

Self-Efficacy in Inquiry Learning

Matthew Reese

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

Abstract

This thesis investigates the experiences of low efficacious students within an inquiry learning context. The research took place in a junior college in Auckland, New Zealand catering to Year 7-10 students. Interviews were conducted with three students with different self-efficacy profiles and one teacher, who is part of the project-based learning team across the school. Bandura's (1977) self-efficacy construct forms the conceptual framework for interpreting the students' experiences and beliefs around inquiry learning. Overall, the study suggests that while low efficacious students express positivity towards inquiry learning, they lack of confidence in their ability to self-regulate their learning, citing habitual task disengagement and maladaptive strategy use. This contrasts with the high efficacious student who reported strong belief in her self-regulatory ability and adaptive strategy use. The study also identifies the foregrounding of the key competencies of the 2007 New Zealand Curriculum (NZC). The study suggests that greater attention needs to be given to the efficacy profiles of students in inquiry learning environments, as the learning experiences of students appear to differ considerably. This finding has implications for both policy and practice in New Zealand secondary schools and in particular the impact of inquiry learning practices and minimally guided instruction on certain students.

Acknowledgements

I would like to express my sincere thanks to the participating teacher for sharing her thoughts and perspectives on her craft and for her patience in answering all of my questions. I would also like to thank the three participating students for sharing their time, thoughts and ideas.

I would like to thank my advisor Nina Hood.

To the amazing Heidi, thank you for your advice and help in getting to the finish line. I could not have done it without you.

And finally, to my family and friends, without your love and support this thesis would never have been possible.

Table of Contents

Abstract	ii
Acknowledgements	iii
List of acronyms.....	1
Chapter 1: Introduction.....	2
1.1 Student centric teaching.....	2
1.2 Inquiry learning	3
1.3 Contested space.....	4
1.4 Limitations of current research into inquiry learning.....	5
1.5 Motivation for research	5
1.6 The study	6
1.7 Self-efficacy.....	7
1.8 Research site	8
1.9 Thesis overview	9
Chapter 2: Literature review	10
2.1 Inquiry learning	10
2.1.1 The rise of student-centric learning.....	10
2.1.2 Origins of inquiry learning.....	11
2.1.3 Inquiry learning process.....	11
2.1.4 Inquiry learning in New Zealand.....	13
2.1.5 Challenges in assessment	14
2.1.6 Impact on learning.....	15
2.1.7 Impacts of inquiry learning in New Zealand.....	16
2.2 Self efficacy	16
2.2.1 The construct of self-efficacy.....	16
2.2.2 Sources of self-efficacy	18
2.2.3 Self-efficacy and self-regulation	21
2.3 Self-efficacy and inquiry learning.....	22
2.4 Summary of research gaps	23
Chapter 3: Methodology.....	25
3.1 Research context	25
3.2 Research design.....	25
3.3 Philosophical orientation.....	26
3.4. Sample selection	27
3.5 Data collection:	28
3.5.1 Interviews.....	28
3.5.2 Observation	28
3.6 Data analysis	29

3.7 Ethical considerations	30
Chapter 4: Findings.....	32
4.1 HSE1.....	32
4.1.1 Self-regulation.....	32
4.1.2 Emotional arousal.....	34
4.1.3 Help seeking / teacher support	35
4.1.4 Challenge	35
4.1.5 Evidence of learning	36
4.2 LSE 1 and LSE2.....	37
4.1.1 Self-regulation.....	37
4.2.2 Emotional arousal.....	40
4.2.3 Help seeking / teacher support	41
4.2.4 Challenge	42
4.2.5 Evidence of learning	42
4.3. Teacher – project learning design team	43
4.3.1 Self-regulation.....	43
4.3.2 Emotional arousal.....	44
4.3.3 Help seeking / teacher support	44
4.3.4 Challenge	45
4.3.5 Evidence of learning	46
4.4 Summary.....	47
Chapter 5: Discussion and conclusions.....	49
5.1 Research problem.....	49
5.2 Self-regulation	50
5.2.1 Student choice	50
5.2.2 Motivation.....	52
5.2.3 Emotional arousal and help-seeking behaviors	54
5.3 Help-seeking.....	57
5.4 Challenge and evidence of learning	59
5.4.1 Challenge	59
5.4.2 Evidence of learning	61
5.5 Conclusion	64
References.....	66
Appendix A: Teacher interview guide	78
Appendix B: Self-efficacy questionnaire.....	81
Appendix C: Participant information sheet	85
Appendix D: Teacher consent form	88
Appendix E: Student assent form	91

List of acronyms

MAC	Mentor Advisor Coach
NZC	New Zealand Curriculum
TAIP	Transdisciplinary authentic inquiry projects

Chapter 1: Introduction

The aim of this thesis is to investigate the impact of inquiry learning on low efficacious students. This will be done through exploring their perspectives using Bandura's (1977) self-efficacy construct. This chapter will provide an overview of the movement, both in New Zealand and globally, towards student centric teaching approaches in school, followed by a description of inquiry learning. It then presents the need for this research, the motivation behind the study, and an overview of the study. After this, Bandura's (1977) self-efficacy construct is presented.

1.1 Student centric teaching

Rapid economic, technological and societal change has contributed to calls for new approaches to education, in order to better prepare students for the challenges of the future (Ministry of Education, 2012). This has led to the movement from teacher centric to learner driven approaches in education. Educationalists contend that student centric approaches support the necessary development of skills, capabilities and habits of the mind, that will enable learners to thrive in an increasingly complex global society (Buchanan et al., 2016). This shift to more student centric learning is encapsulated in inquiry learning. Inquiry is thought to better develop the independent critical and adaptive thinking skills needed to prepare students to become 21st century learners (Bell, 2010). Amongst many educationalists, teachers and policy makers it is considered well aligned with the intentions of the NZC (Boyd & Hipkins, 2012). One consequence of this shift in educational philosophy, and the implementation of inquiry learning approaches, is the transference of greater responsibility to students, positioning the teacher in a more facilitatory role. Facilitation is reliant on teachers' interpretation of the principles and key competencies of the NZC (2007). This in turn shapes their interpretation of how students navigate the demands of greater responsibility.

Ideas around constructivism and ease of access to information have prompted a movement away from an emphasis on academic domain knowledge, delivered through direct instruction, to an emphasis on facilitating the development of 'lifelong learners' who are able 'do things' with their learning rather than being passive recipients (Hipkins, 2008, p .2, NZC, 2007). The fundamental philosophical shift from knowledge as something we learn, to something we use and create, has led to a reimagining of teacher-student dynamics (Ministry of Education, 2012).

The role of teachers explicitly transmitting knowledge to students, has been replaced with an emphasis on coaching or mentoring students in their use of knowledge. This purposefully places greater responsibility for learning on to students, which is done with the intention of cultivating the habits of the mind, and the capabilities they are thought to need in the future.

The NZC's (2007) departure from the subject specific focus of the past, towards developing the 'whole person' is evidenced by its emphasis on developing its key competencies and principles. The key competencies of 'managing self', the vision of 'lifelong learners' and the principles of 'learning to learn' are of particular interest to this study, as there appears to be a significant relationship between these policy objectives and the study's participating teacher's educational beliefs, as well as the school's use of transdisciplinary project-based learning. All of which impact on the experiences, of both the students who can meet the demands inquiry learning, and those who cannot.

1.2 Inquiry learning

At the heart of inquiry learning is the idea that students arrive at a deeper understanding of the subject matter by engaging in self-directed investigations (Lanzonder, 2013). These investigations and learning approaches are a product of constructivist learning theories "which assumes that knowledge is generated by learners based on their prior experiences and meaning-making processes and occurs best when there is a strong focus on learner's engagement with and responsibility for their own learning" (Debs et al., 2019, p. 298-299). In this approach, students engage in the investigation of authentic issues, topics, and problems, where the students are expected to manage their learning through setting goals, and managing their time and effort (Blumenfeld et al., 1991).

Inquiry learning has been linked to both improvements in academic performance and affective states. Greater levels of school engagement, motivation, enjoyment, alongside developments in resourcefulness and accountability, are all outcomes commonly linked with inquiry approaches (Buchanan et al., 2016; Bell, 2010). Inquiry learning is also argued to produce superior academic outcomes to that of classroom instruction, in addition to developing valuable thinking skills and epistemic domain practices that aid in developing adaptive lifelong learners (Hmelo-Silver et al., 2007). Additionally, it has been linked to producing positive gains in academic self-efficacy (Määttä et al., 2016). Leveraging student interest and providing greater

levels of autonomy and choice are core components of inquiry, through the investigation of personally relevant questions, it is believed this produces deeper personal engagement (Buchanan et al., 2016). Inquiry methodologies are also attributed to fostering motivated learning, important study skills and significant gains in conceptual knowledge (Buchanan et al., 2016).

1.3 Contested space

Despite the many advantages of inquiry approaches, some significant limitations exist in assessing its efficacy. The first is the lack of researcher understanding as to what constitutes an authentic inquiry experience, which makes it difficult to draw generalizable conclusions. Leggett and Harrington (2021) despite their overall positive review of implementing inquiry approaches, acknowledge that there is disagreement amongst researchers as to what an inquiry unit consists of. More specifically, there is no clear consensus as to length of time a unit lasts, nor “how much emphasis should be placed on student choice, the extent of collaborative learning, and how to assess learning” (Yetkiner, Anderoglu & Capraro 2008 as cited in Leggett & Harrington, 2021 p.1272). Added to this, is the lack of agreement amongst researchers as to the appropriate extent of teacher scaffolding within projects (Lazonder & Harmsen, 2016). In a meta-analysis of the effects of guidance within inquiry learning, Lazonder and Harmsen (2016) highlighted the critical importance of teacher guidance within inquiry learning, and the extent of differing levels of teacher guidance used. In describing problem-based learning (PBL), an offshoot of inquiry learning, Thomas et al. (2000, as cited in Krsmanovic, 2021, p. 96) posits that “this heterogeneity of PjBL characteristics and the absence of a universally adopted PjBL model leads to not only numerous variations in implementing this approach, but also to challenges in assessing its effects”. For these reasons, any claims of universalism with regards to inquiry learning producing deeper learning, and increased motivation, would appear problematic.

Inquiry learning has also come under criticism for ignoring the limitations of working memory. Kirshchner et al. (2006) have questioned the effectiveness of inquiry learning due to the demands it places on cognitive capacity. They argue that inquiry processes divert cognitive resources to tasks unrelated to learning. This strains the capacity of working memory, leading to overload. Kirshchner et al. (2006) further contend that explicit instruction lowers the cognitive demands on students, leading to more effective learning experiences, especially in

the case of novice learners. Sweller (2021) posits that in the case of biologically secondary knowledge, knowledge that we have not evolved to acquire through experience, like that of reading or mathematic equations, are best acquired through explicit instruction. Zhang et al. (2024) cited a lack of evidence for the implementation of inquiry in science instruction, due to an absence of randomly controlled trails used in assessing its efficacy. Given arguments involving the limits of our cognitive architecture, any claims to deeper learning occurring in inquiry, remain a contested space in educational research.

1.4 Limitations of current research into inquiry learning

Limitations exist in the range of educational contexts that have been researched. Research into the impacts of inquiry learning tend to focus on the senior high school years and college students, principally studying math and science (Buchanan et al., 2016). Studies have also tended to focus on schools with students with higher socioeconomic status, making it difficult to generalize those effects across varied contexts. One reason for this concentration, is that most instances of inquiry implementation tend to be in more advantageous school environments (Duke et al., 2021). In New Zealand inquiry approaches have been broadly and diversely applied across a range of subject areas and year levels (Boyd & Hipkins, 2012). Some claim this has been done without sufficient empirical evidence (Kirschner et al., 2006). There is currently a dearth of research conducted into the effectiveness of inquiry learning in content areas such as social sciences or transdisciplinary studies. Additionally, little research exists focusing on younger students. Scant studies investigated students' perspectives on inquiry, so little is known about how they interpret the demands of the inquiry process. Gaining insight into these perspectives would aid teachers in designing better learning experiences, especially for students who may struggle with the demands of greater personal responsibility in inquiry learning.

1.5 Motivation for research

Having taught for 21 years, I have witnessed countless students struggle with poor self-regulation and low motivation. This led to an interest in how these students were impacted by a movement towards more student centric pedagogies, that require them to take greater responsibility for managing their own learning. I wanted to explore the perspectives of students who may struggle with this responsibility, while they engage in inquiry approaches that rely

heavily on high levels of motivation and self-regulation for their success. To investigate these perspectives, I incorporated Bandura's (1977) self-efficacy construct to identify students who may struggle in inquiry settings. Self-efficacy according to Bandura (1997) represents "people's beliefs in their capabilities to produce desired effects from their own actions" (p.vii). These beliefs powerfully influence the types of actions individuals choose to engage in, their levels of effort and perseverance, goal selection and self-guided behavior (Gaskill & Woolfolk Hoy, 2002; Bandura & Schunk, 1981; Maddux & Kleiman, 2021). Low efficacy individuals doubt their causative capabilities, producing low motivation, low levels of effort and poor self-regulation (Bandura, 1997). All of which will impact on academic functioning and performance within inquiry learning.

1.6 The study

This study is framed by the overarching research question: 'How are students with different efficacy profiles impacted by inquiry learning?'. The research site was selected due to the school employing a mainly project based learning approach. As this study sought to gain rich insights into students' perspectives of inquiry learning, a qualitative approach was employed. Through open ended interviews, I sought to explore the lived experiences of these students and contrast those with that of one high efficacious student and their teacher (learning coach), who is also a member of project design team. As a member of the project design team, she was well positioned to offer valuable insight into the aims and learning intentions of the school's delivery of project-based learning. Though the study was small in scale, it sought to collect rich data from deeply exploring participants' thoughts, feelings, ideas, and experiences. This was largely achieved through open ended questions that allowed the participants to reflect on their past and current experiences of inquiry learning. Each student was interviewed once for 30 minutes, while the participating teacher was interviewed twice, once for one hour, and second time for 30 minutes. In addition, there were multiple written correspondences between myself and the participating teacher. This was done to check details and ensure an accurate account was achieved. Added to this was a research journal, used to document my experiences during my four site visits. A recognised self-efficacy measure was used to select two low efficacy student participants, and one high efficacy student. Self-efficacy was additionally employed as a conceptual tool to interpret the data gathered from interviews. Justifications for the employment of self-efficacy construct will follow later in this chapter.

Linked to the aim of exploring low efficacious experiences of inquiry learning, is the examination of claims made that inquiry learning promotes greater engagement and deeper learning for all. This is seen to be produced through high levels of agency, choice, and student interest. There however is limited empirical evidence from both New Zealand and international contexts to support this claim. Additionally, there is a dearth of research that examines the impact of shifting greater responsibility to students that struggle with self-regulation, exhibit low motivation, and doubt their academic capabilities. Greater emphasis on student directed pedagogies comes with unique challenges for teachers. Striking the right balance between developing independent lifelong learners, and ensuring learning aims of projects are met, may prove challenging. This balance is especially precarious when dealing with low efficacious students who may habitually struggle with self-regulation. Given the differing motivational orientations existent throughout New Zealand schools, it can be assumed that shifting greater responsibility to the learner, is likely to lead to an array of learning outcomes. This study contributes to the literature by exploring the gaps that exist in inquiry research regarding the experiences of low efficacious students as they engage in inquiry learning.

1.7 Self-efficacy

Bandura's (1977) self-efficacy construct was selected because it provides a useful conceptual framework for thinking about the inner cognitive and metacognitive processes of students, as they navigate the demands of inquiry learning. Self-efficacy is supported by a considerable body of research, that has established individual differences in perceived self-efficacy predict academic performance (Schunk & Pajares, 2004). Important to this study are the processes that produce this performance. The first process of note to this study is procrastination. Students who report higher levels of academic self-efficacy report lower levels of academic procrastination than their low efficacy peers (Klassen et al., 2008). The second relevant process is task persistence. There is a significant relationship between high efficacy beliefs and persisting in the face of difficulties through successfully self-regulating their thoughts and actions (Komarraju & Nadler, 2013). Of particular importance to this study is the relationship between high efficacy and sustained motivation in challenging academic circumstances (Komarraju & Nadler, 2013). The third process of significance is the link between efficacy appraisals and anxiety arousal (Bandura, 1988). Low efficacy appraisals trigger anxiety responses, whereas high efficacy appraisals predict lower levels of adverse arousal (Bandura, 1997). While this is by no means an exhaustive list of the functions and interactions of efficacy

beliefs, they are processes of particular importance as they powerfully influence students' experiences within inquiry learning, making self-efficacy a useful conceptual tool.

1.8 Research site

This study focuses on three year 9 students and one teacher, who also holds a role on the project design team. This middle school is situated in Auckland, New Zealand and caters to year 7-10. The school's mainly project based learning approach makes it an ideal research site for investigating the impacts of inquiry learning on low efficacious students. Though the terms 'inquiry learning', 'problem-based learning', 'constructivist learning' and 'project-based learning' are thought by some researchers as being used interchangeably (Sweller, 2021), the participating teacher outlined the differences that exist in their approach to inquiry and that of project-based learning. The participating teacher defined inquiry at their school as open and fully student driven. Students can choose their project, decide their milestones, and come up with an original final outcome. The learners select project ideas, based on provocations led by learning coaches. This may result in 30 groups working on 30 different projects, guided by an inquiry model and learning conversations with coaches.

Project-based learning on the other hand is based on the Buck Institute for Education model, and involves a teacher planning a project, and learners carrying out that project. Ideally given to them at the start of the module, with the outline and resources prepared, learners then go through at their own pace. This is still very reliant on learners driving their learning, but there is a 'map' for learners to follow. Recently the school has shifted to more project-based learning from inquiry due to student ratios for transdisciplinary authentic inquiry projects (TAIP) increasing, making it difficult for the school to provide quality inquiry. According to the participating teacher, inquiry learning relied heavily on smaller ratios, which allowed for longer and more in-depth learning conversations. Projects can last for five to six weeks or as long as 15 weeks. Students work on one project at a time, with all their TAIP time dedicated to that project.

Despite the differences in approaches, both require significant levels of motivation, strategy use, effort management and high levels of self-regulation. For the purpose of this study, I will use the term inquiry learning to encompass both approaches, unless specific research refers to project-based learning.

1.9 Thesis overview

This thesis consists of five chapters. Chapter two presents the relevant literature around the emergence of inquiry learning, its tenets, and challenges. This is followed by an overview of Bandura's (1977) self-efficacy construct, sources of efficacy information and its relationship to self-regulation. The third chapter outlines the methodology used in conducting this qualitative study, site selection, methods used to gather and analyse data, as well as ethical considerations and trustworthiness. The fourth chapter presents the interview findings using thematic analysis. The final chapter includes a discussion of the findings incorporating Bandura's (1977) self-efficacy framework and the main conclusions and recommendations of the study.

Chapter 2: Literature review

This chapter reviews the literature relating to inquiry learning and self-efficacy, setting the stage for the research questions. The chapter begins by presenting the origins of inquiry learning, moving to its current theoretical underpinnings and the resulting application in New Zealand. Challenges in assessing the impact of inquiry learning are noted and the limited knowledge about its impact in New Zealand is demonstrated. Next, the chapter explores the literature on self-efficacy and connects how self-efficacy relates to inquiry learning.

