in aligning practices and NCEA, a great deal of thought, and effort, had gone into developing a meaningful framework.

Building up to KBC

This section concentrates on the necessary conditions for developing KBC. Across the individual interviews, teachers highlighted the importance of enabling students to work as a community, the notion of building up to a KB approach, and the necessity of reframing the landscape of learning. Within the focus group, teachers focused on the importance of developing relationships within the class and the importance of reframing 'the game.'

Keep the community central

An important factor in the success of a KBC is the development of a community. It is critical to keep the concept of communal responsibility central to learners' efforts. This takes a considerable amount of ongoing effort from the teacher. As Charlotte commented:

> You have got to really work on them and keep on at them about this is a community it's not an individual, you know, if you're here for individual learning and you're not prepared to be in the community why aren't you even here?

Developing community

Creating a sense of community was highlighted, in the focus group and the interviews, as a critical starting point before any conceptual development can occur within the class. However, there are a number of complexities involved in developing a community for a KBC. Miriam emphasised the need to shift from teacher-centred activity to creating a sense of a community working together. However, creating a sense of community required an ongoing effort and, although the teacher took a step back from direct teaching, it was vital for students to feel supported. Correspondingly, within the focus group the idea of 'social presence' was stressed as a crucial aspect of developing community. Participants agreed that, with the changing roles and responsibilities in KB, it was important for learners to feel supported, to have a sense of the teacher's 'presence,' and to feel connected to the community. In this respect, Charlotte intentionally worked to develop a sense of community in her online class, to counter the effects of cliques in particular schools:

> … sometimes you have a whole group from a school and that's the community [makes small circle gesture with hands]. Yeah so, I deliberately obliterate that from the word go.

Moreover, an emphasis on communal responsibility for ideas was accentuated as essential for enabling students to work as a KBC. Miriam believed that it was essential to continually foster a sense of communal responsibility within the class, as demonstrated in her comment below:

> The pushing and the sort of moulding them to be part of a collective responsibility, rather than just being that individual and concerned about their own grade and their own work.

Additionally, Kyle noted the importance of developing a community-centred approach to inquiry:

> Hey look, it's about us and we, not about me and my understanding. That's sort of incidental, it follows on.

Using language to frame how the class worked was significant part of developing a community-centred mindset. David made this approach a central aspect of his online class as indicated below:

> I really emphasize them as a team, I say they're a research team.

It was essential to shift the language of the classroom in order for the students to be able to shift their thinking and learned practices.

Developing trust

A theme that was noted within individual interviews and the focus group was that of developing trust. Participants viewed trust as being central to the development of KBC. Within the focus group, the theme 'developing a safe space' emerged. Participants entered into a detailed discussion about the importance of developing trust between students, and in the teacher, in order for members to feel safe going outside of their comfort zones. Teachers agreed that developing relationships between the community members was a vital step in gaining trust. This led the focus group to conclude that relationship building should take priority over content exploration initially. Interestingly, Maia placed an emphasis on getting regular feedback from students about the KB process:

> I guess getting plenty of feedback from students about how they felt they were going and how it was working for them. It was really critical.

Maia's point indicates that tuning into students' voices is an important part of developing trust in the KB process. However, David noted that inexperience with the collaborative development of ideas meant that a lot of work had to go into developing trust amongst community members, which creates a level of complexity in developing a KBC

Where learners were participating in online classes, there was an additional challenge due to the absence of established relationships. Teachers noted that it was necessary for learners to grow comfortable with the other members of the class in order to begin contributing. This point is illustrated by a statement from Maia:

> That was really pivotal for them to be able to feel comfortable sharing their ideas, because obviously, the downside is that they don't, generally, they don't know each other.

Similarly, Miriam stated that relationships needed to be developed amongst students:

> You know if they don't have a relationship then they just, yeah, they're not very good at sharing.

Relatedly, Charlotte emphasised that building relationships among the online class was her priority, when working to develop a KBC at the beginning of the year. Developing relationships among learners was a critical aspect of fostering KB for teachers, particularly for those who taught online classes, which presented the challenge of bringing together learners from a range of schools and backgrounds.

Guiding framework

When asked about what they did to support the development of KB in their class, all research participants emphasised the need to guide students towards a KB approach. Interviewees discussed the need for a structured approach to draw out students' ideas, particularly where students were unaccustomed to metacognitive thinking and idea improvement. For instance, Stephanie used very explicit strategies with her class in order to elicit reflective thinking from her learners:

> ‘I want you to go through in a different colour, go through and put what your ideas are about it’. So those were the things I was doing to try and get them to start giving me their voice.

Whereas, Maia talked about the necessity for the teacher to develop pertinent questions, initially, to allow students to enter an inquiry. as demonstrated in this comment:

> So, I tried to develop a big question to kick off conversations, that would be challenging but would enable students to access a starting point, but also, I guess, nudge them in a direction of the type of knowledge within that realm that they might need to explore.

On the other hand, Charlotte talked about the importance of, carefully, judging how much to intervene in the direction of the KB:

> I have on occasion sort of waltzed in and said, okay now I see that you’ve been talking about this, this and this, have you thought about this, and then sort of subtly tried to direct the conversation and the knowledge building in a new direction and you have to really finely the judge that.

Guiding students’ KB required teachers to be agile, responsive and to have a detailed knowledge of students’ needs. Within the focus group, participants discussed the need for a great deal of teacher guidance in the background. In order to focus on the investigation of authentic questions, teachers tended to spend a lot of time working in “the background” in order to provide a more “organic” approach to assessing learning. Strategies for ‘working in the background’ included prompts, provocative statements, and carefully thought out questions. One participant, talked about their aim for the evidence for the assessment to emerge directly from the KB dialogue, and how they viewed it as being their job to work out how to capture this material. This led participants to discuss the potential for the future development of KB, with the rise of evidence-based assessment practices. However, a question arose in the focus group around the extent to which a teacher should direct the KB. This was an ongoing dilemma for one participant:

> I found myself fighting myself, in terms of going, ok, should I push them here, do I just leave it and let them, and if they don't, they don't.

The tension between meeting the demands of assessment and enabling students to have agency over their learning was very present for the focus group participants. The need to balance these elements is an ongoing concern for KB teachers of NCEA classes.

Developing reflective capacity

It was important for teachers to develop iterative reflective capability in students. In particular, Maia talked about going to great efforts to embed this approach into learning design, through built-in opportunities to reflect on understanding and further develop knowledge:

> I also tried to shift them to a point where they would collate their evidence and share that back with each other and be able to read collations and then go back and re-reflect on, on what they had collated, and just take that a step further each time.

Although, as Stephanie pointed out during her interview, this was not an easy habit to imbed in learners who were unaccustomed to this process:

> I was trying to get them to preface all of their comments with what kind of thinking they were doing. And they just didn't have a bar of that at all. They just kept blurting out whatever came into their mind.

However difficult, it was critical for teachers to provide opportunities to develop students' reflective capabilities. This finding suggests that epistemic agency and metacognition can be difficult to develop when students are unaccustomed to working in this way.

Clarity about the KB approach

Five participants heavily emphasised the importance of providing students with clarity about the KB approach. For example, teachers commented on the importance of being very upfront with students about the KB approach, and of providing clarity about the different class structure and the heavy focus on community. As Calvin commented, clear communication and expectations were vital:

> What was important to do, was to explain to students 'look what we're going to do, we're going to learn this unit of work in this way, and so this is how we going to do it'. And beginning with the fact that it, you needed to put some, um, framework in place in terms of behaviour to begin with.

In this respect, David, along with being very explicit about KB, built in KB-centred practices very early in the process. When asked what he considered imperative to developing a KB mindset in students, he replied:

> So, I sort of say that it's almost part of the course early on. Make it quite clear that the way the course is going to be approached, that is we're going to be working as a team, it will work differently, and if you're not up for that, it doesn't really fit, then don't do it, and sort of say so now and be quite upfront.

It was critical that students knew what the KB approach entailed and that they were able to make a choice to buy into the approach. This finding suggests that clarity about the KB process is extremely vital. As KB asks a lot of students, in terms of epistemic agency and student-led inquiry, it is pivotal that they understand their roles and responsibilities and how KB will differ from conventional practices they may have experienced in their education.

All participants emphasised the importance of developing relationships in order to establish trust among students, in regards to developing a highly functional KBC. Furthermore, a

critical point about trust was raised by Maia. When asked what she considered to be central to establishing KB community norms, she responded:

> So, I found that I needed to be quite structured in terms of how to explain how knowledge building worked, in order to start developing trust across the students.

Hence, KB was taking students in a different direction from the entirety of their educational experience. For many this was confronting and disorientating to their beliefs about how learning worked. Therefore, this finding suggests that, not only is it critical for students to develop trust in one another, but it is vital for them to develop trust in the KB process, and their teacher's intended direction.

Keeping the KB visible

Developing KBC requires practices to be very visible in class. A strategy emphasised by interviewees for getting students to focus on KB, and develop their practices, was for the teacher to actively model KB to students and discuss the students' ideas in class. This is illustrated by Miriam's comment:

> I think that you have to be modelling it, and doing it with them, in face-to-face class. You can't sort of use it as the secret aspect that happens, and that's 'cause we're in the online environment. But yeah, you can't sort of just, set it as part of the weekly tasks and expect that they're going to go in and do it.

It was important for KB practices to be a prominent part of the life of the class, rather than an additional aspect that sat in the background.

Reframing the landscape of learning

Developing a KBC requires a great shift in practices. This is challenging when working within a school with established cultural norms and practices. An interesting finding emerged in regards to the effect that the online context presented an opportunity for developing KB. Reflecting on the challenges that came with teaching a disparate group within an online class led Kyle to comment:

> So, in some ways, that may also be a bit of an advantage for the online class that, you know, that there isn't an established cultural way of doing things.

Online teaching provided an opportunity to develop KBC outside of institutional boundaries, as there was flexibility to innovate. Moreover, Maia discussed the tendency of online students to suspend ingrained expectations of learning:

> Students took the course knowing that they were doing something that was completely new, it was different from the normal culture of their school. So, they would arrive online to the class expecting and waiting for something different.

For focus group participants, a significant part of reframing the landscape was removing the boundaries to learning. Participants recognised that KB learning is not a linear exercise, which led participants to discuss the idea of 'messy questions.' Participants concluded that it was essential for there to be a sense of open-endedness in the KBC, furthermore, participants agreed that this could be facilitated by allowing students the freedom to explore ideas, and to follow the inquiry in a number of different directions. However, two participants raised the issue of students who were resistant to open-ended learning. It was difficult for learners to take ownership of ideas when this concept was so unfamiliar. An idea-centric approach destabilised students' understanding of the educational 'game'. KB requires a rewriting of the rules of learning, and these findings suggest that the flexibility of online learning may be conducive to making the required large pedagogical and social shifts.

Agency

Another principal factor in reframing the landscape of learning is developing student agency, with a focus group participant stressing learner agency as a 'key criterion' for the development of KB. Though focus group participants acknowledged that agency was not unique to KB, the point was raised that it is rarely a central element in conventional classrooms, whereas, it seems to be a necessary factor for the development of KBC. Without agency it is difficult to establish authentic communal inquiry. Similarly, interviewees raised the point that a significant aspect of developing a KB approach with students was providing opportunities for agency. Charlotte expressed concerns about teachers overly scaffolding the learning experience for students:

> We are too eager to spoon-feed our kids. And it is raising students who cannot think for themselves. And moving particularly into the future that's what we need. It's being people who can think for themselves, can express their ideas collaboratively and can work collaboratively.

In this regard, allowing students to exercise agency was viewed as an important responsibility for 21st century teachers. However, David voiced his frustration about the difficulty of getting students to exercise agency over their learning inquiry at a high level:

> I've very rarely got to that point when they are actually taking ownership and going 'right, we're gonna pull ideas together and see if I can synthesise it all'. I almost have to force that to happen.

Similarly, Kyle agreed with the notion that students needed a great deal of support in developing their epistemic agency:

> You need to really scaffold them actually, how they can start assuming responsibility for their own learning. It just doesn't happen overnight. Again, it's a pattern of 10,11, 12 years of education where it's being done to them.

Notably, Kyle noted that many students found the sudden shift, to agency over their learning, to be confronting, as it was incongruous to their experience of education:

> There is an expectation from the students, that, ‘hey look, you know you’ll do the organisation, you do the structuring or whatever. And it’s still quite there.

This finding suggests that where students lack the skills to exercise epistemic agency a large amount of guidance is necessary.

Democratising ideas

Another significant idea is the requirement, in KB, for the roles and responsibilities of teachers and students to shift, with a lot more responsibility being taken on by students, as pointed out by David:

> And I treated them, like the idea of it being a democratic classroom. That they drive a lot of what we do and take ownership of that.

Interestingly, Maia made a connection between KB and the concept of ako, in terms of empowering students:

> And it moves from the role of the teacher and students being quite fixed, to an environment that promotes the concept of ako I guess, in terms of enabling students to be teachers, and to be able to access learning, understanding, and information far more directly.

