Impacts of Interdisciplinary Project-Based Learning on High School Students' Future-Readiness: A Mixed Methods Study

by

Christopher Burns

A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfillment of the requirements of the degree of

MASTER OF EDUCATION

Department of Education

University of Manitoba

Winnipeg

Abstract

Project-based learning (PBL) is an emerging pedagogy which shows promise in improving student outcomes but has not been widely studied. An explanatory sequential mixed methods study was conducted in rural Manitoba which examined participant-reported future readiness across several purposes of education to better understand reported differences in future readiness between an education based on traditional pedagogy and one based on PBL. The participants' current life situation was considered as a moderating variable to determine if it impacted what facets of each pedagogy participants believed was most helpful. Participants from the group which received primarily traditional pedagogy were first surveyed in January of the year after they graduated, and then select participants of this group were interviewed roughly four months later. A year later a group of students who received primarily PBL went through the same process of surveys and interviews. 18 participants were surveyed from each group, and from those who were surveyed 8 were interviewed from each group. Survey results indicated that students who attended university or were taking a gap year had nearly identical future readiness scores, while students going to college or directly into the workforce with no further plans for education saw an increase in future readiness from the PBL pedagogy. The interviews indicated that while gap-year and university attending students shared concerns about readiness for high stakes testing, the collaborative and more independent nature of PBL was found to increase future readiness across all groups.

Keywords: interdisciplinary project-based learning, progressive pedagogy, secondary school, high school, self-reported, mixed methods, explanatory sequential, future readiness

Acknowledgements

I would like to express my deepest gratitude to my committee: Dr. Thomas Falkenberg, Dr. Robert Renaud, and Dr. Lilian Pozzer. Their guidance and support were invaluable and I've learned so much from them.

I would also like to offer special thanks to my colleagues from the grade 9 team, particularly Tony who is sharing the educational journey to obtain a master's and who was always an inspiration and sounding board for ideas, and Brett who inspired the start of this adventure. I am also thankful to our divisional administration for their support of this project both locally and divisionally.

Finally, I'd like to acknowledge the pivotal role my wife Melissa played. Without her unwavering support, encouragement, and occasional kick in the butt, this would not have been possible.

Contents

List of Tables

List of Figures

Impacts of Interdisciplinary Project-Based Learning on High School Students' Future-Readiness: A Mixed Methods Study

There have always been pushes for education reform (Yang & Zhou, 2021). For instance, at the time of this writing there have been sweeping education changes planned in the province of Manitoba (Government of Manitoba, 2021). These changes do not reflect or advocate for changes in pedagogical approach, but rather push accountability to academic outcomes. On the other hand, education research is increasingly showing the academic benefit of progressive pedagogies and benefits in learner development, student perceptions, attitudes towards their subjects, intrinsic motivation, engagement and even efficacy (Buchanan et al., 2016; Holm, 2011; Samsudin et al., 2020). Progressive pedagogies include practices which transition away from traditional teaching styles, including many lecture-and-note based classes for knowledge acquisition and an emphasis on worksheets and testing. More progressive pedagogies include classroom and lesson design which include inquiry, project-based learning, inter or trans-disciplinary learning, and/or team teaching. Shifting towards progressive pedagogies appears beneficial in public education. Research (Baloch et al., 1996; Ivanitskaya et al., 2002; Jacobs, 1989) suggests that stranding by subject is increasingly problematic for the development of students who can think holistically, and that integration of subject domains may be a solution. However, educational traditions continue to hold sway and traditional pedagogies remain prevalent throughout the education system from classrooms to curricula (Ornstein & Hunkins, 2016).

The field of education has seen a growing focus on alternative measures of success other than standardized tests and post-secondary enrollment, such as holistic development of students (Rennie Center for Education Research & Policy, 2020). As progressive pedagogies such as

project-based learning and interdisciplinary practices evolve to meet a broader definition of success for all students, we must determine how effective these practices are at attaining these varied measures of success.

One type of progressive pedagogy is interdisciplinary project-based learning (PBL) in which an essential question is used to provoke students into activities which result in a final product which addresses the initial question (Brassler & Dettmers, 2017). This initial provocation must be an "authentic, engaging, and complex question, problem, or challenge" (Buck Institute for Education, n.d.). The exploration of this problem in interdisciplinary PBL consists of learning activities which promote collaboration, critical thinking, self-organization, and other 21st century skills by incorporating an authentic application of student knowledge and skills through interdisciplinary experiences which span multiple curricular outcomes (e.g., science and ELA). Fullan et al. (2018) described the shift towards 21st century skills as a "movement away from set knowledge to the skills of entrepreneurship, creativity, and problem solving" (p. 16). However, evidence that can be used to assess this learning model is lacking (Brassler & Dettmers, 2017).

When assessing any pedagogy or learning model, one is necessarily drawn to questions about the purpose of education, for if one does not understand the purpose of the pedagogy how can it be assessed? There have been many purposes of education posited by theorists which discuss civic, economic, personal, spiritual, and other aims of the education system, but they all have a single theme in common: future readiness. Each purpose of education aims to create humans who flourish once they have graduated from the system of education they are in, and the argument then shifts to which ways they should learn to flourish. As such, future readiness must be a consideration in any study which purports to explore the efficacy of a pedagogy. Future

readiness must also be defined by explicitly indicating the purposes of education framing the concept. In this study future readiness will be explored through three lenses: human capital (economic), socialisation (civic), and subjectification/humanistic (personal).

The continued focus by the Manitoba provincial government on accountability, outcomes, measurable standards, and 'excellence' through the *Better Education Starts Today: Putting Students First* (BEST) report (Government of Manitoba, 2021) has the implicit effect of enforcing a traditional model of education based on factory style efficiency and behaviourism (Ornstein & Hunkins, 2016). Even the BEST report's definition of 'future-ready' had a neoliberal focus on their ability to contribute to the economy as opposed to their growth as individuals: "We must improve graduation rates and ensure that more students have the qualifications to enter the labour market or pursue post-secondary education, apprenticeship programs and their selected career pathways" (p. 17). This research is necessary to not only better understand the benefits and challenges of specific progressive pedagogies, but so that governments can make informed choices about the policies they choose to enact in the field of education.

A stronger research base is needed to justify a stronger push towards progressive pedagogies and educational policies. As pedagogies such as interdisciplinary PBL evolve to meet a broader definition of success for all students, there is a pressing need to evaluate how effective these practices are at attaining varied measures of success and explore factors which impact student perceptions of future readiness to facilitate a systemic shift away from traditional practices rooted in behavioural psychology and economic purpose. Given the challenges to educational reform from communities and policymakers both globally and locally, research which focuses on the voice of students in the Manitoba context while examining the efficacy of

interdisciplinary PBL would be of great benefit to further support the case being made by educators for progressive curriculum and pedagogy.

Positionality

It is important to position myself in the context of the study and explicitly discuss my personal and professional background to illuminate any values or biases I may bring to the design or interpretation of the inquiry.

I am a 36-year-old, middle-class, cisgender, heterosexual, White male. I grew up primarily in a small rural town in Manitoba of predominantly French Catholic culture. Considering the background that I bring, I needed to be sensitive to feedback from BIPOC participants, LGBTQ+ participants and those of low socioeconomic status as they may have experiences, perspectives, and interpretations of the study methods and conclusions which differ from my own. I also needed to be careful with the conclusions that I drew to ensure that perspectives from these groups had been given voice and power. One way I did that was by ensuring that participant confirmation was used as a strategy to validate my conclusions and ensure they aligned truthfully and respectfully with their experiences.

I was also an educator within the context of the study, teaching with progressive pedagogies in an interdisciplinary PBL classroom. This may have caused me to look at this pedagogy in a favourable light and influenced my interpretations of the data. I needed to be cautious of confirmation bias because of my experiences with this pedagogy. Careful design of the methods, participant confirmation, and other tools for validating conclusions were implemented (Creswell & Creswell, 2018). A bracketing journal was also kept for tracking hunches, opinions, and ideas as they occurred throughout the inquiry. This provided a frame of reference to review any bias that may have entered.

Some research participants were also students of mine at some point, which introduced a power dynamic in which they may not have reported as truthfully, or I may have viewed their responses through a more favourable lens. This was partially avoided by ensuring that all research participants had graduated, which reduced the power dynamic at play. The role of multiple strategies for validation were also important here to ensure that results were not skewed or inaccurate (Creswell & Creswell, 2018).

Purpose

The purpose of this study was to inquire into the impact of interdisciplinary project-based learning (PBL) on high school students' self-reported future readiness and to explore whether and how certain factors in their educational experiences shaped their perceptions. The study recognized multiple purposes of education while honoring high school graduates' current life situation and differing educational needs, both quantitatively and qualitatively. With this purpose, the study informed readers which purposes of education interdisciplinary PBL, compared to more traditional pedagogies, is best serving and offers student-voice based explanations of what facets of the pedagogy are having the greatest impact on participants as they take differing post-graduation paths.

Research in this area is needed to contribute to the field of school education practice and provide a larger knowledge base related to the efficacy of interdisciplinary PBL as an emerging progressive pedagogy. As research continues to show the benefits of progressive pedagogies, it is important to have localized research which explores the specific benefits and risks to pedagogies that are being implemented. Most studies on future readiness (Antoniou, 2012; Arnold & Mihut, 2020; Mishkind, 2014) focus primarily on student measurable outcomes in terms of how well a student is prepared to participate in the economy after graduation, however this is not the only

purpose education can serve, and this research helps fill some of the gaps in the literature related to the impact of interdisciplinary PBL beyond preparing students for economic success. The impact of this pedagogy was also examined through how well prepared they are as citizens to participate in and understand society, and how well prepared they are to pursue their own interests and recognize external pressures on their lives. Furthermore, this study explored the impacts of the pedagogy on students with respect to their post-graduation paths. Students who immediately attend post-secondary, students who delay, and students who directly enter the workforce are likely to have different perceptions of what education should prepare them for, and these life situations were considered in the design of this study. This study also explored differences in how students with different post-graduation paths were impacted by progressive pedagogy. As progressive pedagogies emerge and evolve, it is important to understand the impact that they might have on students with different post-graduation paths in light of different purposes of education and to understand the impacts of these pedagogies on students' future readiness compared to a traditional model of education.

Progressive Education

Progressive education is very difficult to describe with a fixed definition (Jones, 1983; Kohn, 2015), however Kohn (2015, pp. 2-4) described several elements which all definitions of progressive education tend to hold in common:

- Attending to the whole child
- Building community
- Encouraging collaboration
- Focusing on social justice
- Developing intrinsic motivation

- Promoting a deep understanding
- Engaging students in active learning
- Utilizing student perspectives and opinions

Due to the difficulty in precisely defining progressive education, it is often helpful to understand what progressive education is not by juxtaposing its position with that of traditional pedagogy. The following section will describe traditional pedagogy, including the psychological and theoretical foundations it is based on, to allow for a comparison to different progressive approaches which will be discussed in detail in the following sections. The need to shift from traditional to progressive pedagogies is also outlined below in the Need for a Shift to Progressive Pedagogies section (p. 31).

Traditional Pedagogies

All learning models or approaches are based on theoretical concepts. There are three dominant theories of learning: (a) behaviourism (studying and analysing human behaviours), (b) cognitivism (knowledge constructed by mental cognition), and (c) constructivism (learners construct the knowledge during the learning process) (Hammond et al., 2001; Khalaf & Zin, 2018; Ornstein & Hunkins, 2016). Traditional pedagogy is based on the behaviourist theory of learning which "begins with notions of learning which are generally defined as new behaviours or changes in behaviours that are acquired as the result of an individual's response to stimuli" (Anderson & Dron, 2020, p. 82). Behaviourism, and thus traditional pedagogy, was the dominant psychological foundation in education for most of the 20th century and is still common in classrooms today (Ornstein & Hunkins, 2016). "It is generally acknowledged that students enter college classrooms with extensive experience in, and often a strong commitment to, an information-transfer model of education" (Penrose & Geisler, 1994, p. 515).

The behaviourist roots of traditional pedagogy lead to a classroom dynamic in which the teacher is held as "the source of knowledge with the responsibility to impart this knowledge to the students. This is commonly done through the use of textbooks and a teacher helping students better understand the content through lectures or interactive presentations" (Roberts, 2016, p. 40). Behaviourism is a theory of learning which emphasizes human learning through behavioural conditioning or habit forming through repetition and reward/punishment. Behaviourists believe that learning can be observed and measured, and is unrelated to cognitive processes as the results of learning—the conditioning of learners—is a testable outcome (Ornstein & Hunkins, 2016). Anderson and Dron (2020) emphasized how a behaviourist's classroom focus is on measuring behaviours with a primary stress on individual achievement to the neglect of the development of both attitude and capacity. Ornstein and Hunkins (2016) discussed not just the conditioning and measuring of behaviour as a prominent feature of teaching with this philosophy, but also the altering of the classroom environment to obtain desirable outcomes. An individual who prescribes to this theory of learning is naturally led to a teacher-centered, or traditional, classroom design in which the teacher is regarded as the source of knowledge and has a pivotal role in dispensing information, correcting students, and controlling all facets of the learning environment.

The process of educating learners in a behaviourist tradition could be split into two stages: encoding and decoding, which are followed by "assessments of the knowledge acquired, which is typically characterised by the term examination in order to evaluate the outcome of the students' performance" (Hall, 2002, as cited in Khalaf & Zin, 2018, p. 549). Several authors discuss how this theory of learning has often been characterized by linear, highly structured pedagogy and curricula in which learners were made to recall previous information, presented

with new information, were given guidance to practice with the information, were provided with feedback on their performance, and then were assessed on what information they had retained (Anderson & Dron, 2020; Hammond et al., 2001; Ornstein & Hunkins, 2016).