2. 1 Inquiry learning

2.1.1 The rise of student-centric learning

In the last half of the 20th century the theoretical underpinnings of student-centric learning began to be formed. Over the last fifteen years or so, it has moved firmly into the mainstream in New Zealand, with strong support from educationalists who claim that traditional ideas around knowledge and educational practises do not adequately prepare learners for the 21st century (Buchanan et al., 2016). These concerns have contributed to a reimagining of traditional teacher-student dynamics as well as to new interpretations of the meaning of knowledge (Ministry of Education, 2012). In the Ministry of Education (2012) report on future learning, the authors assert that ‘people do not learn well as ‘spectators’” instead they must take an active role in their learning, learning through using knowledge rather than passively absorbing it (p.2). The movement away from conceptions of knowledge as something transmitted from teacher to student, paired with concerns around equity and inclusion have led to the push for a greater personalization of learning. Personalization is meant to ensure learners’ interests and needs are met, hopefully also ensuring their aspirational horizons are not constrained by the rigidity of outmoded knowledge paradigms (Ministry of Education, 2012).

The result is manifested in a movement towards more student-centric approaches to education. Student-centric approaches are thought to be ‘supportive of skills development necessary for effective and satisfying participation in an increasingly complicated, global society’ (Buchanan et al., 2016, para.3). Inquiry learning is one of the approaches that has to come to the fore in the paradigm shift towards student-centric learning.

2.1.2 Origins of inquiry learning

Inquiry learning is grounded in the American progressive education movement with educational philosophers like that of John Dewey (Tobias & Duffy, 2009). Dewey was critical of transmission methods of teaching and emphasised the importance of students developing modes of thinking that led to answers based on students investigating problems connected to their experiences (Friesen & Scott, 2013). Dewey argued that students should be given some autonomy and play (more) active roles in their learning (Friesen & Scott, 2013).

Inquiry learning is essentially constructivist in nature. According to the constructivist ideas of Jean Piaget, as described by McInerney and McInerney (1998), learning occurs through actively experiencing and interacting with objects in the world, which leads to ‘constructing ever more powerful theories of the world’ (p.21). The active participation in the stages of an inquiry embody constructivism’s conceptual underpinnings. Beginning as a theory of learning, rather than a theory of teaching, it has nevertheless given rise to the prolific implementation of constructivist pedagogies like that inquiry learning (McInerney & McInerney; 1998, Kirschner et al., 2006). One tenet of constructivist thought, central to this study, is the assumption that students will naturally exhibit self-regulatory behaviour, when given greater autonomy and when pursuing personally relevant questions. Constructivists argue learners’ natural inclinations to pursue personally relevant goals produces motivated actions and purposeful self-management (McInerney & McInerney, 1998). This study seeks to explore those assertions.

2.1.3 Inquiry learning process

In inquiry learning students are guided through several stages. Despite the various names that have been given to the different stages of the inquiry process, the proposed purpose of each step is similar in its learning intent.

In the first stage of an inquiry project an issue, topic or problem is identified. In some approaches students are given options from which they select their preferred choice of inquiry (Sharples & Anastopoulou, 2012). In other approaches students are given full freedom to brainstorm and generate their own questions to investigate (Boyd & Hipkins, 2012). Agency and choice at this stage is viewed as a critical component in triggering motivated engagement

for the student, which is also expected to deepen their learning experiences (Buchanan et al., 2016).

In the second stage learners plan their methods of information collection (Sharples & Anastopoulou, 2012). Here students decide on the equipment, methods and actions that are necessary to investigate their question, hypothesis, issue or topic (Scanlon et al., 2012). The choice in this stage is mediated by the availability of equipment and domain knowledge students possess and hence requires scaffolding by the teacher (Scanlon et al., 2012). While teacher scaffolding has been established to be a critical component of a successful inquiry, there is no clear consensus amongst researchers, as to the amount of teacher guidance that supports learning without undermining developmental goals (Lazonder & Harmsen, 2016). The decision about this balance is thus left largely up to teacher discretion, resulting in high variability in application.

In the third stage students collect their evidence, using the methods, strategies and equipment decided on in the previous stage. Teacher scaffolding of appropriate strategies in this stage is especially important for younger learners (Lazonder & Harmsen, 2016). In their meta-analysis of the effects of teacher guidance in inquiry learning Lazonder & Harmsen (2016) found a significant positive relationship between high levels of scaffolding and positive learning outcomes, compared to less teacher guided instruction.

In the fourth stage students analyse and present their findings. Here students sort and synthesise the information they have collected (Sharples & Anastopoulou, 2012; Boyd & Hipkins, 2012) using whatever means available to them and communicate their findings using presentations, posters, reports, videos, and other methods to facilitate discussion on what they have found or learnt (Littleton et al., 2012; Boyd & Hipkins, 2012).

In the fifth and final stage students reflect on their project. While reflective thinking plays an integral part in each stage of the process, it is in this stage that students reflect on the project as whole, evaluating their methods, progress and understanding (Scanlon et al., 2012).

Despite the commonality of stages, there exists high levels of variability in its execution (Leggett & Harrington, 2021). Literature around inquiry learning suggests that there is little agreement amongst educationalists as to the ideal duration of a project, the degree of teacher

scaffolding, the amount of student choice, and the level of student collaboration (Lazonder et al., 2021). Added to this, is the variability of school resources and the teachers' skills and confidence in adopting inquiry approaches.

2.1.4 Inquiry learning in New Zealand

Since 2007, the New Zealand Curriculum emphasises 'developing learner autonomy' and a 'participatory view of learning' with the expectation that 'students need to be able to do things with their learning' (Hipkins, 2008, p.2). Clear links exist between the NZC vision of developing 'lifelong learners', 'active seekers, users, and creators of knowledge' and the key competencies of 'manging self' and inquiry models (NZC, 2007). Inquiry learning further satisfies the NZC intentions to shift from traditional transmission-based approaches to more student-centred configurations, where the teacher is no longer transmitting a fixed body of information to passive learners (Ministry of Education, 2019). As a result, inquiry learning has been being broadly and diversely applied across New Zealand schools (Boyd & Hipkins, 2012). Hipkins (2008) in her presentation to the Royal Society outlines the student centric nature of inquiry learning as understood in New Zealand, as students being actively involved in any or all of the following broadly defined parameters:

- Determining inquiry questions/directions.
- Finding and processing information.
- Shaping a response/report.
- Doing something with what they have learned.

This shift has encouraged teachers to view knowledge as fluid and co-constructed, where their role is to facilitate, with an emphasis on cultivating the development of key competencies, while ensuring alignment with the vision and principles of the NZC (2007).

Though there is clear theoretical alignment between inquiry learning and the intentions of the NZC (2007), no clear framework for its implementation is provided in the NZC (2007). This has resulted in an array of inquiry approaches being implemented across the country (Boyd & Hipkins, 2012).

Despite this variability, one common concern raised by teachers in New Zealand, was that students were not ready for the independent work that was perceived as a core component

(Boyd & Hipkins, 2012). This is a commonly reported problem throughout the literature. Proponents of inquiry learning argue that it takes time for students to adjust (Spronken-Smith et al., 2008). Exactly how much time is not specified. Scant research exists both on students' perspectives of the transition and why some students struggle with independent work more than others. In conjunction to this, are the experiences of new international arrivals entering New Zealand school systems. Little qualitative research has been done on these students' experiences of transitioning into inquiry learning approaches from school systems, that are in some instances heavily teacher centric. The shift from teacher centric to student centric approaches may lead to a great deal of confusion amongst these students, as to their role in learning. This points to need for qualitative research area to explore perspectives from students who are struggling: both the newcomers and residents.

2.1.5 Challenges in assessment

Assessing the effectiveness of inquiry learning, and its impact on students with different efficacy profiles, is challenging for a number of reasons. The first stems from attempts to define it. Spronken-Smith et al. (2008) in their article encouraging the use of inquiry, admit that even amongst the five authors, there was considerable disagreement as to what the essential elements of an inquiry were. Rather they view it as a 'philosophical approach' that should involve active participation and be student centric (Spronken-Smith et al., 2008). This ambiguity produces challenges. First, the lack of agreement creates difficulties for researchers to compare literature and draw comparisons across studies (Legget & Harrington, 2021). Second the lack of conceptual agreement leads to significant variation in its application. It is difficult to draw generalizable conclusions from approaches that vary considerably in length, degree of teacher scaffolding, student choice, class size and other significant variables (Lazonder & Harmsen, 2016).

The second challenge is the limited scope of research. Inquiry learning has been strongly linked with improvements in academic performance, confidence and student engagement (Bell, 2010; Duke et al., 2021). The research has largely been limited to science and math taught at high school and university (Buchanan et al., 2016). Little research exists in measuring the effects within transdisciplinary inquiry, more heavily student centric approaches, or the impact on younger learners (Buchanan et al., 2016). Additionally, there is scant research that focuses on student perspectives of inquiry learning (Buchanan et al., 2016). It is problematic to infer the

effectiveness with regards to motivation, confidence, and academic performance, from science and math to transdisciplinary project-based learning that incorporates multiple content areas.

The third challenge is the relative newness of the application in transdisciplinary inquiry. While inquiry in science and math is well established (Lazonder & Harmsen, 2016), transdisciplinary inquiry implemented with young learners has less empirical support. This absence also extends to university level inquiry learning. Krsmanovic (2021) claims this is because it is a “more recent phenomenon that has not yet produced the assessment, evaluation, and validation evidence equivalent” of other similar course redesigns (para.7). This lack of empirical support however has not slowed its broad implementation.

2.1.6 Impact on learning

The impact of inquiry approaches on learning has been a contested space for decades. Advocates of inquiry approaches contend that students learn best when constructing their own knowledge (Hmelo-Silver et al., 2007; McInerney & McInerney, 1998). Krischner et al., (2006) however argue that the processes involved in inquiry learning, diverts cognitive resources to tasks unrelated to learning, which strains the limits of working memory leading to cognitive overload. Additionally, Sweller (2021) contends that there are two broad categories of information. The first he describes as biological primary, which is made up of skills we have evolved to acquire effortlessly, like problem solving skills. The second are those we haven't evolved to acquire, which he terms biologically secondary information. This information requires high levels of focused attention and effort to learn. This complex domain knowledge, Sweller (2021) argues, is best acquired through direct instruction as this lowers the demands on working memory, allowing cognitive resources to be devoted to moving this novel information from working memory to long term memory. Sweller (2021) posits that it takes considerable effort and time to acquire this knowledge through inquiry approaches and posits it can be acquired more expediently and more easily through explicit instruction.

Additionally, Krischner et al., (2006) contend that a lack of prior conceptual knowledge adversely impacts inquiry leaning. They argue that prior domain knowledge is critical in lowering the demands on working memory. They contend that inquiry methods with minimal guidance from the teacher, are more suited to school environments where students have already acquired the content knowledge needed to engage in the inquiry. On the other side of this

argument Hmelo-Silver et al. (2007) argue that teacher guidance in the form of scaffolding provides the necessary support to lower the demands on working memory. However, given the lack of agreement as to what level of scaffolding is best working practice, this presents challenges for inquiry teachers.

2.1.7 Impacts of inquiry learning in New Zealand

While inquiry has been broadly implemented in New Zealand, little is known of its effectiveness when used across curriculum areas. This leads to researcher reliance on more general studies of inquiry and its impact on students when used in single curriculum areas like that of science. Teachers and school leaders report that ‘student voice initiatives’ including inquiry learning approaches have “seen lifts in student attendance and motivation” (Hipkins et al., (2011). The evidence provided however, is anecdotal rather than based on student perspectives. Moreover, the teachers involved admitted that it was too soon to know if the improved motivation led to gains in achievement. Similarly, evidence from PISA has demonstrated a link between the use of science-based inquiry instruction and increased levels of enjoyment for science, without translating to improvements in scientific achievement or competency amongst 15 years olds in New Zealand (Ministry of Education, 2019). In some cases, according to the ‘PISA index of inquiry-based instruction’ students experienced decreases in science performance equivalent to ‘about half a year of schooling’ (Ministry of Education, 2019 p.4). In the case of lower performing students, this decrease amounted to one or two years of schooling (Ministry of Education, 2019. Hattie and Yates (as cited in Ministry of Education, 2019) express concern that lower knowledge students tend to learn less than their higher knowledge peers, despite expressing a preference for minimally guided inquiry approaches. While teachers may view enjoyment as important to generating engagement, it may also lead to a widening of the knowledge gap between higher and low performing students.

2.2 Self efficacy

In the next section another key concept in education, self-efficacy, will be explored.

2.2.1 The construct of self-efficacy

People’s beliefs in their causative capabilities powerfully influences their exercise of control over their lives (Bandura, 1995). Self-efficacy is the judgement of perceived capabilities to cope when confronted with challenging situations (Gaskill & Woolfolk Hoy, 2002). Self-

efficacy strongly influences the actions we choose to take, our resilience, perseverance, and level of effort when confronted with challenging situations (Maddux & Kleiman, 2021). First introduced in the 1970s, the concept of self-efficacy remains a well-used framework in numerous domains including education (Pintrich & Schunk, 1995).

Self-efficacy is not concerned with thoughts about how to complete a task but instead with our belief about whether we can complete it. It is not a reflection of our global confidence or self-esteem, but rather a judgement of our ability to cope with the task in front of us (Hattie & Gregory, 2013). Bandura (1995) posits that our ability to cope in aversive conditions is based more on our beliefs in our competence than our actual competence.

When encountering a task and evaluating our ability to cope with it, we draw on our memory of past experiences with similar tasks, accessing knowledge and specific competencies used in successful attempts (Bandura, 1997). This involves our interpretation of the event rather than a reproduction of it. Individuals interpret successes and failures based on numerous contextual factors. Some individuals may discount successes through maladaptive thought processes (Bandura, 1997). These self-judgements are multi-dimensional in that they encompass knowledge of strategies, skills, and information (Zimmerman, 1995). Believing you can cope with the task stimulates effort and perseverance in the face of difficulty (Bandura, 1997). Individuals construct these self-perceptions of capability overtime, weaving a powerful mental picture of themselves that is instrumental in shaping future performances, goals, and ultimately the trajectory of their adult lives (Bandura, 1986; Pajares, 1992). Self-efficacy plays a vital role in what behaviours we choose to engage in and those that we avoid, and are hence critical to academic achievement (Bandura, 1986).

Academic self-efficacy is important in education, as students who believe they can accomplish a task behave in ways that promote their achievement. Instead of being a measure of self-esteem or how students feel about themselves, self-efficacy judgements are task and context specific: it involves their beliefs about their ability to cope with the task in front of them (Zimmerman, 1995; Pajares, 2002). Self-efficacy in one domain is not necessarily transferable to other domains. For instance, efficacy beliefs for English may differ from efficacy beliefs for science (Pajares, 1997; Zimmerman, 1995). These beliefs powerfully influence what tasks students will avoid and what tasks they will pursue, when given a choice.

Bandura (1997) suggests that efficacy beliefs affect thought processes, the levels of effort and perseverance an individual exerts, as well as resilience when confronted with taxing situations. Efficacy beliefs contribute significantly to motivation and performance (Zimmerman, 1995; Bandura, 1986). An individual is unlikely to exert effort unless they believe a desirable outcome is possible. This involves a context specific judgement of their causative capabilities to achieve a desired outcome (Hattie & Yates, 2014). They may desire to pursue an attractive option but fail to do so as they judge a lack of capabilities to do so (Zimmerman, 1995).

2.2.2 Sources of self-efficacy

Self-efficacy beliefs are formed from four principal sources: mastery experience, vicarious experience, verbal persuasion, and physiological and affective states (Bandura, 1997). These sources of efficacy information work in concert to regulate human functioning. Self-efficacy is not simply formed from the lived experience of individuals, but how those experiences are cognitively chosen, interpreted, and integrated into efficacy judgments. These judgements are embedded within the relational fabric of personal and situational factors (Bandura, 1997).

2.2.2.1 Mastery experience

The most authentic source of efficacy beliefs is that of mastery experiences as they are based on past accomplishments within a given domain (Pajares, 2002). Past successes build a robust belief in one's personal efficacy to engineer future success with similar tasks. Experience in overcoming difficulties through perseverant effort and the development of self-regulatory, cognitive and behavioural tools helps build a robust sense of personal efficacy. Alternatively, a succession of failures lowers self-efficacy beliefs, weakening one's confidence in their ability to cope with similar tasks in the future (Bandura, 1997). Consequently, repeated failures to organise one's time and resources effectively may adversely impact future attempts at similar tasks which influences task avoidance (Pajares, 2002). Perceived self-efficacy through experience is not based on performance alone, but impacted by the perceived difficulty of the task, the amount of help received, effort expended, and the situational circumstances within which the task was performed (Bandura, 1997). Hence, the successful performance of an easy task requiring little effort does not lead to increased self-efficacy. Instead, it leads to the expectation of easy results weakening future resilience when confronted with future difficulty (Bandura, 1995).

2.2.2.2 Vicarious experience

The second most influential source of self-efficacy is vicarious experience which is provided by social models (Bandura, 1995). Seeing others, whom an observer perceives to be like themselves, successfully performing a task helps create and strengthen efficacy beliefs in the observer through persuading them that they too can do it (Bandura, 1997). Critical to modelling influencing efficacy beliefs is the perceived similarity of the viewer to the model (Pajares, 2002). Little is gained if the viewer perceives the model as being quite different from themselves, conversely the greater the similarity the greater the impact on efficacy beliefs (Bandura 1997; Pajares, 2002). Similar models to the observer who are proficient can lift the self-efficacy of ineffectual observers who have experienced repeated failure by conveying effective coping strategies for managing environmental demands (Bandura, 1977 ; Schunk, 1991). Observers can gain the belief that they too can apply similar strategies that may lead to perceived efficacy gains. It is not only skills being modelled that benefit the observer but also the examples of perseverance. Bandura (1995, p.4) posits that: ‘Undaunted attitudes exhibited by perseverant models as they cope with obstacles repeatedly thrown in their path can be more enabling to others than the particular skills being modelled.’

Perseverant modelling may be more impactful on efficacy beliefs than the skills being displayed. While vicarious information can lift self-efficacy, it can also undermine it. Observing similar others fail while trying hard can lower the self-efficacy of the viewer (Bandura, 1995). Another important aspect of vicarious information is that it allows an individual to gauge their capabilities when there is little prior experience to carry self - diagnostic value (Bandura, 1977).

2.2.2.3 Social persuasion

The third source of efficacy information is social persuasion, in which an individuals’ efficacy beliefs can be raised through verbal persuasion in the form of feedback or encouragement (Bandura, 1995). Individuals’ beliefs in their ability to complete a task can be bolstered through encouragement that focuses on them possessing the means to meet the requirements of a task (Bandura, 1997). The source of persuasion must be from a reliable source otherwise it has little impact of efficacy beliefs (Schunk, 2002). People persuaded of their capabilities by a credible source mobilize greater effort and perseverance in taxing situations (Bandura, 1997). In isolation persuasion is not sufficient to sustain an enduring improvement in self-efficacy,

(Bandura, 1986). Even so it does prompt an individual to attempt new strategies to complete the task, increase their level of effort and improve levels of persistence (Bandura, 1986).

2.2.2.4 Physiological and emotional arousal

Another powerful source of efficacy information is physiological and emotional arousal (Pintrich & Schunk, 2002). An individual's somatic and emotional reaction to a task informs judgements of capability. If approaching project deadlines arouse feelings of anxiety, this signals an inability to cope, triggering task avoidant behaviour (Bandura, 1995). High adverse arousal can negatively impact performance and is compounded "when stress reactions to inefficacious control generate further stress through anticipatory self-arousal" (Bandura, 1997, p.106). This cycle of negative emotional arousal may trigger task avoidance and maladaptive behaviours, leading to further losses in self-efficacy. Conversely when the individual is not beset by adverse arousal, and instead experiences feelings of confidence, this can bolster performance and produce efficacy gains (Bandura, 1986). Positive interpretations of somatic information are a critical component of efficacy beliefs.