This shift in roles resulted in a redefinition of the teacher's functions. Three interviewees talked about how this translated into their classrooms. For Charlotte this represented a profound shift in beliefs and practices:

> The teacher isn't actually a teacher. You're facilitating the learning, not, not dictating the learning.

Moreover, a flattening of the class hierarchy was necessary, with a reframing of the class as a team of researcher, including the teacher. Teachers emphasised a radically different relationship between the class and the teacher. This attitude is illustrated in David's comment:

> I was very clear with the students really early on. That I'm not going to be instructing them and they've got to find out for themselves and explore for themselves. I'm sort of a part of it.

Additionally, Maia also described the shift in roles:

> Instead of framing us as students and teacher, I framed us as historians working together to develop understanding.

Similarly, in the focus group, a theme arose around the teacher becoming a participant in the community. The concept of the teacher as 'expert' was dispensed with, and it was considered to be important for teachers to be considered just a part of the team. A major change in the teacher's identity was perceived as helping to develop KB in classes.

These findings suggest that working within KBC is a massive pedagogical shift for learners. A great deal of support is required for learners to develop the capabilities required for explanation driven inquiry. Furthermore, these findings show that the importance of developing community should not be underestimated. Teachers all emphasised that the

development of relationships between students is paramount. Where trust is absent it is difficult to develop any sense of communal responsibility for idea development. Students need to view themselves collectively as an authentic community.

Facilitating the shift to a new pedagogy with professional support

This section focuses on the factors that supported the shift to KB pedagogy. Interviewees highlighted the importance of taking the time to develop understanding of KB and its practices. Additionally, the role of the professional learning community (PLC) was underscored as a major factor, and, within the focus group, key themes raised were: the role of the PLC in teachers' professional development, the time needed to develop practices, and the need for institutional support.

Time to develop understanding

Teachers acknowledged the transition to KB to be a lengthy process and underlined time as an influential factor. It was recognised that making the changes required to develop KBC necessitated an extensive period of time to develop understanding, as demonstrated in Maia's' comment:

> I do remember quite a lot of hard slog mentally … But I do remember feeling extremely scrambled … you know all of those things, all of those elements of what makes our teaching were shifting at once.

It is critical to recognise that this shift puts a great deal of pressure on teachers. Furthermore, teachers regarded the development of understanding as an ongoing and challenging process.

> It took me a long time to get my head around what it was all about, and I don't think I fully understand it now. I just don't" (Miriam)

It was found to be important for teachers to be open to learning on an ongoing basis, as illustrated by David's comment:

> I don't think you're ever an expert, you know. I think, yeah, you're just always learning.

Furthermore, participants recognised that developing an understanding of KB pedagogy requires a great deal of time and effort, as Kyle's comment suggests:

> I think it's a big challenge and it's not an overnight challenge. I think it's a, you know, it's quite a long development.

These findings show that development of KB as a pedagogy requires a long-term commitment from teachers.

Time to develop practices

Significantly, Maia recognized the complexity of KB, and suggested that there was the need for "… a stepping stone, or a stepping stone type pedagogy to mentally prepare a whole school system, or a whole school culture within a school to be more prepared to take on knowledge building". This participant recognised in her interview that KB was a highly demanding pedagogy that pushed against conventional practices and suggested that support for teachers was necessary for developing KB practice in NZ schools. Similarly, David noted in his interview that KB was a difficult pedagogy for many teachers to pick up and persevere with, due to the continual challenges to teachers' established practices.

A theme of playfulness with ideas arose within the focus group. One participant suggested that, if we expect innovative thinking to occur at student-level, teachers need to be given licence, within their schools and classrooms, to play with ideas and be innovative with learning design. However, it was acknowledged that this would require school leadership to give far more agency to teachers, which was a difficult ask in the age of best practice and

accountability to data. From this topic, a discussion emerged about the need to provide the time, and space, to work with KB ideas. Participants recognised that this was difficult within conventional schools, as there tended to be many existing expectations and initiatives competing with KB. This led teachers to discuss the need for a long-term school goal, if an entire school was looking to support teachers in developing KBC. Participants recognised that this would involve a realignment of the school's focus - from assessment to learning.

On the other hand, Miriam suggested that there was great value, for a teacher's professional development, in building on practices in an emergent fashion, as indicated in this comment:

> I think that it helped to build it up over time, and to trial things, and to sort of see how it would work in your subject area.

Additionally, Charlotte suggested that developing KB practice was a case of ongoing experimentation with learning design. Furthermore, the focus group participants suggested that teachers needed to adapt their practices in response to the needs of learners. Moreover, all of the interviewees suggested that it was not possible to develop a universal set of routines, as KB was by nature an emergent process.

However, a challenge to developing KB in the online context was identified. Kyle and David underlined the difficulty of developing practices when they were continually introducing KB to a new group of students each school year, as it took a long time for students to understand the principles and for KB practices to be fostered. Furthermore, in online classes, students frequently came from a range of schools, with a wide geographical spread. This presented an obstacle to continuity, and the ability to build up an institutional culture, within an online class. Within online classes, a plethora of school cultures contribute to the workings of the class. Furthermore, a cohort of students does not necessarily move through together from year to year. Moreover, teachers have limited time in which to develop a KBC in an online class, which places pressure on teachers to embed the fundamentals of KB rapidly and limits the extent to which a KBC can be developed.

Teachers working as a research team

The support of a professional learning community was highlighted, in the interviews and the focus group, as a critical factor in the development of KB pedagogy within individual classrooms. Within the focus group, there was a great deal of discussion about professional support, with teachers adamantly agreeing that their PLC was a form of KB. Participants agreed that the experience of working as a KB group empowered them to better model KB to their students. All focus group participants emphasized that the professional community was a crucial aspect of their own shift to KB pedagogy, and the subsequent development of KBC in their classes.

Developing relationships

As with a student KBC, the relationships between members of the teacher-to-teacher KBC were highly important. Focus group participants

emphasised the importance of working within an active and committed group.

A point that was heavily discussed was the need to feel supported through the frustrations of developing a KBC. The group concluded that they were able to explore issues and challenge each other through robust conversations. Participants agreed that feeling safe with each other, and having a strong sense of community, was important and facilitated collegial conversations.

Reflective conversations

Within the focus group, teachers acknowledged that the support of the PLC enabled them to make large shifts in their teaching practice. Professional conversations were acknowledged as a key factor empowering them to work through ideas and practice challenges. Similarly, when asked what they thought would support the development of KB pedagogy in an ideal world, all of the interviewees emphasised the ability to have collegial conversations with like-minded teachers. Stephanie felt isolated in her practices, and felt that she would be able to further develop KB if she had access to a KB group within her school, or local community, as outlined in her comment:

> Ideally you would have a group of Teachers really keen to develop it. They would be working together sharing their wins and losses, and brainstorming ways of making it better.

However, the changes required for KB are challenging and exceedingly difficult for even a motivated individual teacher. The difficulty of aligning practices with principles is illustrated by Kyle below:

> Actually, my values and beliefs are very much in line with the Knowledge Building. But, until you do some quite serious critical reflection on your own teaching and what you are trying to do, on an ongoing basis you're not going to change. And that's again where the group sort of fits in.

Kyle viewed the reflective conversations that he had with other teachers, as a catalyst for the demanding task of aligning practices to beliefs. This finding suggests that it is necessary to have access to Community of Practice and the discussions facilitated within, in order for a teacher critically address the practice problems associated with developing KBC. However, it is necessary to have a committed group focused on practice problems. David outlines the problem of loose and sporadic group structures in his comment below:

> And we've had a few groups. But it's not well resourced, there's no sort of structures there to help it and support it. It's sort of, have a go, type situation, do this. There's not a real drive around the whys of it.

The lack of a structured and focused PLC presents a serious challenge to KB in NZ. Without the support of a focused PLC, it will be difficult for teachers to develop or sustain KBC in NZ, as KB challenges conventional pedagogy, practices and the very social dynamics of the classroom. Teachers will need resources and collegial support to challenge the accepted practices in NZ education.

Exposure to new ideas

Participating in a KB teacher group was viewed by interviewees and focus group participants as an enriching experience that was a catalyst for the development of teaching practices. For example, Miriam talked about changes to her practices as being the direct result of working within a community of KB teachers. Likewise, Kyle said that the teacher group helped him to see new ways of approaching practice problems:

> But they'd taken an approach and they'd done things. And it was being part of that group. I wouldn't have been exposed to that and being able to talk that through.

Moreover, working within a professional community was highlighted as an authentic form of professional development by David:

> Because you're able to bounce ideas off other people … to me that is the most important and the most real sort of professional development you can do.

Access to a PLC provided teachers with a lot of motivation to engage with the ongoing practice issues involved in developing a KBC. Additionally, there was a great deal of synergy generated within the group.

Overcoming Isolation

Five teachers highlighted the challenge of feeling professionally isolated. For instance, Calvin outlined the importance of a PLC for overcoming the professional isolation within his own school. Likewise, Kyle talked about sharing with other teachers as being extremely vital to the development of his teaching practice:

> "Otherwise you feel very isolated and it can be quite a challenging process"

Additionally, Maia described the development of KB pedagogy as being a fundamentally communal process for her:

> I couldn't imagine being a teacher alone in a school trying to figure it out and actually making it a richer experience.

However, David underlined the limited expertise within teachers using the KBC pedagogical approach in NZ:

> You know, even though you know you want to go, and you want to have those changes, there isn't, that sort of pool of expertise.

Accordingly, it seems that a critical aspect of professional development is access to professional mentoring. Where teachers lack access to collegial support, isolation is a major obstacle to the purposeful development of KB pedagogy, as illustrated by Stephanie's comment:

> It's been on a bit of a back burner, the whole knowledge building thing. I think I do still integrate it a bit but not purposefully. Because I felt such a, like an island at my school.

Without the support of a PLC it is difficult to persevere and make progress, particularly with a challenging pedagogy like KB. Furthermore, two teachers attributed belonging to a PLC as providing the impetus to continue, despite challenging circumstances.

Consolidated findings

Barriers to the development of KB pedagogy

Interviewees and focus group participants reported several barriers to the development of KBC. One challenge related to the competitive nature of secondary education. Teachers felt that they were battling with the mindsets of students who had learned to 'play the game' in terms of assessments and the overarching culture of NZ education, which was perceived to be highly individualised and competitive. The feeling was that the high stakes competitive field of secondary education was a major constraint to the development of innovative KBC.

Another issue was the pressure teachers felt to cover a large amount of curriculum content for assessments. Some participants highlighted that certain subjects lacked the flexibility to follow a full KB approach. A significant dilemma was the inability to develop KB pedagogy as far as teachers would like, due to external pressure from their schools to produce high results from their students efficiently, and, moreover, the difficulty of fitting in the development of KB pedagogy with the many competing interests, and initiatives, within their own school environments. There was a consensus among teachers that in order to develop as a pedagogy in NZ, the macro level pressures on teachers would need to be minimised to allow teachers time to innovate and develop KB as a pedagogical practice. However, participants recognised that prioritising KB would be a challenging prospect in the current educational environment. Though there was hope that this might change in the future, with increasing evidence-gathering approaches to assessment and the review of NCEA Level One by the Ministry of Education.

Furthermore, a great deal of commitment, reflection and ongoing effort was required from individual teachers to develop a KB-centred approach to assessment with senior students. Where teachers felt that they had been able to align KB principles with NCEA, an immense amount of thought and effort had gone into the learning design.

Building up to a KB approach

The findings of this study cannot be categorically translated into an outline of the steps that teachers should take to develop KBC, as both interviewees and focus group participants emphasised the emergent nature of developing KBC. However, some key aspects of

developing KBC were highlighted in this study, which teachers who want to develop KBC may find useful.

One was the importance of developing strong relationships within the community. Teachers viewed this as essential to the development of KBC. Another was the need for a democratisation of the classroom. Teachers felt that a reframing of identities was required, with a flattening of hierarchies to empower students to assume agency within the classroom. However, teachers also stressed that the shift to KB involved significant perturbation for students, which required a large amount of scaffolding and support for students to make the transition to working as a KBC. Furthermore, teachers drew attention to the need to provide clarity about KB to students, aided by ongoing dialogue to keep the goals of the KBC visible.

Facilitating Shift with professional support

A positive factor, in terms of facilitating the shift to KB, was the support of a PLC. Participants highlighted the value of working with a team of teachers in relation to: sharing the mental load as they developed KBC practices, the PLC facilitating reflective conversations which grew their understanding and enabled their practices to move forward. The ability to share challenges provided the support to persevere and develop their KBC. Participants also suggested that professional development, for teachers working with a KBC, required a community-centred approach, in order to overcome the challenges of isolation.