For this study, I define *traditional pedagogy* as that which is linear and highly structured, teacher centric, and which emphasizes information recall and individual achievement. Additionally, traditional pedagogy is characterized by significant lecture time and note taking, worksheets as methods of knowledge acquisition, and quizzes or tests as knowledge assessment with a final high-stakes exam. Labs, discussions/debates/seminars, or end-of-unit projects are infrequently incorporated as part of this pedagogy, although they are not related to behaviourism directly and are often the effect of a "wide range of reforms in educational fields supported by new technologies that facilitate the change from a teacher to a student-centred model" (Khalaf & Zin, 2018, p. 545).

This pedagogy was theorized to be the most efficient way to increase a learner's knowledge acquisition while keeping them active during the learning process (Khalaf & Zin, 2018), and it has proved useful for the development of some types of skills—especially those that can be learned substantially by rote through reinforcement and practice (Hammond et al., 2001, p. 6). Due to the step-by-step nature of traditional teaching practices, adaptation for students who are not as successful in the context of traditional pedagogies can be done with more ease by further breaking down steps into smaller and easier to sequence pieces designed to reinforce the desired behaviour (Ornstein & Hunkins, 2016). However, the emphasis on measurement of behaviours and outcomes has led to several criticisms.

Klenowksi and Wyatt-Smith (2012) noted that "high stakes testing is driven by a desire to meet public accountability, demonstrate transparency and maintain public confidence in the

standards of schooling" (p. 65), which contrasts with many educational policies, which aim to help promote the well-being of all learners and promote equity within the educational system (Government of Manitoba, n.d.; Government of Manitoba, 2021). Youth attest to feeling shame and show further marginalization due to high-stakes testing as it is often used to categorize students as "at-risk" (Kearns, 2011). Student designations of "at-risk" affect racialized students more prominently (Kearns, 2011), which makes clear the "dangers of testing to undermine, or at least work against, equity initiatives" (Klenowski & Wyatt-Smith, 2012, p. 66). A designation of "at-risk" has been shown to produce "feelings of not being good enough, which leads to some youth feeling as though they do not belong in schools, or question their school class placement" (Kearns, 2011, p. 115). Examination in traditional pedagogies also leads to a superficial learning approach because such exams require students to memorize concrete factual knowledge rather than demonstrate conceptual and procedural understanding of such knowledge. The focus of such examinations is on remembering rather than the ability to engage knowledge in practice. Biggs (1996) noted that in exams, teachers ask about a narrow line of knowledge through closed questioning, and may miss other learnings, abilities, or connections that a student has amassed through their studies. Given that exams miss many facets of student knowledge and do not allow for assessment of real understanding (Biggs, 1996), some scholars suggest that the process of examination is actively harmful to students' self-identity (Klenowski &Wyatt-Smith, 2012) and more broadly to students' education (Entwistle & Tait, 1995, as cited in Khalaf & Zin, 2018), and that high-stakes testing further marginalizes students (Kearns, 2011).

Beyond the issues related to high-stakes testing, it is becoming clear that "students who adopt traditional learning in their education undergo some drawbacks, ultimately leading to the failure of the learning process… These drawbacks are predominantly related to factors such as

learners' knowledge, skill improvement, competence, learners' performance and outcomes" (Khalaf & Zin, 2018, p. 550). Evidence continues to build showing that traditional pedagogy does not facilitate the ability to complete tasks which require synthesis of ideas, critical thinking, problem solving, and other higher level mental process (Hammond et al., 2001). Penrose and Geisler (1994) noted the inefficiency in the traditional model of education and how it seemed to consume disproportional time and effort in increasing raw domain knowledge at the expense of a limited development in learners' abilities to apply and develop knowledge interactively. This led to a learned lack of student agency where students, "who see all texts (except their own) as containing 'the truth,' rather than as authored and subject to interpretation and criticism, will of course see the objective report as the only conceivable response to a reading-writing assignment" (p. 515). This meshes well with the ideas of Khalaf and Zin (2018):

> Traditional learning produces active and non-active learners as result of its conceptualization of the learning process. Traditional behavioural classes do not favour active engagement of learners in the learning process, but rather focus on the behavioural impacts of immediate context and the teacher's role on learners. (p. 546)

Given all these drawbacks, the field of education has been working on a wide range of reforms since the early 1970's (Khalaf & Zin, 2018). The following sections of the literature review discuss several progressive approaches which arose from pedagogical reforms regarding teaching and learning.

Progressive Approaches

In this section of the literature review, I review four progressive approaches to teaching and learning: interdisciplinary teaching; interdisciplinary team teaching; inquiry teaching; and

project-based teaching. These approaches are closely related to each other and different facets of these approaches were integrated into the context of this study. I cluster all four approaches as "progressive approaches", by which I mean they include many of the elements described by Kohn (2015) in his categorization of progressive pedagogy.

Interdisciplinary Teaching

Interdisciplinary teaching, which is related to the integrated curriculum reform movement, is an educational approach to teaching that exposes students to multidisciplinary knowledge using a theme or essential question as opposed to presenting discrete subjects (Ivanitskaya et al., 2002; Lake, 1994). Many related operational definitions have been proposed, but common components include a combination of subjects, an emphasis on projects, sources beyond a textbook, examining relationships among concepts, organizing using themes, flexible schedules, and flexible student groupings (Humphreys et al., 1981; Palmer, 1991). It is believed that interdisciplinary teaching will help students develop critical thinking and metacognition, help them see relationships between disciplines, and allow them to understand and develop their epistemological beliefs (Baloch et al., 1996; Ivanitskaya et al., 2002; Jacobs, 1989).

The human knowledge base continues to grow exponentially while the amount that can be traditionally studied in a day does not change, which makes the teaching and learning of this increasing knowledge base unmanageable. Traditional fragmented schedules are also unrealistic and require students to completely "switch gears" every period change while a fragmented compartmentalization of education has led many students to miss the relevance of their education, leading to disengagement. Building a program which avoids fragmentation and shows students the interconnected nature of the "individual" disciplines and how they impact both the world and their lives is critical (Jacobs, 1989).

Studies on interdisciplinary teaching have found a variety of benefits, including better outcomes and job placement rates (Hotaling et al., 2012). Discipline-specific approaches frequently fail to demonstrate how a particular discipline is related to any other, which leads to fragmented learning and gaps in understanding (Baloch et al., 1996). Ivanitskaya et al. (2002) theorized that interdisciplinary studies improve outcomes by building holistic knowledge, which fills in the gaps left by traditional monodisciplinary courses, and by removing issues that arise from a natural tendency to categorize or compartmentalize knowledge that is learned independently from a larger context. They believed that "shifting the programmatic focus from memorization of facts to focus on a central theme, application of knowledge relative to this theme, and reflection on the thinking process" (p. 98) aids the development of critical thinking and deeper connection making. Lipson et al. (1993) described how interdisciplinary teaching also helped students apply skills by promoting faster retrieval of information due to students making more connections between things they learned. Seeing multiple perspectives led to a more integrated knowledge base and increased depth and breadth in learning. They also noted that an integrated curriculum promotes positive attitudes in students, and more quality time for curriculum exploration.

Jacobs (1989) suggested that "students should study epistemological issues" (p. 10) as a student's epistemological beliefs directly impact how active they are as learners, how much tenacity they have during difficult tasks, how well they comprehend written material, and how they cope with abstract problems (Schommer, 1994). Schommer (1994) gave some examples of such epistemological beliefs which impacted students' activities as learners: beliefs about received knowledge, or that knowledge is handed down and not generated; subjective knowledge, which is considered "personal, private, and intuitive" (p. 298); and constructed

knowledge, which is obtained through a combination of objective and subjective processes. She developed a method that promotes the development of epistemological beliefs, which included:

- allow more hands-on construction of personal knowledge
- encourage persistence through difficulty
- teach growth mindset and the search for multiple solutions
- show that to understand a discipline deeply means to understand how it connects to other disciplines (and that the nature of those connections can change over time)
- link the learner's interpretation and application of knowledge from one discipline to the real world and other discipline contexts.

Ivanitskaya et al. (2002) have noted that a "development of higher level epistemological beliefs relates to the pedagogical strategies characteristic of interdisciplinary programs" (p. 4) through promoting construction of knowledge, persistence, multiple solutions, and an understanding of connections and applications between disciplines.

Jacobs (1989) approached interdisciplinary education pragmatically, noting that "curriculum integration is not a panacea; many integration decisions entail tradeoffs" (Foreword). One of those tradeoffs is achievement on standardized tests. The integration of subject areas makes it much more difficult to address specific logical sequences of content, especially in areas such as math (Shoemaker, 1989). This leads to less consistency in the classroom experiences that students receive as learning is often student-initiated. This may "impact performance on standardized tests and require alternative methods of assessing student understanding of essential concepts" (p. 12). This is supported by Ivanitskaya et al. (2002) when they noted that because "cognitive development and intellectual maturation are among the most important outcomes of interdisciplinary programs, assessment of student progress toward these

milestones is as important as more traditional assessment of discipline-specific declarative and procedural knowledge" (p. 109). However, ways of implementation, evaluation of the domains of cognitive development and maturation, and the fact that these domains are not generally assessed by standardized tests remain challenges to interdisciplinary education. They acknowledged this when they stated that "not all purposes of education will be equally served by interdisciplinary studies, however the emphasis on developing complex thinking skills often leads to a balance between learning about thinking processes and learning specific content" (p. 98). Another drawback to interdisciplinary education is the lack of support at the high school level in curriculum design. However, Field et al. (1994), as cited in Ivanitskaya et al. (2002), discussed a different viewpoint on the lack of standard curriculum:

> While the lack of a standard curriculum in interdisciplinary programs is usually thought of as a major disadvantage for the assessment of interdisciplinary education, it may be a major advantage in that it requires us to focus on the development of intellectual capability in the student rather than on a fixed body of information. (pp. 70–71)

Interdisciplinary Team Teaching

An educational approach that has been used for middle years students, college students, and as a model for teacher development is interdisciplinary team teaching. There are many definitions for interdisciplinary team teaching, but some common conceptualizations include having two or more teachers from two or more academic disciplines working with the same group of students and being involved in various amounts of coordination and shared responsibility and who are stressing the connections between disciplines (Akpan et al., 2010; Al Saaideh, 2011; Cotton, 1982; Hrivnak et al., 2017; Stewart & Perry, 2005). This is an extension

of interdisciplinary teaching in that it specifically involves the use of a team of teachers, however it does not necessarily require a theme or essential question as long as the connections between disciplines are emphasized by the subject area experts who are team teaching.

For the context of this study, *interdisciplinary team teaching* will be defined as the collaborative work of a group of teachers who work together to integrate multiple curricula from different disciplines, co-plan learning experiences which are interdisciplinary in nature, meet regularly with shared prep time, and work with all students (although each might have a primary group they are assigned to). For example, one teacher will work with the same cohort of students all year long, however that teacher will encourage his students to seek feedback and assistance from other teachers in the interdisciplinary group if they need further specialization, e.g., students are asked to see the art specialist for critique on an art project or to see the science specialist for difficult science knowledge questions. Classes will also "cross-pollinate" for learning experiences such as Socratic Seminars, midway project feedback, presentations, etc. Stewart and Perry (2005) would conceptualize this style as low-collaboration team teaching due to the lessons being primarily individually taught, as compared to team teaching in which multiple teachers teach the same group of students in their respective area of expertise, one teacher at a time, or in which multiple teachers teach the same group of students simultaneously.

There have been many academic benefits to students recorded in the literature including improvements in school climate and student performance (Akpan et al., 2010; Al Saaideh, 2011; Hrivnak et al., 2017; Little & Hoel, 2011). Al Saaideh (2011) found increases in student understanding and retention and ascribed these benefits to the ability of a team of teachers to utilize varied teaching styles more effectively. Another potential source of the increase in student performance was increased student participation due to increased frequency of student-teacher

interactions (Little & Hoel, 2011). Increases in student motivation were also found (Hrivnak et al., 2017) and could be a contributing factor to increased student success.

Beyond just academic performance there were benefits in other areas as well. "With regard to affective outcomes such as self-concept and school attitudes, interdisciplinary teaming is at least slightly favored by the majority of studies reviewed and significantly favored by some" (Cotton, 1982, p. 5). The ability of students to engage alternative perspectives and discuss worldviews other than their own was linked to an attitudinal change that interdisciplinary team teaching facilitated (Hrivnak et al., 2017; Little & Hoel, 2011). This was further reinforced by Hrivnak et al. (2017), who found that "interdisciplinary subjects permit students to develop a meta-knowledge about different disciplines, methods and epistemologies. Importantly, students also learn how to purposefully and reflectively integrate and synthesise different perspectives to promote understanding and develop robust solutions" (p. 4), which allowed for deeper understanding of the concepts.

Students were not the only beneficiaries of interdisciplinary teaming. Ellerbrock (2012) noted that "teacher communication as a result of teaming may provide the teacher support and individualized student attention necessary to foster a family-like ninth-grade environment that meets student and teacher needs" (p. 32). The benefits to teachers included professional growth, improved school climate, development of new teaching approaches, removal of academic isolation, availability of new approaches for disciplinary issues, professional development in lesser-known areas, and intellectual growth (Akpan et al., 2010; Al Saaideh, 2011; Ellerbrock, 2012). Cotton (1982) recognized the ability to use each individual's strengths while simultaneously having support to minimize weaknesses. He also discussed benefits in teacher cooperative planning and teaching.