It is important to note that the intensity of the arousal is not as important as how it is interpreted by the individual (Bandura, 1995). If somatic information is interpreted as a "vulnerability to dysfunction" (Bandura, 1997, p.106) the body perceives a threat. This produces a heightened stress response where the body prepares for defeat stimulating the hypothalamic-pituitary-adrenal (HPA) axis in the brain, leading to increased cortisol production (Yeager et al., 2022). Cortisol triggers the body to anticipate physical damage or social defeat, resulting in a prolonged stress response and avoidance motivation (Yeager et al., 2022). Perceived vulnerability to psychological stressors contributes to low-efficacious students' beliefs that they cannot cope with project deadlines, resulting in less effort, failing to listen to instructions and ignoring helpful feedback. This results in poor performance, which in turn reinforces their initial negative interpretations of somatic information (Bandura, 1997, Hattie & Yates, 2014).

Learners who do not experience heightened arousal may interpret this as a signal that they can cope with the task. If not beset with sweaty palms, or tense visceral agitation, they may interpret this as an indication that they can overcome challenge in front of them (Bandura, 1997). In addition to how learners interpret somatic information, their cognitive framing of the task also shapes their somatic and affective response (Pintrich, 1999). Highly efficacious students tend to pursue challenging mastery goals and demonstrate high commitment to those goals

(Zimmerman, 2000). They view difficult tasks as challenges to be mastered rather than threats to be avoided (Bandura, 1995).

High self-efficacy individuals interpret obstacles as challenges rather than threats. The challenge response mindset increases peripheral blood flow readying the body for optimized performance and engagement (Yeager, et al 2022). Additionally, the challenge response results in a “faster return to homeostasis after the onset of stress” (Yeager et al., 2022, p.513). The result is that learners with the challenge mindset recover faster from stress producing stimulus than those who perceive a threat. In contrast, the threat response increases hypothalamic-pituitary-adrenocortical activation leading to a prolonged stress response. Recent research has demonstrated how the challenge mindset produces a positive somatic feedback cycle that leads to adaptive responses to future stressors resulting in better coping and task performance (Yeager et al., 2022).

2.2.3 Self-efficacy and self-regulation

Given the increasing demands of student centric pedagogy, understanding why some learners struggle with self-regulation more than others is of particular significance. Procrastination effects can be viewed as self-regulation failure. Steel posits that “to procrastinate is to voluntarily delay an intended course of action despite expecting to be worse off for the delay” (2007, p.1).

The current emphasis on the importance of self-regulation and self-control on academic success is a relatively recent phenomena in education. Educators now contend “that self-control is as important, and sometimes more important than IQ in predicting outcomes” (Hattie & Yates, p252). Research points to the importance of learners proactively managing and controlling their actions and thinking to attain academic success (Clearly et al., 2020). As previously noted, what learners believe about their capacity to manage themselves impacts self-regulatory processes. In an investigation into the relationship between procrastination and self-regulated learning Wolters (2003) found that low academic self-efficacy beliefs were a strong predictor of procrastination tendencies.

2.2.3.1 Low efficacy

Low self-efficacious individuals tend to avoid challenges and slacken their effort in face of obstacles (Zimmerman, 1995; Bandura, 1997). Low efficacy also limits the aspirations individuals have for themselves, directing them to less valued goals and lowering their motivation to achieve those goals (Pintrich, 1999; Bandura, 1997). The importance of academic self-efficacy and self-efficacy for self-regulation has significant empirical support in its relationship to academic procrastination (Klassen et al., 2008). Komarraju & Nadler (2013) found that students reporting low self-efficacy also report higher levels of procrastination. Low efficacy has been consistently demonstrated to adversely impact on students' adaptive strategy use and ability to self-regulate in academic tasks (Pintrich et al., 1993; Komarraju & Nadler, 2013; Zimmerman, 1995). Goal directed action and managing resources are critical components of self-efficacy theory (Pajares & Miller, 1995). Students low in efficacy may doubt their capacity to manage their behaviour, which leads to poor outcome expectancy, resulting in task delay and an inability to exert much effort (Schunk et al., 2002).

2.2.3.2 High efficacy

Highly efficacious individuals tend to set challenging goals for themselves and display strong commitment to those goals (Bandura, 1997). These goals are critical to self-regulation as they impact on individuals' thought, actions and emotional responses to environmental demands (Bandura, 1997). High aspirations buffeted by a belief in an individuals' ability in acquiring them creates motivation and incentives to achieve the desired result. They 'approach difficult tasks as challenges to be mastered rather than threats to be avoided [...], remain task focused and think strategically in the face of difficulties' (Bandura, 1997, p.39). Numerous studies have demonstrated the link between high self-efficacy and positive learning outcomes (Usher & Pajares, 2008). The processes that contribute to these outcomes stem from high levels motivation, perseverance and strong goal commitment (Pajares, 1996;). High efficacious students work hard, manage their anxiety (Zimmerman, 2000). These learners utilized cognitive and metacognitive strategies such as self-monitoring, goal setting and self-evaluation (Zimmerman, 2000).

2.3 Self-efficacy and inquiry learning

Self-efficacy has been demonstrated to predict performance and coping ability across multiple domains for decades (Maddux & Kleiman, 2021). Yet its use in studies related to inquiry learning's impact on young learners is limited. Despite this gap, one study from Finland

demonstrated a link between inquiry approaches and gains in self-efficacy, which as previously noted, strongly predicts academic performance. This pilot study employed what they described as a ‘novel perspective’ in using self-efficacy to investigate the integrated curriculum approaches employing the skills of inquiry (Tarnanen et al., 2023). Students participated in one week of subject-specific curriculum, followed by one week of an integrated approach. The study found gains in self-efficacy in the second week using the integrated approach for the low efficacy students. No significant change was observed for the students that initially reported higher efficacy in the second week. As this study was an intervention study lasting only two weeks, in which teachers were supported by university staff, generalizability for longer inquiry approaches is limited. Similar studies investigating older students also demonstrated efficacy gains when using inquiry methods. Legget and Harrington (2021) cite two studies Kuklok (2016) and Weber (2016), where increases in self-efficacy and confidence were observed. However, limitations exist for both studies. Weber’s (2016) account of increases in self-efficacy were identified in the semi-structured interviews rather than indicated in participant survey responses. Whereas in Kuklok (2016), students were not asked about gains in confidence, this was instead observed by the researcher (Legget & Harrington, 2021 p.1280). Overall, the literature around self-efficacy and inquiry learning for young learners in integrated approaches like transdisciplinary inquiry is limited and inconclusive, requiring further investigation.

2.4 Summary of research gaps

Significant gaps in the state of knowledge around inquiry learning exist. As demonstrated above, little is known in New Zealand or elsewhere, about inquiry learning in transdisciplinary projects, for young learners in year levels 7-10 and how it impacts lower self-efficacy students. These gaps of knowledge are particularly relevant in the New Zealand context where inquiry learning is being applied on a large scale, with young learners holding a variety of self-efficacy beliefs.

Therefore, this study, is framed by the following research question: “How are students with different efficacy profiles impacted by inquiry learning?”

To aid in answering this question two sub questions were generated:

- What impact does self-efficacy have on self-regulation in inquiry learning?
- How do teacher beliefs around agency in inquiry impact on low-efficacious learners?

Chapter 3: Methodology

The goal of this study was to investigate how inquiry and project-based learning impact on students displaying low and high self-efficacy. As self-efficacy deals with students' beliefs the research design was qualitative in nature as this approach is seen as the most appropriate for investigating student perceptions and thoughts. With an increased emphasis on students driving their learning, gaining insight in to how they feel and experience this responsibility is crucial to understanding how to best support all learners. Important to this understanding is contrasting student beliefs with that of their teachers'. This will offer valuable insight to educators both in New Zealand and abroad. This chapter describes the research context, philosophical orientation of methodology, reasons for selecting this approach, the methods used, the process of site and participant selection, data analysis methods, reporting of findings, and ethical considerations and limitations.

3.1 Research context

The study took place within a co-educational junior college (years 7-10) in Auckland. The school employs a transdisciplinary approach to curriculum, with links made across different learning areas. The primary pedagogical approach employed is transdisciplinary authentic inquiry projects, which are driven by students. The school's physical environment consists of flexible learning spaces encouraging autonomous and independent self-directed learning. As this school strongly promotes learner autonomy, it suited the purpose of understanding how students cope with this expectation.

3.2 Research design

This study employed a qualitative approach in order to explore the lived experience of low and high efficacy students self-managing their learning. Important to gaining understanding of student perspectives it was important to contrast their beliefs with that of their teacher and member of the project design team. Using a qualitative approach also allowed for authentic voices to be drawn out, with commonalities and differences in perceptions explored over a small sample size (Mutch, 2013).

3.3 Philosophical orientation

Given the complexity of students' belief systems that are formed from interacting with the world, the researcher sought a paradigm that reflected the subjectivity of individuals constructing these beliefs. Their views are built through complexly interwoven daily interactions with a social world (Creswell, 2003). The researcher was interested in the participants' different and subjective experiences of inquiry projects. To do this an interpretivist paradigm was utilized. Willis (2007) contends that an interpretive positionality honors the different beliefs and values of individuals within contexts. Unlike the positivist paradigm which is aligned with science research like that of biology, an interpretivist perspective is sensitive to contextual factors, and seeks to understand how people see the world (Stake, 2006). Through an interpretivist lens, the researcher was able to make decisions on how best to capture the lived realities of the participants (Harrison et al., 2017). Rather than taking the position of one single reality as would a realist or positivist perspective an "interpretivist perspective adopts the premise that multiple realities and meanings exist" (Harrison et al., p.5 2017). This perceptual lens seeks to understand how individuals come to understand what they are experiencing and how they make sense of their lived reality, allowing access to those multiple realities.

Case studies are thought to meet the needs of understanding complex phenomenon through providing in-depth and holistic investigations into this complexity (Creswell, 2014). This qualitative tool was employed by the researcher to gather rich descriptive datasets allowing the researcher to draw connections between different participants' perspectives of the same phenomenon (Merriam, 2009). Case studies make use of the qualitative tools including interviews and field notes, which capture the unique perspectives of the teacher and students as well as securing rich descriptions allowing for deeper understanding (Harrison, et al., 2017).

This study was focused on gaining insight into how students' beliefs are both shaping and being shaped by their experiences of inquiry learning. Semi-structured interviews allowed the students and teacher to present their views of what they believed was happening within inquiry and project-based learning tasks. Moreover, the semi-structured nature allowed the researcher to probe for deeper insight through follow up questions, particularly useful in the case of research with children who may be timid in initial responses. The open-ended nature of the

discussions allowed participants to explore what they believed, allowing them to elaborate and reflect on their experience of inquiry learning. This allowed for deep descriptive data unearthing participants' perspectives. In accordance with the interpretivist perspective, analysis of the participants' words was used to reveal their unique world views (Merriam, 2009).

Detractors of interpretivist approaches claim this approach is too subjective in nature (Neuman, 2003) and suffers from a lack of transferability (Merriman & Tisdell, 2015). However, the advantage lies in its ability to unearth the students' and teacher's beliefs. These differing interpretations of the same phenomenon bring a rich description of complex systems of thoughts and affective states (Mutch, 2005) that influence the success or failure of inquiry pedagogies.

3.4. Sample selection

Given the dearth of research into young student's perspectives of inquiry learning in New Zealand, a middle school in Auckland was selected. To gain deeper insight into their thoughts and feelings around inquiry, the researcher chose to limit the number of participants in the survey to three students and one teacher. As rich descriptive data was sought, a small sample size seemed appropriate. The researcher employed purposive sampling as the researcher needed participants that fit several criteria (Creswell, 2008). The first condition was high and low self-efficacy profiles. The researcher aimed to select two low efficacy participants and one exhibiting high efficacy. The second condition was that students participated in inquiry and or project-based learning for longer than 4 weeks. The students additionally needed to be between the school years 7-10. The criteria for selecting the school was based on its predominant use of inquiry and project-based learning pedagogies and emphasis on student directed learning. The length of student projects (5-14 weeks) and pedagogical positioning of teachers as facilitators and learning coaches was ideal for the study. I first approached the school's vice principle (learning leader) and arranged a meeting. Following this, three teachers were suggested by her to the researcher. The selection of the participant teacher was made as she also held a role on the transdisciplinary inquiry project design team. Her participation as member of the project design team, was believed to provide deeper insight into the educational beliefs informing and shaping the pedagogical decisions impacting the participant students. Once the teacher was selected, consent was granted. 30 students within the participant teacher's MAC (Mentor Advisor Coach) were selected for convivence as the students do not have designated

classrooms during TAIP (Transdisciplinary Authentic Inquiry Projects) time but are instead moving throughout the school. Selecting the students in this way aided in the teacher delivering the self-efficacy survey on the researchers' behalf. The purpose of the self-efficacy survey developed by Panorama education was to identify students displaying low and high self-efficacy. The Panorama survey was chosen for its trustworthiness and reliability. The Panorama Social Emotional Learning Survey was developed specifically to identify self-efficacy. Once the surveys were completed, the Panorama measures were used to identify two low-efficacy students and one high-efficacy student. Following this they were informed by their teacher of their selection. Next, interview times were set at school during class hours. Despite the study being limited to only three students, and one teacher, which limits the generalizability of the results, its rich description of these students' experiences provides a valuable staging point for future study.

3.5 Data collection:

3.5.1 Interviews

Semi-structured interviews have a set of key questions that are followed in an open-ended way to get a more in-depth understanding of the participants perceptions and insights (Mutch, 2005). "The qualitative research interview is a construction site of knowledge. An interview is literally an inner view, an interchange of views between two conversing about a theme of mutual interest" (Kvale, p.2, 1996 as cited in Mutch, 2005 p. 127). Once the students were selected from the efficacy survey, each student was interviewed once for 30 minutes. Interviews were conducted in silos next to the open planned learning environments. This was done to ensure participants felt comfortable. The participant teacher was interviewed twice, with the first interview lasting one hour and the second 25 minutes. This interview also took place in one of the silos. Interviews were recorded on the researcher's audio recorder as well as on a phone as a backup.

3.5.2 Observation

In addition to interviews, field notes were taken throughout the data collection process on site. These notes were recorded in a separate field note journal and on the researcher's phone. Field notes are written or spoken documentation capturing what the researcher observes. They may include 'the observers personal and subjective responses to and interpretations of social action encountered' allowing the researcher to later access these 'valuable comments and insights' during the data analysis phase providing a rich site for deeper analysis (Saldaña, p.42, 2014).

3.6 Data analysis

The interviews revealed the students' inner views of their efficacy for regulating their actions within a student centric pedagogy. This brought interesting insight, confirmation and contrast to the popular assumptions made about engagement and motivation within inquiry learning. Given the diversity of perspectives and the natural complexity of social science, a careful methodical investigation of the data to find underlying patterns and meaning surrounding the phenomena being researched was adopted (Creswell, 2003). The interviews were then transcribed using Cockatoo, an artificial intelligence transcription application. The researcher carefully went through the transcript and recording to correct any errors. To reach verifiable research conclusions from complex personal narratives a thematic approach was employed, as this approach seeks understanding through emerging themes and concepts (Thomas, 2006). To ensure the reliability and trustworthiness the researcher employed the well-established qualitative approach lattice work data analysis. This approach provides a rigorous process to bring to light key findings across multiple participants by focusing first vertical analysis of individuals' transcripts, researcher notes and analytic memos, followed by thematic bands of comparative analysis across the different participants (Mutch, 2018).

The data under analysis came from five interview transcripts and field notes. The researcher first read and re-read, as well as listened to the findings numerous times to get a general sense of how the participants came to understand their experience of inquiry learning. In addition to this, a careful re-reading of field notes was done to provide a richer picture of participants within their context through the researchers' subjective interpretations of his time on site. Then came the vertical internal analysis of each individual transcript. The process began with recording first impressions, where interesting, surprising, confusing, unexpected, and expected findings were recorded (Mutch, 2018). Following this, the researcher revisited his first impressions using analytic memos. These memos served the purpose of documenting and reflecting on the coding process, as these personal musings delve deeper into the questions under investigation. Analytic memos are comparable to a researcher journal, as Salaña (2014) puts it, they are 'a place to "dump your brain" about the participants, phenomenon [...] under investigation' (p.41). This allowed the researcher to go beyond his impressions, raising questions and drawing connections to possible answers. Each memo was time stamped with dates to record the evolution of his thinking, but not categorized into themes at this stage. In addition to writing memos on codes, memos were also generated at unexpected moments. As

Saldaña (2014) suggests, sometimes ‘ah-ha’ moments can come at inopportune times. For this reason, the researcher always carried his memo journal with him, or recorded them on his phone. This process allowed the researcher to reflect and expand on the codes established in the first phase.

In the third stage of vertical analysis ideas were grouped according to criteria to narrow the scope of the analysis. To do this the researcher grouped data with links to the research questions, inquiry and project-base literature, self-efficacy theory, strength of emotions, repeated ideas, motivation and so on (Mutch, 2018). This allowed the researcher to navigate the dense data and remain focused on the research question. Ideas were further categorized and labelled. This careful step-by-step process allowed the researcher to organize the plethora of discursive data (Thomas, 2006). Following categorization, supporting evidence was highlighted, individual quotes were coded for ease of access later. These quotes were cut up and grouped under the previously established categories. After multiple readings, data patterns began repeating themselves. From this point the researcher reduced the number of categories into what became initially eight themes.

The next phase was horizontal analysis. In this stage the eight themes from the vertical analysis were grouped into new cross-case categories. This comparative analysis allowed for “categories, themes, and evidence from the vertical analysis to bring the underlying assumptions and conceptualizations to the surface” (Mutch, p.3, 2018). This analytic phase continued until the researcher was confident in the trustworthiness of the six final themes that emerged. The final themes to emerge were self-regulation, emotional arousal, help seeking behaviors, challenge, and learning.

3.7 Ethical considerations

Once approval was granted from the University of Auckland Human Participants’ Ethics committee the school principal was contacted and sent permission and consent documentation. Once permission for conducting the study was obtained, the researcher contacted one of the suggested teachers and secured their informed consent. Following this, consent and permission was sought from students within the participating teacher’s MAC. Parental consent was gained through the school’s online permission system. Participant information sheets were sent both to parents and students via the participating teacher.

Qualitative research seeks to uncover participants belief, values, opinions, and their understanding of the phenomenon being investigated. As this may involve revealing personal and sensitive information about themselves, there was a need to ensure anonymity. To achieve this, pseudonyms were used with all participants to ensure their identities remained confidential. Assurances were given to the participants that their involvement in the study would not impact on their relationship with the school and principle, this was achieved through the principal participation sheet.

Chapter 4: Findings

This chapter presents a thematic analysis of the findings. Five themes emerged from the analysis of the data: self-regulation, emotional arousal, help-seeking behaviors, challenge, and learning. All five themes are impacted by efficacy beliefs in addition to producing efficacy beliefs. The student identified as displaying high self-efficacy (HSE) characteristics will be identified as HSE1, while the two low self-efficacy (LSE) students will be identified as LSE1 and LSE2 respectively. The teacher will be identified as T. In addition to interview findings field notes are employed to capture the lived experience of the student participants.

The findings are divided into three sections beginning with HSE1, followed by both LSE1 and LSE2 combined, and lastly T. Each section will begin with a brief description of the participants, followed by five themes discussed in this order: Self-regulation, emotional arousal, help seeking behaviors, challenge, and evidence of learning.

4.1 HSE1

During the interview, HSE1 appeared confident and excited to share her learning journey. Her body language was relaxed and engaged. She began by enthusiastically describing a side project she was working on with some friends. Together they had started a flight simulator club and built a simulator from scratch, often working on it in their break time. The pride and sense of ownership she felt about the project was palpable. She would go on to exude that sense of confidence throughout the interview.