However, this study also underscored areas where teachers felt they could be better supported in their professional development. These included: the lack of an ongoing formalised PLC, the lack of a framework for developing KBC in NZ. These factors created a heavy mental load for teachers - in terms of developing a well-grounded understanding of KB and working out how to align ideas and practices. Furthermore, teachers felt highly professionally isolated within their own schools, due to KB pedagogy being so divergent from the practices and learning culture within their schools. Teachers suggested that, if KB was developed in the long term within a school, they would require sufficient time to develop practices and the support of a long-term leadership vision for KB.

CHAPTER FIVE: DISCUSSION, CONCLUSION, AND LIMITATIONS

Introduction

In this section, I discuss key themes that have emerged from my findings, with reference to the literature. The chapter will form a conclusion about the implications arising from the findings in relation to the three research questions. I make recommendations to teachers and schools regarding supporting the development of KBC. Furthermore, I discuss the limitations of this and make recommendations for future research.

This research study has found three key themes:

1) The barriers to developing a KBC (Knowledge Building Communities) in NZ (New Zealand) secondary schools
2) Important aspects of developing a KBC
3) The role of professional support in facilitating the development of KBC

The barriers to developing KBC in NZ secondary schools

This study uncovered the challenges of developing KBC in secondary schools. These challenges are underscored by the work of several studies, including (Lai, 2012; Lai et al., 2012; Lakkala et al., 2005; van Aalst, 2015). Additionally, it highlighted a number of barriers to the development of KBC in NZ schools. These range from the assessment driven nature of learning, the dilemma of curriculum coverage, and the challenge of aligning the curriculum to Knowledge Building (KB). These barriers will be examined in a detailed discussion below

Competitive learning environment

Teachers involved in this study underlined concerns about working against the grain of existing secondary school learning and assessment culture. The words ‘the game’ and ‘playing the game’ were used to reflect teachers’ views of students’ approach to learning. Teachers raised concerns about risk aversion in students, which they associated with the competitive environment of secondary education. This was perceived as having a negative effect on the community and the ability to develop KB dialogue. This aligns with Niu and

van Aalst's (2009) findings about writing apprehension, which indicated that student anxiety about the adequacy of their KB contributions can affect students' abilities to engage in the KB environment.

Teachers also voiced concerns about their efforts to develop KBC being undermined by existing attitudes and practices within schools. The consensus was that secondary students were primed by the system to perceive education as a highly individualised and competitive environment. Indeed, the work of Hakkarainen, Paavola, Kangas and Seitamaa (2013) highlights this as an issue, suggesting that constant assessment and a highly competitive culture were likely to stymie participation in KBC due to fear of failure. Notably Hakkarainen, Paavola, Kangas and Seitamaa (2013) point out that it is important to develop an encouraging environment in order to support students, which bears out with the participants in this study reporting that it was vital to develop resilience in students. Teachers need to be highly responsive to the social and psychological needs of students in order to foster the confidence to work as KBC.

Additionally, teachers underlined the challenge of the ingrained view among students about education being an individual enterprise. This was viewed as an impediment to the communal development of ideas, in terms of students' mental models of education and their willingness to participate in the KBC. Likewise, Van Aalst and Hill (2006) discuss their finding that, when the education culture surrounding students values individual efforts highly, they have a tendency to reject the communal advancement of ideas, by withholding their good ideas from the community. Significantly, Hakkarainen and Paavola (2007) indicate that KBC cannot be created from nothing, and needs to be deliberately fostered. Therefore, this study concludes that a substantial amount of effort will need to go into developing an environment that is conducive to KB and fostering the necessary learner dispositions. This will be discussed in the section called 'Aspects which support the development of KBC.'

The dilemma of curriculum coverage

Teachers in this study perceived a crowded secondary school curriculum as an obstacle to KB. Indeed, van Aalst (2015) draws attention to the tendency of the curriculum to be "a mile

wide and an inch deep" (p. 18) and argues that the KB approach needs to confront this reality if it is to be a central pedagogy in the classroom.

However, this is a complex issue. As highlighted by Hong and Sullivan (2009) the ability to move from a circumscribed 'know that' model to a more expansive 'know how' approach to solving problems requires a flexible curriculum. Meanwhile, Zhang et al. (2009) emphasise the importance of teachers shifting their focus from curriculum coverage to the KB process, and a deepening of learners' abilities to inquire. This, however, is challenging in secondary classrooms, particularly at the secondary level. As Lakkala, Lallimo and Hakkarainen (2005) observed that it was difficult for senior secondary teachers to engage in innovative practices, due to the pressure exerted to prepare students well for final examinations. If KB is to be developed as a pedagogical approach in secondary schools, close attention must be paid to how teaching practices can better support adaptive and critical thinking, whilst still meeting the need for assessment. Discussion of teacher actions that contribute to the development of KBC will be detailed in the section 'Aspects which support the development of KBC'.

The challenge of aligning the curriculum with KB

This study underscored the tension between the secondary curriculum, particularly NCEA, and KB practices. Participants found that it was a huge challenge to work out how KB would fit within their subject, to find the time for the KB approach and furthermore, how to work with KB to provide students with what they would need for NCEA. In fact, Lai (2012) and Lai et al. (2012) reiterate the perceived lack of flexibility in senior NZ secondary education. Therefore, the extent to which KBC can be incorporated into learning is uncertain. Similarly, Lakkala, Lallimo and Hakkarainen (2005) found that innovative practices appeared to be far easier to develop at primary level. In this respect, when secondary teachers in this Finnish study tried to bring into effect innovative activities, these approaches still contained many of the characteristics of conventional tasks. This parallels the systemic difficulties which secondary teachers face in NZ.

Teachers also reported an inherent tension between the circumscribed knowledge required in their subjects and the creative thinking that they tried to foster within their KBC. In this respect, So and Tan (2014) reported macro-level tensions between the extent to which

schools valued collaboration and their focus on assessment tasks weighted towards measuring individual understanding. However, Lee, Chan and van Aalst (2006) suggest that, in relation to the issue of gathering evidence for assessment, collaborative KB processes can monitor both individual and collective understanding, through the use of learning portfolios. Additionally, the work of Zhao and Chan (2014) suggests that assessment should be embedded in the KB process, with metacognitive reflection on the student's own understanding, and that of their peers, used as a tool for measuring progress. Moreover, where possible within the constraints of national assessment specifications, teachers should seek to capture evidence for assessment from learners' KB work.

These findings, and the literature, suggest that teachers need to be highly agile and innovative in order to overcome the tension between the constraints of their subject area and the goals of KBC. However, teachers reported that another challenge for aligning practices in their subject was the lack of a clear example, or framework, to follow. In some cases, where the distance between KB and the subject felt too great, teachers reverted to familiar practices. This highlights the need to provide support for teachers who are developing a KB approach, which will be discussed in the following section.

The role of professional support in facilitating the development of KBC

A key finding of this study was the importance of professional support. Teachers reported that they felt overwhelmed, isolated within their own school context, and confused when working out how to go about developing KBC. The professional support teachers gained from involvement in a professional KBC was viewed as invaluable, and aspects of this support will be discussed herein.

Overcoming isolation

Developing KBC is not without complexities, such as the feeling of professional isolation. Given that KB pedagogy is so different from established pedagogical practices within schools, and an emergent pedagogy in NZ, teachers often felt quite alone within their own schools. Participants frequently mentioned that staff in their own school did not 'get it' and

often the goals and values of their schools or departments were incongruent with KB, and this made working within the KB approach exceedingly difficult.

Critically, Fields, Lai, Gibbs, Vermunt and Kirk (2016) note that learning communities can serve an important purpose in providing support for isolated members to continue. Indeed, one participant highlighted the lack of access to professional support as a barrier to continuing to, deliberately, advance KB in her classes. On a similar note, Lai (2011) identifies “intellectual isolation” as a barrier to continuing with distance education. This is particularly applicable where a person is the only teacher in their school working with KB pedagogy and they, therefore, feel professionally and intellectually isolated. This finding is supported by the work of Hadar and Brody (2010), who identify “breaking isolation” (p.1643) as a central part of driving challenging change initiatives. This aligns well with an idea echoed among participants who had been involved in a KB professional learning community (PLC), given that they were adamant that the PLC gave them the motivation to continue with KB pedagogy.

This finding leads me to conclude that it is difficult to continue to make progress with changes to one’s practice without conceptual and social support and encouragement from a community. This concept is born out by the work of Tseng and Kuo (2010) who argue that a “collective identity” (p.1046) influences an individual’s ability to stay committed to professional development goals.

Working as a research team

All participants acknowledged the importance of working within a KB PLC in terms of developing their own understanding of KB pedagogy whilst simultaneously developing KBC in their own classrooms. According to Zhang et al. (2011) a supportive PLC, that is centred around critical thinking and innovation, is an important part of sustaining knowledge work in classrooms. This can be regarded as an essential part of developing KB pedagogy. Indeed, participants reiterated that they saw themselves as a KB team working to advance meaningful practice issues. As Lai (2016) points out, it is necessary for teachers to experience KB in order to foster the disposition required for KBC. It is difficult to develop KBC within the classroom until one has tacit knowledge of the dynamics of a KBC. This idea is supported by Paavola, Lipponen and Hakkarainen (2004) who talk about the need

for teachers to have personal experience of KB. A study participant also noted that the PLC helped to lighten the mental load for the difficult task of comprehending how KB principles might be developed in their own classrooms. As highlighted by Hong, Zhang, Teo and Scardamalia (2009), professional development of KB teachers is a fluid, and reflexive, process focused on the progressive advancement of practice issues. This aligns well with the finding in this study that teachers valued the PLC as a means of working through challenges, issues and frustrations. One participant noted that working in a PLC was an incredibly relevant, and meaningful, form of professional development. This notion is supported by Timperley, Wilson, Barrar and Fung (2007), who acknowledge that much professional learning can occur in informal contexts. Indeed, Hargreaves (1999) underscores the need for teachers to work collectively, as researchers, in order to transform practices for the 'knowledge society'. This finding emphasises the need for teachers who wish to develop KB pedagogy within their own classes to engage with a PLC as much as is practicably possible.

A driving force

Yet, simply having access to a group is not enough to drive meaningful change. This point was illustrated by one participant who highlighted by a concern around the current lack of structured support for KB teachers in NZ. There were a number of elements to this issue. Firstly, NZ KB teacher PLC have not been very well resourced in recent years, as there is no monetary funding and they rely on the passion, motivation, and voluntary efforts of individual teachers, who often have a limited knowledge base, to drive the work. As one participant pointed out there is a 'limited pool of expertise' with regards to KB teachers in NZ. Furthermore, as Hakkarainen (2009) underlined, a KB culture takes an extraordinary amount of time and effort to emerge. Moreover, empowering teachers to work as a KB research team, as Lai (2016) demonstrated, involves a great deal of commitment, structure and resourcing. Furthermore, time was an issue as participants in the various PLC that sprang up were busy full-time teachers. Therefore, the ability to participate in PLC and make contributions waxed and waned, although, as Fields et al. (2016) contend, groups have a natural life cycle. However, it also must be recognised that a great deal of effort needs to be invested in the "sustaining phase" of a professional community, as Lai et al. (2006) point out.

Most significantly a participant also recognised that Knowledge Building New Zealand (KBNZ) needed to return to the investigation of practice issues as their driving focus. This finding aligns with Popp and Goldman's (2016) observation that PLC discussions should centre around the 'why' questions with an emphasis on inquiry. Thus, aligning with the KB goal of engaging in "explanation driven enquiry" (So, Seah, et al., 2010, p. 480).

This finding indicates the need for a more formalised and structured approach to inducting teachers into KB and supporting their progress with implementing the pedagogy. An essential factor in developing KB pedagogy may be mentoring by more experienced teachers (Lave & Wenger, 1991), as teachers frequently expressed the desire to talk to teachers who had worked with KB. Another improvement might be the development of a knowledge repository (Wenger, McDermott, & Snyder, 2002) of KB practices, as teachers voiced the need for a framework to help make sense of the 'messiness' of KB. Furthermore, these findings lead me to conclude that KB needs to refocus on teacher-led inquiry about relevant problems of practice, in order to remain sustainable.

Aspects which support the development of KBC

As mentioned in the literature review, implementing KBC at secondary level is challenging, and the extent to which this can happen in NZ secondary schools is unknown (Lai, 2012). Nonetheless, many teachers are turning to collaborative inquiry models of learning as a response to the need to adapt to the 'knowledge age'. Therefore, I deemed it to be worthwhile to collate the aspects which might support the development of KBC in NZ schools, as reported by the teacher participants in this study, with links to relevant literature.