Despite all the benefits found, there are also some drawbacks to interdisciplinary team teaching that need to be considered. In terms of student outcomes, while much of the literature was supportive of interdisciplinary team teaching there were some studies which offered differing viewpoints. Ellerbrock (2012) noted that although benefits were reported for interdisciplinary teaming, they were significantly more reported by school personnel rather than from the students themselves. Al Saaideh (2011) theorized that if not implemented carefully there exists "the potential to confuse students if two teachers present differing viewpoints on a particular subject" (Al Saaideh, 2011, p. 270). Cotton's (1982) review of the literature noted that "the effectiveness of interdisciplinary team teaching, as compared with traditional one-teacher, one-classroom arrangements, generally indicates that these two formats are equally effective in enhancing student achievement, both at the intermediate level and for students generally" (p. 5). However, this review is dated and more recent research has shown that students experience an increase in achievement. Beyond academic achievement some students, specifically at the college level, presented their own set of challenges to a change in teaching style where they worried of excessive amounts of extra work or a drop in their GPA due to experiencing non-traditional styles (Little & Hoel, 2011). Al Saaideh (2011) foresaw additional student difficulties with implementation, including "unwillingness to try out new learning techniques implied by teams, and the frustration and discontentment about having more than one teacher in the class" (p. 272).

Teachers also faced difficulties with interdisciplinary team teaching, including worries of increased teaching loads, interference in their timetables, team member compatibility, the need for additional training, and the work required to modify content and redesign curricula, and philosophical disputes between teachers during curriculum (re)design (Al Saaideh, 2011).

Concerns over curriculum design difficulties arose as part of a discussion about overcoming difficulties related to teaching loads by integrating various curricula together and synthesise them into a more holistic document. To overcome these difficulties Kodkanon et al. (2018) pointed to shared decision-making, leadership and supportive relationships between both staff and administration that take into consideration both professional worries and personal philosophies of education.

Kodkanon et al. (2018) conducted a review of the literature, which revealed a lack of literature on interdisciplinary team teaching in a high school context. There have been numerous studies of interdisciplinary team teaching in higher education and at the middle years level. Studies which examine high school contexts are much less common, and the ones which have been done often focus on vocational studies (e.g., Akpan et al., 2010; Al Saaideh, 2011; Kodkanon et al., 2018). Kodkanon et al. (2018) noted that an interdisciplinary aspect may be achieved in high schools through engagement in project-based learning (PBL). The PBL approach provides a shared purpose and a framework support teachers' planning and curriculum design work. PBL as another form of progressive pedagogy will be discussed further below.

Inquiry-Based Learning

Inquiry learning is based on the constructivist philosophy of education in which the learner is "the key player; learners participate in generating meaning or understanding" (Ornstein & Hunkins, 2016, p. 113). Hammond et al. (2001) discuss the evolution of learning theory and note that modern learning theory, including inquiry learning:

> Recognizes the role that both experience and reflection play in the development of ideas and skills. Researchers and practitioners appreciate that reinforcement and practice play a role in the development of skills, and so do cognitive intent, effort, and reasoning. (p. 9)

The recognition of "intent, effort, and reasoning" align well with Khalaf and Zin's (2018) perception that inquiry learning includes an ongoing assessment of not just knowledge, but also of the learning process.

A pedagogy based on a constructivist theory of learning has proven difficult to define, with a long list of definitions due to "the differences in opinions and conceptualization on this model of learning" (Khalaf & Zin, 2018, p. 550). Educators have historically used many definitions of inquiry. "Based upon the definitions currently used for inquiry (Minstrell, 2000; Barman, 2002; Lederman, 2003), there is no uniform agreement among the science education community about what is the meaning of inquiry" (Barrow, 2006, p. 274). Keselman (2003) discussed inquiry for elementary students as "an educational activity in which students are placed in the position of scientists gathering knowledge about the world" (pp. 898-899), which is similar to the definition proposed by Pedaste and Sarapuu (2006), in which they defined inquiry as "an educational activity in which students investigate a set of phenomena and draw conclusions" (p. 47). A specific definition from the literature includes one by Wolf and Fraser (2008), who discussed inquiry learning as that which specifically builds on prior knowledge, includes group work and hands-on activities, requires students supporting their conclusions with evidence, encourages sharing ideas with peers, and utilizes the teacher as a guide who offers divergent questions to push students beyond their current level of understanding. Biggs (1996) added to the operational definition that students should be involved in the selection of evidence to support their learning, further enforcing the use of both self and peer assessment. Khalaf and Zin (2018) referred to the work of John Dewey in their definition in which the main features of inquiry learning included student-based discussions, support for evidence, building evidence-

based explanations of events, connecting their explanations to existing knowledge, and communicating their findings.

This pedagogy is related to interdisciplinary teaching in that interdisciplinary teaching often uses inquiry to provoke students wonder and guide them towards the links between disciplines, however inquiry learning on its own does not require an interdisciplinary approach and can be done within a single subject area quite easily.

Although difficult to succinctly define, the literature does offer some support of inquiry learning as an effective pedagogy. Wolf and Fraser (2008) published an explicit comparison between traditional and inquiry learning methods based on the learning environment and students' performance. The study was primarily concerned with the learning methodology and learner achievements in science classes, but it also found significant differences in the performance of learners during the learning process. They found a shift of more than double the student achievement for those who adopted inquiry-based instructions over traditional methods. Dorier and Maass (2012) found several challenges to inquiry learning and categorized them into three types: school systems, lack of curricula, and pre-service teacher education. School system challenges included lack of available teacher professional development, teacher and administration reluctance for change, educational traditions, lack of time due to prioritizing finishing curriculum, and assessment requirements. The systemic issues were corroborated by Wolf and Fraser (2008), who highlight the need for time as one of the key issues. Dorier and Maass (2012) found that many stakeholders in education, including students and parents, resisted a shift towards an inquiry learning model. They also noted a lack of curricula for inquiry learning, which made it more difficult to implement. The pre-service teacher education challenge related mostly to difficulties in teaching pre-service teachers the changed role from a professor of

knowledge to a guide of students, as inquiry learning aims to transform the teacher's role into one which is more complex, nuanced, and relational.

In terms of challenges concerning the implementation of inquiry learning, Keselman (2003) noted that many educators were "asking students to direct their own scientific activities, [and that] educators implicitly assume that students possess the repertoire of scientific skills necessary for successfully completing such investigations" (p. 898). Students need to be scaffolded in how to inquire (providing the skills needed) and be supported in developing metacognition (reflection for improvement) for this type of pedagogy to be effective. Pedaste and Sarapuu (2006) summarized this issue when highlighting that "students need some additional support for realizing the potential of working in the Web-based inquiry learning environment" (p. 60).

Students of inquiry learning also experienced some negative effects and have "been found to experience a sense of complexity and frustration in practice" (Khalaf & Zin, 2018, p. 559). This may help to explain the widespread resistance from students to inquiry learning curricula as highlighted by students during interviews by Khalaf and Zin (2018). Wolf and Fraser (2008) also identified a pedagogical equity issue in that "males benefited more from inquiry methods, females seemed to benefit more from non-inquiry approaches in terms of attitudes to science and classroom task orientation, cooperation and equity" (p. 336). They also found that even though "strong and consistent associations emerged between student attitudes and learning environment scales … associations between achievement and learning environment were relatively weaker" (p. 336).

Given the current gap between learning models and the expectations of our educational systems about learners, Khalaf and Zin (2018) recommended reform in the field of inquiry

learning by creating a new learning model to make up for the aforementioned deficiencies. They limited their discussion, however, to an encouragement to further research with an added hope that the new model accounts for development of learners' cognition, skills, background knowledge and manages still to achieve improved outcomes.

Project-Based Learning

Inquiry learning has some advantages, but also many drawbacks. An iteration of inquiry learning known as project-based learning (PBL) includes many of the aspects of inquiry learning but extends them in a way that may avoid some of these drawbacks. PBL is roughly defined as a model that organizes learning around projects.

> Projects are complex tasks, based on challenging questions or problems, that involve students in design, problem-solving, decision making, or investigative activities; give students the opportunity to work relatively autonomously over extended periods of time; and culminate in realistic products or presentations. (Thomas, 2000, p. 1)

The specific definition of *interdisciplinary PBL* used for this study is contextualized to the implementation in the school being studied. In this context, interdisciplinary PBL is based on continued cycles of inquiry, student choice and freedom within the project, reflection, revisions, and presenting the final product to an authentic audience as described by the Buck Institute of Education: PBLWorks (Boss & Larmer, 2018). The projects are designed by an interdisciplinary team of teachers who plan based on "Gold Standard PBL" (Larmer et al., 2015), which includes the above facets of PBL as well as a challenging question, authenticity, and public presentation.

Thomas (2000) conducted a literature review on PBL and found that despite the difficulties in implementation, there was both direct and indirect evidence that student attitudes

towards learning improved in PBL classrooms. He found that PBL was either "equivalent or slightly better than other models of instruction for producing gains in general academic achievement and for developing lower-level cognitive skills in traditional subject matter areas" (p. 34). He also noted that there was some evidence to support enhanced depth of knowledge in subject matter areas which implied better critical thinking and problem solving. Finally, he concluded that:

> There is ample evidence that PBL is an effective method for teaching students complex processes and procedures such as planning, communicating, problem solving, and decision making, although the studies that demonstrate these findings do not include comparison groups taught by competing methods. (p. 35)

Kingston (2018) found that "generally, research on PBL has weaknesses including, but not limited to: lack of experimental studies, varying fidelity of PBL, implementation challenges, and lack of validity and reliability of measures" (p. 3). A literature review by Kokotsaki et al. (2016) highlighted similar issues with the quality of the studies they found:

> reviewed studies did not involve random allocation of participants to control and experimental groups, and as a result, a causal link between PBL instruction and positive student outcomes cannot be established with certainty. The majority of these studies were based on a quasi-experimental pretest–posttest design with some baseline equivalence established for the outcomes measured at the classroom level. Some studies of weaker quality were based on observations of students' behaviour, attitudes and accomplishments in a PBL environment without the presence of a comparator group. (pp. 269-269)

Similarly, Thomas's (2000) review of the literature pointed to a need for evidence of the effectiveness of PBL specifically when compared to other methods, and increased research on the breadth of PBL effects as "much of the research reported above incorporates only one or two indices of learning to measure PBL effectiveness, typically, academic achievement and conceptual understanding" (p. 37). It would appear there is still a pressing need for research in the efficacy of PBL.

The Need for a Shift to Progressive Pedagogies

In this section, I will outline the arguments being made in opposition to continuing with traditional pedagogy and the benefits of adopting progressive pedagogies.

Boss and Larmer (2018) described the core issue school education faces: "Though we all agree the world has changed, we also know that schools have not" (xii). Jacobs (1989) also described a prominent issue with traditional education:

> The academic areas are forced into 50-minute time blocks taught by individual specialists. It is no wonder that many secondary school students complain that school is irrelevant to the larger world. In the real world, we do not wake up in the morning and do social studies for 50 minutes. The adolescent begins to realize that in real life we encounter problems and situations, gather data from all of our resources, and generate solutions. The fragmented school day does not reflect this reality. (p. 1)

Even Dewey (1938, as cited in Williams, 2017) noted something wrong with the traditional education of the day when he described progressive education as "a product of discontent with traditional education" (p. 92). Williams (2017) also mentioned that "education in most

classrooms today is what Dewey would have described as a traditional classroom setting" (p. 91).

Education research is increasingly showing the academic benefit of progressive pedagogies and benefits in learner development, student perceptions, attitudes towards their subjects, intrinsic motivation, engagement and even efficacy (Buchanan et al., 2016; Holm, 2011; Samsudin et al., 2019; Wenglinsky, 2004). Shifting towards progressive pedagogies is increasingly supported as beneficial in public education. These benefits were often found in comparison to traditional practices, like higher performance in mathematics and science when emphasizing critical thinking and projects as compared to traditional worksheets and textbook work (Wenglinsky, 2004). At the core of progressive pedagogy is "a desire to nourish curiosity, creativity, compassion, skepticism, and other virtues" (Kohn, 2015, p. 5), which lead to favourable outcomes as compared to traditional education. The benefits outlined by the research are specific to the pedagogy being researched, the lens the researcher used, and the purpose of education through which education was examined as outlined in the sections above. However, all progressive pedagogies (such as PBL, interdisciplinary education, and inquiry learning) showed benefits to holistic student understanding and critical thinking that were missing in the segmented traditional education system which is prominent today.

Study Context: Purposes, Life Situations, and Research Site

Progressive pedagogy has been widely reported as beneficial in education, however many details of the impact of these pedagogies need to be researched. The purpose of this study was to understand how traditional pedagogy and interdisciplinary PBL impact students' perceptions of their future readiness. This was examined through different purposes of education including human capital, socialisation, and subjectification/humanistic. Each pedagogy may have different

strengths or weaknesses in addressing these different purposes of education and understanding where and why these strengths and weaknesses exist will be useful for framing future improvements pedagogy and teaching practice. The path that students choose to take—their life situation—must also be considered. Students who enter directly into the workforce, or attend college, or take a gap year with intent to pursue further education, all have differing needs in their education. Additionally, a student's post-graduation path might impact their values and perceptions of education. Their needs may be met differently within progressive pedagogy so an exploration of how changes in pedagogy impact different demographics of students is important to understand as well. Furthering our understanding of how progressive pedagogies impact students, both through different purposes of education and different demographics of students, will provide more thorough evidence for where and how progressive pedagogies should be adopted to best impact our students positively.

A broad understanding of the impact of shifts towards progressive pedagogies must be qualified by an understanding of both the students' needs and expectations from their education (through knowledge of their life situation), as well as knowledge of different purposes that education can serve. As these are both critical to understanding how a pedagogy can influence a student, they will be included as variables in this study. The next sections will detail literature discussing purposes of education and the impacts of student's life situation on their education to qualify and justify their use as variables as well as provide operational definitions for use within this thesis.