4.1.1 Self-regulation

When asked to reflect on how she manages her time during project-based learning she responded confidently:

I feel like I'm an organized person.... Because it helps me focus and make sure that I'm doing my work....Because if I just leave things until the last minute, then I feel like I haven't done a good job. (HSE1)

In her view, she has always been an organized person. She described taking ownership of her actions and feeling responsible for her learning and achievement. She believed she was able to manage her time, avoid distractions and work autonomously towards her goals. When asked about how well she stayed on task while moving freely around the school unsupervised, she responded *'The majority of the time. I'm not going to do something I don't really want to do.'* (HSE1), demonstrating her confidence in her ability to regulate her actions autonomously while working independently.

Reflecting on recent group work, she contrasts this ability with others: *'I feel like I managed my time okay. I'm not sure about other people in my group. [...] It's just there's people who are like slackers and then there's people who do the work.'* (HSE1) She spoke about her frustration of *'having to do extra work'* (HSE1) to avoid getting in trouble because some non-contributing students *'weren't getting in trouble.'* (HSE1) Her emphasis on the other students not getting in trouble may indicate that teachers were unaware of what some students were doing. It also suggests little interaction with the learning content of the project for some students. When asked what she could have done better on the last project HSE1 highlighted a failure to self-regulate when collaborating on a project with peers.

'We procrastinated on everything for a long time because there was mainly just one person at a time doing it, which means we didn't know what to do. Because we had one person in our group was really good with technology. And then there was one person who didn't know anything.' (HSE1)

The source of self-regulatory issues for HSE1 stemmed from inadequate skills and content knowledge, meaning the demands of the task lay outside her capabilities. Procrastination also stemmed from an over reliance on one team member. Even with high belief in her causative capabilities, inadequate prior content knowledge stalled progress on the project. Despite the prolonged delay, her confidence in her ability allowed her to persevere. When she and her team were stuck, she recalled saying to her team *'Okay we need to get this done with, otherwise we won't be able to do it anymore.'* (HSE1) Her drive to complete the project helped propel her to completion. This intrinsic drive helped her in navigating problems independently and further cultivated her belief in her causative capacities. Where others see threats, she sees useful challenges: *'In that situation, you just got to push through.'* (HSE1)

An essential element of successful student centric learning is staying on task. This means avoiding competing motivations, and delaying the gratification you might get from playing with friends. This is illustrated in HSE1's high self-efficacy for strategically managing her attention which is demonstrated in the next quote.

'I try to surround myself with good people I know, that will actually help me to start [...] So, if I know there are people who I will like [like] my friends or friends that I know I'll just play around, I'll go and sit by myself, get my work done, and then I'll go play. Or even during break times or after school, I'll focus on my work, get it done so I can relax the next day.' (HSE1)

This kind of self-regulation is challenging within open plan learning environments. However, rather than the environment adversely impacting her, she leverages it to her advantage. When stuck in projects she reflected:

'With the freedom of like moving from one project to project, I'll take a break from it, sit back and go to something else, and then when my minds freed up a bit, then I'll go back to it and try again.' (HSE1)

This affirmative orientation allows her to rest without fully disengaging from the project. She demonstrates the beliefs and actions of highly efficacious students who think strategically when faced with challenges and remain task focused. Rather than giving up, she strategically utilizes her agency.

4.1.2 Emotional arousal

Overall HSE1 was very positive towards project-based learning and expressed how these projects had increased her confidence and knowledge:

'I've gained new skills, new friends, and more knowledge. Obviously. [...] That I can put towards different things. [...] I've grown more. [...] I've learned to work with new people. And I feel like I've grown in personality, so it's easier for me to talk to other people, like its boosting my confidence because we also had to get all those people that joined, we had to like talk to them one-on-one, so it's like giving me a little bit of confidence.' (HSE1)

In this next quote HSE1 expresses positive feelings around her personal agency in projects.: *'I think it helps with the passion kind of thing. So, I have a drive to actually do what I want to.'* (HSE1) Strong belief in her ability to manage this agency results in limited adverse emotional arousal. For instance, project deadlines are not a source of stress and anxiety for her.

'I feel like our deadlines are very good, because also the teachers maybe are less strict than other schools, I'm not sure. Because if we really need to, then we can ask for an extended deadline. Even if you're a little bit late you can continue handing it in.' (HSE1)

She expresses her relaxed feelings about projects and her trust in her teacher's flexibility:

'It feels like less stress. So, I'm not like crazy about getting, like obviously I still want my work done, but it's not like I need to do it, I need to stay up all night and work on this, work on that. I can relax, do it in the morning, do it whenever I have time.' (HSE1)

4.1.3 Help seeking / teacher support

HSE1 expressed confidence in approaching staff for help and feels comfortable engaging teachers for guidance. HSE1 discussed how support and guidance from peers and teachers helped motivate her: *'Sometimes just like a little bit of help from peers or other teachers can push you.'* (HSE1) Referring to support from a teacher, she said: *'He kind of pushed us so that we weren't just procrastinating. That's how we actually got started.'* (HSE1)

HSE1's confidence and willingness to independently engage teaching staff when interested in pursuing a difficult new challenge, led to the development of new skills and more confidence in seeking help. The result of this kind of virtuous cycle is demonstrated in her successful contribution to creating a flight simulator.

4.1.4 Challenge

From my interview with HSE1, it became apparent that not only did she seek out challenging goals, but that she also enjoyed the challenge. In speaking of the flight simulator, she spoke with pride about its creation *'So, we basically started with nothing and built up the whole set up. [...]'* *'there's monitor stands, and the whole seat and cockpit kind of design. So, it took us*

about like four or five weeks to create it because we were just doing it during our breaktimes.' (HSE1)

HSE1 spoke at length about the learning opportunities and experiences afforded to her through project-based learning, including skill development: *'I learned how to use a PC which I've never used before and also the monitor set up.'* (HSE1) Working on a challenging project through her breaktime highlights her strong motivational orientation and the willingness to pursue difficult goals. The challenge and ensuing success contributed to new aspirations:

'And its convinced me in a way that I would want to pursue that career, like being a pilot or just working with planes in general, being an engineer.' (HSE1)

The school provided more learning opportunities that further cultivated this aspiration. *'We recently also had a woman in engineering workshop. So that kind of just shows that there is a pathway that I can go on.'* (HSE1)

4.1.5 Evidence of learning

Evidence of learning was difficult to assess from the interview data. However, HSE1 spoke at length about the practical skills, communication skills, and increased confidence she has attained through her projects. Her answers seemed to focus on the things she could do and her feelings, rather than what concepts she had learned, as illustrated in the next quote.

'Mmm hmm. Well, I've grown more. I've got the skills now.' (HSE1)

When asked, she elaborated on what went well and what she had learned in one of her last projects.

'We were learning about natural disasters. My group specifically was learning about landslides. I live in an area, well obviously there's a lot of hills around us and quite, well not recently, but a while back there was heavy rains'[..] 'Yeah so that kind of gives me a little knowledge in that area, which I guess, more knowledge is better.' (HSE1)

She offered little in terms of what physical processes were in action. She does, however, show that she made connections between the inquiry and its relevance to her life satisfying some NZC (2007) goals. Whether that led to an understanding of the underlining natural phenomena that produce landslides is less certain and is not ascertained in this study.

4.2 LSE 1 and LSE2

LSE1 was polite and somewhat shy in the beginning of our interview, but became more comfortable and expressed his opinions frankly, although somewhat nervously at times. Once reassured of confidentiality he spoke openly, although careful with his words. Through the interview he contradicted himself on a few occasions, expressing both confidence and lack of confidence regarding effort regulation, an indication of uncertain or ambiguous efficacy beliefs.

LSE2 seemed shy, pensive and a little unsure of himself. His body language was closed and somewhat defensive. He spoke at such low volumes that some words were inaudible for transcription purposes. His answers were limited to one or two words until encouraged to share more. Despite this, he was clearly thoughtful and bright but conveyed little self-confidence.

4.1.1 Self-regulation

LSE1's and LSE2's interview responses indicated both low academic self-efficacy and low efficacy to self-regulate. They spoke about the difficulty of managing distractions and time management. LSE1's answers reflected doubt in his ability to stay on task and persevere when challenges arose. Research suggests that low efficacious students tend to doubt their causative capabilities believing that they lack strategy and capacity to learn, this affects their levels of motivation and persistence. When asked if he started projects early, he responded '*Not that early. Like if I'm in the mood, then I just do it, but mostly not.*' (LSE1)

However, his response about whether he finds it easy or difficult to get started on projects is somewhat contradictory. In one moment, he expresses that most of the time he does not start early and in the very next instance that he finds it easy.

'As soon as we get a project, I find it really easy, but then I just forget about it until it gets due, because they remind us its due in a bit [pause]. Then I become really worried, and I start working really hard.' (LSE1)

LSE1 experiences and thoughts contrast significantly with HSE1's proactive approach. Task procrastination is evidently a cause of anxiety for him. He mentions worry as a motivational factor; fear rather than interest motivates when close to deadlines.

Similarly, LSE2's response to time management questions suggested he also engages in intentional task delay. When asked how well he manages the time allotted for a project he responded *'because we only talk about the project midway through, so I start like the week after.'* (LSE2) It is unclear what he means. However, it may suggest that he is not working on his project during the allotted TAIP time until the midway point. This is problematic given the entirety of TAIP time is dedicated to this project. Given that the school's projects can last from between 5 to 15 weeks, this represents a significant loss of learning opportunities.

LSE2 spoke of his difficulty in starting on his first project designing a building for autistic children. He reflected on struggling to due to a lack of necessary content knowledge, he commented. *'I didn't know anything about design before.'* (LSE2) Without knowing what to do, he shied away from engaging in task. When asked later in interview what projects he preferred not to do, he reported *'design ones.'* (LSE2) Failure in his first attempt may have shaped his efficacy beliefs around future design projects. When asked how he felt at the end of that project, he reflected *'I felt relieved that it was over.'* (LSE2)

For both LSE1 and LSE2 effort regulation were recurrent themes. At times LSE1 mentions that the cause of these ineffectual patterns of behavior are external distractions and that he can always focus and get his work done when he is at home. But later contradicts this by commenting that he cannot focus when the project is boring. He commented *'So, when it's really boring, then I do it at first, then muck around the whole time.'* (LSE1) With prompting he elaborates *'With friends we just, like, probably just, sometimes watch videos on YouTube and sometimes play fighting.'* (LSE1)

LSE1 did not display any confidence in this ability to avoid distractions or manage his environment, and instead pointed to it as the cause of his ineffective functioning on projects

while working autonomously *'My friends distract me and we muck around and then we forget about the project.'* (LSE1) This contrasts significantly with HSE1, who strategically chose which friends and situations to avoid and which to work with. Given that both students are the same age and have been doing projects at the school for two and half years, this potentially highlights how their differing efficacy profiles influence their ability to manage independent work.

When asked what would be easy and what would be hard on the next project LSE1 commented that it would be easy to work on the project at home because he can always focus but concerningly that in school he had no confidence he could maintain this effort *'If I have nothing distracting me and I always focus on it at home, but in school I have friends distracting me and stuff like that.'* (LSE1)

LSE2 expressed similar doubts in his ability to manage his focus and avoid distractions. When asked about his ability to stay on task, his answers mirrored that of LSE1. He commented *'It depends on my surroundings. Like if friends are around me. I'll be focused but not as focused as you'd think.'* (LSE2)

His answer suggests that to an observer he may seem focused on his work, but in actuality his attention is divided. When asked to elaborate he commented *'So if my friends were around me, it would be hard to focus because they would start talking.'* (LSE2) When asked how often this happens, again his answer was similar to LSE1's earlier answers *'Um.... most of the time.'* (LSE2)

Both LSE1 and LSE2 through their responses indicated low self-efficacy for managing their levels of effort and avoiding distraction. This belief contributes to the ineffectual behavior and generates confirmatory behavioral evidence of this belief. This produces a vicious cycle. LSE1 and LSE2 were asked about their ability to move around the modern learning environment, they replied: *'I feel good. Because we have lots of space.'* (LSE1) and *'It's not claustrophobic.'* (LSE2)

Both students were positive about the ability to move around the school during projects. When LSE2 was asked if this helps him learn, he responded. *'Yeah' [...] Because you're not just cramped up in one place trying to learn.'* (LSE2) He offered no further reasons as to its

advantages. When LSE1 was asked if the learning environment helps him get his projects done, he responded: *'At home it does, because I have lot of space and I sit in the corner and do it.'* (LSE1) This response seemed evasive. When asked if the ability to move around the school and to choose where he sits to work on his projects helps his learning, he replied:

'Kind of Half-half [...] because like when I go outside it distracts me a bit more. But when I go inside, the noise and all that stuff distracts me.' (LSE1)

LSE1's inefficacy in coping with distractions and noise levels, potentially influences his feelings towards inquiry learning and his experience of school. Which can be seen in this next comment. *'I don't value the time I get from school I mostly work at home.'* (LSE1) Though he enjoyed the flexibility of both the learning environment and projects, he expressed little confidence in his ability to avoid distraction.

4.2.2 Emotional arousal

For LSE1 and LSE2 project deadlines appear to be a significant source of adverse emotional arousal. When asked what he liked most about projects, LSE1 responded *'When you finish it, the stress gets out of your mind. [...] I'm happy that it's gone and I can do whatever I want, I won't get in trouble.'* (LSE1) Similarly, LSE2 reflected on his best moment in a project *'I felt relieved it was over.'* (LSE2) This anxiety reportedly stemmed from their beliefs around ineffectual time management. As a result, deadlines are interpreted as threats that they are unable to cope with. This low efficacy appraisal produces adverse emotional arousal and task avoidant behaviors, resulting in poor performance.

When LSE1 was asked if he found anything interesting, he said *'no.'* This was not the teacher's fault; he was not interested in the project topics. In contrast LSE2 enjoyed one project where he developed a basketball training program, commenting *'Just because I had something passionate to do in it.'* (LSE2) His enjoyment of playing basketball and training impacted on his engagement and motivation in this inquiry. However, when asked what other projects he would like to do, he responded *'Sports ones.'* (LSE2) He explained *'I would feel a lot more passionate about that than normal ones.'* (LSE2) This answer may point to limited interest or confidence in exploring other content areas. His emphasis on passion is interesting to note, as this idea also appeared in both HSE1 and T's interview data. The importance of feeling

passionate about your inquiry topic may be something stressed at this school. While aspirational, it's difficult imagine all students feeling passionate about academic domain areas, where they experience low self-efficacy or lack interest in the topic. Beliefs around passion may impact on what content knowledge they deem worthwhile acquiring, especially if enjoyment and passion are the measure of worthy information. The result of this line of thinking, may manifest more readily in the school's heavily open inquiry approach, where projects are fully student driven.

4.2.3 Help seeking / teacher support

LSE1 expressed a reluctance to seek help and viewed teachers as disciplinaries rather than mentors he could approach. When LSE2 was asked what he does when he gets stuck in projects, he commented *'I don't have confidence to ask the teacher.'* (LSE2) LSE1's response was similar, when stuck on a project he would first return to the instructions, if he needed further help, he would ask his friends. When asked if he would ever approach a teacher for help, he responded meekly *'Maybe.'* (LSE2) His reluctance to seek help may be attributed to his relative newness in the school. LSE1's on the other hand may indicate something else. His initial reaction to the question regarding teacher guidance was to look towards the door for any sign of a teacher and after a long pause, ask *'Um, is anyone seeing this?'* (LSE1) He then commented:

'Um, they didn't really give guidance to us. [...] like they give it right. And we just sit separately wherever we want. And they come after, sometimes a bit and then they see what we've done. If we've done, like, completely nothing, then [...] they separate us or make us sit next to them. If we've done something but little, then they say keep doing your work.' (LSE1)

Unsurprising, LSE1 comments indicate not all students can respond to increased levels of agency adaptively. It also points to the critical need for students to feel supported in inquiry learning. In this comment is an expression of confusion and arguably feelings of abandonment. Low self-efficacy may have explanatory power in this instance. Low-efficacious individuals tend to prefer proxy control rather than assuming greater levels of personal responsibility (Bandura, 1997). High efficacious individuals on the other hand express a preference for greater levels of personal agency (Maddux & Kleiman, 2021). This stems from their belief in their ability to cope with environmental demands. This may to some extent, explain the stark differences between LSE1 and HSE1 experiences of inquiry learning.

4.2.4 Challenge

When LSE1 was asked what the biggest challenges in projects were, he responded. *'There's not really a (inaudible) of difficult.'* (LSE1) Further prompts produced similar if not shorter responses. Similar to this LSE2 also thought the projects were easy. Neither student felt that the projects challenged them in anyway. Interestingly they failed to reflect on their issues with time management or managing distractions. Their answers may instead be reflections on content. Their responses around questions of challenge contrasted significantly with HSE1's who described at length her gains in areas like technology, that she reported previously struggled in. This may point to HSE1 actively seeking out more challenging learning opportunities than her low efficacious peers.

4.2.5 Evidence of learning

When asked about what he had learned in his previous project, LSE1 answers were limited. In a response to a question on what three things he had discovered and found interesting in his last project, he responded: *'I don't find anything interesting. But like, I don't know, [long pause] there's a plant called Camarau and it was native to New Zealand.'* (LSE1) He had enjoyed this project due to the camping element. However, when it came to aspects of project that involved biology and conservation themes, he disengaged. He spoke about difficulties in staying focused on things he found boring *'some things are important like reading maps, but other stuff is boring.'* (LSE1) This no doubt impacts his motivation in accessing domain knowledge within projects he sees no value in.

When LSE2 was asked how confident he was in remembering what he had done in his last project, he responded, *'Like halfway sure [...] I might have forgotten something, and I might remember something.'* (LSE2) When asked what he had discovered or found interesting, he replied: *'Umm...I...I don't know.'* (LSE2). Neither student could elaborate in depth as to what they had done in their previous projects. While no clear conclusions can be drawn from the interview data with regards to inquiry's impact on their learning, it is reasonable to suggest that given their proclivity for self-regulatory issues, this may present significant challenges to learning.

4.3. Teacher – project learning design team

T is an experienced teacher and a member of the project design team across her school. Her passion for teaching and care for students and their well-being was clearly visible. As we walked around the school students would approach her confidently and warmly. Overall, her interview answers indicated that she primarily sees her role as a facilitator *‘rather than a holder of all knowledge.’* (T) She prioritizes helping students grow in confidence and develop into lifelong learners.

4.3.1 Self-regulation

T believes strongly believes in providing high levels of agency to her students. By providing greater amounts of choice, she believes this develops student ownership over projects. For T, students exploring their passion and enjoyment is key to them uncovering what kind of learners they are. She recalled one example of student that was interested in coding. The student had an ambitious goal of writing translation software for a robot. The project failed, T commented.

‘She tried everything that she could think of trying and she led her group [...] She had so much learning about herself and the project, um and about her perseverance and resilience, even though it didn’t work, it was the best project she did in her three years here and she would refer back to it in badge pitching.’ (T)

T would go on to describe this student as *‘tenacious’* and *‘driven’*. In contrast to this T reflects on other students who struggled with self-regulation:

‘So, they wanted to make a blanket. But every time I went up to have a conversation with them, they were watching YouTube videos. They were mucking around. They weren’t doing anything they were supposed to be doing. So, every time I’d go and have a chat with them and I’d try and get them back on track, they just didn’t care. They did not care at all. So, the second I walked away from them, they were back to mucking around.’ (T)

These students, like LSE1 and LSE2 struggled to self-regulate on topics they did not find interesting. Like the other examples of self-regulatory failure, T again suggested that students learn from this failure. She commented:

'We've had lots of groups like that who just muck around, because they're in group work. In a group, they'll muck around with the group and they'll waste time, most of them will then come up with something at the end. So, the last week, 'oh shit better get something together', or something right at the end.' (T)

Despite these instances of poor self-regulation, T believes these students eventually develop useful coping skills and improve in their performances.