Developing relationships and trust within the community

This study found developing relationships and trust within the class to be a vital aspect of developing KBC. With reference to developing community, participants agreed that it was important to invest time in establishing connections with members of the KBC. The work of Bielaczyc (2012) supports this finding, with her observation about "person-to-person" (p.19) relationships being a starting point for developing a sense of collective responsibility. Furthermore, Myllärri et al. (2010) highlight community building as a critical aspect

underpinning the development of KB. However, participants reiterated that the communal aspect needs to be continually emphasised and reiterated to their classes. As stated by Lai et al. (2014), the importance of fostering community should not be overlooked. Furthermore, several studies emphasise the need for trust to be developed amongst the community members (Bielaczyc, 2012; Bielaczyc et al., 2013; Lai & Campbell, 2017; Loh & Smyth, 2010). Indeed, teachers emphasised the challenge of developing KBC when members of the class did not know each other. Creating a safe space was viewed as essential for developing confidence among students to share. Indeed Lai et al. (2012) stress developing a safe class atmosphere as fundamental to eliciting idea development.

This finding shows that, where students have little in common, time spent developing the social infrastructure (Bielaczyc, 2006) of the class is a wise investment for the future development of the class as a KBC. Community building should be regarded as an essential step for laying the foundations for KBC.

Reframing the landscape of learning

Developing KBC requires a new mental model (Bereiter, 2005; Gilbert, 2005) of knowledge, learning and our understanding of young peoples' capabilities. However, as Hakkarainen (2003) observed, it is not possible to simply apply KB over top of existing classroom practices. A common thread, among participants, was the need for student agency to be developed. However, a frequent issue highlighted by these participants was the difficulty of getting students to assume agency, due to lack of practice and discomfort in occupying an unfamiliar role. The work of Scardamalia and Bereiter (1991) also underlines this challenge, stating that control cannot just be inverted. A dramatic shift in roles is necessary in order for students to assume agency. Lai and Campbell (2017) support this notion, with the finding that students need to be invited to assume an active role in building up content. Furthermore, one participant raised concerns about spoon-feeding students in their learning. Whilst this is a fair concern in the long term, Viilo, Seitamaa-Hakkarainen and Hakkarainen (2018) suggest that initially a lot of teacher guidance is needed in order to induct students into the practices of a KBC. This finding shows that learners will need scaffolding to gradually assume more, and more, agency for their learning.

Furthermore, the concept of democratising ideas was reported as being an essential aspect of developing KBC. Participants highlighted the importance of flattening classroom hierarchies, in order to empower students to take charge of the direction of inquiry. This aligns with the work of Moss and Beatty (2006) who suggest that the teacher's voice may need to be quieter in the KB environment in order to legitimise students contributions to KB problems. However, a theme underscored by teachers in this study was that of students and teachers working as a team. Similarly, one participant highlighted they no longer thought of themself as a teacher. Of particular interest was the concept of ako, which a participant saw as being a powerful way of empowering students to learn from, and teach each other, within the KBC. It seems that a significant redefinition of identities is an important part of developing a democratic classroom. This finding is supported by the work of Lai (2016) who associates knowledge creation with a shift in professional identity for teachers.

A particularly significant finding stressed by a couple of participants was the opportunity that the online teaching context presented to rewrite the rules of how teaching and learning operate. Participants postulated that online classes were not tied to conventional teaching practices commonly used in face to face classes. Moreover, as Lai (2017), points out online learning in NZ diverges from face to face learning on pedagogical, social and technological fronts. Therefore, a new pedagogical approach is necessary. Furthermore, a participant noted that students are often very willing to adopt new practices in the online context. This aligns with the work of Hoadley and Kilner (2005), who recognise online communities as a promising support for KBC.

This finding shows that online classes have the potential to be a fertile place for developing KBC. Furthermore, it seems to me that the topic of online classes, as a conducive factor for developing KBC in NZ, is worthy of further investigation, as this is a little researched area, with the majority of international KB case studies taking place in face-to-face teaching contexts.

Guiding Framework

Another key aspect highlighted by participants was how ill-prepared secondary students were for KB, due to their complete lack of experience with collaborative learning and being

accustomed to a teacher-centred approach to learning. This is a common issue in developing KBC, with Hakkarainen et al. (1999), Scardamalia & Bereiter (1991), Goh et al. (2013) all emphasising the need for teachers to take an active role in guiding KB inquiry when a community is in its infancy. This was certainly the case in this study with teachers outlining a number of actions they performed to guide inquiry, including asking pertinent questions, modelling KB-orientated questions, and built in opportunities for metacognitive reflection.

This is in keeping with Bielaczyc and Ow's (2014) research which talks about scaffolding students into making "knowledge building moves" (p.33). Though as one participant pointed out, teachers needed to carefully judge how to support learner KB. This is a critical issue as the aim of a KBC is to become student-centred. This issue has previously been underscored by Zhang et al.'s (2009) work, recommending flexibility for learners to work in a dynamic way as ideas organically emerge. However, the practices of the teachers in this study aligned with the findings of So et al. (2010), who suggest that a high level of teacher guidance is required to encourage community participation, particularly within novice KBC where students are unaccustomed to such modes of learning and lack the tools to inquire collaboratively.

These findings confirm that the teacher needs to take a very active role in order to nurture a novice KBC. However, this approach requires teachers to have a strong understanding of the guiding principles of KBC (Lai & Campbell, 2017), and how these can be developed within the local context (Hakkarainen & Paavola, 2007). The creation of a culturally responsive NZ framework, to guide KB actions, would be a valuable resource for guiding the development of novice KBC in NZ.

Clarity about KB

In this study, providing students with clarity about the KB approach was found to be another key aspect of developing KBC. As KB is such a different approach to existing teaching practice within NZ, participants recognised that it was vital to be very explicit with the class about aims and the approach of the community. Participants regarded visibility of the community's aim and clarity about the knowledge building approach as particularly important. With reference to developing a KBC, Hakkarainen (2004) highlights the importance of establishing a class culture where all actions are centred around inquiry.

Moreover, the work of So et al. (2010) supports this finding with their emphasis on nurturing a collaborative culture through clarity about the process and strong teacher guidance. Furthermore, Goh et al. (2013) emphasise the importance of 'teacher modelling' of KB practices. Though, an issue underlined in this study's findings was the need for students to buy into the process, as KB work is very difficult if students did not accept the goals of the community. However, the work of Xiong and Toh (2015) suggests that, where students are less receptive to collaborative work, teachers can gradually induct students into KB by frequent exposure to small collaborative tasks and adjusting the framework according to students' needs. As one participant pointed out, developing KBCs, in practice, was an ongoing process of experimentation. These findings underscore the importance of KB being a central focus of learners' work from day to day in order to enculturate students into the KB approach to learning.

Concerning keeping KB visible to the class, the importance of dialogue about the class' work was emphasised by a participant. The participant emphasised that KB could not sit in the background. They considered it to be imperative to keep the KB work, and the community goals, present in students' minds. In their view this can be achieved by leading class discussions about the notes students had made in the KB environment Knowledge Forum. This participant's approach sits well with the work of Zhang et al. (2009) and Chen et al. (2015) who place emphasis on the importance of 'KB talk' in progressing community inquiry. Furthermore, Resendes, Scardamalia, Bereiter, Chen and Halewood (2015) stress the importance of formative feedback in advancing the level of understanding, and the depth of critical thinking, in students' work. These findings emphasise the need for teachers to provide regular opportunities for students to enter into dialogue about their KB work, in order to keep the goals of the KBC central. Furthermore, the findings, and the literature, affirm that the teacher's role in guiding questions and dialogue about the class' KB work plays a significant part in progressing the work of the community.

Conclusions

This study arose out of an interest in the development of KBC in NZ and the challenges of adapting to such an idea-centred pedagogy. The research questions arose from the overall research aims, which were to reveal what was necessary for the development of KBC in NZ, the challenges in relation to developing KBC, and what can be done to overcome the

challenges that teachers face. The research questions are reiterated in full below, followed by a summary of the answers:

1. What are the pedagogical factors that make it difficult for NZ secondary school teachers to develop KB pedagogy within their classes?
2. What social factors are involved in developing KBC in a NZ secondary school classroom?
3. Which actions from teachers contribute positively to the development of a KBC in NZ secondary school classrooms?

What are the pedagogical factors that make it difficult for NZ secondary school teachers to develop KB pedagogy within their classes?

To evaluate the factors that make it difficult to develop KBC in NZ secondary classrooms, I will outline the challenges highlighted by teachers and suggest how these might be ameliorated, given the environment that secondary teachers currently work within. There were a number of external challenges to developing KBC, including expectations within each school, the constraints of the national assessment system, and the attitudes and expectations of students.

Teachers faced a great deal of pressure to compete with local schools and, furthermore, faced scrutiny in terms of the outcomes within their classrooms. However, despite these challenges, teachers remained motivated by the potential for KB to foster critical thinking and the ability to solve complex problems. An implication, at a macro level, is a need for student assessments to shift to an evidence-gathering approach based within authentic contexts. Furthermore, at a school level, whenever possible, teachers need to be given permission to innovate and, moreover, given the time and resources to make KB a professional development focus. At a teacher level, this study concludes that, where the assessment rules for their subject allow, teachers should seek to capture evidence of student learning from the KB work that students undertake.

Furthermore, students exerted pressure on teachers to maintain the status quo in respect of the activities and hierarchies within the classroom, as they were well versed in the rules

for success in the current system. Even though students may have an appreciation of the benefits of KB, the shift represents a significant perturbation to the social infrastructure (Bielaczyc, 2006) of the classroom, and their very experience of how learning works. Therefore, this study concludes that it is crucial for teachers to understand the enormity of the changes that they ask their learners to make, and, furthermore, to recognise that students will require scaffolding and guidance to become a community of knowledge workers. Teachers will need to be agile and responsive to the needs of learners. Furthermore, it is likely that students will experience emotional and cognitive discomfort as a result of the change to working within a community of knowledge builders. Therefore, teachers need to provide learners with continual opportunities to collaborate in a "psychologically safe" (van Aalst, 2015, p. 20) environment, to allow learners to establish trust in the unfamiliar learning process.

What social factors are involved in developing KBC in NZ secondary school classrooms?

The findings of this study underline that strong community ties are important for developing KBC in the classroom. As demonstrated above, KB represents a significant change to the dynamics of a secondary school classroom, and it is imperative to develop a safe learning environment. Teachers stressed several social factors that were critical for the development of a KBC. First, a strong theme emerged about the centrality of the concept of community. This involved continual dialogue about communal ideas and responsibility and, furthermore, required an emphasis on community in the structure of learning design and assessments. Secondly, trust was a crucial factor for secondary school students, as the concept of improvable ideas relied on students feeling safe enough to voice their theories. It took time to develop a sense of trust, particularly in online classes where there were no obvious commonalities between students from different schools. However, it was also vital for teachers in face-to-face classes to recognise the link between strong interpersonal relationships and the ability to develop ideas. This study recommends that teachers prioritise relationship building within their classes in order to enable KB to take place. Furthermore, care should be taken to keep the class focused on communal idea development, implicitly and explicitly, through the foci of learning tasks and ongoing discussion of the goals of the community.

However, even when teachers are positive, passionate and highly interested in KB as a pedagogy, it can be a challenging transition, which could prove insurmountable without good support. Teachers in this study relied on their PLC to work out the pedagogical principles of KB and the day to day issues of how to best develop a KBC centred approach. Where teachers did not have ready access to a Professional Learning Community, they found it extremely difficult to sustain the KB pedagogical approach. This study concludes that when teachers feel isolated in their practice the mental load becomes overwhelming and the viability of KB suffers. Therefore, I conclude that the support of a KB teacher community is an essential part of the development of KBC pedagogy for teachers. In this respect, teachers who aspire to develop KBC within their classrooms should seek out a network of like-minded teachers to support the growth of their practices. Furthermore, teachers are advised to centre their learning network around shared pedagogical issues.

What teacher actions contribute positively to the development of a KBC in NZ secondary school classrooms?

Despite pedagogical challenges, and the complex social factors outlined above, teachers managed to cultivate a KBC. The teachers involved in this study articulated a set of common practices, which are: the need to develop a strong communal bond between learners, the democratisation of learning, reassigning roles and responsibilities, and keeping the KB process visible for learners. Furthermore, the development of KBC was supported by ongoing reflection on practice, and the extent to which practice supported the needs of learners and embodied the principles of KB. Overall, this study concludes that the teacher is essential to the development of KBC. However, this role is highly taxing for teachers due to the fluid, and evolving, nature of learning design within KB, and the agility required to support learners' needs; in terms of socialising them into KB and fostering the practices needed for explanation-driven thinking (So, Hoon Seah, & Leng Toh Heng, 2010).

Indeed, teachers said that they spent a lot of time individually working out the principles of KB and developing their classroom practices. Although teachers found the process of experimenting with practices that aligned with KB to be highly valuable, this was balanced with a recognition of the 'mental haze' that ensued while practices were transitioning and a wish for mentoring support and a clearer picture of how to begin developing KBC. Therefore, this study concludes that common effective practices for the NZ context should

be recorded in a knowledge repository (Lave & Wenger, 1991) in order to alleviate the mental load for teachers and, furthermore, to support novices who are inducted into KB.