Purpose of Education

The purposes of education have historically been many and varied, including objectives of self-realization, human relationship, economic efficiency, and civic responsibility

(Educational Policies Commission, 1938). The debate about what constitutes best practice in education, and even how and what to assess, are in fact a symptom of a deeper philosophical issue…what is the purpose of education? Understanding the purpose for what you are doing leads to an acknowledgment of the fact that different strategies are useful for different kinds of learning (Hammond et al., 2001). This understanding of the purposes of education has been dwarfed by the school effectiveness and improvement movement, which pushes the concept that educational outcomes must be measured. This tendency to focus discussions about education almost exclusively on the measurement and comparison of educational outcomes has had an overwhelmingly negative effect on the field of education in which any purposes which are difficult to measure are judged unworthy of our time (Biesta, 2009).

"When we are engaged in decision making about the direction of education we are always and necessarily engaged in value judgements—judgements about what is educationally desirable" (Biesta, 2009, p. 35). To make the correct decision about the direction of education, we need to have a deeper understanding about what we value, what others value, what society values, and what values are being promoted at the expense of others. Biesta (2009) believed that there "still remains a significant role for education, therefore, to explore its age-old concerns with the more abundant life, with democracy, society, citizenship, happiness, and fulfilment" (p. 236).

Biesta (2009) proposed three functions or purposes of education: qualification, socialisation, and subjectification. Collier (1959) had considered purposes of education as well, and described economic situation, scale of communities, changing power distributions, purposes of the human life, and the expanding space between people's philosophies as worthy of consideration. Gillies (2011) discussed the purposes of education through the lens of Human

Capital Theory and argued that "it risks offering a diminished view of the person, a diminished view of education" (p. 224). He believed that purposes other than economic ones needed to be considered, such as educational, social, and moral values as well as philosophies of what constitutes a good life or a good society. Other purposes that have been considered include transmitting cultural values, encouraging critical thinking, and transmitting content (Tatto, 1998).

The three purposes of education as outlined by Biesta (2009) seem best suited for this study as they encapsulate the others well. For example, Collier's (1959) ideas of economic situation and scale of community, as well as Tatto's (1998) idea of transmitting content all fall under what Biesta would refer to as qualification.

The three purposes of education discussed below are not designed to be considered independently, but rather as a guide to help describe what purposes education could have in shaping learners. Biesta (2009) described this notion best:

> An answer to the question what constitutes good education should therefore always specify its views about qualification, socialisation and subjectification – even in the unlikely case that one would wish to argue that only one of them matters… The three functions of education can therefore best be represented in the form of a Venn-diagram, i.e., as three overlapping areas, and the more interesting and important questions are actually about the intersections between the areas rather than the individual areas per se. (p. 41)

Human Capital

Biesta (2009) described qualification as "providing them with the knowledge, skills and understanding and often also with the dispositions and forms of judgement that allow them to 'do something'" (p. 39) usually for "preparation of the workforce and, through this, in the

contribution education makes to economic development and growth" (p. 40). These ideas link closely to ideas of human capital, which is primarily concerned with economic functions and future preparedness. Gillies (2011) described this purpose through the lens of Human Capital Theory, in which there is "considerable stress on the education of individuals as the key means by which both the individual accrues material advantage and by which the economy as a whole progresses" (p. 225). Gillies (2011) also noted that historically education was seen as a method through which the quality of the workforce could be improved. As the progression of the economy and individual in Human Capital Theory is accomplished through an education focused on qualification for particular skills and knowledge, Gillies' term *human capital* will be used to describe this purpose of education within this study as it is the overarching purpose within what Biesta (2009) has called the qualification function of education.

Beyond a purely economic argument, the human capital purpose of education is also important for the general populace. Jacobs (1989) recognized that "we cannot train people in specializations and expect them to cope with the multifaceted nature of their work" (p. 6), and Biesta (2009) also pointed to the human side of human capital: "Providing students with knowledge and skills is also important for other aspects of their functioning" (p. 40). Gillies (2011) also made the connection between an individual's investment in their education, and their general well-being. More recently "the definition of human capital has widened somewhat so that it is not simply knowledge or skills but also 'competencies', 'attributes', and 'attitudes' such as 'reliability, honesty, self-reliance, and individual responsibility'" (Gillies, 2011, p. 227).

Human capital alone is not sufficient as a purpose for all of education. It offers only a narrow view of what education can be, and the view of humans as "capital" can be dehumanizing. It alters views of relationships and values as another form of capital, values

economic success above all else, and presents education as a tool for growing the economy without elaborating on why that is important (Gillies, 2011). Gillies (2011) wrote that there exists "two significant challenges for Human Capital Theory: that it diminishes the concept of the human and that it diminishes the concept of education" (p. 234). It is for this reason that other purposes of education must be considered.

Socialisation

The socialisation function has to do with "the many ways in which, through education, we become members of and part of particular social, cultural and political 'orders'" (Biesta, 2009, p. 40). This purpose of education transmits the values of society, perpetuates traditions both cultural and religious, and indoctrinates individuals to a common set of beliefs which unify them into a cohesive whole (Biesta, 2009). Other than an initiation into the dominant culture, the socialisation purpose also aids in developing complex perspectives most needed by modern society (Davis, 1995, as cited in Jacobs, 1989). Socialisation "plays an important role in the continuation of culture and tradition – both with regard to its desirable and its undesirable aspects" (Biesta, 2009, p. 40) and as such is something that can be, for instance, a tool of colonialism and repression when continuing harmful traditions, or a tool for emancipation when used to socialise a new generation into norms which are less exclusionary or damaging then those which were previously in place.

Subjectification / Humanistic

Subjectification as a purpose of education might "best be understood as the opposite of the socialisation function. It is precisely not about the insertion of 'newcomers' into existing orders, but about ways of being that hint at independence from such orders" (Biesta, 2009, p. 40). This purpose of education allows those being educated to become "more autonomous and

independent in their thinking and acting" (Biesta, 2009, p. 40). This allows the populace to understand the consequences of their actions and enable them to choose to act freely with full knowledge of the impact that they might have on themselves and others. It frees them to become a subject themselves, in that they can be a more fully realized individual who is not at the mercy of forces around them.

A humanistic lens was added to this definition as it encompasses ideas of learner centered curriculum design, which is based on "students' lives, needs, and interests" (Ornstein & Hunkins, 2016, p. 176). It is an accompaniment to Biesta's subjectification in that students are freed from outside influences by being equipped with the skills needed to pursue their own interests and attain their full potential.

This purpose of education cannot stand alone as its interests are overwhelming individualistic and ignores the needs of the greater society, and it also tends to ignore any insights from behaviourism and cognitive development theory due to a focus on human action over stimulus response and a subjective understanding of human nature over an objective belief system (Ornstein & Hunkins, 2016). Humanistic purposes would heavily value "the social, emotional, and spiritual realms above the intellectual realm" (Ornstein & Hunkins, 2016, p. 181).

Life Situations

Biesta (2009) noted that education, no matter the intended purpose, also needs to be designed for an intended audience:

> Instead of simply making a case for effective education, we always need to ask 'Effective for what?' – and given that what might be effective for one particular situation or one group of students but not necessarily in another situation or for

> other groups of students, we also always need to ask 'Effective for whom?' (p. 36)

Schwartz (2014) reported that although over 90% of high schoolers plan to go to post-secondary studies, and around 70% of them enroll, only 32% finish a four-year program with an additional 10% finishing a two-year college program. The author estimated another 10% finish a one-year certification program. Although this data comes from the United States, the enrollment numbers closely mirror data from Statistics Canada (2021a) who found that 71% of Canadians aged 19-23 had either attended or completed post-secondary education by May 2016. This gap between goals, enrollment, and completion could possibly indicate that students are not being prepared by their high school education for post-secondary success.

Lee and Frank (1990) found that:

> In terms of both social background and academic preparation, the students who were attending community college were generally almost as different from those in four-year college as both groups of college students were from the high school graduates who were not engaged in any form of higher education. (p. 184)

This implies that these groups of students (no further education, community college, university or four-year college) are quite different from each other, and thus might have different needs in their education and should be considered their own demographic categories for the purpose of this study.

Tomkowicz and Bushnik (2003) grouped high school graduates into three categories, right-awayers, delayers, and no-goers based on when and if they attended post-secondary programs. This aligns well with Lee and Frank's (1990) findings that high school "graduates have only a few alternatives open to them for the future. In general, they must choose college or

work" (p. 182). Given that "research has shown that high school graduates who delay their postsecondary education have certain characteristics that differentiate them from high school graduates who enroll in a post-secondary institution immediately after high school" (Tomkowicz & Bushnik, 2003, p. 6), students who plan on attending post-secondary education later should also be considered a specific demographic group with possibly unique educational needs. This is further reinforced by their findings that there were general demographic differences between the right-awayers and delayers, including financing factors, grade average, working during high school, and receiving scholarships. There were also differences between right-awayers and no-goers in gender, having a child, parents' level of education, grade average, participation in work during high school, and their perceptions about the importance of continued education (Tomkowicz & Bushnik, 2003).

According to Statistics Canada (2021b), in Manitoba the specific breakdown for education completion amongst 26-64 year-olds consisted of:

- 25.2% University Bachelors or higher
- 3.2% University below bachelors
- 21.1% College or other non-university
- 8.2% Apprenticeship or trades certificate or diploma
- 27.9% High school only
- 14.4% No diploma

This demonstrates that roughly 42.3% of Manitobans either entered the workforce directly or are not currently working, 29.3% completed a college, trades, or other non-university diploma, and 28.4% completed a university degree (including below bachelors). Manitoba Education (2019)

published statistics for each school division, and the context within which this study takes place is not significantly different from the Manitoba averages.

Rohan and Zanna (1996) linked parenting values to a corresponding transmission of values to their children, which have a direct impact on education according to both Carter (2002) and Butlin (1999). As parenting values are correlated with student values, and student values impact post-secondary attendance (Butlin, 1999), it seems reasonable that a student's post-graduation path might impact their values and perceptions of education.

Research Site

The school where the study took place is a grade 9-12 secondary school (opened for the 2019-2020 year) which exists in a rural Manitoba town of around 5000 people, where most students are White and speak English as their first language. It had a population of around 320 students with some minority student groups, including Black Canadian students, Indigenous students, Filipino students, and Korean students[1]. Historically, the town held conservative Christian values and had a majority Mennonite heritage. Within the last 15 years, the town had grown significantly, leading to a diversification of the student population. The median annual household income was $90,675 and the majority of the households would not be considered low income as of 2016. Most people commuted to the nearest major city for work, although many residents were involved in agriculture or ran small local businesses.

The school division had been explicit in instructing staff to teach and assess 21st century skills alongside the curriculum, and as such the school had developed a grade 9 and 10 interdisciplinary project-based learning (PBL) course to align with these goals and planned to roll out grade levels one year at a time. Inquiry-based learning theory had been extended using

[1] This and other school and school-divisional-specific information will not be referenced for confidentiality reasons.

the PBL model, while also including elements of interdisciplinary team teaching and interdisciplinary learning. An operational definition of interdisciplinary PBL is provided above in the Project-Based Learning section of this thesis (p. 31).

In grades 9 and 10, these projects were interdisciplinary and incorporated content from science and/or social studies, while simultaneously teaching English Language Arts skills. Math was not included due to the difficulty of authentic integration and because it is better taught in a sequential manner (Shoemaker, 1989). In grades 11 and 12, as courses diverged, project-based learning was encouraged but less opportunities for interdisciplinary studies were available to students. However, some interdisciplinary courses continued to be offered, such as Topics in Science/ELA (senior 3), Sociology/ELA (grade 11), and Topics in Science/Physical Education (grade 12).

The grade 9 and 10 courses averaged between 1.5 and two full periods each day and spanned the entire year, which created the same instructional time as three to four separate and semestered courses. Within this timeframe concepts from both the science and social studies curricula were taught using a project-based approach, while interweaving English language arts (ELA) skills. This provided students with three of their mandatory credits (science, social studies, and ELA). During a project, students were assessed on content from social studies, science, or both, and skills developed from the ELA, as well as 21st century skills such as communication, collaboration, or critical thinking. This approach was implemented in all sections of grade 9 simultaneously in the first year and all grade 10 sections the second year. All teachers of these courses worked together to plan and deliver the projects in a synchronous manner (while still respecting individual teaching styles).

This new pedagogy was implemented in the 2019/2020 school year as the school opened, however there was little consultation with the local community and significant backlash was experienced during the year. Many parents did not see the value in the approach, worried that a lack of traditional testing practices would affect their students' ability to succeed in post-secondary education and questioned the assessment practices that were implemented. Administrators supported the team throughout the year. COVID-19 affected implementation of the program for the final few months, but the team worked to continue interdisciplinary project-based learning as best as possible.

The 2020/2021 school year implemented the grade 10 program alongside the grade 9 program, and a newsletter was created for parent outreach which appeared to impact parent concerns as less were reported. Despite the ongoing COVID-19 pandemic, both programs continued with interdisciplinary project-based learning with plans to implement grade 11 in the 2021/2022 year and grade 12 in the 2022/2023 school year.

The concerns presented by the community and the continuing roll-out of the program presented a unique opportunity for research where a comparative design could be used which would look at a class graduating who had not yet had the interdisciplinary PBL pedagogy experience, and then examine a class a year later who had been part of the interdisciplinary PBL roll-out. This study design is suitable for informing all educational partners, including parents, of the different benefits and challenges of interdisciplinary PBL.

Conceptual Framework

This section introduces the conceptual framework used for the development of the data collection tools utilized for the study (survey instrument and interview protocol), building upon the purpose of the study to inquire into the impact of two types of pedagogies on students' future

readiness as defined through three purposes of education with the consideration of students' life situations after graduation. To effectively design each of the data collection tools, a conceptual understanding of "future readiness" and "life situations" was needed.