4.3.2 Emotional arousal

In speaking of students that struggled on projects, T expressed a strong belief in the personal growth these experiences provided. She recounted a story of a student who had done very little work on her assignment and presented a project in front teachers and her peers she knew to be of low quality. T recalls the conversation, with her initiating the discussion:

'You didn't do any work right? What was that?' She was like 'I know, I'm sorry'. I said, 'You can do better than that. How long did that take you? When did you start making that box that you just presented as your whole 12 weeks of learning?' She said, 'I know it was really bad'. I said, 'what happened?' She said, 'we just procrastinated, we mucked around, we didn't do anything.' (T)

Evidence from T's interview suggests this kind procrastination was not isolated, pointing to the possibility that many students experience adverse arousal around project deadlines. Despite this experience, T would go on to say how much this student had grown from the experience and developed as learner.

4.3.3 Help seeking / teacher support

T recounted an example of a girl who struggled with self-regulation the past:

'She spent the whole time struggling and didn't tell her teachers and managed to just hide away in a corner and not really do anything. And so, the last minute she didn't have a project in the end to present.' (T)

While this indicates a lack of confidence in approaching teachers it also highlights an absence of teacher support. This project was 12 weeks in length, representing considerable class time lost. This student's experience was contrasted with that of a student T described as 'driven' and 'tenacious':

'She couldn't work in the grey. Everything's black and white. Um and so she'd come up to me five times a lesson 'I still don't get it, what do you mean?'. She's the kind of kid that'll keep at it.' (T)

The stark difference between these two students' confidence in seeking support clearly impacted their project performance. In comments about students with learning needs, T commented:

'I had too many groups to look after. And it was really difficult because they needed almost constant one-to-one attention, otherwise they were off task. And it was too hard from them.' (T)

This highlights the critical need for adequate teacher guidance and presence during demanding student-centered approaches.

4.3.4 Challenge

One of the school's inquiry approaches is fully student driven. Effectively students are setting the content aims of their inquiry. Learners choose their project ideas, based on provocations led by learning coaches. The aim of the project is to collect evidence towards badge attainment. These badges reflect connections to the learning aims of the NZC (2007). Students chooses how to satisfy these aims, then map the path the projects take.

'Some groups will challenge themselves, like I was saying before, but some will choose the easy option and then they won't actually be able to push themselves [...].' (T)

This comment potentially points to differing levels of content exploration amongst students. In her role as 'facilitator', 'rather than a holder of all knowledge' she guides but does not direct students in their curriculum choices. She commented 'Ideally the kids come up with their own

ideas of what direction they go through.’ (T) She points out that she tries to encourage students to take on more challenge within their projects. However, T admits that:

‘Often though, the kids get fixated on something, or some suggestions that you’ve made which would actually be challenging for them and difficult. They’ll chose to ignore it and you’ll come and have a conversation with them and they’ve conveniently forgotten some of these suggestions.’ (T)

This may explain the differences between the low efficacy students reporting a lack of challenge in projects compared to the high efficacious student reporting challenging learning opportunities. Differences in efficacy appraisals influence the degree of goal difficulty students select. Low efficacy results in opting for easy options, requiring little effort and commitment and potentially limited learning.

4.3.5 Evidence of learning

Throughout the interview T stressed the importance of students discovering what kind of learners they were. There was a clear emphasis on helping students develop the skills and competencies outlined in the NZC (2007). Strong emphasis was placed on becoming lifelong learners and pursuing passions to encourage learning. In her example of a student wanting to code a robot, T was unaware of the student’s coding ability. T also had no experience with coding, however, not wanting to limit the student, T encouraged the project. Given T’s lack of expertise in this area, it is doubtful she could offer the conceptual knowledge or domain specific support needed to scaffold this project. This was not an issue for T. For her, inquiry projects appeared to be vehicles for developing confidence, resilience and skills, while the content within projects was less important. This is further evidenced in her reflection on a conversation with a student’s mother. The mother was concerned about the lack emphasis on academic content in the school’s approach. T recalls:

‘And she was asking me about what? About science and what about content? What about this? And what about that? And I said, well, what we’re actually finding is if we teach the kids how to learn, we teach them the skills that they need. The content comes later. The content is easy. Once you know how to learn the content is not difficult to pick out because you know where to find it.’ (T)

This comment reveals two significant educational beliefs that T holds around learning and knowledge. The first is a conflation of processual knowledge with the cognitive processes that produce learning. The second is the low significance she seems to attribute to academic content. Both these beliefs appear to influence her interpretations of learning outcomes. In describing one student's ambitious project: *'It didn't work [...] she had so much learning about herself...about her perseverance and resilience'*. (T) In describing the quality of another student's project, she comments. *'It's not great. He's not a super academic kid, something like that. But now he has the confidence to present his learning in front of us and which is a massive thing for kids.'* (T)

The importance of gains in self-esteem and confidence from projects are clear priorities for T. This is believed to provide students with the foundations for future success. Her reflections on students learning to 'hack the system' and 'thriving' seem to reiterate this belief. This may explain her relaxed attitude to students taking 'two years' to adjust, and to discounting the many instances of problematic procrastination. In her belief they are fertile grounds for learning about themselves and developing as confident learners. She is however realistic about the approach.

'We're dealing with 12-year-old children [...]and they're not always going to perform the way we want them to perform or take the opportunities as much as we want, we think they should be. [...] But despite themselves, they're learning, and what they're learning is how to learn.' (T)

T described a group of boys who were continually off-task on science themed inquiry. She admitted they had significant issues in regulating their behaviour. In contrast to this, their current project was much easier for them, more teacher guided and linked to their interests in camping. This she said has led to gains in confidence they would not get in traditional classroom settings. When asked if this confidence translates into other academic performances, T responded: *'Yeah, that's a great question, I couldn't answer that. I would have to go and talk to those kids.'* (T)

4.4 Summary

Overall, the findings point to considerable differences between high and low efficacy students and their experiences of inquiry learning. Low efficacy predicted significant task disengagement, maladaptive strategy use, challenge avoidance and adverse emotional arousal around deadlines. In stark contrast, high efficacy allowed HSE1 to exercise adaptive behavior in self-regulating her learning in projects, setting challenging goals, exerting high levels of effort and persevering when confronted with challenges in her inquiries. T's beliefs around agency and choice producing motivated learning were challenged by the low efficacious students self-reported self-regulatory issues. An additional finding was the foregrounding of the key competencies and vision of the NZC (2007) influencing T's beliefs regarding learning aims within inquiry projects. The implications of this will be further discussed in the next chapter.

Chapter 5: Discussion and conclusions

What students believe about their academic competency and power to exercise control over their environments shapes how they will act when the demands of self-directed learning are placed on them. Using Bandura's (1997) self-efficacy construct, this study set out to explore how students' self-efficacy beliefs impacted their experiences of inquiry and project-based learning. The key findings suggest that low efficacy students may be disadvantaged in minimally guided project-based learning environments. This chapter will revisit the research problem and discuss the themes that emerged from the findings: self-regulation, challenge avoidance, adverse emotional arousal, maladaptive help seeking behaviors, and learning.

5.1 Research problem

As the complexities and challenges of the modern world mount, educators and policy makers have sought to equip new generations of students with the knowledge and skills to contend with those challenges. Educational approaches like inquiry learning and project-based learning have emerged as pedagogical approaches to provide tools to 21st century learners to meet these challenges. They place students at the center of learning, as highly active producers of knowledge rather than passive receivers (Boyd & Hipkins, 2012). In New Zealand, the Ministry of Education has also promoted moving to innovative learning environments which feature open flexible learning spaces (MoE, n.b-d). This educational shift from single celled classrooms to open plans and from teacher centric to student models of instruction is aligned the NZC's (2007) goals, which directed teachers to implement more learner centered practices. In seeking a more participatory pedagogy the importance of student agency has taken on greater significance. Approaches like inquiry and project-based learning are seen to deliver this agency and help foster 'lifelong-learners'. While these approaches have been implemented, the efficacy of innovative learning spaces (Gislason, 2007) and inquiry pedagogies remains a contested space in educational research (Kirshchner et al., 2006; Mostafa et al., 2018; Hattie & Yates, 2014).

The Ministry of Education's statement of intent (2021) reaffirms the intentions of NZC (2007) and firmly places 'learners at the centre'. Additionally, educational policy has produced a shift away from disciplinary knowledge and instead has promoted the development of skills and competencies. These shifts are clearly evident in T's educational beliefs. The statement of

intent aims to direct teachers to ensure ‘learners have the relevant skills, knowledge and pathways to transition to and thrive in higher learning’ (p.20). However, the findings from this study cast some doubt on whether pedagogies like inquiry learning deliver on MoE ideals for all students equally. The findings indicate there is a risk that low efficacious students fail to access the knowledge and pathways to transition into higher education, not as a product of their abilities, but instead from their learning environments, which negatively reinforces their beliefs in their low causative capacities when managing their own learning. Furthermore, teacher emphasis on developing ‘independent learners’ has resulted in a devaluing of disciplinary content knowledge, which was both reflected in T’s educational beliefs and in the responses of the students interviewed.

5.2 Self-regulation

Data from the interviews demonstrated a strong relationship between efficacy beliefs and self-regulatory behavior in inquiry pedagogies. The low-efficacious students self-reported that while participating in project-based learning they struggled to regulate their levels of effort and attention, failed to manage competing motivations and distractions, lacked a strategic approach to projects and displayed weak commitment to their goals. In stark contrast, the high efficacious student demonstrated strong goal commitment, applied a strategic approach to mitigating distracting elements, and persevered when confronted with difficulty. Frequent student self-regulation failure, while acknowledged by the participating teacher was interpreted as providing learning opportunities for personal development in line with her interpretation of NZC (2007) goals of ‘developing lifelong learners’.

5.2.1 Student choice

Embedded within T’s educational beliefs was an expectation that providing high levels of choice yields a positive return from students in the form of increased personal responsibility and engagement. Studies including that of Borovay et al. (2019) support this finding, positing that inquiry environments are especially suited for high achieving or gifted students. This is in part due to their reported high levels of intrinsic motivation and drive allowing them to thrive in these environments (Borovay et al., 2019). However, it is important to note that Borovay et al.,(2019) like others, primarily focuses on the benefits for *high achieving* students.

There is currently a dearth of research exploring the impact on students from low achieving school environments, where research indicates students can experience low levels of motivation (Leggett & Harrington, 2021). Intrinsic drive and high self-efficacy may afford students the capacity to work autonomously on projects that they are not particularly interested in. However, as evidenced from LSE1's interview, low interest in the project topic combined with low self-efficacy for self-regulation potentially contributes to task avoidance and poor effort regulation. As he expressed little interest in the choices presented to him, greater choice did not produce greater engagement, or the kind of personal ownership T alluded to.

Evidence from PISA 2015 has shown that despite higher levels of enjoyment and preference for science-based inquiry, compared to teacher directed methods, lower performing students gain less scientific knowledge (Ministry of Education, 2019). Enjoyment, choice, and liberation from the confines of the traditional classroom settings may generate activity, but this may not necessarily translate into motivated conceptual learning. The Education Review Office (2012) found few examples of well-run science-based inquiry activities that successfully managed to integrate science conceptual knowledge. This has consequences for developing scientifically literate citizens. Despite low efficacious students like those in this study expressing a preference for the minimal instruction within inquiry, it may not translate into conceptual knowledge gains.

Greater levels of choice and agency may not always produce the kind of self-regulated learning needed for successful inquiry. T spoke of many students taking two years to adapt to the school's project-based learning approach. This may represent two years of conceptual knowledge loss for the low efficacious students who fail to self-regulate. Across New Zealand the use of inquiry-based methods in science are 'especially high compared to most countries in the quarter of our schools with the most disadvantaged students (Ministry of Education, p.2, 2019). Given the strong empirical links between low academic self-efficacy and low socioeconomic status, efforts to engage these students using inquiry could result in a widening of the knowledge-socioeconomic gap.

The majority of inquiry literature focuses on science-based subjects and the growth of its use in schools, with much of it pointing to the positive impact of science-based inquiry on student engagement. However, given the declines in PISA results for science between 2012 and 2023 it may cast some doubt of its general efficacy. T's example of two challenging students

continually disengaging in the science investigation they chose to do when not being monitored, illustrates ‘student choice’ and ‘agency’ is unable to overcome self-regulatory factors. The experience of these students contrasts significantly with HSE1 who spoke of her gains in technological understanding. While she found the content challenging, she was able to strategically manage her resources and maintain high levels of effort.

Despite all the students interviewed expressing a preference for inquiry-based methods and enjoying greater levels of choice, only HSE1 reported a strong belief in her ability to self-regulate and stay engaged in projects while working independently. This suggests that not all students are having the same learning experience. While LSE1 was aware ‘*mucking around*’ impeded his progress he did not believe he could avoid it while around his friends and out of sight of teachers. Bandura (1997) posits that low efficacious individuals may know what to do but struggle to translate that into proficient performance. Low self-efficacy for self-regulation then, may act as a barrier for some students achieving the vision of the NZC (2007) for young people ‘to seize the opportunities offered by new knowledge and technologies’ (Hipkins et al., p.11, 2014). Greater levels of choice and assumed personal ownership may not be the powerful motivating factors they are purported to be.

5.2.2 Motivation

While the success of inquiry learning is reliant on many factors aligning: adequate teacher guidance and scaffolding (Lazonder, 2014; Lazonder & Harmsen, 2016), the disciplinary climate (Mostafa et al., 2018) and prior content knowledge (Kirschner et al., 2006), its success also relies heavily on the productive learning behaviors of students. As highlighted in earlier chapters, motivation for learning is derived from the complex interplay of personal and environmental factors with self-efficacy playing a pivotal role (Schunk, et al, 2002). Self-efficacy impacts motivation through influencing goal setting and perseverant effort (Schunk & Zimmerman, 2008). Despite constructivist arguments that posit greater amounts of agency produces motivated learning, a belief shared by T, this was not observed in the low efficacious students’ beliefs. They expressed little confidence in their inability to manage competing potential distractions. Self-efficacy beliefs influence how strategically individuals approach a task and their level of effort and commitment to that task (Bandura, 1997). In contrast to the low efficacious students, HSE1 reported being able to remain task focused and motivated on her projects. She reported strategically choosing which friends were best to work with to stay

on task and expressed a strong belief in her ability to achieve the project results she wanted. This manifested in her starting projects early and sustaining high levels of effort throughout.

The complex interplay of environmental and personal factors that produce motivated learning cast some doubts on some of the assumptions made about both inquiry learning methodologies and innovative learning environment's motivational impact. Highly efficacious students may persevere even when disinterested. However, T's assumption that choice and agency promote motivated autonomous learning fails to account for students like LSE1 who takes no interest in the project topics presented. In the absence of interest, combined with a lack of intrinsic motivation and low self-efficacy for self-regulation, students like LSE1 and LSE2 disengage.

If students both doubt their ability to cope with the demands of a task and see little value in its completion, they will exert little effort (Bandura, 1997). LSE1 found none of the projects available interesting. LSE2 was only interested in sports projects, with little interest in engaging in other projects like design, where he had experienced earlier difficulties. This however is possibly attributed to it being his first year in the school. HSE1 in contrast saw a direct link between projects and future work possibilities. This study suggests that students with low efficacy profiles may behave in maladaptive ways. This has broad implications given the NZC's (2007) orientation. Given the struggles that LSE1 and LSE2 had in an environment geared towards delivering well-structured and supportive inquiry learning projects, it stands to reason that students in less structured environments may struggle to regulate their learning while working autonomously.

Innovative learning environments are argued to support inquiry learning pedagogies (Ministry of Education, 2014). All students interviewed reported positive feelings towards these spaces and their ability to move around them freely. Advocates of innovative learning environments use the phrase 'nooks and crannies' to describes spaces that students can utilize to work independently (Mulcahy, 2015). They contend these spaces encourage students to take greater responsibility for their learning. HSE1 clearly demonstrated this belief. She spoke enthusiastically about how these spaces allowed her to think and reflect on problems in her projects. However, not all students can use these spaces to their advantage. T recalls a student that *'spent the whole time struggling and didn't tell her teachers and managed to just hide away in the corner and not really do anything.'* (T) The space was facilitating distance from teachers support over the duration of a 12-week project.

Research into innovative learning environments has found that while highly motivated students may gain from the flexibility of their design, less motivated students were instead adversely impacted by the openness of the spaces (Gislason, 2007). Gislason (2007) points to less intrinsically motivated students being more prone to distraction in open learning environments. This was confirmed in this study. HSE1 felt secure in her ability to remain motivated and navigate the distracting elements, leveraging the learning environment to her advantage. In contrast, LSE1 and LSE2 both reported being unable to avoid playing with friends, with LSE1 highlighting noise as adversely impacting his ability to focus. Concerningly, LSE1 reported only being able to get work done at home, where he believed he was able to focus, away from the distractions of friends and noise at school. While inquiry pedagogies situated within innovative learning environments may produce potential benefits for students with high self-efficacy and high levels of intrinsic motivation, they may also potentially disadvantage low efficacious students who experience a lack of intrinsic drive. These students in the absence of adequate teacher guidance and supervision may potentially misuse both the space and their time in maladaptive ways. This signals a need for further qualitative research into the impact of inquiry approaches on low self-efficacious students within flexible learning environments.

5.2.3 Emotional arousal and help-seeking behaviors

The findings connect self-efficacy both in levels of adverse emotional arousal and help seeking behaviours. Overall HSE1 did not report any feelings of anxiety towards deadlines, instead she expressed positive emotions towards projects, her teachers and the school's physical environment. In contrast, LSE1 and LSE2 both reported feelings of anxiety and stress related to deadlines and time management. T highlighted the positive emotional reactions of students to projects they enjoyed and the resulting boosts in confidence for students with learning issues. HSE1 reported high levels of teacher support and her willingness and comfort in engaging help. In contrast LSE1 and LSE2 both expressed no confidence in engaging help, with LSE1 reporting that teachers did not offer much support during inquiry.

5.2.3.1 Emotional arousal for high efficacious students

Inquiry learning literature posits that through inquiry projects students experience greater levels of enjoyment and motivation due to the child-driven nature of inquiry (Duke et al., 2021). Similar to T, Bell (2010) contends that inquiry projects foster enjoyment and positive feelings towards learning through inquiring into questions and topics they are passionate about. Bell

(2010) and Duke et al (2021) frequently reference ‘highly motivated’ students. Bell (2010) describes one exciting feature of project-based learning being the ‘intrinsic motivation’ students’ experience, continuing to explain ‘students who are highly motivated will improve...strive to learn and understand during PBL.’(para.7) Later she adds ‘children instinctively reach further when they are highly motivated and interested in their inquiry topic’. Bell (2010) shares T’s belief in projects tapping into students’ intrinsic motivation and enjoyment in learning.

Debs et al.’s (2019) study found that not only did project-based learning improve motivation but also student satisfaction. HSE1’s reported satisfaction towards projects fits this framing. She reported feeling comfortable with deadlines and time management, expressing no particular adverse arousal. Similar to these findings Chun Chu & Choi’s (2005) study found a strong relationship between high self-efficacy and non-procrastination tendencies, as high efficacy was linked to purposive use of time and time control. Furthermore, highly efficacious students like HSE1 may interpret the absence of negative emotional and physical arousal in relation to deadlines and time management as a somatic signal that they are able to cope with the demands of projects, and as consequence initiate higher levels of engagement and perseverance than their low efficacious peers (Zimmerman, 1995). As noted earlier somatic and psychological information are important sources of efficacy building information. In the absence of adverse physiological and emotional arousal connected to deadlines, high efficacy students may be spared the taxing emotional consequences of procrastination such as guilt, inadequacy and self-doubt that their low efficacy peers may experience in self-directed learning (Chun Chu & Choi’s, 2005).