Recommendations for Practice

The following recommendations have been devised in response to the findings of this study. As this was a small study, working within the qualitative framework, these findings cannot be generalised. However, they will be of interest to secondary teachers within NZ wishing to develop KBC. The recommendations have been categorised into three overarching ideas:

1. The collation of common practices of NZ KB teachers in a range of subject areas, in order for teachers new to KB to make sense of how to begin developing KBC.
2. The development of a KB framework for the NZ context, with a particular focus on how a culturally responsive approach to KB might support priority learners in NZ secondary schools.
3. The re-establishment of a structured KB PLC focused on problems of practice. Meetings should be conducted on a regular basis in order to establish a rhythm to the community (Wenger et al., 2002).
4. Seek to align KB with local and national pedagogical initiatives, such as the redesign of NCEA level 1, in order to address the lack of time and resourcing to develop KB in NZ.

Limitations

There were several limitations to this study, given that it focused on a small group of teachers who had been engaging with the KB approach for a sustained period of time. Therefore, they may have been more motivated than the general population to persevere with a challenging pedagogy. The findings of this research project are not generalisable, although they may be of use to practitioners in NZ schools seeking to understand how to develop the KB approach.

While this study reflected on teachers' experiences of developing KBC in their classes, the study did not provide an opportunity for students within these classes to share their experiences and views of the development of KBC. This limited the study's findings as it is based exclusively on the experiences, and views, of teachers.

It is possible that a case study of a class that was new to KB could have provided a more comprehensive view of the challenges of developing KBC and aspects of community development. However, as outlined above, it takes an extensive of time for teachers to develop practices that align with KB pedagogy and it takes a great deal of time to enculturate a community. While this approach would have provided rich data, it would have been outside of the scope of a small qualitative master's study.

Another limitation is that this study did not undertake further in-depth exploration of the key areas that were encapsulated in the findings. For instance, professional support was stressed as an important aspect of supporting the development of KBC. However, the more granular aspects of what enables a PLC to work successfully were not explored deeply enough to definitively state the mechanisms that held the group together. Similarly, developing trust was outlined as an essential part of developing KBC. However, this study did not involve in-depth research into how teachers establish trust within a class community.

Furthermore, it is possible that the practitioner research approach limited this study. Efforts were made to ensure that a range of participants were selected for the study and that they were able to reflect freely on their experiences and views. However, in most instances, I had working relationships with participants and we knew each other well. It is possible that this affected how participants reported their responses and how I interpreted them.

Moreover, it must be acknowledged that time and inexperience placed limitations on this study. The limit of one year to develop a proposal, attain approval, collect, analyse and present the research data as a novice researcher, meant that the aims of this research project needed to remain simple and manageable. Furthermore, as I was working with busy teachers, who worked in a range of different contexts, access to participants for interviews

proved to be more challenging than originally anticipated. Therefore, it was necessary for the sampling to be somewhat convenience based. In retrospect there were a number of elements that could have been approached differently, but I believe that I have managed to honour the research problem and the data my participants provided me with.

Also, it was my assumption as a novice researcher that it was the norm to work alone. I have discovered through the master's process that researchers frequently collaborate. While I sought to honour the voices of my participants, I very much drove the focus of the research. It may have been beneficial to collaborate closely with practitioners from the outset of the study. This would also have been more in line with the KB principle of democratising knowledge. However, as outlined above, time is of a premium for secondary teachers and, while this would have been valuable, it may have been difficult to manage in practice.

Recommendations for further studies

As highlighted in the literature review and the research findings, idea-centred learning is regarded as critical for preparing learners for a changing world where industry is defined by the knowledge age. The shift to KB is deemed to be a vehicle for preparing students for 21st century life, though it is currently a very small and emergent pedagogy in NZ. This study focused on a small group of teachers, albeit with a wealth of experience with the pedagogy. However, as pointed out by Hakkarainen (2009) the "invisible" (p.222) work that teachers do to develop KBC is worthy of research investigation. In this respect, this study did not provide a detailed examination of the factors which support teachers, nor did it directly observe KB in the context of a NZ classroom or factor in the student voice about their experience of working within KBCs. For this reason, I recommend a number of issues within this topic for further research. These include:

1. Research on how a KB framework for the NZ context can support KB in NZ schools, in order to establish how this might ease the transition into KB.
2. A longitudinal study of a class working with the KB approach, to identify the actions which support the social and pedagogical development of a KBC in NZ, and to ascertain the challenges within a NZ secondary school more fully.
3. A focused study on a KB professional community in NZ, and how this can be leveraged to best support the development of KB pedagogy in NZ.

4. Research on the effect that professional development has on the development of KBC within classes.

5. A qualitative research study on NZ secondary students' experiences of being a part of an emerging KBC, in order to better understand the benefits, and complexities, of developing KBC in NZ secondary schools.

LIST OF REFERENCES

Aronson, E., & Patnoe, S. (1997). *The jigsaw classroom: Building cooperation in the classroom* (2nd ed.). New York, NY: HarperCollins College Division.

Barker, C., Nancy, P., & Elliott, R. (2015). *Research methods in clinical psychology : An introduction* (3rd ed.). https://doi.org/10.1002/0470013435.ch6

Beitin, B. K. (2014). Interview and sampling: How many and whom. In J. F. Gubrium, J. A. Holstein, A. B. Marvasti, & K. D. Mckinney (Eds.), *The SAGE handbook of interview research: The complexity of the craft* (pp. 243–253). https://doi.org/http://dx.doi.org/10.4135/9781452218403

Bereiter, C. (2005). *Education and mind in the knowledge age* (1st ed.). New York, NY: Routledge.

Bereiter, C., & Scardamalia, M. (2014). Knowledge building and knowledge creation: one concept, two hills to climb. In S. C. Tan, H. J. So, & J. Yeo (Eds.), *Knowledge creation in education* (pp. 35–52). Retrieved from http://link.springer.com/10.1007/978-981-287-047-6

Bernard, H. R. (1988). *Research methods in cultural anthropology.* (1st ed.). Newbury Park, CA: Sage.

Bielaczyc, K. (2006). Designing social infrastructure: Critical issues in creating learning environments with technology. *Journal of the Learning Sciences*, *15*(3), 301–329. https://doi.org/10.1207/s15327809jls1503

Bielaczyc, K. (2012). Informing design research: Learning from teachers' designs of social infrastructure. *Journal of the Learning Sciences*, *22*(2), 258–311. https://doi.org/10.1080/10508406.2012.691925

Bielaczyc, K., Kapur, M., & Collins, A. (2013). Cultivating a community of learners in K-12 classrooms. In C. Hmelo-Silver, A. M. O'Donnell, C. K. K. Chan, & C. A. Chin (Eds.), *International handbook of collaborative learning* (1st ed., pp. 233–249). https://doi.org/10.4324/9780203837290.ch13

Bielaczyc, K., & Ow, J. (2014). Multi-player epistemic games: Guiding the enactment of classroom knowledge-building communities. *International Journal of Computer-Supported Collaborative Learning*, *9*(1), 33–62. https://doi.org/10.1007/s11412-013-9186-z

Birch, M., & Miller, T. (2012). Encouraging participation: Ethics and responsibilities. In T. Miller, M. Birch, M. Mauthner, & J. Jessop (Eds.), *Ethics in qualitative research* (2nd ed., pp. 91–105). https://doi.org/10.4135/9781473913912.n7

Bishop, R. (1998). Freeing ourselves from neo-colonial domination in research: A Māori approach to creating knowledge. *International Journal of Qualitative Studies in Education*, *11*(2), 119–219. https://doi.org/10.1080/095183998236674

Blair, L. (2016). *Writing a graduate thesis or dissertation*. Rotterdam, The Netherlands: Sense Publishers.

Bolstad, R. (2011). *Taking a "future focus" in education — what does it mean?* NZCER Working Paper. Retrieved from http://www.nzcer.org.nz/system/files/taking-future-focus-in-education.pdf

Bolstad, R., Gilbert, J., McDowall, S., Bull, A., Boyd, S., & Hipkins, R. (2012). *Supporting future-oriented learning & teaching — a New Zealand perspective report to the Ministry of Education*. (NZCER). Retrieved from https://www.educationcounts.govt.nz/publications/schooling/supporting-future-oriented-learning-and-teaching-a-new-zealand-perspective

Boyask, R. (2010). Learning and diversity in schools. In M. Thrupp & R. Irwin (Eds.), *Another decade of New Zealand education policy: Where to now?* (pp. 21–31). Hamilton, New Zealand: Malcolm Wilf Institute of Educational Research.

Bratton, M., & Liatto-Katundu, B. (1994). A focus group assessment of political attitudes in Zambia. *African Affairs*, *93*(373), 535–563. Retrieved from http://www.jstor.org.libproxy.unitec.ac.nz/stable/723666

Brinkman, S., & Kvale, S. (2009). *InterViews: Learning the craft of qualitative research interviewing* (2nd ed.). Thousand Oaks, CA: Sage.

Brunk, J., Molari, G., Napoletano, L., Rizzo, A., & Toccafondi, G. (2005, June). *Designing a Knowledge Building Community.* Paper presented at the 6th International Conference on Organizational Learning and *Knowledge*, Trento, Italy. Retrieved from https://www.researchgate.net/publication/267380871

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford, England: Oxford University Press.

Bull, A., & Gilbert, J. (2012). *Swimming out of our depth? Leading learning in 21st century schools*. Wellington, New Zealand: NZCER. Retrieved from http://www.nzcer.org.nz/system/files/Swimming out of our depth final.pdf

Campbell, A., McNamara, O., & Gilroy, P. (2010). *Practitioner research and professional development* (pp. 1–19). London, England: Sage.

Campbell, K. H. (2013). A Call to Action: Why we need more practitioner research. *Democracy and Education*, *21*(2/7), 1–8. Retrieved from https://democracyeducationjournal.org/home/vol21/iss2/7

Chen, B., & Hong, H. Y. (2016). Schools as knowledge-building organizations: Thirty years of design research. *Educational Psychologist*, *51*(2), 266–288. https://doi.org/10.1080/00461520.2016.1175306

Chen, B., Scardamalia, M., & Bereiter, C. (2015). Advancing knowledge-building discourse through judgments of promising ideas. *International Journal of Computer-Supported Collaborative Learning*, *10*(4), 345–366. https://doi.org/10.1007/s11412-015-9225-z

Claxton, G. (2013). *What's the point of school: rediscovering the heart of education*. Retrieved from http://ebookcentral.proquest.com

Cochran-Smith, M., & Lytle, S. L. (2009). *Inquiry as stance: practitioner research in the next generation*. New York, NY: Teachers College Press, Columbia University.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). https://doi.org/10.1111/j.1467-8527.2007.00388_4.x

Cohn, T. J. (2012). Assent. In N. Salkind (Ed.), *Encyclopedia of research design* (pp. 45–46). https://doi.org/http://dx.doi.org/10.4135/9781412961288 Print

Corbin, J. M. (2011). Memos, memoing. In M. S. Lewis-Beck, A. Bryman, & T. Futing-Liao (Eds.), *The SAGE encyclopedia of social science research methods* (pp. 1–3). https://doi.org/ 10.4135/9781412950589

Costley, C., Elliott, G., & Gibbs, P. (2010). Key concepts for the insider-researcher. In C. Costley, G. Elliott, & P. Gibbs (Eds.), *Doing work based research: Approaches to enquiry for the insider- researchers* (2nd ed., pp. 1–7). https://doi.org/10.4135/9781446287880.n1

Davidson, C., & Tolich, M. (2007). Competing traditions. In C. Davidson & M. Tolich (Eds.), *Social Science Research in New Zealand* (2nd ed., pp. 23–38). Auckland, New Zealand: Pearson Education New Zealand.

Department of Education (1939). *Report of the Minister of Education for the year ended 31st December, 1938.* Retrieved from https://atojs.natlib.govt.nz/cgi-bin/atojs?a=d&cl=search&d=AJHR1939-I.2.2.4.1&srpos=19&e=-------10--11---bySH---0-AJHR_1939_I_CZz-G-

Dewey, J. (1997). *How we think*. New York, NY: Dover Publications. (Original work published 1910). Retrieved from https://ebookcentral.proquest.com

Dowling, M. (2006). Approaches to reflexivity in qualitative research. *Nurse Researcher*, *13*(3), 7–21. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=c8h&AN=106314915&site=ehost-live&scope=site

Ellis, N., & Loughland, T. (2016). The challenges of practitioner research: A comparative study of Singapore and NSW. *The Australian Journal of Teacher Education*, *41*(2), 122–136. https://doi.org/10.14221/ajte.2016v41n2.8

Erickson, F. (1986). Qualitative methods in research on teaching. In M. C. Wittrock (Ed.), *Handbook of research on teaching, Part 1* (3rd ed., pp. 119–161). New York, NY: MacMillan.

Feldman Alan, Konold, C., & Coulter, B. (2000). Bringing students to the data. In A. Feldman, C. Konold, B. Coulter, B. Conroy, C. Hutchison, N. London (Eds.), *Network Science, a decade later* (pp. 99–152). London, England: Routledge.