The creation of the survey instrument was centered around three distinct purposes of education: socialisation, human capital, and subjectification/humanistic (Kennedy, 2015; Biesta, 2009; Gillies, 2011; Schiro, 2008). This provided a theoretical foundation on which to build the instrument and covered a wide variety of possible purposes of education, which are fundamental to any understanding or discussion of program success (Falkenberg, 2021).

The socialisation purpose of education aims for students to integrate with society and become "members of and part of particular social, cultural and political 'orders'…with regard to the transmission of particular norms and values" (Biesta, 2009, p. 40). The human capital purpose of education is to meet any current or future needs of society or themselves by training students "in the skill and procedures they will need in the workplace and at home to live productive lives" (Schiro, 2008, p. 4). In essence, this purpose sets up "the education of individuals as the key means by which both the individual accrues material advantage and by which the economy as a whole progresses" (Gillies, 2011, p. 225). The final purpose of education being examined is the learner centered or subjectification purpose. This includes developing students who can pursue their own individual interests, explore their passions creatively, and be free to be a subject themselves rather than an object on which education acts (Kennedy, 2015; Biesta, 2020). Biesta (2020) describes it as "encouraging an 'appetite' for trying to live one's life in the world…without thinking oneself in the center of the world" (pp. 97-98).

The purposes of education discussed above all have one common facet: they are all considering the impact of education on how a student will perform in the future. Human capital examines ideas of how students perform in the future job market and economy, socialisation as a purpose emphasizes a student's ability to integrate into society and participate as a functioning member once they have graduated, and a subjectification/humanistic lens guides student's to be able to explore interests and act freely in their future. As such, one may posit that the overall purpose of education is holistic future readiness. As such, future readiness was included in the design as the independent variable.

While future readiness definitions tend to include facets of both post-secondary preparation and career preparation, there are a plethora of diverse definitions which have been developed. For this study, the working definition (based on Mishkind (2014)) was: a future-ready person is a person who demonstrates academic knowledge, critical thinking, social/emotional learning, collaboration, perseverance, and community involvement, as well as a commitment to ongoing growth and lifelong learning. This definition was chosen as it encapsulates all the potential purposes of education discussed.

Based on the literature review above, participants were also grouped into five "life situation" categories in order to differentiate the needs and perceptions of different types of right-awayers, delayers, no-goers:

- working and I plan to continue working
- working and I plan to attend an educational institution in the future
- currently attending a college or training institute
- currently attending a university
- other

As the following literature review demonstrates, the specific purpose of the study together with the conceptual framework just described made it difficult to find and utilize a suitable instrument for the study. It was more appropriate to develop an instrument specifically for this study.

When exploring approaches to assessment, the PBL approach has by far the most literature available. Trauth-Nare and Buck (2011) as well as Huysken et al. (2019) focused on ideas of outcome assessment in PBL, while Samsudin et al. (2019) discussed social/emotional learning (SEL) through the lens of self-efficacy. Some authors took multiple approaches to assessing PBL in the classroom, including Saunders-Stewart et al. (2012), whose literature review examined not just outcome growth, but also SEL and 21st century skill development, which resulted in the creation of the McGill Inventory of Student Inquiry Outcomes. Less literature was found in interdisciplinary learning at the secondary level, and only one study could be found when the two approaches were combined while specifically looking for post-graduation assessment of the practices (see Appendix A). The work of Howe and Ruberg (2019) looked at interdisciplinary project-based learning, however they only examined it through an analysis of growth in 21st century skills within a very narrow context (a full semester, day long course in digital media).

A common tool discussed for measuring complicated outcomes was the use of a proficiency scale rubric. The use of this type of rubric was discussed many times (Fullan et al., 2018; Mansilla et al., 2009; Trauth-Nare & Buck, 2011) as an effective tool to make complex learning outcomes clear to students, however their use for assessing the learning approach holistically is unexplored. Proficiency scale rubrics were recommended for the assessment of 21st century skills (Fullan et. al., 2018) and for the assessment of content knowledge (Trauth-Nare &

Buck, 2011), however a consideration of using a proficiency scale rubric for the efficacy of the pedagogy, has not been attempted.

Within the classroom the difficulty of assessment is clear and when examining post-graduation measures of student success similar difficulties arise. Most studies examine either quantitative data, or qualitative data from adults without reference to students' lived experiences (See Appendix A). These post-graduation success rates are also measured primarily through an academic/post-secondary achievement lens, or by considering a socialisation purpose of education instead of incorporating multiple purposes of education.

Literature examining secondary school post-graduation outcomes tends to focus on highly contextualized demographics such as youth with disabilities (Newman et al., 2009) or low-income students (Arnold et al., 2016), or focus solely on admission and completion in post-secondary education as the sole measure of student future readiness (Antoniou, 2012; Arnold & Mihut, 2020; Dickson, 2011; Fleming et al., 2018). A single study (Fournier-Sylvester, 2014) was found in which the authors examined student perspectives post-graduation, but they only used a socialisation purpose of education in examining how Quebec students perceived their citizenship education. No studies could be found which examined post-graduation student conceptions of their education from diverse educational approaches or diverse purposes of education.

Based on these considerations, a tool was developed for this study to assess the efficacy of the pedagogy which was based on a Likert-type scale.

There is a clear gap in the literature in which the efficacy of interdisciplinary project-based learning is examined post-graduation through a student's perspective of future readiness while utilizing multiple purposes of education.

Methodology

Study Design and Research Questions

The purpose of this study was to inquire into the impact of interdisciplinary project-based learning (PBL) on high school students' self-reported future readiness and to explore whether and how certain factors in their educational experiences shaped their perceptions. To best address the purpose of the study and to address the gaps in existing research surrounding the efficacy of interdisciplinary Problem Based Learning (henceforth just referred to as PBL), the study was designed as a comparative explanatory mixed-methods study. A mixed methods study is one in which an author is "collecting and analyzing both qualitative and quantitative data, integrating the two forms of data and their results, using specific mixed methods designs, and framing the study within theory and philosophy" (Creswell & Plano Clark, 2017, p. 18).

Research Questions

The study design included three groups of research questions to be examined. The first group of questions were quantitative in nature and centered around pedagogy-specific inquiries, namely whether there were differences in impact on students' future readiness that may exist *across* the three purposes of education and life situations or *within* each of the groups of students that have experienced one or the other of the two pedagogies. The second group of questions were qualitative in nature and were designed to explain why the differences exist (if they do) within each of the two pedagogy groups. The third set of questions were comparative questions designed to find differences *across* the two pedagogies and explain those differences.

The following research questions fall into the first group and were used to address pedagogy specific differences:

1. Are there differences in the scores in future readiness in each of the three purposes of education a) within the TP student group and b) within the PBL student group?
2. Are there differences between life situations in terms of overall future readiness within each pedagogy?
3. Are there differences between life situations in terms of each of the three purposes of education within each pedagogy?
4. Is there an interaction between education type and life situation in terms of overall future readiness?
5. Is there an interaction between education type and life situation in terms of each of the three purposes of education?

Research questions 1-5 helped determine the perceived future readiness of participants within each pedagogy, determine what parts of future readiness they felt most prepared for, and determine if their life situation interacted with how prepared students said they felt. This set the stage for the qualitative phase of the mixed-methods study, which took place after the survey data were collected and analyzed and was designed to explain the findings of research questions 1-5. To this end, the qualitative phase of this study was directed by the following research questions of the second group:

6. What factors in a student's educational background do participants describe as being impactful on their total future readiness?
7. What events in a student's education make the student feel prepared (or would have helped them feel prepared) for their future from a socialisation perspective?
8. What events in a student's education make the student feel prepared (or would have helped them feel prepared) for their future from a human capital perspective?

9. What events in a student's education make the student feel prepared (or would have helped them feel prepared) for their future from a subjectification perspective?
10. How is a participant's current life situation related to their perceptions of their future readiness?
11. How do specific explanation patterns which emerge from participants' qualitative interviews explain the quantitative results of the survey data across each of the two pedagogies?

Comparative research questions (the third group of research questions) were needed to help interpret the results across the two pedagogy groups, and in comparing the differences in qualitative data explaining those results. Based on the quantitative results and ensuing qualitative exploration, the comparative mixed methods research questions explored were:

12. Are there differences in overall future readiness between the TP student group and the PBL student group?
13. Are there differences in the scores for each of the three purposes of education between the TP student group and the PBL student group?
14. What differences exist in future readiness between the PBL and TP groups with different life situations?
15. Are there differences in future readiness in each of the purposes of education in students who received PBL as opposed to TP when considering life situation?
16. How do differences in pedagogy impact how students feel prepared for their futures?

Study Design

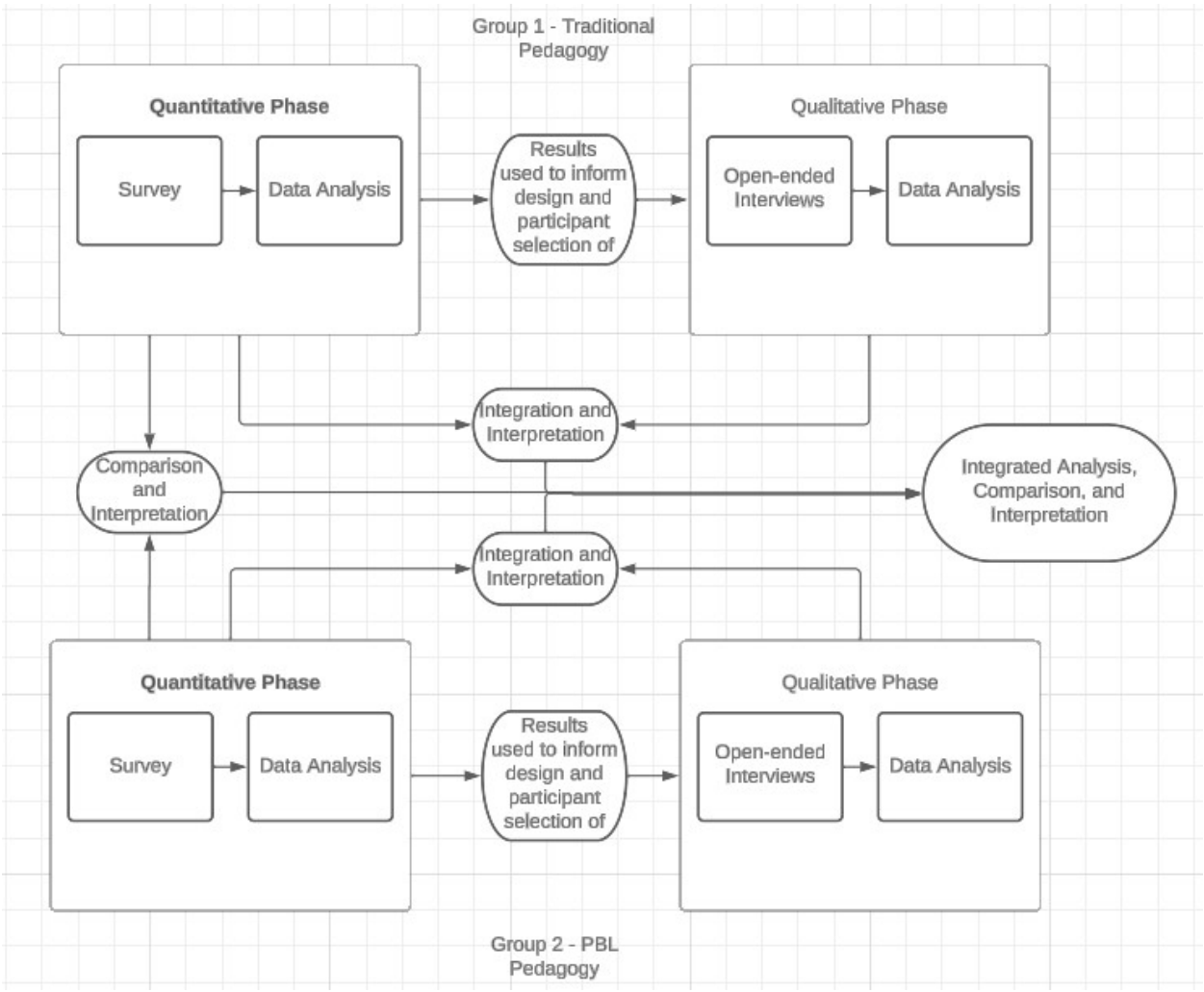
An explanatory sequential mixed methods design was used in conjunction with a comparative study design in which quantitative data was gathered initially, and then qualitative

data was used to explain the findings for the quantitative phase of the study. The quantitative data was analyzed initially to determine boundaries for the follow-up qualitative phase. This fixed mixed methods design is one in which "the researcher begins by conducting a quantitative phase and follows up on specific results with a subsequent qualitative phase to help explain the quantitative results" (Creswell & Plano Clark, 2017, p. 77). Figure 1 (below) provides a procedural diagram of the design. In each group, quantitative data was collected, analyzed, and used to inform the qualitative phase. The qualitative data was then used to help explain the findings of the quantitative phase.

Since the qualitative data are collected to *explain* the finding from qualitative data—thus giving primacy to the quantitative data in this study—the design can be represented as QUAN → qual, using a common mixed methods notation (Morse, 1991) in which "the components are indicated as qual and quan (or QUAL and QUAN to emphasize primacy), respectively, for qualitative and quantitative research… and arrows (→) refer to sequential implementation" (Schoonenboom & Johnson, 2017, pp. 108-109). The survey design used a cross-sectional comparison group design, to address the comparative aspect of the study purpose. This comparative design feature allowed for a direct comparison across the two pedagogies being studied as this was the main purpose of this study.