5.2.3.2 Emotional arousal for low efficacious students

Research has demonstrated the link between low self-efficacy and procrastination (Steel, 1997; Chun Chu & Choi, 2005). Considering the dearth of research into middle school learners’ feelings around project deadlines, it is relevant to consider studies in other environments. Debs et al.’s (2019) study focuses on university age students and offers some insight. Debs et al. (2019) found that students’ experiences with project-based learning were significantly affected by their lack of confidence in self-directed learning. Time management and distal deadlines were the most reported challenges all students faced in the study (Debs et al., 2019).

The findings from this study support the theory that low efficacy influenced self-regulatory behaviour adversely and produced negative emotional arousal as project deadlines approached.

LSE1 and LSE2 reported adverse arousal around deadlines. Both reported starting projects late and used highly emotive language in describing time management and deadlines: ‘stress’, ‘relief’, ‘getting in trouble’ and ‘worry’. LSE1 may perceive his inability to manage time as threat activating a stress response that leads to further task avoidant behaviour.

Given the empirical evidence that student propensity to procrastinate is significantly linked to low self-efficacy beliefs (Klassen, et al, 2007), it can be argued the low SE students’ tendencies to procrastinate would be further exacerbated in an inquiry environment where greater levels of self-regulation are required. Steel (1997) contends that problematic procrastinators experience adverse emotional consequences from delaying important tasks.

It can be said that low efficacious individuals are more exposed to adverse emotional arousal in self-directed learning due to time and effort management increasing instances of procrastination. Students high in impulsivity with accompanying low self-efficacy may also seek out immediate gratification at the expense of pursuing the distant goals of projects (Hughes & Adhikari, 2022). For students to successfully achieve the learning aims of an inquiry, they need to exercise high levels of self-control. A propensity for procrastination and a lack of adequate monitoring may disadvantage low efficacious students in independent learning environments. Greater levels of teacher support, monitoring and scaffolding are needed for these students to succeed.

T admits some students with ‘learning needs’ are unable to manage their learning during some projects, but insists that when doing projects, they enjoy and feel passionate about, the students experience more success than they would in a traditional classroom setting. T’s view aligns closely with the NZC (2007) push for a more student-centric approach that prioritize learners’ interests. This may account for T’s apparent lack of concern about the learning content aims of projects not being completely met. This belief is likely to have more impact on low efficacious student disciplinary knowledge base than their high efficacious peers, given their tendency to navigate away from difficult academic material. Preferencing student enjoyment over challenging conceptual knowledge is a debatable goal. There is no doubt however, that increasing students’ feelings of success and building their confidence is important. This boost in confidence may raise self-esteem, yet T was uncertain if this translated into academic success. Research suggests that increases in self-esteem may not correspond to increases in school achievement (Hattie & Yates, 2014) nor to increases in academic self-efficacy, which is

task and domain specific involving ‘specific beliefs about what one believes one can do’ rather than positive feelings about oneself (Schunk, et al., 2014 p.150). Though increasing students’ positive feelings towards school is desirable outcome, attention also needs to be given to what knowledge they can both learn and use purposefully in society. Sweller and Clark (2006) contend that to provide this knowledge more successfully, a pedagogy emphasising teacher centric guidance needs to be initiated, especially in the case of students who lack adequate domain knowledge.

5.3 Help-seeking

While research into the relationship between help seeking and self-efficacy is limited, there is evidence that efficacy beliefs predict the use of strategic behaviours (Bandura, 1997). Pintrich (1999) describes how efficacy plays a significant role in resource management strategies, with highly efficacious students managing and controlling their environments through the use of help seeking strategies. Not only do they adapt to the environmental demands of tasks, but they also actively seek out help from peers and teachers in order to best shape their environments to meet their learning needs and goals (Pintrich, 1999). T gave an example of a highly driven Taiwanese student engaging her support ‘*five times a lesson*’ until she understood how to proceed in her project. Similarly, HSE1 spoke enthusiastically of the support she received and her comfortability with asking for help when stuck on a problem she could not solve. In contrast, both the low efficacious students interviewed did not feel confident in initiating help from teachers. These differing approaches to help seeking may work to further widen the performance gap between students during an inquiry. This aligns with Schunk’s (1995) link between high efficacy and the use of adaptive strategic behaviours to navigate challenges within their environments.

When confronted with setbacks and failures high efficacious individuals are more likely to ‘remain task focused and think strategically’ (Bandura, 1997 p.39). This kind strategic thinking was lacking in the low efficacious students interviewed who failed to utilize teachers’ help while working autonomously. It can be argued that this aids in developing the NZC goal of managing self, however when there is a significant skills and knowledge deficit that blocks their ability to overcome difficulties independently, low efficacious students may disengage rather than persevering with the task (Bandura, 1997). This may further lower their efficacy beliefs as they struggle to progress without seeking help. These students may then yield to other

more powerful competing motivations, like that of having fun with their friends. More confident students would engage support strategically allowing them to progress and remain task focused (Pintrich, 1999).

The school taking part in this study has measures in place to help guide students through projects such as workshops, research logs and learning conversations where students' progress is checked and strategies are given to help them manage their learning. This however may not provide the type of on the spot timely support struggling students might need when too hesitant to engage help for themselves. The consequences of this may be exacerbated in a more disruptive school environment, where noise and disorder may be the norm. In addition to this, larger student-to-teacher ratios add a further degree of difficulty in identifying these struggling students. When these factors are combined with students being widely dispersed within the open plan environment, it creates significant challenges in monitoring. This becomes especially salient when those that need help fail to seek it.

Even when strategies are provided, students like LSE1 may still procrastinate on projects not from a lack knowledge of useful strategies but as consequence of a lack in confidence in applying them. As the success of inquiry learning is highly dependent on teacher support and skills (Lazonder & Harmsen, 2016). Failing to independently access this resource may impede project success. In addition to this is the need for availability of support, though these students may be hesitant in engaging support, monitoring teachers can nevertheless gauge what students may be struggling and intercede. However, this relies heavily on the ratio of students to teachers. In describing some challenging students with learning needs T had this to say:

'I had too many groups to look after. And it was really difficult because they needed almost constant one-to-one attention otherwise, they were off task. And it was hard for them.' (T)

Evidence of students struggling and failing to achieve the content learning aims of projects was nevertheless construed as a possible success by T. Though they struggled to access the content aims of the project, her belief is they learned how to learn from the failure. This reveals an interesting pedagogical positionality both implied by T and imbedded within the goals of the NZC, which seeks a more student centric approach to learning. The belief seems to be that students learn more from driving their own learning, even if they fail to access curriculum knowledge. Knowledge attainment plays a secondary role to creating life long-learners. In

attempting to develop 21st century learners, students low in efficacy and lacking confidence in seeking help, may be further left behind.

5.4 Challenge and evidence of learning

Findings from this study draw a link between efficacy beliefs and the pursuit of challenging learning goals. Both low efficacious students interviewed reported preferring easier projects within domains in which they expressed both interest and knowledge, whereas HSE1 actively pursued challenging mastery goals beyond her existent capabilities. In alignment with this, T reported that not all students were prepared to challenge themselves within projects. This may indicate that not all students are experiencing the same degree of exposure to challenging learning material, with some students instead opting to remain within the limits of their lived experience.

While evidence of learning was hard to determine, and was beyond the scope of this study, there was a significant difference in the scale and depth of elaboration that the students were able to produce when describing what they had learnt in recent projects. T's educational belief reflected the spirit of the NZC (2007) in prioritizing personal growth and enjoyment over the learning of domain specific knowledge.

5.4.1 Challenge

The degree to which individuals challenge themselves is influenced to a large extent by their perceived personal efficacy. This has consequences in school environments where students act as content drivers determining the scope and complexity of their learning within their projects. Although a student may possess the ability to engage with complex learning material, they, like LSE1 and LSE2, may select not to, preferring to instead inquire into a topic domain that does not demand a high investment of effort. While there has been a push to link learning to students' lives and interests, it can be argued that a lack of confidence in engaging challenging material may restrict their access to powerful knowledge, knowledge that may take them beyond the limits of their own experience.

This study highlighted the role students are playing in determining the level of challenge within their projects. One inquiry model implemented by T in the previous year involved *'projects where the kids would choose what they wanted to do, and they would make their way through*

an inquiry cycle'. In tune with the direction set by the NZC, T spoke of her role as 'facilitator' whereas teachers they *'wouldn't do a lot of explicit teaching except for workshops when it was needed in the project'*. While the framework of the inquiry was predetermined, it could be argued that the degree of difficulty in epistemic ascent students attempted during their inquiry was largely determined by their personal aspirations and academic beliefs. Rather than the teacher determining the target of learning content, that role is largely being left to the students. This may empower some students who set challenging goals for themselves, but it may undermine efficacy in students who doubt their ability to stretch their learning capacities even after supportive encouragement.

T spoke often about the importance of students setting their own direction in projects but pointed out that teachers may try and steer students with suggestions *'which would actually be challenging for them and difficult. They'll conveniently ignore it'* or *'they've conveniently forgotten'*. With low efficacious students' tendency to avoid challenging material even when capable of performing the task, this may mean these students fail to access knowledge necessary for future learning attainment. T pointed out that herself and the team responsible for projects across the school were continually striving to improve the learning experiences of students but that difficulties exist, noting *'we're dealing with 12-year-old children...and they're not always going to perform the way we want them to perform or take the opportunities as much as we want, we think they should be.'* Unsurprisingly children do not approach these opportunities devoid of any notion of themselves and their capabilities. Through transactional experiences with their environments, they build complex self-schemata of personal efficacy information, which influences what they believe they are capable of (Bandura, 1997). As such, not all children approach opportunities or believe they can cope with the opportunities available to them in the same way. Low efficacious students potentially opt for less challenging learning goals, while those gifted advantage from the academic capitals of university educated parents, or through high academic efficacy developed through advantageous conditions, may thrive and embrace the learning opportunities available. Lv et al., (2018) established an empirical link between parents' educational aspirations and parent child activity in fostering high efficacy in children. Thus, less advantageous home environments may mean those of equal intelligence but who doubt their causative capacities, may shy away from the same learning opportunities. Rather than levelling the playing field, this may in fact gift further advantage to those that are already positioned advantageously.

T noted one very driven student whose mother was heavily invested in her education, setting herself a very challenging goal in a project of writing code to program a robot. According to T, although the project did not work in the end, this student applied significant levels of effort and gained valuable information about herself. Contrast this to the low efficacious students in this study who preferred easy projects and disengaged when the content was difficult or uninteresting for them. Easy tasks provide redundant efficacy information revealing little in terms of efficacy re-appraisals. Succeeding in challenging tasks on the other hand builds a robust sense of efficacy as perseverant effort is required to succeed in these tasks (Bandura, 1997). Though T believes students experience boosts in confidence from the successful completion of projects that are easier for them, research suggests this may have little impact on their academic self-efficacy beliefs, if they both interpret the task as easy and exert little perseverant effort in completing the task. Bandura (1997) contends that this in fact undermines students, through leading them to expect quick results, positioning them to become easily discouraged by difficulty and failure. However, it could be argued that any gains in self-esteem are valuable, even if they fail to improve academic performance.

5.4.2 Evidence of learning

The NZC (2007) push to develop more student centric approaches has led to a significant shift in how teachers see their role in students learning. Seemingly no longer central to the learning process, teachers in the participating school are rebranded as ‘mentors’ and ‘coaches’, rather than providing explicit instruction and ensuring conceptual learning, their role is to act as facilitators, empowering students to teach themselves. While this has allowed students to take responsibility for their learning, it has also opened up the possibility for low efficacious to mismanage it. This repositioning of a teacher’s purpose is evident in T repeatedly articulating her role as a facilitator rather than a ‘holder of all knowledge’. The focus of this facilitation appears married to the development NZC (2007) key competencies of ‘managing self’ and developing ‘lifelong learners’ rather than fostering the acquisition of academic content knowledge. T’s passionate commitment to her students building these competencies, has in her belief led to great gains in students’ confidence and personal growth, which is evident in highly efficacious students like HSE1. However, visible gains in students’ self-esteem and enjoyment of school have potentially created for T, a blind spot with regards to gains in disciplinary knowledge for low efficacious students. These students struggle to self-regulate, disengage and potentially fail commit the necessary attentional focus required for long term learning to occur.

It is doubtful that students like LSE1, who reported spending the majority of time off task, gain the kind of valuable self-knowledge seen to justify an absence of conceptual knowledge development.

In line with the NZC (2006) goals of student centric learning T's students essentially act as curriculum creators in their inquiry projects, in essence they set the conceptual destination of the project. T spoke about one student planning on writing code for a robot. T expressed her doubts prior to the project: *'In my head, it doesn't work because I'm not a software engineer, I have no idea about coding.'* These doubts however were superseded by T educational belief in allowing students to explore their passion and enthusiasm. The capacity to purposefully steer the student towards a conceptual destination appears less relevant, as does the destination itself. Here one can assume the student is the expert and the teacher the novice, though T had no idea if the student could actually code. Fortunately, T commented *'But it actually turned out she had the ability and was able to access it.'* Whether the project was beyond her capabilities was not as relevant as the students' interest in doing it. While the project ultimately failed, T spoke glowingly that *'She had so much learning about herself...about her perseverance and resilience'*. All of which is clearly valuable in developing 'life-long learners'. It also however highlights a lack of emphasis on the value on what content is being taught. It reflects a clear movement away from teachers purposefully guiding students towards conceptual understanding, and instead overly emphasising competencies. It also opens up the possibility for low efficacious students who navigate away from challenging content, to limit what they attempt to learn, while at the same time placing teachers in a position, where they may lack relevant the content knowledge to assist in the variety of projects students may select. This may hamper their ability to expertly guide students towards their learning goals.

Developing life-long learners is clearly an important aim, but one of the biggest barriers to learning is prior conceptual knowledge (Hattie & Yates, 2014). The importance of ensuring students build the foundational concepts that future learning is based upon, seems to be in opposition to statements like the one T makes here *'The content comes later. The content is easy. Once you know how to learn, the content is not difficult to pick out because you know where to find it.'* This seems to both downplay the difficulty in acquiring abstract conceptual knowledge (Kirschner et al., 2006) and its foundational importance (Hattie & Yates, 2014), while at the same time overpromising on skills acquired in inquiry. Nor does it consider students efficacy beliefs, that impact significantly learning performances. It does however

reflect the agenda set after 2007, that set the stage for a movement away from academic knowledge, towards constructivist pedagogies emphasizing knowledge from experience (Rata, 2012). So that when students like LSE1 and LSE2 make few gains in academic content, this loss is deemed to be buffered by experience gains. Though evidence from this study suggests this is not always the case.

While teacher centric modes are argued to be antiquated and unsuitable for developing 21st century learners (Bell, 2010) there is however little empirical evidence that inquiry methods deliver on the promise of fostering deeper learning (Zhang et al., 2022), even when students are on task and not disengaged. Zhang et al. (2022) point to mounting empirical evidence that scientific conceptual knowledge is best obtained through explicit instruction, rather than through exploration-based investigation activities. They argue that investigative skills and methods do not emerge automatically, if at all, and further posit that it is far easier for individuals to obtain information from others than to discover it through their own investigation, which places considerable strain on our cognitive capacity. It is evident from T's transcript that some students disengaged while conducting their own scientific investigation of waterproof blanket material. T explains that the '*task was too difficult for them*' and that when out of sight of the teacher they failed to stay on task. Arguably the students gained little conceptual knowledge as a result.

Both cognitive overload and low self-efficacy have potential explanatory power for this kind of disengagement. Low self-efficacy can often stem from genuine knowledge and skills gaps (Hattie & Yates, 2014). While low efficacy impacts the level of effort, perseverance and strategy students mobilize (Bandura, 1997), low levels of prior knowledge contribute to cognitive overload (Hattie & Yates, 2014, Kirschner et al., 2006, Zhang et al., 2022). Inquiry methods involving problem solving searches like that of the blanket material investigation place considerable demands on working memory, overburdening students' cognitive capacity and diverting resources away from activities related to learning (Kirschner et al., 2006; Zhang et al., 2022). This impacts low knowledge students more than their high knowledge peers, as more prior content knowledge lowers the levels of strain on working memory (Kirschner et al., 2006). All students learn with limits to their biological capacity, however those with less prior conceptual understanding, lacking the proper schemas to integrate novel information are more likely to be adversely impacted (Kirschner et al., 2006). Given the extent that inquiry pedagogies are applied across New Zealand, and to our most disadvantaged schools, it could

be suggested that an unnecessary cognitive burden is being placed on these students, when explicit instruction has been demonstrated to be more effective for novel learners (Zhang et al., 2022).

Biological capacity is both strained by the demands of inquiry and by maladaptive behaviours diverting attentional resources towards non learning related activities. In addition to this, Hattie & Yates (2014) point out that inappropriate coping strategies also contribute to overload, as does unfavourable environmental conditions. For LSE1 and LSE2, though they enjoyed the freedom of movement within the flexible learning spaces, they struggled to overcome the distractions therein, adding to the demands. When these factors are combined with a lack of interest in the subject topic, it strongly calls into questions the claims made that inquiry produces deep learning experiences.

5.5 Conclusion

This study aimed to answer the question ‘How are students with different efficacy profiles impacted by inquiry learning?’. Overall, this study indicates that low efficacious students face considerable challenges with time management, effort regulation and adverse emotional arousal within inquiry learning. This is contrasted with high efficacy which allowed the student in this study to respond adaptively to the demands of independent learning required in inquiry approaches.

Proponents of inquiry learning highlight its ability to produce high level levels of motivation, engagement and deeper learning. This is attributed to high levels of student agency, choice, enjoyment and the pursuit of students’ interests. This however fails to account for individual differences in self-efficacy appraisals, which powerfully influence the actions individuals choose to engage in, their levels of effort, goal commitment, their emotional and somatic arousal and their ability to persistent in the face of challenges (Bandura, 1997). All of which were found to significantly influence the students in this study and their experiences and beliefs around inquiry learning.

Despite the small size of this study, it nevertheless points to the need for further research into students’ perspectives on inquiry approaches, give the dearth of research in this area. Additionally, there is a clear gap in the research surrounding the types of transdisciplinary

inquiry projects done in this school. Little is known about their effectiveness as most inquiry studies tend to focus on older children and university age students taking part in science courses. Given the rise in the use of this type of curriculum integration encouraged by policy makers and educationalist both in New Zealand and abroad, the importance of this study is clear. Through this, educators can gain some insight in how to best support low efficacious students as they navigate the demands of student centric pedagogies like that of inquiry learning. Before shifting greater responsibility onto the learner, educators need a better framework for supporting those students that habitually disengage otherwise it doubtful the intentions of the NZC (2007) will be met.

It is clear to this researcher that there is a place for inquiry in education. Two of the three students interviewed used the word ‘passion’ in describing one of their projects. Enjoyment is clearly an outcome that benefits all students and their feelings about school. However, it should not take precedence over providing them with the knowledge they may need to confront the challenges of their future lives. Teacher beliefs around the importance of enjoyment and ‘learning to learn’ may take precedence over the development of conceptual knowledge in inquiry. Limited content gains due to poorly executed inquiries may be interpreted as fertile grounds for learning about themselves and developing into lifelong learners. This belief arguably stems from the ideological shift that occurred after 2007, with the movement away from subject-focused delivery to key competencies. This belief then shapes pedagogical decisions to provide high levels of autonomy to low efficacious students that may not have the ability to manage it. The consequence of this is potentially producing a situation where instead of student centric approaches providing more equitable outcomes, it instead increases the knowledge gap, resulting in low efficacious students potentially falling further behind.