Fields, A., Lai, K. W., Gibbs, J. (Jack), Vermunt, A., & Kirk, J. (2016). The transformation of an online learning community from an organised facility to an organic fraternity. *Distance Education*, *37*(1), 60–72. https://doi-org.libproxy.unitec.ac.nz/10.1080/01587919.2016.1158769

Fructuoso, I. N. (2013). Pedagogical directions to design and support collaborative knowledge building on-line tasks. *Education in the Knowledge Society (EKS)*, *14*(1), 51–75. Retrieved from http://campus.usal.es/~revistas_trabajo/index.php/revistatesi/article/view/9443

Gilbert, J. (2005). *Catching the knowledge wave?* Wellington, New Zealand: NZCER Press.

Gilbert, J. (2007). Catching the knowledge wave: Redefining knowledge for the post-industrial age. *Education Canada*, *47*(3), 4–8. Retrieved from www.edcan.ca

Gilbert, J. (2010). Are we there yet? In J. Kidman & K. Stevens (Eds.)*, Looking back from the centre* (pp. 19–40). Wellington, New Zealand: Victoria University Press.

Goh, A., Chai, C. S., & Tsai, C. C. (2013). Facilitating students' development of their views on nature of Science: A knowledge building approach. *Asia-Pacific Education Researcher*, *22*(4), 521–530. https://doi.org/10.1007/s40299-012-0050-0

Greene, M. (2014). On the inside looking in: Methodological insights and challenges in conducting qualitative insider research. *Qualitative Report*, *19*(29), 1-13. Retrieved from http://ezproxy.leedsbeckett.ac.uk/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edb&AN=97272692&site=eds-live&scope=site

Groenewald, T. (2012). Memos and memoing. In L. M. Given (Ed.), *The Sage encyclopedia of qualitative research methods* (pp. 1–4). https://doi.org/http://dx.doi.org/10.4135/9781412963909

Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communication & Technology*, *29*(2), 75–91. https://doi.org/10.1007/BF02766777

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105–117). https://doi.org/http://www.uncg.edu/hdf/facultystaff/Tudge/Guba%20&%20Lincoln%201994.pdf

Guest, G., MacQueen, K. M., & Namey, E. E. (2014). *Applied thematic analysis.* http://dx.doi.org/10.4135/9781483384436.n4

Guest, G., MacQueen, K., & Namey, E. (2014). *Applied thematic analysis*. https://doi.org/10.4135/9781483384436

Hakkarainen, K. (2003). Emergence of progressive-enquiry culture in computer-supported collaborative learning. *Learning Environments Research*, *6*(2), 199–220. https://doi.org/10.1023/A:1024995120180

Hakkarainen, K. (2004). Pursuit of explanation within a computer-supported classroom. *International Journal of Science Education*, *26*(8), 979–996. https://doi.org/10.1080/1468181032000354

Hakkarainen, K. (2009). A knowledge-practice perspective on technology-mediated learning. *International Journal of Computer-Supported Collaborative Learning*, *4*(2), 213–231. https://doi.org/10.1007/s11412-009-9064-x

Hakkarainen, K., Lipponen, L., Järvelä, S., & Niemivirta, M. (1999). The interaction of motivational orientation and knowledge-seeking inquiry in computer-supported collaborative learning. *Journal of Educational Computing Research*, *21*(3), 263–281. https://doi.org/10.2190/C525-TDYQ-WWKY-87CB

Hakkarainen, K., & Paavola, S. (2007). *From monological and dialogical to trialogical approaches to learning.* Retrieved from http://escalate.org.il/construction_knowledge/papers/hakkarainen.pdf

Hakkarainen, K., Paavola, S., Kangas, K., & Seitamaa-Hakkarainen, P. (2013). Sociocultural perspectives on collaborative learning: Towards collaborative knowledge creation. In C. E. Hmelo-Silver, C. A. Chinn, C. K. K. Chan & A. M. O'Donnell (Eds.) *The International handbook of collaborative learning* (pp. 57–73). https://doi.org/10.4324/9780203837290.ch3

Hakkarainen, K., & Sintonen, M. (2002). The interrogative model of inquiry and computer-supported collaborative learning. *Science and Education*, *11*(1), 25–43. https://doi.org/https://doi.org/10.1023/A

Hargreaves, D. H. (1999). The knowledge-creating school. *British Journal of Educational Studies*, *47*(2), 122–144. https://doi.org/10.1111/1467-8527.00107

Hatch, J. A. (2002). *Doing qualitative research in education settings*. https://doi.org/10.1207/s15430421tip3903

Hennink, M. M. (2013). *Focus group discussions*. https://doi.org/10.1093/acprof:osobl/9780199856169.003.0001

Herr, K., & Anderson, G. L. (2005). *The action research dissertation: A guide for students and faculty*. https://doi.org/10.1111/j.1365-2648.2006.04168.x

Hesse-Biber, S. N., & Leavy, P. (2011). *The ethics of social research* (2nd ed.). Thousand Oaks, CA: Sage.

Hilsabeck, A. (2010). Why make a commitment to practitioner research? *Inquiry in Education*, *1*(1), 1–3. Retrieved from ttps://digitalcommons.nl.edu/ie/vol1/iss1/3

Hoadley, C. M., & Kilner, P. G. (2005). Using technology to transform communities of practice into knowledge-building communities. *SIGGROUP Bulletin*, *25*(1), 31–40. https://doi.org/10.1145/1067699.1067705

Holian, R., & Coghlan, D. (2013). Ethical issues and role duality in insider action research: Challenges for action research degree programmes. *Systemic Practice and Action Research*, *26*(5), 399–415. https://doi.org/10.1007/s11213-012-9256-6

Hollander, J. A. (2004). The social contexts of focus groups. *Journal of Contemporary Ethnography*, *33*(5), 602–637. https://doi.org/10.1177/0891241604266988

Holloway, I., & Todres, L. (2003). The status of method: Flexibility, consistency and coherence. *Qualitative Research*, *3*(3), 345–367. https://doi.org/10.1177/1468794103033004

Hong, H. Y., & Sullivan, F. R. (2009). Towards an idea-centered, principle-based design approach to support learning as knowledge creation. *Educational Technology Research and Development*, *57*(5), 613–627. https://doi.org/10.1007/s11423-009-9122-0

Hong, H. Y., Zhang, J., Teo, C., & Scardamalia, M. (2009). Towards design-based knowledge-building practices in teaching. *Proceedings of the 9th international conference on Computer supported collaborative learning - CSCL'09*, 1, 257–261. https://doi.org/10.3115/1600053.1600092

Jacobson, D. (1999). Doing research in cyberspace. *Field Methods*, *11*(2), 127–145. https://doi.org/10.1177/1525822X9901100204

Janis, I. (1972). *Victims of groupthink; a psychological study of foreign-policy decisions and fiascoes*. Boston, MA: Houghton, Mifflin.

Kim, Y., Glassman, M., & Williams, M. S. (2015). Connecting agents: Engagement and motivation in online collaboration. *Computers in Human Behavior*, *49*(1), 333–342. https://doi.org/10.1016/j.chb.2015.03.015

Kincheloe, J. L. (2012). *Teachers as researchers: Qualitative inquiry as a path to empowerment* (3rd ed.). New York, NY: Routledge.

King, N. (2004). Using interviews in qualitative research. In C. Cassell & G. Symon (Eds.), *Essential guide to qualitative methods in organizational research* (pp. 11–23). https://doi.org/10.4135/9781446280119.n2

Krueger, R. A., & Casey, M. A. (2015). *Focus groups: A practical guide for applied research* (5th ed.). Thousand Oaks, CA: Sage.

Lai, K. W. (2005). Teachers using ICT: Myths and realities. In K. W. Lai (Ed.), *e-Learning Communities* (pp. 9–22). Dunedin, New Zealand: University of Otago Press.

Lai, K. W. (2010). The impact of the New Zealand ICT strategies on learning and teaching: What the research says. In V. Ham & D. Wenmoth (Eds.), *eLearnings: Implementing a national strategy for ICT in education, 1998-2010* (pp. 153–163). Christchurch, New Zealand: Core Education.

Lai, K. W. (2011). Digital technology and the culture of teaching and learning in higher education. *Australasian Journal of Educational Technology*, *27*(8), 1263-1275. https://doi.org/10.14742/ajet.892

Lai, K. W. (2012). Knowledge building with senior secondary sciences students: The OUASSA project. *Computers in New Zealand Schools: Learning, Teaching, Technology*, *24*(3), 259–277. Retrieved from http://www.otago.ac.nz/cdelt/otago063709.pdf

Lai, K. W. (2013). *Knowledge building with senior secondary students: A New Zealand study.* Paper presented at the X World Conference on Computers in Education July 2-5, Torun, Poland. Retrieved from http://wcce2013.umk.pl/publications/v1/V1.1_007-Lai-fullR-FPR.pdf

Lai, K. W. (2015). Knowledge construction in online learning communities: A case study of a doctoral course. *Studies in Higher Education*, *40*(4), 561–579. https://doi.org/10.1080/03075079.2013.831402

Lai, K. W. (2016). *Developing teacher identity in a knowledge building community*. Paper presented at Leading education: The distinct contributions of educational research and researchers, Dublin, Ireland. Retrieved from https://eera-ecer.de/ecer-programmes/conference/21/contribution/36840/

Lai, K. W. (2017). Pedagogical practices of NetNZ teachers for supporting online distance learners. *Distance Education*, *38*(3), 321–335. https://doi.org/10.1080/01587919.2017.1371830

Lai, K. W., Bolton, C., Bennett, Campbell, C., & Kelly, M. (2012). Designing knowledge-building communities in New Zealand secondary schools: Some preliminary

reflections, *Teaching and Learning Research Initiative*, *24*(3), 278–307. Retrieved from http://www.otago.ac.nz/cdelt/otago063713.pdf

Lai, K. W., & Campbell, M. (2017). Developing secondary students' epistemic agency in a knowledge-building community. *Technology, Pedagogy and Education*, *27*(1), 69–83. https://doi.org/10.1080/1475939X.2017.1369150

Lai, K. W., Pratt, K., Anderson, M., & Stigter, J. (2006). *Literature review and synthesis: Online Communities of Practice*. Retrieved from Ministry of Education website: http://www.educationcounts.govt.nz/__data/assets/pdf_file/0019/7480/lrs-online-com.pdf

Lai, K. W., Trewern, A., Pullar, K., Bolton, C., Campbell, M., Yuill Proctor, T., … Zaolum, T. (2014). *Designing knowledge building communities in secondary schools*. Retrieved from the Teaching & Learning Research Initiative website: http://www.tlri.org.nz/tlri-research/research-completed/school-sector/designing-knowledge-building-communities-secondary

Lakkala, M., Lallimo, J., & Hakkarainen, K. (2005). Teachers' pedagogical designs for technology-supported collective inquiry: A national case study. *Computers and Education*, *45*(3), 337–356. https://doi.org/10.1016/j.compedu.2005.04.010

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. https://doi.org/http://dx.doi.org/10.1017/CBO9780511815355

Lee, E. Y. C., Chan, C. K. K., & van Aalst, J. (2006). Students assessing their own collaborative knowledge building. *International Journal of Computer-Supported Collaborative Learning*, *1*(2), 277–307. https://doi.org/10.1007/s11412-006-8997-6

Lempert, L. B. (2011). Asking questions of the data: Memo writing in the grounded theory tradition. In A. Bryant & K. Charmaz (Eds.), *The SAGE handbook of grounded theory* (pp. 1–25). https://doi.org/http://dx.doi.org/10.4135/9781848607941

Littkey, D., & Allen, F. (1999). Whole-school personalization, one student at a time. *Educational Leadership*, *57*(1), 24–28. Retrieved from http://web.a.ebscohost.com.libproxy.unitec.ac.nz/

Loh, J., & Smyth, R. (2010). Understanding students' online learning experiences in virtual teams. *MERLOT Journal of Online Learning and Teaching*, *6*(2), 335–342. https://doi.org/10.1007/978-3-642-14484-4

Lonka, K., Hakkarainen, K., & Sintonen, M. (2000). Progressive inquiry learning for children — Experiences, possibilities, limitations. *European Early Childhood Education Research Journal*, *8*(1), 7–23. https://doi.org/10.1080/13502930085208461

Mann, C., & Stewart, F. (2011). Internet interviewing. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interview research* (pp. 602–627). https://doi.org/http://dx.doi.org/10.4135/9781412973588

Mann, C., & Stewart, F. (2011). *Internet communication and qualitative research*. https://doi.org/http://dx.doi.org/10.4135/9781849209281

Mauthner, C. M., Birch, M., Miller, T., Jessop, J., Miller, E. T., Birch, M., … Jessop, J. (2014). Conclusion: Navigating ethical dilemmas and new digital horizons. In T. Miller, M. Birch, M. Mauthner, & J. Jessop (Eds.), *Ethics in qualitative research* (pp. 176–186). https://doi.org/http://dx.doi.org/10.4135/9781473913912

Meyer, K. A. (2014). Limits to student engagement. In K. A. Meyer (Ed.), *Student engagement online: what works and why* (1st ed., pp. 75–86). https://doi.org/10.1002/aehe.20018

Mills, J. (2014). Methodology and methods. In J. Mills & M. Birks (Eds.), *Qualitative methodology: A practical guide* (pp. 31–47). https://doi.org/10.4135/9781473920163

Ministry of Education New Zealand. (2007). *The New Zealand curriculum*. Retrieved from http://nzcurriculum.tki.org.nz/the_new_zealand_curriculum

Ministry of Education. (2010). *Enabling the 21st century learner: eLearning action plan for schools 2006-2010*. Retrieved from http://elearning.tki.org.nz/content/download/230/1251/file/ELearningActionPlan-5.pdf

Ministry of Education. (2018). NCEA review discussion document: Big opportunities. Retrieved from https://conversation-space.s3.ap-southeast-2.amazonaws.com/NCEA Review Discussion Document MAG Big Opps_WEB.pdf/NCEA Review Discussion Document MAG Big Opps_WEB.pdf

Moss, J., & Beatty, R. (2006). Knowledge building in mathematics: Supporting collaborative learning in pattern problems. *International Journal of Computer-Supported Collaborative Learning*, *1*(4), 441–465. https://doi.org/10.1007/s11412-006-9003-z

Mutch, C. (2005). *Doing educational research*. Wellington, New Zealand: NZCER Press.