Figure 1

Procedural Diagram



The quantitative phase of this study was specifically designed to examine if differences exist in students' self-reported future readiness when educated using PBL or when using traditional pedagogy (TP). 'Future readiness' is defined relative to each of the three purposes of education discussed and defined in the literature review: (1) socialisation; (2) human capital; (3) subjectification/humanistic. Thus, in this study, students self-reported on their future readiness as

defined through the socialization lens, on their future readiness as defined through the human capital lens, and on their future readiness as defined through the subjectification/humanistic lens.

A survey was administered and analyzed in the quantitative phase to identify what purposes of education students felt most prepared for (or least prepared for) within each specific pedagogy. The surveys were administered seven months after high school graduation from a rural secondary school in Manitoba. This provided data which helped in responding to research questions 1-6 to gather information about what purposes of education their pedagogy prepared them for. In accordance with the design process represented in Figure 1, the survey data was also used in determining which participants would be selected for a qualitative interview (see below). For details on the instrument design see the *Instrument Design* section (p. 64).

To respond to research questions 6-11, individual interviews were undertaken as a data collection instrument for the qualitative phase of the study. An interview protocol was developed (see Appendix B) to address research questions 6-11. The interview protocol was designed based on a protocol refinement framework including a design matrix (for details see *Protocol Development* on p. 71. Research questions 6-9 were addressed through the questions of the interview protocol, and answers to research questions 10 and 11 were inferred from the differences between interview responses of participants in different life situations. Research question 11 was also approached by looking for common themes across participants. The interview data was analyzed to help explain what factors contributed to perceptions of future readiness for any differences which were suggested by the survey. The design of the interview and selection of participants was partially determined by the results of the survey (see Table 1), and the interview itself was designed to elaborate on the initial survey data. This approach was chosen to provide a quantitative general understanding of the problem first, followed by

collecting and analyzing qualitative data, which allowed for a deeper understanding of participants' views and illumination of explanations for the results (Creswell & Creswell, 2018).

Table 1

Potential Interview Groupings

Future readiness scores	Life situation			
	Workforce	College	Gap year	University
Above group average				
Close to average				
Below group average				

Note. Only groupings with a significant number of participants were interviewed, so although there are potentially 12 groupings here, it was anticipated that less groups would emerge which were significant to understanding the research questions.

Data collection was repeated one year later with the group of participants who experienced project-based learning to compare the impact of progressive pedagogy directly with the group who experienced more traditional education, based on the roll-out of progressive pedagogy at the school starting in their grade 9 year. The conclusions of the surveys and the interviews of both groups were integrated to provide a deeper understanding of the impact of PBL on students' future readiness than would be granted by either a quantitative or qualitative approach individually. This integrated analysis provided the basis for a response to research questions 12-16.

Design Justification

An explanatory sequential mixed methods approach utilizes the benefits of both quantitative and qualitative methodologies. The gathering of additional evidence also allows for an explanation of what factors may have shaped the quantitative data, such as using interview data to back up or explain survey findings. Green et al. (1989) summarized possible reasons for

using mixed methods designs including triangulation for validity, complementarity for further description, development for informing further research methods, initiation for finding new understandings, and expansion for using different methods for enhanced understanding. For this study, the primary reason for using this design was that it was a very good fit for the stated purpose. It allowed us to find out the impact of different pedagogies through quantitative data, explain the impact those pedagogies had through qualitative data, compare the impact of pedagogies across different groups, and explain any similarities or differences in those impacts.

An explanatory sequential mixed-methods research design was chosen for this study to allow for a larger sample size than an interview-based study alone could have provided due to the time and resource intensive nature of interviews. This larger sample size for data in the quantitative part of the study and the ability to explain those findings in more detail through the qualitative part of the study allowed for a better understanding of the phenomenon being investigated. Quantitative studies alone consider the data from a larger pool of participants results but lose details which allow for a better understanding of any underlying causes for the observed differences, while qualitative studies give very detailed understanding of a few individuals but are not as generalizable and can introduce more interpretive biases from the researcher. Combining these approaches gives the best understanding by integrating the results using different methods to establish both effect and process (Schoonenboom & Johnson, 2017). As the purpose of this study was to determine whether educational experiences shaped student future readiness, to determine how those factors may have impacted them, and to explain possible differences in findings across samples and across educational experiences, it was beneficial to gather both qualitative and quantitative data. Qualitative data were gathered to explain the quantitative findings on different impacts, especially as student perceptions of future

readiness are self-reported and explored through their personal anecdotes and worldviews. A mixed-methods design allowed for the desired mix of quantitative, qualitative, and integrated research questions.

An explanatory sequential design also offers many advantages to the researcher. It is more straightforward to implement than a concurrent mixed-methods design, as only one type of data is collected at a time, and the more structured design aids in report writing and provides readers a clear path to follow. Another benefit is that the emergent approach of the explanatory sequential design also helps tailor the research questions to the specific problem being addressed as qualitative questions can be customized based on emerging patterns in quantitative results. For this study, access was also available to return to participants for a second round of qualitative data collection, and there was time to conduct research in two phases, which addressed two major challenges in mixed methods research (Creswell & Plano Clark, 2017).

The mixed methods approach allowed for an integrated understanding of the research problem, which may be greater than the sum of the individual understandings gained from single methods research (Creswell & Plano Clark, 2017).

A survey was appropriate as a data collection instrument for the quantitative phase as surveys are suitable for gathering large amounts of data efficiently and gaining insight into a larger sample of regular stream student graduates from the study site. Survey methods were also ideal because perceptions of future readiness that were collected from the survey were inherently personal and self-constructed and could only be provided by the participants directly; they could not be obtained from other data sources (Fink, 2017).

The results of the quantitative part of the study were needed to fill the gap identified in the literature regarding the impact of progressive pedagogies on student learning generally (and

the PBL approach in particular). In addition, the results of this phase of the study offered consideration of students' self-reported perceptions of future readiness, as well as helped to determine if differences in impact existed across the two different pedagogies when considering different purposes of education and what the impact of student life situation might have been on students' readiness within each purpose of education.

To this end, research questions 13-16 allowed for expansion on the original results while specifically searching for an understanding of why particular purposes of education compared differently across the two pedagogies. The question on current life situations would also show if and how students' post-graduation path affected their perception of the education system and if certain pedagogies impacted the participating students disproportionately. This was necessary because simply showing a difference across pedagogies for certain groups was not enough information to identify what might have caused those differences or how to potentially remedy or replicate them. Elaborating on what might have caused differences in reported impact of different pedagogies can help develop better pedagogies, help target specific demographics with specially designed interventions or pedagogies and help inform governing bodies about best practices when creating and implementing policy.

The mixing of methods gives a more complete understanding of factors at play within each case (Creswell & Plano Clark, 2017). Knowing that there are significant differences in the impact of the use of different pedagogical approaches is not as useful as knowing why these differences exist, as this can better guide future decisions within schools, allow for strategic interventions for students or demographics, and provide scholarly research for governmental policymakers.

A comparative design, which allows for direct comparison of two groups, allows for a more accurate understanding of the impacts an educational change might have within a certain context and provides a unique perspective that is lacking in current literature.

The Quantitative Phase of the Study: The Survey

For this phase of the study, survey data were collected, analyzed, and then compared to identify how the learning approach used in their secondary education impacted their self-reported future-readiness. The survey was administered seven months post-graduation. The choice to distribute the questionnaire online was deliberate, as after graduating participants may have moved. Students were contacted during their graduating year to ask permission for enrollment in the study and to collect their contact information. The school division was asked to send out a form letter to all eligible students for this purpose which was designed based on the University of Manitoba's informed consent form template (University of Manitoba, 2003). According to Fink (2017), the main drawbacks for web-based surveys include difficulty with multiple email addresses, privacy concerns, validating identity of participants, and difficulty operating technology. All these drawbacks were addressed. Contact information were gathered effectively ahead of time, cross-referencing email addresses with the original list helped validate identity, and the recent shift to online learning due to the COVID-19 pandemic helped provide the entire population with technology skills. Also, graduates are allowed by the school to keep the computing device they used during high school upon graduation in order for them to have access to technology with an internet connection.

Microsoft Forms was chosen, as it is a trusted platform for data security and because it allows for exporting data into spreadsheet software to facilitate analysis.

Another consideration in using an online survey was the cost, which was minimized via the use of email. I was the sole surveyor, so no training of other survey facilitators was needed, and participants were not financially incentivized to complete the survey. The participants had some intrinsic motivation to participate due to their prior connection to the school that was the setting of the study.

Sampling

The population of the survey was the entire group of graduates of the classes of 2022 and 2023 from the selected school. However, excluded from the study were students who attended a significant amount (more than one year) in a flexible learning program (FLEX), joined the school population after grade 10 (less exposed to the pedagogy being used), or had an individualized education plan. The FLEX program was intended for students who:

- have difficulty attending school regularly,
- have extenuating circumstances in which they would benefit from a learning environment that allows them to work at their own pace or in a setting outside the regular classroom,
- will be completing coursework off campus, or
- require credit recovery.

Students in the FLEX program spent less time in the school building, often received highly individualized programming, had self-paced courses which may span more than a single semester if needed, and are allowed a maximum of three courses at a time. This provided a very different educational experience than either traditional education or PBL pedagogy generally provided, and as such these students were not considered part of the population of this study. The FLEX program had less than fifteen students in it at any given time.

All non-FLEX graduates were eligible to participate, which would remove any potential for biases in sample selection other than any naturally occurring differences in demographics due to the time gap between the two groups. The graduating year of 2023 had a total of 75 graduates, and the class of 2024 had 72 total graduates as a total possible population before eliminating the exceptions listed above. These students were contacted prior to graduation via divisional email and provided a letter of information about the study. Any students interested in participating left their contact information at the school office to allow for recruitment after they had graduated.

For the traditional pedagogy group there were 25 expressions of interest, and of those 25 potential participants, 18 of them responded to the survey. For the PBL pedagogy group there were 22 expressions of interest, and of those 22 potential participants, 18 of them responded to the survey.

Data was collected only once per group, in January of the year following their graduation, which was 2023 for the traditional pedagogy group and 2024 for the PBL pedagogy group. The choice to contact students seven months after their graduation was made to give all participants time to acclimatize to life after school, whether that be a semester of additional education or time to find and adapt to a job. Another consideration for the chosen wait period was that it was short enough so that their secondary school experiences would still be recently lived, as waiting too long risks invoking rosy retrospection, that is, the fact that recollections of the past are likely to be viewed more positively than the actual experiences (Mitchell et al., 1997).

A time frame of two weeks was given to gather initial responses. Once initial surveys were completed, survey data was cross referenced with the enrollment list to check whether all participants responded. For students who did not provide a response, another invitation to participate in the study was made via email and then by phone. This was an effort to address a

common survey response problem known as nonresponse (Groves et al., 2009, Chapter 6) and to promote the highest possible response rate.

The timeline to complete all surveys and contact all participants was approximately 2 months (from January until the end of February).

Survey Design

For the survey a cross-sectional comparison group design which examined two groups was used. One group of participants experienced primarily traditional pedagogy (June 2022 graduates) and the other experienced interdisciplinary project-based learning for most of their secondary education. It is considered cross-sectional as each group was only surveyed at one point in time, even though the groups themselves were surveyed a year apart. The survey design was a group comparison design, because the same variables were used to survey two different groups, which were then compared.

A group comparison design was chosen as the two groups being studied should not differ significantly from each other in demographics, data was collected the same way for both groups, the same variables were being used in the survey to compare them, and both groups were enrolled in the program under equivalent circumstances. These factors aided in producing a valid comparison (Coalition for Evidence-Based Policy, 2014).

The survey design included a pilot testing component, for which pilot testers were asked the survey questions, the time it took them to respond was recorded, and included an extra question inquiring about any questions which may have been unclear or lacking in detail. This pilot survey was completed by three different alumni of the school from the 2021 graduating classes, all of whom had different life situations. The pilot survey took these participants approximately 3-5 minutes to complete, which provided a good estimate that could be provided

to future participants and resulted in no requests for additional clarity or details in the questions as written. This indicated that the questions were of an appropriate reading level and that the questions themselves did not require adjustments in terms of clarity.

Instrument Design

A survey instrument was created in Microsoft Forms specifically for the purposes of this research (see Appendix C), as most available tools studying post-graduate success had very specialized demographics (Arnold et al., 2016; Newman et al., 2009), very specific purposes of education (Gehlback & Hough, 2018), or were not student-perspective centered (Waukesha County Center for Growth, n.d.). Survey questions were developed carefully to be self-administered, including considerations of "question wording, questionnaire flow, question context, and choice of response categories" (Leeuw et al., 2008, p. 5). The survey included twelve 5-point Likert-type questions and one question about demographics, which were checklist style and included the option to select "other" with "elaborate" to allow for the variations in responses as needed.

Questions which discuss the socialisation purpose of education were drawn from Tedeschi et al.'s (2021) review of survey scales, including questions of political attitude (Gainous & Martens, 2012), civic attitude (Syvertsen et al., 2011), political behaviour (Schulz & Sibberns, 2004), and civic behaviour (Chi et al., 2006; Wicks et al., 2014). Survey items related to political knowledge were not utilized as all surveys were based out of the United States, and items related to skills and traits were not utilized due to the sheer number of skills or traits that would need to be examined. These areas were also deliberately omitted because students who report high scores on other facets of civic or political involvement would be utilizing political knowledge and skills.

Survey questions to assess social efficiency were created based on theories of human capital which "involves a combination of 'hard' skills involving technical expertise in a particular occupation and 'career' skills (e.g., interpersonal competence, 'soft skills') for successful interaction in the workplace" (Hernandez-Gantes et al., 2018, p. 192). Assessment of basic skills including reading, writing, and mathematics is also considered a foundation for workforce entry and success, along with communication and teamwork skills (Carnevale, 2013).