References

- Anfara, V. A., & Mertz, N. T. (2015). *Theoretical frameworks in qualitative research* (2nd ed.). SAGE.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice Hall, Inc.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review*, 84(2), 191-215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman.
- Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, 88(1), 87-99. <https://doi.org/10.1037/0021-9010.88.1.87>
- Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, 41(3), 586-598. <https://doi.org/10.1037/0022-3514.41.3.586>
- Barone, D. F., Maddux, J. E., & Snyder, C. R. (1997). *Social cognitive psychology: History and current domains* (1st ed.). Springer. <https://doi.org/10.1007/978-1-4615-5843-9>
- Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, 83(2), 39-43. <https://doi.org/10.1080/00098650903505415>
- Belo, N. A. H., van Driel, J. H., van Veen, K., & Verloop, N. (2014). Beyond the dichotomy of teacher- versus student-focused education: A survey study on physics teachers' beliefs

- about the goals and pedagogy of physics education. *Teaching and Teacher Education*, 39, 89-101. <https://doi.org/10.1016/j.tate.2013.12.008>
- Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development*, 78(1), 246-263. <https://doi.org/10.1111/j.1467-8624.2007.00995.x>
- Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist*, 26(3-4), 369-398. <https://doi.org/10.1080/00461520.1991.9653139>
- Bolstad, R., Gilbert, J., & McDowall, S. (2012). *Supporting future-oriented learning & teaching a New Zealand perspective*. Ministry of Education. http://www.educationcounts.govt.nz/_data/assets/pdf_file/0003/109317/994_Future-oriented-07062012.pdf
- Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review*, 15(1), 1-40. <https://doi.org/10.1023/A:1021302408382>
- Borovay, L. A., Shore, B. M., Caccese, C., Yang, E., & Hua, O. (2019). Flow, achievement level, and inquiry-based learning. *Journal of Advanced Academics*, 30(1), 74-106. <https://doi.org/10.1177/1932202X18809659>
- Boyd, S., & Hipkins, R. (2012). Student inquiry and curriculum integration: Shared origins and points of difference (part A). *Set: Research Information for Teachers*, (3), 15-23. <https://doi.org/10.18296/set.0386>

- Buchanan, S., Harlan, M. A., Bruce, C., & Edwards, S. (2016). Inquiry based learning models, information literacy, and student engagement: A literature review. *School Libraries Worldwide*, 22(2), 23-39. <https://doi.org/10.29173/slww6914>
- Chun Chu, A. H., & Choi, J. N. (2005). Rethinking procrastination: Positive effects of "active" procrastination behavior on attitudes and performance. *The Journal of Social Psychology*, 145(3), 245-264. <https://doi.org/10.3200/SOCP.145.3.245-264>
- Cleary, T. J., Kitsantas, A., Peters-Burton, E., Lui, A., McLeod, K., Slemp, J., & Zhang, X. (2022). Professional development in self-regulated learning: Shifts and variations in teacher outcomes and approaches to implementation. *Teaching and Teacher Education*, 111, 103619-. <https://doi.org/10.1016/j.tate.2021.103619>
- Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson/Merrill Prentice Hall.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- de Jong, T., Lazonder, A. W., Chinn, C. A., Fischer, F., Gobert, J., Hmelo-Silver, C., Koedinger, K. R., Krajcik, J. S., Kyza, E. A., Linn, M. C., Pedaste, M., Scheiter, K., & Zacharia, Z. C. (2023). Let's talk evidence – the case for combining inquiry-based and direct instruction. *Educational Research Review*, 39, 100536. <https://doi.org/10.1016/j.edurev.2023.100536>
- Debs, L., Miller, K. D., Ashby, I., & Exter, M. (2019). Students' perspectives on different teaching methods: Comparing innovative and traditional courses in a technology program. *Research in Science & Technological Education*, 37(3), 297-323. <https://doi.org/10.1080/02635143.2018.1551199>

- Demant, J., & Van Houtte, M. (2018). Socioeconomic status, economic deprivation, and school misconduct: An inquiry into the role of academic self-efficacy in four European cities. *Social Psychology of Education, 22*(1), 1-22. <https://doi.org/10.1007/s11218-018-9470-x>
- Duke, N. K., Halvorsen, A., Strachan, S. L., Kim, J., & Konstantopoulos, S. (2021). Putting PjBL to the test: The impact of project-based learning on second graders' social studies and literacy learning and motivation in low-SES school settings. *American Educational Research Journal, 58*(1), 160-200. <https://doi.org/10.3102/0002831220929638>
- Education Review Office. (2012). *Science in the New Zealand curriculum: Years 5 to 8*. <https://ero.govt.nz/sites/default/files/2021-05/Science-in-the-New-Zealand-Curriculum-Years-5-to-8.pdf>
- Edwards, S. (2015). Active learning in the middle grades. *Middle School Journal, 46*(5), 26-32. <https://doi.org/10.1080/00940771.2015.11461922>
- Fall, M., & McLeod, E. H. (2001). Identifying and assisting children with low self-efficacy. *Professional School Counselling, 4*(5), 334-341. <https://search.proquest.com/docview/213438878>
- Finn, J. D., & Rock, D. A. (1997). Academic success among students at risk for school failure. *Journal of Applied Psychology, 82*(2), 221-234. <https://doi.org/10.1037/0021-9010.82.2.221>
- Friesen, S., & Scott, D. (2013). *Inquiry-based learning: A review of the research literature*. Alberta Ministry of Education. <https://galileo.org/focus-on-inquiry-lit-review.pdf>
- Gaskill, P. J., & Woolfolk Hoy, A. (2002). Self-efficacy and self-regulated learning: The dynamic duo in school performance. In J. Aronson (Ed.), *Improving academic*

- achievement: Impact of psychological factors on education* (pp. 185-208). Academic Press. <https://doi.org/10.1016/B978-012064455-1/50012-9>
- Gislason, N. (2007). Placing education: The school as architectural space. *Paideusis*, 16(3), 5-14.
- Harrison, H., Birks, M., Franklin, R., & Mills, J. (2017). Case study research: Foundations and methodological orientations. *Forum, Qualitative Social Research*, 18(1) <https://doi.org/10.17169/fqs-18.1.2655>
- Hipkins, R. (2008, June 20) Perfect match or problematic partners? CORE Seminar. Royal Society, Wellington, New Zealand. <https://www.nzcer.org.nz/research/publications/key-competencies-and-inquiry-learning-perfect-match-or-problematic-partners>
- Hmelo-Silver, C., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist*, 42(2), 99-107. <https://doi.org/10.1080/00461520701263368>
- Hughes, S., & Adhikari, J. (2022). Time wasters?: Active procrastination and the dark tetrad. *Journal of Individual Differences*, 43(2), 89-94. <https://doi.org/10.1027/1614-0001/a000357>
- Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41(2), 75-86. https://doi.org/10.1207/s15326985ep4102_1
- Klassen, R. M., Krawchuk, L. L., & Rajani, S. (2008). Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of

procrastination. *Contemporary Educational Psychology*, 33(4), 915-931. <https://doi.org/10.1016/j.cedpsych.2007.07.001>

Klassen, R. M., & Usher, E. L. (2010). Self-efficacy in educational settings: Recent research and emerging directions. In T.C. Urdan, & S. A. Karabenick, (Eds.) *The decade ahead: Theoretical perspectives on motivation and achievement (Advances in Motivation and Achievement, Vol 16 Part A)* (pp. 1-33). Emerald Group Publishing Limited. [https://doi.org/10.1108/S0749-7423\(2010\)000016A004](https://doi.org/10.1108/S0749-7423(2010)000016A004)

Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences*, 25, 67-72. <https://doi.org/10.1016/j.lindif.2013.01.005>

Krsmanovic, M. (2021). Course redesign: Implementing project-based learning to improve students' self-efficacy. *The Journal of Scholarship of Teaching and Learning*, 21(2) <https://doi.org/10.14434/josotl.v21i2.28723>

Kuhn, D., Black, J., Keselman, A., & Kaplan, D. (2000). The development of cognitive skills to support inquiry learning. *Cognition and Instruction*, 18(4), 495-523. https://doi.org/10.1207/S1532690XCI1804_3

Lazonder, A. W. (2014). Inquiry learning. In J.Spector, M. Merrill, J. Elen, M. Bishop, (Eds.), *Handbook of Research on Educational Communications and Technology* (pp. 453-464). Springer. https://doi.org/10.1007/978-1-4614-3185-5_36

Lazonder, A. W., & Harmsen, R. (2016). Meta-analysis of inquiry-based learning: Effects of guidance. *Review of Educational Research*, 86(3), 681-718. <https://doi.org/10.3102/0034654315627366>

- Leggett, G., & Harrington, I. (2021). The impact of project based learning (PBL) on students from low socio economic statuses: A review. *International Journal of Inclusive Education, 25*(11), 1270-1286. <https://doi.org/10.1080/13603116.2019.1609101>
- Littleton, K., Scanlon, E., & Sharples, M. (2012). *Orchestrating inquiry learning*. Routledge.
- Lv, B., Zhou, H., Liu, C., Guo, X, J., Jiang, K., Liu, Z., & Luo, L. (2018) The relationship between parental involvement and children's self-efficacy profiles: A person-centered approach. *Journal of Child and Family Studies, 27*(11), 3730-3741. <https://doi.org/10.1007/s10826-018-1201-6>
- Lyons, M., & Rice, H. (2014). Thieves of time? Procrastination and the dark triad of personality. *Personality and Individual Differences, 61-62*, 34-37. <https://doi.org/10.1016/j.paid.2014.01.002>
- Määttä, E., Järvelä, S., & Perry, N. (2016). Personal and contextual contributors to young children's activity-based perceived self-efficacy. *Scandinavian Journal of Educational Research, 60*(4), 417-434. <https://doi.org/10.1080/00313831.2015.1024161>
- Maddux, J. E., & Kleiman, E. M. (2021). Self-efficacy: The power of believing you can. In S. J. Lopez & C. R. Snyder (Eds.), *Oxford handbook of positive psychology* (2nd ed., pp. 335–343). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199396511.013.26>
- McInerney, D. M. , McInerney, V. (1998). *Educational psychology : Constructing learning*. Prentice Hall.
- McPhail, G. J. (2013). Mixed pedagogic modalities: The potential for increased student engagement and success. *New Zealand Journal of Educational Studies, 48*(1), 113-126.

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. Jossey-Bass.

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (4th ed.). Wiley.

Ministry of Education. (2007). New Zealand Curriculum Online.

<https://nzcurriculum.tki.org.nz>

Ministry of Education. (2019). Inquiry-based or teacher-directed science? Evidence from PISA

<https://www.educationcounts.govt.nz/publications/series/insights-for-teachers/teaching-in-nz-inquiry-based-or-teacher-directed>

Ministry of Education (n.d.-b). Innovative learning environments.

<http://ile.education.govt.nz/>

Mostafa, T. (2018). How do science teachers teach science – and does it matter? *PSIA in Focus*, 90, <https://doi.org/10.1787/f3ac3fd6-en>

Mostafa, T., Echazarra, A., & Guillou, H. (2018). *The science of teaching science: An exploration of science teaching practices in PISA 2015*. OECD Publishing.

<https://doi.org/10.1787/f5bd9e57-en>

Mulcahy, D., Cleveland, B., & Aberton, H. (2015). Learning spaces and pedagogic change: Envisioned, enacted and experienced. *Pedagogy, Culture & Society*, 23(4), 575-595. <https://doi.org/10.1080/14681366.2015.1055128>

Müller, S. M., Stolze, D., & Brand, M. (2021). Predictors of social-zapping behavior: Dark triad, impulsivity, and procrastination facets contribute to the tendency toward last-

minute cancellations. *Personality and Individual Differences*, 168, 110334.

<https://doi.org/10.1016/j.paid.2020.110334>

Mutch, C. (2005). *Doing educational research: A practitioner's guide to getting started*.

NZCER Press.

Neuman, W. L. (2003). *Social research methods: Qualitative and quantitative*

approaches (5th ed.). Allyn and Bacon.

Organisation for Economic Cooperation and Development (OECD). (2016a). *PISA 2015 results volume I: Excellence and equity in education*.

<https://doi.org/10.1787/9789264266490-en>

OECD. (2016b). *PISA 2015 results volume II: Policies and practices for successful schools*.

<https://doi.org/10.1787/9789264267510-en>

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational*

Research, 66(4), 543-578. <https://doi.org/10.3102/00346543066004543>

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*, 31(6), 459-470.

[https://doi.org/10.1016/S0883-0355\(99\)00015-4](https://doi.org/10.1016/S0883-0355(99)00015-4)

Richards, L. (2009). *Handling qualitative data: A practical guide* (2nd ed.). SAGE.

Saldana, J. (2014). *Thinking qualitatively: Methods of mind*. SAGE publications.

Scanlon, E., Anastopoulou, S., & Kerawalla, L. (2012). Inquiry learning reconsidered:

Contexts, representations and challenges. In K. Littleton, E. Scanlon, & M. Sharples

(Eds.) *Orchestrating inquiry learning* (pp. 7-30). Routledge.

- Schunk, D. H., Meece, J. L., & Pintrich, P. R. (2014). *Motivation in education: Theory, research, and applications* (4th ed.). Pearson.
- Schunk, D. H., & Mullen, C. A. (2012) Self-efficacy as an engaged learner. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 219-235). Springer. https://doi.org/10.1007/978-1-4614-2018-7_10
- Schunk, D. H., & Pajares, F. (2002). The development of academic self-efficacy. In A. Wigfield, & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 15-31). Academic Press. <https://doi.org/https://doi.org/10.1016/B978-012750053-9/50003-6>
- Sharples, M., & Anastopoulou, S. (2012). Designing orchestration for inquiry learning. In K. Littleton, E. Scanlon, & M.Sharples (Eds.) *Orchestrating inquiry learning* (pp. 69-85). Routledge.
- Spronken-Smith, R., Bullard, J. O., Ray, W., Roberts, C., & Keiffer, A. (2008a). Where might sand dunes be on mars? Engaging students through inquiry-based learning in geography. *Journal of Geography in Higher Education*, 32(1), 71-86. <https://doi.org/10.1080/03098260701731520>
- Stake, R. E. (2006). *Multiple case study analysis*. Guilford Press.
- Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133(1), 65-94. <https://doi.org/10.1037/0033-2909.133.1.65>
- Tarnanen, M., Räikkönen, E., Martin, A., Kaukonen, V., Kostainen, E., Toikka, T., & Vauhkonen, V. (2023). Pupils' academic self-efficacy in subject-specific and integrated curriculum instruction. *Scandinavian Journal of Educational Research*, 67(2), 252-267. <https://doi.org/10.1080/00313831.2021.2006303>

- Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *The American Journal of Evaluation*, 27(2), 237-246. <https://doi.org/10.1177/1098214005283748>
- Usher, E. L. (2009). Sources of middle school students' self-efficacy in mathematics: A qualitative investigation. *American Educational Research Journal*, 46(1), 275-314. <https://doi.org/10.3102/0002831208324517>
- Wolters, C. A. (2003). Understanding procrastination from a self-regulated learning perspective. *Journal of educational psychology*, 95(1), 179.
- Yeager, D. S., Bryan, C. J., Gross, J. J., Murray, J. S., Krettek Cobb, D., H F Santos, P., Graveling, H., Johnson, M., & Jamieson, J. P. (2022). A synergistic mindsets intervention protects adolescents from stress. *Nature*, 607(7919), 512-520. <https://doi.org/10.1038/s41586-022-04907-7>
- Zacharopoulos, G., Sella, F., & Kadosh, R. C. (2021). The impact of a lack of mathematical education on brain development and future attainment. *Proceedings of the National Academy of Sciences*, 118(24), 1. <https://doi.org/10.1073/pnas.2013155118>
- Zhang, L., Kirschner, P. A., Cobern, W. W., & Sweller, J. (2022). There is an evidence crisis in science educational policy. *Educational Psychology Review*, 34(2), 1157-1176. <https://doi.org/10.1007/s10648-021-09646-1>
- Zimmerman, B. J. J. (1992). *Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting*. American Educational Research Association. <https://doi.org/10.3102/00028312029003663>

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25(1), 82-

91. <https://doi.org/https://doi.org/10.1006/ceps.1999.1016>

Appendix A: Teacher interview guide



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand
T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

Indicative questions for the teacher interview

Semi-Structured Interview: Indicative Questions for Teacher Interviews :40 minutes

The interview will occur after the classroom observation and at the end of the inquiry project

Begin with introductions, interview purpose, and protocols.

I will make the participant teacher aware that they can ask for the recorder to be turned off at any time.

Interview questions

Can you tell me how you see your role in this type of inquiry project?

How many times have you taught this particular inquiry project?

What are the benefits for students of these types of projects?

How do you think these types of projects impact on student's levels of motivation and engagement to learn? Does it translate to academic achievement?

What difficulties or successes have students had with these types of projects in the past?

How have you adjusted your delivery of inquiry projects given past experiences of similar projects?

Can you think back to when you planned this project, what problems did you anticipate for individual students and how did you plan for them? How successful were the interventions?

What do you think are the biggest challenges students face when completing this type of project?

Why do you think some students may struggle with this type of teaching approach? How can they be supported?

How involved in a project do you get when you see some students progressing slowly or avoiding challenging themselves?

Do you think the students achieved the learning goals for this project?

How did you monitor student's progress during the inquiry project?

What went really well during the project?

What were the biggest challenges students faced?

What were some of the challenges you faced with teaching the project?

What do you believe the students will take away from this project?

How do you think students engaged in this project? Why do you think this?

Do you think students that doubt their abilities to complete academics tasks benefit from student directed tasks? In what ways?

Has advances in AI made any impact on students projects?

What impact do noisy learning environments have on students that have struggled in the past?

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext. 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext. 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number

Appendix B: Self-efficacy questionnaire



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand

T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

Self-Efficacy questionnaire

Sample questions taken from

Panorama Education:

PANORAMA SOCIAL-EMOTIONAL LEARNING SURVEY

How confident are you that you can complete all the work that is assigned in your classes?

Not at all confident

Slightly confident

Somewhat confident

Quite confident

Extremely confident

When complicated ideas are presented in class, how confident are you that you can understand them?

Not at all confident

Slightly confident

Somewhat confident

Quite confident

Extremely confident

How confident are you that you can learn all the material presented in your classes?

Not at all confident

Slightly confident

Somewhat confident

Quite confident
Extremely confident

How confident are you that you can do the hardest work that is assigned in your classes?

Not at all confident
Slightly confident
Somewhat confident
Quite confident
Extremely confident

How confident are you that you will remember what you learned in your current classes, next year?

Not at all confident
Slightly confident
Somewhat confident
Quite confident
Extremely confident

How confident are you that you can complete all the work that is assigned in your [SUBJECT] class?

Not at all confident
Slightly confident
Somewhat confident
Quite confident
Extremely confident

When complicated ideas are presented in your [SUBJECT] class, how confident are you that you can understand them?

Not at all confident
Slightly confident
Somewhat confident
Quite confident
Extremely confident

How confident are you that you can learn all the material presented in your [SUBJECT] class?

Not at all confident
Slightly confident
Somewhat confident
Quite confident
Extremely confident

How confident are you that you can do the hardest work that is assigned in your [SUBJECT] class?

Not at all confident
Slightly confident
Somewhat confident
Quite confident
Extremely confident

How confident are you that you will remember what you learned in your current [SUBJECT] class, next year?

Not at all confident
Slightly confident
Somewhat confident
Quite confident
Extremely confident

How often do you stay focused on the same goal for several months at a time?

Almost never
Not at all focused
Not at all likely
Almost never
Not at all focused

If you fail to reach an important goal, how likely are you to try again?

Not likely at all
Slightly likely
Somewhat likely
Quite likely
Extremely likely

When you are working on a project, how focused can you stay when there are lots of distractions?

Not at all focused
Slightly focused
Somewhat focused
Quite focused
Extremely focused

If you have a problem while working towards an important goal, how well can you keep working?

Not well at all
Slightly well
Somewhat well

Quite well
Extremely well

How often did you get your work done right away, instead of waiting until the last minute?