Mylläri, J., Åhlberg, M., & Dillon, P. (2010). The dynamics of an online knowledge building community: A 5-year longitudinal study. *British Journal of Educational Technology*, *41*(3), 365–387. https://doi.org/10.1111/j.1467-8535.2009.00972.x

Neuman, W. L. (2011). *Social research methods: Qualitative and quantitative approaches* (7th ed.). Boston, MA: Pearson.

Niu, H., & Van Aalst, J. (2009). Participation in knowledge-building discourse: An analysis of online discussions in mainstream and honours social studies courses. *Canadian Journal of Learning and Technology*, *35*(1), 1–23. Retrieved from http://hub.hku.hk/handle/10722/85086

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, *16*(1), 1–13. https://doi.org/doi/10.1177/1609406917733847

O'Neill, J. (2005). Policies on teachers and teaching: More of the same. In J. Codd & K. Sullivan (Eds.), *Education policy directions in Aotearoa New Zealand* (pp. 115–125). Melbourne, Australia: Thomson Learning Australia.

O'Neill, J. (2010). Teachers and teaching. In M. Thrupp & R. Irwin (Eds.), *Another decade of New Zealand education policy: Where to now?* (pp. 1–19). Hamilton, New Zealand: Malcolm Wilf Institute of Educational Research.

21st Century Learning Reference Group. (2014). *Future-focused learning in connected communities*. Retrieved from https://www.education.govt.nz/assets/Documents/Ministry/Initiatives/FutureFocusedLearning30May2014.pdf

Oliphant, T., & Branch-Mueller, J. (2016). Developing a sense of community and the online student experience. *Education for Information*, *32*(4), 307–321. https://doi.org/10.3233/EFI-160979

Opie, A. (2007). Unstructured interviewing. In C. Davidson & M. Tolich (Eds.), *Social science research in New Zealand* (2nd ed., pp. 240–250). Auckland: Pearson Education New Zealand.

Pelletier, J., Reeve, R., & Halewood, C. (2006). Young children's knowledge building and literacy development through knowledge forum®. *Early Education & Development*, *17*(3), 323–346. https://doi.org/10.1207/s15566935eed1703_2

Persaud, N. (2012). Interviewing. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 633–636). https://doi.org/http://dx.doi.org/10.4135/9781412961288

Popp, J. S., & Goldman, S. R. (2016). Knowledge building in teacher professional learning communities: Focus of meeting matters. *Teaching and Teacher Education*, *59*, 347–359. https://doi.org/10.1016/j.tate.2016.06.007

Popper, K. (1978). Three worlds. In *The Tanner lectures on human values* (pp. 143–167). Retrieved from http://tannerlectures.utah.edu/_documents/a-to-z/p/popper80.pdf

Pór, G., & Molloy, J. (2000). *Nurturing systemic wisdom through knowledge ecology*. Retrieved from https://thesystemsthinker.com/nurturing-systemic-wisdom-through-knowledge-ecology/

Resendes, M., Scardamalia, M., Bereiter, C., Chen, B., & Halewood, C. (2015). Group-level formative feedback and metadiscourse. *International Journal of Computer-Supported Collaborative Learning*, *10*(3), 309–336. https://doi.org/10.1007/s11412-015-9219-x

Robinson, V. M., & Lai, M. K. (2006). *Practitioner research for educators*. Thousand Oaks, CA: Sage Publications.

Ryan, G. W., & Bernard, H. R. (2003). Techniques to identify themes. *Field methods*, *15*(1), 85–109. https://doi.org/10.1177/1525822X02239569

Scardamalia, M. (2002). Collective cognitive responsibility for the advancement of knowledge. In B. Smith (Ed.), *Liberal education in a knowledge society* (1st ed., pp. 67–98). Chicago and La Salle, Il: Open Court.

Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge building: A challenge for the design of new knowledge media. *Journal of the Learning Sciences*, *1*(1), 37–68. https://doi.org/10.1207/s15327809jls0101_3

Scardamalia, M., & Bereiter, C. (2003). Knowledge building. In T. Postlethwaite, T. N. Husen (Eds.), *Encyclopedia of education* (2nd ed., pp. 1370–1373). New York, NY: Macmillan Reference USA.

Scardamalia, M., & Bereiter, C. (2006). Knowledge building: Theory, pedagogy, and technology. In R. K. Sawyer (Ed.), *Cambridge handbook of the learning sciences* (pp. 97–118). https://doi.org/10.1598/RT.61.2.5

Shwandt, T. A. (2011). Memoing. In T. Schwandt (Ed.), *The SAGE dictionary of qualitative inquiry* (3rd ed., pp. 1–2). https://doi.org/http://dx.doi.org/10.4135/9781412986281

Sikes, P. (2004). Methodology, procedures and ethical concerns. In C. Opie (Ed.), *Doing educational research.* (pp. 1–17). London, England: Sage.

Silverman, D. (1998). The quality of qualitative health research: the open-ended interview and its alternatives. *Social Sciences in Health*, *4*(2), 104–118.

Snook, I. (2003). *The ethical teacher*. Palmerston North, New Zealand: Dunmore Press.

So, H. J., & Tan, E. (2014). Designing the situation for pervasive knowledge building: Future school experiences. In S. C. Tan, H. J. So, & J. Yeo (Eds.), *Knowledge creation for education* (pp. 123–142). https://doi.org/DOI: 10.1007/978-981-287-047-6_8

So, H. J., Seah, L. H., & Toh-Heng, H. L. (2010). Designing collaborative knowledge building environments accessible to all learners: Impacts and design challenges. *Computers and Education*, *54*(2), 479–490. https://doi.org/10.1016/j.compedu.2009.08.031

Stahl, G. (2000). *A model of collaborative knowledge-building.* Paper presented at the 4th International Conference of the Learning Sciences (ICLS '00). Ann Arbor, MI. Retrieved from https://www.isls.org/icls/2000/

Staller, K. M. (2012). Qualitative research. In N. J. Salkind (Ed.), *Encyclopedia of research design* (pp. 1159–1163). https://doi.org/http://dx.doi.org/10.4135/9781412961288 Print

Stockleben, B., Thayne, M., Jäminki, S., Haukijärvi, I., Mavengere, N. B., Demirbilek, M., & Ruohonen, M. (2017). Towards a framework for creative online collaboration: A research on challenges and context. *Education and Information Technologies*, *22*(2), 575–597. https://doi.org/10.1007/s10639-016-9483-z

Terry, G., Hayfield, N., Clarke, V., & Braun, V. (2017). Qualitative research. In C. Willig, W. Stainton-Rogers (Eds.), *The SAGE handbook of qualitative research in psychology* (pp. 17–36). https://doi.org/http://dx.doi.org/10.4135/9781526405555

Thorne, S. (2000). Data analysis in qualitative research. *Evidence-Based Nursing*, *3*(3), 68–70. https://doi.org/10.1136/ebn.3.3.68

Tiidenberg, K. (2018). Ethics in digital research. In U. Flick & M. Steele (Eds.), *The SAGE handbook of qualitative data collection* (pp. 466–479). https://doi.org/http://dx.doi.org/10.4135/9781526416070

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development*: *Best evidence synthesis iteration [BES]*. Retrieved from Ministry of Education website: https://www.educationcounts.govt.nz/__data/assets/pdf_file/0017/16901/TPLandDBESentireWeb.pdf

Tolich, M., & Davidson, C. (2007). Collecting the data. In C. Davidson & M. Tolich (Eds.), *Social science research in New Zealand* (2nd ed., pp. 121–153). Auckland, New Zealand: Pearson Education New Zealand.

Tseng, F. C., & Kuo, F. Y. (2010). The way we share and learn: An exploratory study of the self-regulatory mechanisms in the professional online learning community. *Computers in Human Behavior*, *26*(5), 1043–1053. https://doi.org/10.1016/j.chb.2010.03.005

UNESCO. (2017). The four pillars of learning. Retrieved from http://www.unesco.org/new/en/education/networks/global-networks/aspnet/about-us/strategy/the-four-pillars-of-learning/

van Aalst, J. (2015). Knowledge building: Rationale, examples, design, and assessment. In K. W. Lai (Ed.), *Designing knowledge building communities in schools* (pp. 9–23). Retrieved from https://www.amazon.com/Designing-Knowledge-Building-Communities-Schools-ebook/dp/B01CRIZUHK/

van Aalst, J., & Hill, C. M. (2006). Activity theory as a framework for analysing knowledge building. *Learning Environments Research*, *9*(1), 23–44. https://doi.org/10.1007/s10984-005-9000-6

van Aalst, J., & Truong, M. S. (2011). Promoting knowledge creation discourse in an Asian primary five classroom: Results from an inquiry into life cycles. *International Journal of Science Education*, *33*(4), 487–515. https://doi.org/10.1080/09500691003649656

Viilo, M., Seitamaa-Hakkarainen, P., & Hakkarainen, K. (2018). Long-term teacher orchestration of technology-mediated collaborative inquiry. *Scandinavian Journal of Educational Research*, *62*(3), 407–432. https://doi.org/10.1080/00313831.2016.1258665

Wells, R. (2016). *A learner's paradise: How New Zealand is reimagining education: A guidebook for parents and educators everywhere*. London, England: EdTechTeam Press.

Wenger, E. (2000). Communities of Practice and social learning systems. *Organization articles*, *7*(2), 225–246. https://doi.org/10.1177/135050840072002

Wenger, E., McDermott, R., & Snyder, W. M. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, MA: Harvard Business School Press.

Wylie, C. (1999). *Ten years on: How schools view educational reform* (4 NZCER). Retrieved from NZCER Distribution Services: https://www.nzcer.org.nz/system/files/7483.pdf

Xiong, Y., & Toh, Y. (2015). Assessing learners' perceived readiness for computer-supported collaborative learning (CSCL): a study on initial development and validation. *Journal of Computing in Higher Education*, *27*(3), 215–239. https://doi.org/10.1007/s12528-015-9102-9

Yuen, A. H. K. (2003). Fostering learning communities in classrooms: A case study of Hong Kong schools. *Education Media International*, *40*(1/2), 153–162. https://doi.org/10.1080/0952398032000092198

Zhang, J., Hong, H. Y., Scardamalia, M., Teo, C. L., & Morley, E. A. (2011). Sustaining knowledge building as a principle-based innovation at an elementary school. *Journal of the Learning Sciences*, *20*(2), 262–307. https://doi.org/10.1080/10508406.2011.528317

Zhang, J., Scardamalia, M., Reeve, R., & Messina, R. (2009). Designs for collective cognitive responsibility in knowledge-building communities. *Journal of the Learning Sciences*, *18*(1), 7–44. https://doi.org/10.1080/10508400802581676

Zhang, J., & Sun, Y. (2011). Reading for idea advancement in a Grade 4 knowledge building community. *Instructional Science*, *39*(4), 429–452. https://doi.org/10.1007/s11251-010-9135-4

Zhao, K., & Chan, C. K. K. (2014). Fostering collective and individual learning through knowledge building. *International Journal of Computer-Supported Collaborative Learning*, *9*(1), 63–95. https://doi.org/10.1007/s11412-013-9188-x

APPENDICES

Appendix A: Participant Consent Form

Participant Consent Form

Research Project Title:

How can knowledge building communities be developed in New Zealand Secondary Schools?