The final purpose of education being examined was a combination of learner centered ideology (Schiro, 2008) and subjectification (Biesta, 2020). These ideas were combined as they were very similar in their focus on personal growth and development but had enough differences that using a single label would not have been appropriate. This purpose was assessed using the ideas of Biesta (2020), who discussed subjectification in education as a process in which students learn to control themselves, think for themselves, and free themselves from the influence of "societal and natural forces they are subjected to" (p. 94). In education specifically, subjectification manifests as students encountering something real and experiencing interruptions, even frustrations, and being confronted with the freedom to choose to persevere through them, or not. The ideas of Shiro (2008) come into play as he discussed how "education involves drawing out the inherent capabilities of people" (p. 5). These concepts were combined to create questions which explore ideas of self-exploration, self-development, and understandings of students' impact on others and vice versa.

Word choice for the questions was considered to keep the reading level to 8th grade as measured by the Flesch-Kincaid Grade Level formula (My Byline Media, n.d.). The questionnaire flow was designed to start with concrete demographics questions to get the participant comfortable before asking non-factual questions. The questions were deliberately not

organized by purpose of education to ensure that participants do not become bored or careless answering questions on a similar topic as well as to ensure that their answers are less likely to be influenced by the prior answer. The final question was also a concrete question which helped ensure any fatigue that was setting in did not affect the results. The survey was kept to just 15 items to alleviate fatigue.

Data Collection and Variables

The survey examined one independent variable, one moderating variable, and three dependent variables. The independent variable being examined was the pedagogy used in the participants' secondary education. There were two values for this variable: traditional learning and interdisciplinary project-based learning. The value for the independent variable was primarily based on their graduating year (gathered when collecting data), but it was also verified using item 14 on the survey instrument to ensure participants were not part of a specialized education group or had an individualized education plan.

A moderating variable captures "that factor which is measured, manipulated, or selected by the researcher to discover whether it modifies the relationship of the independent variable to an observed phenomenon" (Tuckman, 1978, p. 60, as cited in Hiemstra, n.d.). The moderating variable was the participants' current life situation, which was collected using item 2 on the survey instrument and required some extra analysis as it was an open-ended response component.

The three dependent variables in this study captured the three purposes of education and were measured through future readiness scores with respect to each of the three educational purposes. The three dependent variables were future readiness in socialisation, future readiness in human capital, and future readiness in subjectification/humanistic. The readiness scores for

each of the three educational purposes were collected through the survey instrument with 11 Likert scale items which examined different facets of future readiness. Each purpose of education had a future readiness score calculated by assigning a numerical value to each Likert item, with ‘A large amount’ being scored as a 5 and ‘None or very little’ being scored as a 1.

A codebook was created (see Appendix D) alongside the actual survey instrument to facilitate data management and organization. The codebook also ensured that coding and data analysis were done consistently between groups.

Student contact information was gathered in May and June of their graduating year, and then survey links were emailed out to them in January of the following year. Data gathered was entered and processed manually using password protected spreadsheet software. Follow-up calls were then made for non-respondents following the sampling plan.

Survey Data Analysis

For each of the research questions 1 to 5, the respective dataset was analyzed to determine if differences exist within the data. Prior to analysis, the data was inspected to determine if it approximated a normal distribution to determine the method of analysis best suited to the data. However, there were not enough participants in each life situation group to allow for reliable use of more advanced statistical analysis (R. Renaud, personal communication, April 12, 2023) to determine if differences are significant. Thus, the analysis consisted of descriptive statistics, using median, mean, and standard deviation.

The future readiness scores for each purpose of education were summed to provide a summary score for the student’s total future readiness. Each student’s total was then converted back into an ordinal scale for future readiness with scores of 11-19 being assigned a value of 1, 20-28 assigned 2, 29-37 assigned 3, 38-46 assigned 4, and 47-55 assigned 5. This allowed for

easy comparison between individual responses for each question to see which purposes were above or below average for each participant.

The mean for all future readiness scores was calculated by averaging all ordinal scores across the 11 questions. Means, medians, and standard deviations were calculated for all ordinal scores across the 11 questions for each of the purposes of education for total scores, as well as all 11 questions for each purpose of education within each life situation to better understand the impact of the moderating variable. A sum of total points was calculated as well, allowing for a maximum score of 55 and a minimum score of 11 for each student.

Survey Reliability and Validity

Quantitative and qualitative research are quite different in their philosophical approaches to knowledge and research, and as such require different methods to validate the claims they make and establish rigor. In quantitative research the objective is often to find support for (or to fail to find support for) a hypothesis using statistical methods. The rigor of a study is often established using content validity (whether you are measuring what you claim to measure), construct validity (can you distinguish between the construct you are claiming to measure?), internal validity (can you show that the effect measured is only due to changes in your independent variable?), and external validity (can your results be generalized to other contexts?). Another common facet of quantitative research is the reliability of the instrument, that is, if the instrument gives results that are consistent and repeatable (Creswell & Creswell, 2018).

This survey has been designed with four demographic questions, four socialisation questions, four subjectification questions, and three human capital questions. Several of the survey questions also have reliability and validity data published (Tedeschi et al., 2021), although the questions have been modified slightly to serve the purposes of this study. For

example, Chi et al.'s (2006) study had a Cronbach's alpha of 0.78 in the civic participation skills survey scale and was considered valid based on correlations between the scales aligning well with the framework of the instrument.

Internal consistency reliability was supported by expert review of the items. An alpha value above 0.5 is generally considered acceptable for comparing groups (Fink, 2017). This indicates that the questions here were well correlated with each other and tested the same phenomenon. Civic participatory skills are also considered a major facet of Canadian socialisation (Reed & Selbee, 2001), and the question was adapted from a set which were highly correlated when factor analysis was completed, which is an indicator of content validity for socialisation. For this instrument, content validity is further supported by basing the questions on existing theory, as discussed previously.

A pilot test was also run to calibrate the instrument for clarity, ensuring it was properly presented online and on a variety of devices, and to help determine how long the survey took to complete, utilizing graduates of the class of 2021 in January of 2022, using a snowball sampling method to gather participants from students with whom the school still had contact. The same survey instrument was used, but an extra section was appended for feedback and clarification, and questions were not made mandatory. The pilot was then analyzed for questions which were left blank, comments which were left in the feedback box, and to ensure a broad spectrum of demographics were collected. This pilot test was continued until the demographic data was saturated and there was no perceived further need for improvement (Fink, 2017). The pilot testers and their data were not included in this study.

Limitations

The analysis of this research was limited by the group sizes that were available. Both the traditional pedagogy group and project-based learning group had a total of 18 survey respondents each. Once these respondents were grouped by life situation, the sub-groups varied in size from as large as 8 to as few as 1 participant. This meant that a reliable analysis of significant differences was not possible without a statistical test losing power. The results allowed for a direct comparison between the groups but not to reliably make a judgement on whether any differences were statistically significant.

The Qualitative Phase of the Study: The Interviews

This phase of the study utilized an interview to inquire into participants' high school experiences and to look for emerging common themes to explain what facets of their experiences contributed both positively and negatively to their perceived future readiness. The interviews provided data for potential explanations of survey results within each of the two groups and for explanations of differences between the two groups' survey results. The interviews were conducted through the months of April to June to remain close to the original survey dates while considering that participants who were attending a post-secondary institution might have to prepare for or write exams.

Semi-structured interviews were chosen for the qualitative phase as they are "flexible enough for interviewees to be able to raise questions and concerns with their own words and from their own perspectives" (Brinkmann, 2018, p. 579). This was crucial for a valid understanding of the experiences of the participants and allowed for their perceptions of the impact of their education to naturally emerge from dialogue. It also allowed the interviewer to

retain some control over the pace and direction of the conversation as opposed to a more unstructured interview.

The purpose of the qualitative interviews was to inquire into possible factors that contributed to students' perceived future readiness and any significant differences in the perceived future readiness across sub-groups of participants which were suggested by the survey.

Protocol Development

An interview protocol with open-ended questions was developed and refined based on the quantitative results using Castillo-Montoya's (2016) interview protocol refinement framework. The interview protocol design process included aligning the interview questions with the research questions, creating interview questions which allowed open-ended conversation, and receiving feedback on the protocol (T. Falkenberg, personal communication, August 24, 2021).

The preliminary (non-refined) protocol was created based on hypothetical findings including differences in total future readiness across PBL and traditional groups and differences within each group related to life situation (see Appendix B). A protocol design matrix was developed for the purpose of aligning the research questions and the interview questions (see Appendix E).

Participant Selection

Using the same individuals in both phases is best in explanatory studies as the participants explaining the quantitative results are the same participants that provided them and are best positioned to provide data that allow explaining the results (Creswell & Plano Clark, 2017). Following data collection and analysis of the quantitative survey data, participants for the qualitative interviews were selected from the survey participant pool using criteria explained

below. Participants were then grouped by life situation and potential interviewees were selected based on the survey analysis as explained below.

Once differences were identified within or across groups, interviewees were chosen using maximal variation purposeful sampling to target participants who would provide diverse opinions or differing perspectives on their future readiness (Creswell & Plano Clark, 2017). These participants were determined based on several criteria, including if they were willing to be contacted (a question about the willingness was included in the quantitative survey), if their reported future readiness scores were consistently above or below the group average, how well they were representative of the group being explored (based on life situation and future-readiness scores), and how much contact they had with the interviewer during their schooling (with less contact being desirable to remove potential bias). Students whose survey response scores were significantly higher or lower than the rest of the group were also included as cases of interest.

The total number of interviews depended on how many major groupings emerged, with at least five but up to 10 interviews being optimal to maximize data gathered without sacrificing detail due to time constraints.

Those who indicated they were willing to be contacted and whose survey data met the inclusion criteria described above were contacted by either email or phone depending on what they had indicated as a preference during their survey. Some groups with only two or three participants did not require multiple interviews as the inclusion criteria could not be meaningfully applied. In that case, the person closest to the group average was contacted. If a response was not received after around two weeks, a follow up email or phone call was made. Once contact was established, participants were asked if they would prefer an online or in-person interview, and what location would best suit them.

For the traditional group, this led to eight interviews being conducted. The selected participants included a representative from both the college (C3) and working (W1) groups, and three participants each from the university (U1, U3, U5) and the preparing for more schooling (P1, P3, P5) groups, based on having one person well above the average, one well below, and one close to the group average (See Appendix F).

For the PBL group, this led to eight interviews being conducted. The participants selected included a representative from the working group (PW1) and the preparing for more schooling (PP7) group, and three participants each from the college (PC1, PC2, PC3) and from the university (PU4, PU6, PU7) groups, based on having one person well above the average, one well below, and one close to the group average (See Appendix G).

Interview Process

Interviews were conducted either virtually or in a one-on-one setting recommended by the participant. The interviews followed the interview protocol. During the interviews, participants were first led through an interview consent form, which conformed to all REB requirements, were given their own copy of the consent form, and were asked to confirm that they gave consent for an audio recording of the interview. This recording was made on a password protected cell phone and transferred to University of Manitoba file storage as soon as possible. This ensured that a record was available to transcribe later and helped to ensure the accuracy of what was said in the interview. Each interview included the time, date, and place of the interview, which was included in the interview protocol.

Participants were then led through the interview protocol, with occasional prompts for more information or clarification, and with occasional follow-up questions to help them fully explain how their educational experiences influenced their perceptions of future readiness. Every

interview ended with an open-ended question about any other facets of their experience that they felt they wanted to include or mention. This design choice was intentional to allow participants to have their authentic voices heard and to ensure that anything that was impactful that may have fallen outside the scope of the protocol could be illuminated during the interview process.

Data Preparation

After the interviews were completed, the audio recordings were transcribed into word processing software using Microsoft Word's built-in transcription tools. The transcriptions were then cross-checked against the audio recordings and edited for accuracy. The finished transcriptions were then compared against any field notes for accuracy to ensure that the data was sufficiently cleaned as to fully represent what was said.

Once the transcriptions were completed, member checking was done by emailing back the transcripts to the participants with a request to check them over to ensure that they were accurate and fully encapsulated what participants wanted to communicate. They were asked to add anything they felt needed to be added, and to remove anything they did not think was relevant or did not want on record. This ensured that the transcriptions were the truest representation of the participants' voice, and that they believed their experiences had been accurately represented.

Once member checking was completed, the interviews were organized by date to group the traditional interviews and the PBL interviews separately. These transcribed files were also stored on University of Manitoba owned file storage.

Qualitative Analysis

An evolved Straussian grounded theory approach to data analysis was used, which is appropriate as the goal of this research is to construct an explanatory theory. Furthermore, there

is currently little research in this area (Chun Tie et al., 2019). Straussian grounded theory is one in which an understanding of a phenomenon can only be understood through multiple perspectives based in a particular point in time (Howard-Payne, 2016). This approach is based in the philosophy of pragmatism and matches well with a research approach like mixed methods, which uses all available tools to fully explore a phenomenon while recognizing that individuals lived experiences can and will have an impact on their interpretations. This extends to the researcher as well. Mills et al. (2014) discussed how recognizing that a researcher's biography impacts their interpretation of the data requires reflexivity and suggests the use of a reflective journal.

The analysis of the interview data consisted of several steps. First, all interview data were read by life situation group to get a general sense of possible initial codes or themes. The data from the entire group was then coded using in-vivo coding to ensure that the authentic voice and perspective of the participants were conserved while creating codes utilizing their exact words (Siegal, 2023). In-vivo coding was chosen as a technique to ensure that the truest essence of the participants' lived experiences was captured, and to capture their multiple perspectives in the most accurate manner possible.