Almost never
Once in a while
Sometimes
Frequently
Almost all the time

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number

Appendix C: Participant information sheet



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand
T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

Participant Information Sheet

STUDENT PARTICIPANT INFORMATION SHEET

Project Title: Self-efficacy and Inquiry Learning
University Supervisors: Dr Nina Hood

Student Researcher: Matthew Reese
Master of Education

Project Description and Invitation:

I am a teacher at ICL group and I am currently enrolled in a Master of Education degree at the University of Auckland. The research I will be carrying out in this project will form the basis of my Master of Education thesis, which will be conducted during the 2023 school year.

The purpose of this research is to explore how students with low academic Self-efficacy beliefs are impacted by inquiry learning projects, with a particular focus on motivation and engagement.

I would like to invite you to participate in this research project as you are student taking part in an inquiry learning project.

Data Collection Process:

To carry out this research, the use of semi-structured interviews and classroom observations will be used. The data collection process will occur for the duration of one inquiry learning project.

- Self-efficacy questionnaire
- Two 30 minute semi-structured student interviews one prior to the start of the project and one at the end of the project
- 2 50 to 60 minutes classroom observations of the inquiry project.

- One teacher interview of 40 minutes

Self-efficacy Questionnaire

I would like to give you a questionnaire about how confident you feel doing academic tasks. From this questionnaire I will identify three students who fit a certain profile and invite them to participate in the research project

Two Semi-structured teacher interview

Before you start your inquiry project I would like to have a 30 minute interview with you to talk about how you feel about this project and some other questions about projects you have done in the past. At the end of the project I would like to interview you again and discuss how the project went. This interview will be audio recorded on my phone, at any time you can ask me to stop recording.

Two Classroom Observations

I would like to observe you in two different class periods while you do the project and ask you some questions. There will also be an audio recording of these interactions

Use of data:

The data will be analysed to answer the research questions and inform the writing of my thesis. It may also be used in other writings by the researcher.

Data Storage:

I will keep all recordings safely locked away at my home.

Anonymity

Your participation cannot be anonymous due to the interviews and observations that make up this study.

Informed Consent

Your participation is voluntary. You may decline the invitation to participate without giving reason. Participation is based on your informed written consent gained without coercion.

Participant Right to Withdraw

You will have the right to withdraw from participation in the research project at any time without having to give a reason. You have the right to withdraw any interview transcript data.

Participant Checks

You will be offered the opportunity to check the interview transcripts made from audio- recordings. You will have two weeks from the date that the final interview transcripts are sent to check them.

You will be offered the opportunity to comment on the draft Findings Chapter within the thesis, and will be given two weeks from the date the draft Findings Chapter is sent to make any comments.

The school principal has given their assurance that your decision to participate, or not participate, in this research will not impact on your grades or relationship with the school.

If you consent to participate in this research, I would like to request that you:

- sign the attached consent/ assent form and return it to me. If you consent/assent, I will then contact you and arrange suitable times for the interviews and observations.

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number

Appendix D: Teacher consent form



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand

T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

TEACHER PARTICIPANT CONSENT FORM

Project title: Self-efficacy in Inquiry learning

University Supervisors: Professor Nina Hood

Student Researcher: Matthew Reese
Master of Education

I have read the Participant Information Sheet provided. I understand the nature of the research and why I have been asked to participate. Details of the research project have been fully explained to me. I have had the opportunity to ask questions and have had them answered to my satisfaction.

- I agree to participate in this research project.
- I understand that my participation is voluntary and based on informed written consent gained without coercion.
- I understand I can withdraw from participation at any time without having to give a reason.
- I understand I can withdraw any interview transcript data or teaching artefacts without having to give a reason, up to two weeks from the date of being sent a copy of the final interview transcripts.
- I agree to the audio-recording of semi-structured interviews and classroom observations, I understand that I can ask for the digital recorder to be turned off at any time, and I understand that field notes will be jotted on an Observation Schedule
- I understand that my school principal has been asked to give assurance that my participation, or non-participation, will not influence my relationship with the school or my employment status.
- I understand that my identity will be known only to you, your supervisors, and a University of Auckland approved transcriber who will be required to sign a confidentiality agreement and

that confidentiality will be ensured by the use of self-selected pseudonyms in all data information.

- I understand that, while confidentiality is ensured regarding my participation, my participation cannot be anonymous due to the interviews and observations that make up this study.
- I understand that information will not be made available to the Principal or the Board of Trustees and that any information that may be reported or published will not identify the school at which I teach, or myself.
- I understand that I will be offered the opportunity to check the post observations interview transcripts made from the audio-recordings, and that I will have two weeks from the date of being sent a copy of the final interview transcripts to amend, clarify, or delete any of my answers.
- I understand that I will be given the opportunity to review the draft Findings Chapter, and that I will have two weeks from the date it is sent to make comments.
- I understand that consent forms will be stored separately in a locked filing cabinet, that all other data will be stored electronically on a password-protected computer or transferred to the University of Auckland's main server, and that all data will be destroyed/deleted after a period of six years.
- I wish / do not wish to receive the summary of findings at the following email/ postal address

Email:

Address:

I would like to check the transcript of each of my interviews Yes / No I would like to review the draft Findings Chapter Yes / No Please circle which answers apply.

Email address: _____ Date: _____

Name: _____ Signature: _____

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext.

83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number

Appendix E: Student assent form



**EDUCATION AND
SOCIAL WORK**

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand
T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

STUDENT ASSENT FORM

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project title: Self-efficacy in inquiry learning

Name of Principal Investigator/Supervisor (PI): Nina Hood

Name of Student Researcher(s): Matthew Reese

I have read the Participant Information Sheet and understand the nature of the research and why I have been invited to participate. I have had the opportunity to ask questions and have had them answered to my satisfaction.

- I agree to take part in both a self-efficacy survey and the research project
- I understand that I may not be selected for the research project
- I understand that I am free to withdraw my participation up to two weeks after the final interview, and to withdraw any data traceable to me
- I understand that the Principal has given assurance that my participation or non-participation will have no impact on my grades or my relationship with the school.
- I agree / do not agree to be audio recorded.
- I wish / do not wish to receive the summary of findings.

Email: _____

Address: _____

Name: _____

Signature: _____ Date: _____

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext. 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext. 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand
T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

Transcriber

Project Title: Self-efficacy in Inquiry learning

Researcher(s): Matthew Reese

Supervisor: Nina Hood

Transcriber:

TRANSCRIBER CONFIDENTIALITY AGREEMENT

I agree to transcribe the audio-recordings/video-recordings (delete one as appropriate) for the above research project. I understand that the information contained within them is confidential and I agree that I will not disclose or discuss it with anyone other than the researcher and his/her supervisor(s). I shall delete any copies that I may have made as part of the transcription process.

Name: _____ Signature: _____ Date: _____

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland
k.fitzpatrick@auckland.ac.nz
+64 9 373 7999 ext 48562

Student Researcher: Matthew Reese
School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland
mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number



EDUCATION AND SOCIAL WORK

SCHOOL OF CURRICULUM AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand
T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

PARTICIPANT INFORMATION SHEET

Luke Sumich

Project title: Self-efficacy and inquiry learning

Name of Principal Investigator/Supervisor (PI): Dr Nina Hood

Name of Student Researcher: Matthew Reese

Researcher Introduction

My name is Matthew Reese and I am a ESOL teacher at ICL group and studying part-time for a Masters of Education (MEd) degree from the department of Pedagogy and Curriculum at the faculty of Education and Social Work at the University of Auckland.

Project description and Invitation

I invite you to be a part of a study project that is designed to explore how students with low academic Self-efficacy beliefs are impacted by inquiry learning projects, with a particular focus on motivation and engagement.

By taking part in this research, your school may gain possible benefits such as further insight into your teachers practice, as well as participating in research that may support Low self-efficacious students across New Zealand.

I would like to invite you to participate in this research project because your school is in the Auckland region and is using inquiry learning projects in year 10 as a significant component of your curriculum. Should you wish

to participate, this project will involve both a consenting teacher and students in year 10.

The study is designed to collect data from a Self-efficacy survey, observations of 2 lessons of an inquiry project done in class time along with an interview conducted with the consenting teacher individually. I will also interview 3 students individually on two occasions.

Written consent/assent will be required from each participant in the form of an attached Consent form, after they are aware that participation is on a voluntary basis. All consent forms are stored by the Principal Investigator in a secure locked location on the University of Auckland site, separate from all research data. They are only accessible to the researcher and Principal and Co-Investigators, and are kept for a period of six years.

It is the intention of the researcher to record audio only in both the observations and interviews and all study participants will have the chance to withdraw from these at any stage. Each participant will have given written consent/assent to being observed and recorded audibly through use of a wearable microphone prior to any observations or recordings taking place. All data will later be transcribed and each participant will be given opportunity to change or redact any information they wish.

Pending approval from the Ethics committee of the University of Auckland, the project will take place over 4 weeks of Term 1 of 2023. It is a requirement to request your permission for the above-named researchers to enter your school property and conduct observations and interviews for the 4-week duration and have access to your employees as participants. This will be included in the Consent form you will need to sign. It is important to note that the I will be on site for a pre-study visit. A secondary requirement is to ask for your assurance that participation/non-participation of each teacher will not affect in any manner their relationship with the school. I also seek your assurance that student's participation or non-participation will have no impact on their grades or relationship with the school.

Project Procedures

Pre-study visit

Prior to observations and interviews, a pre-study visit will allow the participants to meet the researcher, share any necessary details about the inquiry project, and give opportunity to discuss the best possible method for observations, arranging; time, place and when the teacher will be

observed. Also included will be an opportunity to arrange Interview details such as time and place. It is at this time participants will have the opportunity to ask questions and sign a Consent Form.

Self-efficacy questionnaire

All student participates will be given a self-efficacy questionnaire. This will be given in class time to all participating students. The purpose of this questionnaire is to identify 3 students who fit a low self-efficacy profile. These students will become the focus of the study, including interviews and class observations.

Observations

Observations will take place in the first week and fourth week, in the same place at the same time of day and same day of the week so as to minimise disruption to timetables. Participants will be observed working on their inquiry project in two 45-minute slots. The two observations will be recorded by the researcher in a notebook and audio recordings on the researchers phone, for which written consent will be necessary. All audio data will later be transcribed and the final documentation will be a written thesis for a Master's degree.

Interviews

Interviews will include both a teacher and three student interviews individually, they will be asked questions around their perspectives on inquiry projects. The teacher participant will be interviewed once and the 3 student participates twice, they will be audio recorded for the purpose of later transcriptions. Interviews will be scheduled to take around 50 minutes for the teacher and 30 minutes for the three students, participants will be able to choose an appropriate time and place according to their schedule. This will be arranged at the pre-study visit. The purpose of the student interviews is to gather data on low self-efficacious student's perspectives on inquiry learning projects. The aim of the teacher interview is to gain an understanding of their teaching approach to low self-efficacious students in the context of an inquiry project.

Transcripts

All data from the Interviews and observations will be transcribed and stored securely. All participants have the opportunity to review and edit their interview transcript; this will be arranged through the consent form participants sign before any data is recorded.

Transcripts will be sent to participants email addresses and any revisions should be received by the researcher at the following email mree317@aucklanduni.ac.nz no later than 14 days after receiving the transcript in their email inbox.

Data storage/retention/destruction/future use

Data from both the observations and interviews will be stored on separate memory sticks, with each school having data stored on a stick each for observations and interviews. Digital data will be kept in a drive folder connected to the researcher's University of Auckland email address and all paper data will be held in a secure location. The data will be held for six years after which time all data will be erased. Data is for the purpose of the study only and no data will be shared publicly, however, data from both observations and interviews will be included in a written thesis pending consent after they have taken place.

Participant right to withdraw

It remains the right of any participant to withdraw from any part of the study or the study in its entirety at any stage without giving reason up to 1 month after the first observation. This time limit is in place due to data from the study being present in the thesis after the month lapses. Upon withdrawal, the participant will be given the choice to either redact their data or let it remain as part of the project.

Anonymity and confidentiality

Each participant's right to anonymity and confidentiality will be respected for the entire duration of the study. This includes no names being included in the written thesis, and no names are permitted in the interviews to protect anonymity of both participants and non-participants. A signature for this will be requested on the attached Consent Form.

Each participant will be assigned a letter which will identify individuals anonymously in the written thesis, however, complete anonymity will be impossible within the research team. Participants will not be able to identify any other participant by data, given the random letter assigned to each participant.

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext. 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext. 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand
T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142
New Zealand

CONSENT FORM

Luke Sumich

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project title: Self-efficacy and inquiry learning

Name of Principal Investigator/Supervisor (PI): Dr Nina Hood

Name of Student Researcher: Matthew Reese

I have read the Participant Information Sheet, have understood the nature of the research and why I have been selected. I have had the opportunity to ask questions and have had them answered to my satisfaction.

- I permit the research team access to the school grounds for a period of 4 weeks for observations and interviews to take place and for access to employees as participants.
- I give my assurance that teachers participation or non-participation will have no impact on their employment or relationship with the school. I also give my assurance that students participation or non-participation will have no impact on their grades or relationship with the school.
- I understand that I am free to withdraw participation of the school at any time without giving reason, up to a deadline of 1 month after the first observation. However, I also understand that I cannot

withdraw any data already provided by teachers or students up to the time of withdrawal.

- I wish / do not wish to receive the summary of findings at the following email/postal address:

Email: _____

Address: _____

- I agree to not disclose any names or details that could identify another individual.

Name: ___Luke Sumich_____

Signature: _____

Date:

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext. 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext. 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private

Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand

T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142
New Zealand

PARTICIPANT INFORMATION SHEET (Parents)

Dear Parents,

You are receiving this letter to inform you of a research project the school has permitted that will take place in your child's classroom this term. The purpose of this letter is to share with you information about the project including duration, goals and what will happen at times in your child's classroom during the term.

This project is aimed at finding out how Inquiry learning projects impact on students with low Self-efficacy beliefs, that is students who may struggle with self-regulation, find it hard to motivate themselves, give up easily when confronted with challenge and display weak commitment to goals they set.

Project description

This study project is designed to explore how students with low academic Self-efficacy beliefs are impacted by inquiry leaning projects, with a particular focus on motivation and engagement. The possible benefits of your child participating in this research is that it may support Low self-efficacious students across New Zealand that learn through Inquiry learning projects.

I would like to invite your child to participate in this research project because their school is in the Auckland region and is using inquiry learning projects in year 10 as a significant component of the curriculum.

The study is designed to collect data from a Self-efficacy questionnaire which will help identify three students who fit the low self-efficacy profile, observations of two lessons of an inquiry project will be done in class time of the three chosen students. Those three students will also be interviewed on two occasions. I will also interview their teacher at the conclusion of the inquiry project.

It is the intention of the researcher to record audio only in both the observations and interviews and all study participants will have the chance to withdraw from these at any stage. Each participant will have given written consent/assent to being observed and recorded audibly through use of a microphone prior to any observations or recordings taking place. All data will later be transcribed and each participant will be given opportunity to change or redact any information they wish.

The project will be consented by the University of Auckland Human Participants Ethics Committee, the school Principal and all teachers involved in the project, who will sign consent forms acknowledging participation in the project.

It is the intention of the researcher to record audio only in the observations and interviews, no visual recording material will exist. Please inform your child that a researcher will be based in their classroom this term, however, only the three selected participants will be observed.

Pending approval from the University of Auckland Human Participants Ethics Committee , the project will take place over 4 weeks of Term 1 of 2023. It is important to note that the research team will be on site for one week on a fortnightly basis meaning over the 4-week period there will be three weeks of visitations into your child's classroom.

Project Procedures

Self-efficacy questionnaire

All student participates will be given a self-efficacy questionnaire. This will be given in class time to all participating students. The purpose of this

questionnaire is to identify 3 students who fit a low self-efficacy profile. These students will become the focus of the study.

Observations

Observations will take place in the first week and fourth week, in the same place at the same time of day and same day of the week so as to minimise disruption to timetables. Participants will be observed working on their inquiry project in two 45-minute slots. The two observations will be recorded by the research in a notebook and audio recordings on the researchers phone, for which written consent will be necessary. All audio data will later be transcribed and the final documentation will be a written thesis for a Master's degree.

Interviews

Interviews will include both a teacher and three students who will be asked questions around their perspectives on inquiry projects. The teacher participant will be interviewed once and the 3 student participants twice, they will be audio recorded for the purpose of later transcriptions. Interviews will be scheduled to take around 50 minutes for the teacher and 30 minutes for the three students, participants will be able to choose an appropriate time and place according to their schedule. This will be arranged at the pre-study visit. The purpose of the student interviews is to gather data on low self-efficacious student's perspectives on inquiry learning projects. The aim of the teacher interview is to gain an understanding of their teaching approach to low self-efficacious students in the context of an inquiry project.

Transcripts

All data from the Interviews and observations will be transcribed and stored securely.

Data storage/retention/destruction/future use

Data from both the observations and interviews will be stored on separate memory sticks, with each school having data stored on a stick each for observations and interviews. Digital data will be kept in a drive folder connected to the researcher's University of Auckland email address and all paper data will be held in a secure location. The data will be held for six years after which time all data will be erased. Data is for the purpose of the study only and no data will be shared publicly, however, data from both observations and interviews will be included in a written thesis pending consent after they have taken place.

Ethical Considerations: Confidentiality

Your identity will be known only to myself, my supervisors and a University of Auckland approved transcriber who will be required to sign a confidentiality agreement. Confidentiality will be ensured by the use of self-selected pseudonyms in all data information. No information will be made available to the principal or Board of Trustees. If information provided is reported or published, it will not identify you or the school in which you teach.

Anonymity

Your participation cannot be anonymous due to the interviews and observations that make up this study.

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext. 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext. 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number



**EDUCATION AND
SOCIAL WORK**
SCHOOL OF CURRICULUM
AND PEDAGOGY

Epsom Campus

Gate 3, 74 Epsom Ave
Auckland, New Zealand

T +64 9 623 8899

W education.auckland.ac.nz

The University of Auckland

Private Bag 92019
Victoria Street West
Auckland 1142

Participant Invitation

INVITATION EMAIL FOR PARTICIPANT TEACHER AND STUDENTS

Dear _____

My name is Matthew Reese and I am currently undertaking Master of Education research at the University of Auckland.

I am writing to extend an invitation for you to participate in this research study.

The research project is designed to explore how inquiry learning projects impact on low self-efficacious students levels of motivation and engagement, as well as the impact on their academic self-efficacy beliefs. Furthermore, it aims to explore how teacher's understanding of differing Self-efficacy profiles impacts their pedagogical choices in administering inquiry learning approaches.

Participation in this study will involve one self-efficacy questionnaire for students in year 10, two class observations, two 30 minute interviews with 3 students and one post project semi-structured interview with the teacher.

Please find attached a Participant Information Sheet and Consent form.

If you are interested in being involved in this study, please sign and return the consent form. Kind regards

Matthew Reese

Principal Investigator Contact Details

For more information, queries or concerns you may have about the project please contact the Principal Investigator or Academic Head using the following details:

Principal Investigator: Dr Nina Hood

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

n.hood@auckland.ac.nz

+64 9 373 7999 ext 48445

+64 9 923 7819

Head of School, Curriculum and Pedagogy: Dr Katie Fitzpatrick

Faculty of Education, The University of Auckland

k.fitzpatrick@auckland.ac.nz

+64 9 373 7999 ext 48562

Student Researcher: Matthew Reese

School of Curriculum and Pedagogy, Faculty of Education, The University of Auckland

mree317@aucklanduni.ac.nz

UAHPEC Chair contact details

For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Office of Research Strategy and Integrity, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: humanethics@auckland.ac.nz

Approved by the University of Auckland Human Participants Ethics Committee on for three years. Reference number