Project researcher: Philippa Mallinson, phone 027-469-9702 or email philippa.mallinson@gmail.com

Project supervisor: Prof. Hayo Reinders, phone 021-747926 or email wreinders@unitec.ac.nz

I have read and understand the information sheet given to me and any questions I have about the study have been explained to me.

- I understand that I do not have to be part of this research project should I choose not to participate and may withdraw from involvement in the project if I wish to.
- If I choose to withdraw following the focus group, the data collected in the focus group session will not be able to be removed.
- If I choose to withdraw following the individual interview, the data collected in the interview can be withdrawn up to three weeks following receipt of digital recordings of the interview.
- I understand that everything I say is confidential and none of the information I give will identify me and that the only person who will know what I have said will be the researchers. I also understand that all the information that I give will be

stored securely on the researcher's computer for a period of 10 years, after which it will be securely deleted.

- I understand that any potentially identifying information such as names, towns or school will be deleted from transcripts and be referred to with a pseudonym. Every care will be taken with identities, however absolute and total anonymity cannot be guaranteed within the context of New Zealand given the small population and the relatively small number of teachers working with Knowledge Building pedagogy.
- I understand that a video recording will be made of the focus group discussion and parts will be transcribed.
- I understand that a video recording will be made of my individual interview and parts will be transcribed.
- I understand that I will be sent any transcriptions made of my individual interview for review.
- I understand that I will be sent the video recording of my individual interview for review.
- I understand that I will be provided with a summary of findings and can see the finished research document if I wish to.

I have had time to consider everything and I give my consent to be a part of this project.

Participant Name (please print):

…….....

Participant Signature: …….. Date: ……

Project Researcher: Philippa Mallinson, Date: 12-08-18

UREC REGISTRATION NUMBER: 2018-1053

This study has been approved by the UNITEC Research Ethics Committee from (20 August 2018) to (20 August 2019)

If you have any complaints or reservations about the ethical conduct of this research, you may

contact the Committee through the UREC Secretary (ph.: 09 815-4321 ext. 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix B: Participant Information Sheet

Information for Participants

Research Project Title:

Developing Knowledge Building Communities in the New Zealand Secondary classroom

My name is Philippa Mallinson. I am currently enrolled in the Master of Applied Practice Unitec New Zealand and seek your help in meeting the requirements of research for a Thesis course which forms a substantial part of this degree.

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate I thank you. If you decide not to take part, there will be no disadvantage to you and I thank you for considering my request.

Synopsis of the project: As New Zealand teachers respond to the need to develop a future-focused curriculum (Bolstad et al., 2012) and the demands of a knowledge society (Gilbert, 2005), many are adopting the Knowledge Building Communities approach.

This project examines and evaluates the complexities of developing a Knowledge Building Community (KBC) within a New Zealand secondary school.

What I am doing:

In detail, the aims of this project are to identify and examine teachers' perceptions of the social factors involved in developing a KBC, their perceptions of the pedagogical factors that make this difficult within the New Zealand secondary school context, and their view of the teacher actions that contribute positively to the development of a KBC. The findings of

the research may be beneficial for other teachers and/or schools when adopting new pedagogies such as the KBC model.

What Type of Participants am I looking for?

I am looking for New Zealand secondary school teachers who are familiar with the knowledge building (KB) model and have worked with it for at least one year (either now or in the past).

What will this mean for you?

Participants are asked to contribute to both a focus group (which will take approximately 45 minutes), and subsequently one individual interview (which will take approximately 30-45 minutes). Due to the geographical dispersion of teachers using the KBC model, the focus group and individual interviews will take place via a video conferencing medium that is accessible to all participants (e.g. Skype, or another application of your preference) at a time that is convenient to participants.

If you interested, simply email philippa.mallinson@gmail.com.

If you indicate an interest in participating in this project you will be contacted by email to arrange a suitable time for the interview and focus group.

Please note, if the project receives more volunteers than necessary, a selection will be made based on a range of locations, subject areas and deciles. Anyone who has expressed an interest in the research will receive a published copy of research findings if they wish.

Focus group

The focus group will involve the following:

1. A focus group of up to eight people will be formed.
2. There will be a one-off focus group with myself and the rest of the focus group members, during which I will pose some evaluative and open-ended questions which can

be discussed within the group. The focus group is expected to last approximately 45 minutes and is a one-off event.

3. A screen recording will be made of the focus group and salient points will be transcribed.

4. If you wish to withdraw from the project following the focus group, it is not possible to remove the data collected during the focus group.

Interview

1. I will individually interview up to eight participants.

2. Interviews will be approximately 30-45 minutes and take place via a video conferencing application such as Skype.

3. Screen recordings will be made of interviews and salient points will be transcribed.

4. You will receive a copy of the screen recording to approve.

5. You will be provided with a copy of the transcript to approve or edit. All identifying information will be removed from the transcript and your identity will not be shared with anyone beyond the researchers.

6. If you wish to withdraw your interview data from the project, you must do so within three weeks following receipt of the screen recording file.

You will be asked to sign a consent and confidentiality form. This does not stop you from changing your mind if you wish to withdraw from the project. However, as outlined above if you wish to withdraw following the focus group, the data collected during the focus group session will not be able to be withdrawn from the project. If you wish to withdraw from the project following the individual interview, this must be done within three weeks following receipt of the screen recording, in order for the data collected in your interview to be removed from the project.

Your name and information that may identify you will be kept completely confidential, pseudonyms will be used in the data analysis and publication of findings. All information collected from you will be stored on a password protected file on a password protected computer and only you, the researcher and Unitec supervisors will have access to this information.

When I have completed the study, I will produce a summary of the findings which I will send to you.

The data collected from you will be securely stored on a password protected hard drive for 10 years following the completion of the research project. After 10 years the data will be permanently deleted from the researcher's hard drive

You are very welcome to contact me directly if you need more information about the project. My email address is philippa.mallinson@gmail.com. My cellphone is 027-469-9702.

At any time if you have any questions or concerns about the research project you can contact my supervisor.

My supervisor is Prof. Hayo Reinders, you can contact him by phone 021-747926 or email wreinders@unitec.ac.nz.

Sincerely,

Philippa Mallinson

UREC REGISTRATION NUMBER: 2018-1053

This study has been approved by the UNITEC Research Ethics Committee from

(20 August 2018) to (20 August 2019)

If you have any complaints or reservations about the ethical conduct of this research, you may

contact the Committee through the UREC Secretary (ph.: 09 815-4321 ext. 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

References

Bolstad, R., Gilbert, J., &, Mcdowall, S., Bull, A., Boyd, S., … NZCER. (2012). *Supporting future-oriented learning & teaching — a New Zealand perspective Report to the Ministry of Education*. Wellington, New Zealand. Retrieved from https://www.educationcounts.govt.nz/publications/schooling/supporting-future-oriented-learning-and-teaching-a-new-zealand-perspective

Gilbert, J. (2005). *Catching the Knowledge Wave? The knowledge society and the future of education* (1st ed.). Wellington: NZCER Press.

Appendix C: Focus group confidentiality form

Research Project Title:

Developing Knowledge Building Communities in the New Zealand Secondary classroom

I _____ (full name - please print)

Agree to treat in absolute confidence, all information that I become aware of during the course of participation in the focus group. I agree to respect the privacy of those involved and will not divulge in any form, information with regard to any participating person or institution and agree to not retain or copy any information involving the above project.

Date:

Signature:

_____

Project researcher: Philippa Mallinson, phone 027-469-9702 or email philippa.mallinson@gmail.com

Project supervisor: Prof. Hayo Reinders, phone 021-747926 or email wreinders@unitec.ac.nz

UREC REGISTRATION NUMBER: 2018-1053

This study has been approved by the UNITEC Research Ethics Committee from (20 August 2018

) to (20 August 2019)

If you have any complaints or reservations about the ethical conduct of this research, you may

contact the Committee through the UREC Secretary (ph.: 09 815-4321 ext. 8551). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix D: Interview Schedule - Semi-structured Interview

Title: How can knowledge building communities be developed in New Zealand Secondary Schools?

Aims:

1. Examine teacher actions that contribute positively to the development of a KBC within New Zealand secondary school classrooms.

2. Identify the pedagogical factors that make it difficult for New Zealand secondary school teachers to develop KB pedagogy within their classes.

3. Identify social factors involved in developing a KBC in a New Zealand secondary school classroom.

Project researcher: Philippa Mallinson

- Can you give me a little background about the subject area/s you teach?
- What drew you to this/these subject area/s?
- Tell me about how you became involved in Knowledge Building, beginning with when you first heard about Knowledge Building Communities.
- In your understanding what is different about Knowledge Building culture?
- Which of the Knowledge Building principles do you consider the most important for the initial development of a KBC? Why?
- [Prompts to elaborate on above question]
- What do you consider the most important qualities (mindset/disposition etc.) to develop in a Knowledge Building Community?
- [Prompts to elaborate on above question]

- What made the development of a Knowledge Building Community challenging in your classroom, in terms of the social dynamics (ways students are used to working, dispositions, group dynamics, how they see themselves) of a secondary classroom?
- What do you think would help to support the development of a Knowledge Building Community, in terms of the social aspects of the classroom?
- What kind of challenges have you had in developing a Knowledge Building Community, in terms of pedagogy and learning design?
- [prompts to elaborate on the above question]
- What factors would have helped to support the development of Knowledge Building pedagogy in your classroom?
- What have been the most important developments or changes in your teaching since adopting the Knowledge Building model?
- Please elaborate how these developments happened and why you consider them to be important.
- What do you wish you knew or had access to when you first started adopting the Knowledge Building model?
- Is there anything else you'd like to tell me about your experiences of developing a Knowledge Building Community?

Appendix E: Interview Schedule - Focus Group

Title: How can knowledge building communities be developed in New Zealand Secondary Schools?

Aims:

1. Examine teacher actions that contribute positively to the development of a KBC within New Zealand secondary school classrooms.

2. Identify the pedagogical factors that make it difficult for New Zealand secondary school teachers to develop KB pedagogy within their classes.

3. Identify social factors involved in developing a KBC in a New Zealand secondary school classroom.

Project researcher: Philippa Mallinson

- Brief Introductions: what is your name, where do you work, when did you start working with the KBC model?
- What do you think is unique about Knowledge Building pedagogy, in comparison with traditional teaching methods?
- What, if any, were the challenges for you, in developing a knowledge building approach to your learning design?
- In your opinion, what is a teacher's role in the development of a Knowledge Building Community?
- In your experience, what kind of disposition do learners require for Knowledge Building?
- What factors do you think are important for encouraging a Knowledge Building disposition in your learners?

- What factors do you think supported you in developing a Knowledge Building Community?
- What factors do you think made it difficult for you to develop a successful Knowledge Building Community?
- What have you done to address your challenges of developing a Knowledge Building Community?
- Regarding the previous question please reflect on what worked well and what didn't.
- Imagine that you were in charge of curriculum development at your school, what would you recommend/put in place to help teachers to develop a KBC?
- Is there anything else we need to discuss about teachers developing Knowledge Building Communities?

Unitec
Institute of Technology
TE WHARE WĀNANGA O WAIRAKA

Declaration

Name of candidate: Philippa Lorraine Mallinson

This Thesis/Dissertation/Research Project **entitled** : How can knowledge building communities be developed in New Zealand secondary schools?
is submitted in partial fulfillment for the requirements for the Unitec degree of
Master of Applied Practice

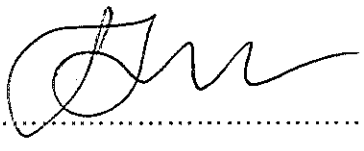
Principal Supervisor: Hayo Reinders

Associate Supervisor/s: Jo Mane

CANDIDATE'S DECLARATION

I confirm that:

- This Thesis/Dissertation/Research Project represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.
  Research Ethics Committee Approval Number: 2018-1053

Candidate Signature:  Date: 18/06/2019

Student number: 1491070

Unitec
Institute of Technology
TE WHARE WANANGA O WAIRAKA

Full name of author: Philippa Lorraine Mallinson

ORCID number (Optional): .....

Full title of thesis/dissertation/research project ('the work'):
How can knowledge building communities be developed in New Zealand secondary Schools

Practice Pathway: Te Miro - Education

Degree: Master of Applied Practice

Year of presentation: 2019

Principal Supervisor: Hayo Reinders

Associate Supervisor: Jo Mano

Permission to make open access
I agree to a digital copy of my final thesis/work being uploaded to the Unitec institutional repository and being made viewable worldwide.

Copyright Rights:
Unless otherwise stated this work is protected by copyright with all rights reserved.
I provide this copy in the expectation that due acknowledgement of its use is made.

AND

Copyright Compliance:
I confirm that I either used no substantial portions of third party copyright material, including charts, diagrams, graphs, photographs or maps in my thesis/work or I have obtained permission for such material to be made accessible worldwide via the Internet.

Signature of author: .....

Date: 18/06/2019