Once all transcripts had a list of generated codes, the data was further refined using axial coding. Axial coding involves a systematic examination of the data while considering any significant results which may have emerged from the quantitative data to find connections or commonalities between codes (Glaser & Laudel, 2013).

Interview Trustworthiness, Credibility, and Neutrality

Qualitative research often deals with descriptions or interpretations of phenomena, and as such requires a different approach to rigor and a different language to describe it. In qualitative

studies, researchers often discuss trustworthiness through transferability, confirmability, dependability, and credibility rather than validity (Morse, 2018). Lincoln and Guba (1985) discussed how credibility can be established through triangulation, peer debriefing, prolonged engagement, and member checks amongst other possible techniques. They highlighted the importance of how transferability, confirmability, and dependability can be established and the overall impact these factors have on establishing trustworthiness of the qualitative data.

To strengthen trustworthiness of the qualitative data and interview themes, member checking was done after transcripts were created to maintain the essence of what the participants said (Creswell & Creswell, 2018) and to lend credibility to conclusions drawn from their responses. Including reflexive statements alongside the analysis by recording analytical memos was another way to improve trustworthiness of the data by helping to "bracket or suspend those researcher biases as the study proceeds" (Creswell & Miller, 2000, p. 127) to improve the neutrality of the inquiry (Lincoln & Guba, 1985). Creating an interview protocol design matrix also ensured that the research questions and interview questions aligned, aiding their applicability.

During the analysis of the interview data, analytical memos were kept in an effort to ensure that analysis and coding development were an ongoing cycle by referring back to previous memos as the coding process continued and jotting down ideas of categories that could be evolving during the coding process. These notes helped track the process of coding, recoding, categorizing, recategorizing, and developing themes, which provides evidence as to the level of analysis done while simultaneously contributing some reflexivity by providing an avenue to revisit my own thoughts and biases (Chun Tie et al., 2019).

To better understand my own biases from a researcher embedded in the context I'm exploring, I prepared a reflexivity statement. All analysis, discussion, and conclusions drawn were made through this lens and shaped by this social context. My reflexivity statement:

> "I am a 36-year-old, White, upper-middle class, cis-gendered, straight, non-disabled male. I'm married with two boys and was the product of a "traditional" nuclear family (married mother and father, one brother). I tend to lean slightly left on the political spectrum. I've lived in Canada all my life, and my family has been in Canada for multiple generations. I was born in Yellowknife (NWT), spent several years living on the East Coast, and settled in conservative rural Manitoba for most of the last 25 years. I currently reside in a small rural Manitoba town, where I also teach. I have a science degree with a focus in chemistry and computer science which I started at the University of Alberta and finished at the University of Manitoba (U of M), as well as an education degree completed at the U of M where I am currently working on my master's thesis. I have been teaching for 13 years now and I started teaching primarily math and science in a Catholic private high school. I moved into teaching traditionally in a rural high school in my home community, and for the last four years have been part of a team building and teaching a project-based learning (PBL) interdisciplinary course for grade 9 students as well as upper-level chemistry and grade 10/11 computer science at a newly built high school in this community.
>
> I was interested in the research for this thesis as the PBL approach was new to me and this community, and I was receiving both positive and negative feedback from parents. I wanted to better understand the benefits and drawbacks of this pedagogy and for whom it worked best to better support my students, the parents in the community, and

other teachers who may be looking to try the PBL approach. I had considered a solely quantitative approach at first, given my background in chemistry, but as I progressed through my master's program, I realized how important the situated stories of participants were to obtain an authentic understanding of the impacts of changes in social sciences.

In approaching this research, I was aware of some personal biases. For instance, I suspected that university and college bound students would not benefit from PBL as much as other students. I based this bias on my observation of the more traditional teaching and learning approach taken by post-secondary institutions. I also thought that in my study I would likely find that PBL would have more of a benefit to those who were entering the workforce, which I based on the increase in collaboration and teamwork that is often found in the workplace. As I have taught both in the traditional and the PBL paradigm, I didn't feel like I was particularly vested in "proving" one pedagogy over the other, although I suspected that both had their pros and cons and was hoping to illuminate what those were. Our school administration has been vocal in advocating for the PBL method, so this may also impact my perceptions of the data.

Given my proximity to the participants, the power dynamics at play in the school system and our necessary interactions over the course of their schooling, there were likely factors which influenced the research during data collection. I was careful to be aware of any personal bias from prior experiences with the students and took steps to minimize this impact, like using a participant joint selection table to sample and trying to avoid students who I had a lot of prior contact with. However, removing bias from who was chosen for the research, or how the interviews were played out, was not completely possible. For example, I noticed some participants seemed more comfortable and willing

to discuss things they felt were negative about their experiences if they had spent more time with me in their schooling.

Given the power and privilege that I have due to my identity and location, extra care will need to be taken during data collection and analysis to ensure my conclusions are a true reflection of what the participants experienced and believe."

Data Integration

The data from the quantitative and qualitative phases was integrated by first summarizing the quantitative results in a cross-tab. This visualization facilitated a discussion of how and why the purposive sampling occurred and justified the integration of the quantitative results in the design of the qualitative interviews. This data was also displayed visually using a participant selection joint display for each group (Appendix H and I), which directly links the quantitative results of interest to participants being selected for maximal variation (Guetterman, 2019).

Once the qualitative themes were identified, a discussion of how the themes explained or described the quantitative results further integrated the data. This led to integrated conclusions both within groupings (same pedagogy but different life situations) and across grouping (between different pedagogies). This provided a possible answer to the mixed methods research question: "How do emergent themes from participants' qualitative interviews explain the quantitative results of the survey data?".

The intent of integrating these data sources was to provide a deeper understanding of the research problem. The initial analysis of quantitative data was designed to provide grounding for qualitative design such that the interviews more fully explained the results of the survey, including development of the interview protocol and interviewees selection. This provided quantitative results that can be generalized to some degree, as well as some deeply contextual

constructed meanings from the individual participants, which provided explanations for the numerical results. The interconnected explanations and significant effects could then be used to answer the research questions more thoroughly.

Participant-generated qualitative explanations, which helped describe significant quantitative results, provided additional nuances and insights. They were used to suggest further exploration, identify what facets of pedagogy were influencing student perceptions of future readiness, and helped identify reasons for any differences in future readiness between different demographics (as measured by current life situation).

Mixed Methods Validity

Above, validity questions were separately discussed for the quantitative and qualitative phases of the study. However, there are validity (threat) issues which are specific to explanatory sequential mixed methods. One major threat includes failing to identify important quantitative results which should be explored qualitatively. This was addressed by ensuring all effects were measured and reported statistically and ensuring that all possible explanations for the results were considered. Another common validity threat is not explaining contradictory quantitative results with qualitative data. This was addressed by ensuring that qualitative questions were designed in such a way that they explored all results, including contradictory ones, and that participants who may have had contradictory views were intentionally included in the purposive sampling for the qualitative part of the study. This was aided by using joint displays for participant selection (Appendices F and G) to help illustrate all opposing views and ensure they are included through the sampling process. An additional threat to validity comes from a failure to connect the initial quantitative results with the qualitative follow up data. Using purposeful

sampling to identify participants who can best explain the quantitative results was used to help counter this threat.

Research Ethics

A mixed methods study does have specific ethical risks and benefits beyond those of a single approach study. Due to the nature of an explanatory sequential mixed methods approach, the exact details of the second phase could not be detailed in advance, which meant that participants did not know at the beginning of the study what the specifics of the second phase of the study would look like. To address this concern, a two-step informed consent process was used. As a mixed methods study tends to take more time and requires repeated contact with some participants, ensuring ongoing consent was another ethical consideration. As participants were all over the age of 18 when the interviews were completed, parental involvement in the informed consent process was not necessary.

To ensure this project proceeded in a research ethical manner, the following precautions were put in place. Participant consent to participate in an interview process was collected during the quantitative phase as part of the survey, and informed consent was re-obtained during the interviews, including permission to audio record the interviews. This consent form informed participants of the details of the study and what participating in the study entailed for them; they were also informed that participation was not mandatory, and that they could withdraw from the study at any point. They were also informed of the benefits of participating.

Confidentiality was maintained and respected by using an alphanumeric coding scheme for all participants, with the key being stored digitally on university-designated file storage requiring two-factor authentication to access. Identifying characteristics or words which could reveal the identity of the participants in published research were removed as best as possible.

Findings

Data Analysis and Discussion

The raw data for the traditional pedagogy group can be found in Appendix J. Tallies of total responses are available in Appendix K. The data for the project-based group can be found in Appendix L. Tallies of total responses in that group are available in Appendix M.

Analysis and discussion of the results will start from the most general results (overall differences), move into more nuanced data sets (examining differences in readiness through purpose of education or life situation), then explore some of the reasoning why participants felt prepared and finish by tying this reasoning back to the quantitative results.

Analysis and Discussion for Q12 and Q6

The twelfth research question looks at the differences in total future readiness across the TP and the PBL groups. This is reported in a cross tab of results in Table 2.

Table 2

Comparison of Total Future Readiness Scores

Pedagogy Used	Summed Total Future Readiness Score
	Average (SD) Total Readiness
TP (n = 18)	34.11 (1.25)
PBL (n = 18)	36.67 (1.12)
Difference	+2.51

The data indicates that there is a small but noticeable positive impact of PBL pedagogy on overall student future readiness.

Research question 6 explored what specific factors participants described as being impactful on their total future readiness and may shed light on this difference in future readiness. One theme stood out, which TP participants described as being impactful on their total future

readiness: academic skills such as rigour, time management, exams/tests, note taking, and general academic skills, which were mentioned the most often as impacting future readiness. Within the PBL group there were three major themes, which emerged at a similar rate: social skills (relationships, interpersonal skills, and relationships with adults), academic skills (time management, testing/exams, paper writing, and structures similarity to post-secondary), and ability to learn/improve/adapt (independence, relevance of material, repetition of content, critical thinking, and pushing comfort zones).

Based on these themes and their prevalence within their respective groups, it appears that participants who experienced PBL saw value and application in things that they learned other than pure academic skills. This exposure to a broader skillset may be the reason why they reported a slightly higher general future readiness.

Analysis and Discussion for Q1 and Q13

The first research question focused on possible differences between the three purposes of education a) within the TP group and b) within the PBL student group. This is reported in a cross tab of results in Tables 3 and 4.

Table 3

Comparison of Future Readiness Scores for TP Group (n = 18)

Purpose of Education	Ordinal Values of Future Readiness		
	Median	*Mean*	*Standard Deviation*
Socialization	2	2.68	1.25
Human Capital	3.5	3.24	1.27
Subjectification	4	3.42	1.14

Table 3 identifies the TP group as generally reporting feeling less prepared in the realm of socialization, and more prepared in the realm of subjectification. Table 4 identifies the PBL

group as having similar results with socialization as the lowest and subjectification as the highest score, although human capital has virtually identical scores to subjectification.

Table 4

Comparison of Future Readiness Scores for PBL Group (n = 18)

Purpose of Education	Ordinal Values of Future Readiness		
	Median	*Mean*	*Standard Deviation*
Socialization	3	3.00	1.13
Human Capital	4	3.46	1.11
Subjectification	4	3.57	1.09

Research question 13 asked about possible differences between the future readiness scores in each of the three purposes of education across the TP student group and the PBL student group. The answer to this question was based on an inspection of median and mean values as represented in Tables 5-7.

Table 5

Comparison of Ordinal Future Readiness Scores in Human Capital

Pedagogy Used	Human Capital Purpose of Education		
	Median Score	*Mean score*	*Standard Deviation*
TP (n = 18)	3.5	3.24	1.27
PBL (n = 18)	4	3.46	1.11
Difference	0.5	0.22	

Table 6

Comparison of Ordinal Future Readiness Scores in Socialisation

Pedagogy Used	Socialisation Purpose of Education		
	Median Score	*Mean Score*	*Standard Deviation*
TP (n = 18)	2	2.68	1.25
PBL (n = 18)	3	3.00	1.13
Difference	1	0.32	

Table 7

Comparison of Ordinal Future Readiness Scores in Subjectification (n = 18)

Pedagogy Used	Subjectification Purpose of Education		
	Median Score	*Mean Score*	*Standard Deviation*
TP	4	3.41	1.14
PBL	4	3.57	1.09
Difference	0	0.16	

From the tables above it appears that students from a PBL background were reporting a generally high future readiness across all three purposes of education, although the differences in subjectification specifically were quite small.

Analysis and Discussion for Q7-9

Research question 7 asks what events in a student's education made the student feel prepared (or would have helped them feel prepared) for the future from a socialisation perspective. Based on the interview data from both groups, knowledge of voting and democracy, an understanding of the different value systems of others, and the skill of collaboration were all valued highly in their education and seen as useful in preparing participants for life after school as Canadian citizens.

Students who underwent TP often mentioned talking to other people as a way to share opinions and better understand Canadian values, identity and politics, for instance: "There were definitely political conversations, some of which were useful, some of which were not" (Participant C3). There was some basic recollection from their school education that they had discussed things like political parties, but most had forgotten the details. For example, participant W1 responded, "they've taught us things. But it never really stuck for me". This appears to indicate that students who experienced TP had a hard time recalling or applying information

which would fall under the socialisation category, which explains why they generally rated their future readiness low in that category.

The PBL group rated their socialisation readiness lower than their readiness in the other two categories (although higher overall than the TP group), for which participant PU6 might have provided an explanation when they said, “the one project about designing…a government system and stuff makes you think about just how complex it is and how… things work and how to look at how society functions”. Participant PC3 also commented on that same grade 9 project when they said, “it was an interesting one because you not only got to learn about different types of ways … that a… government can be run. But you also figure out its pros and cons to how it's run”. This indicates that the way this project was taught left an impact on multiple participants, which lasted past graduation (even from their grade 9 year) and helped students recall information about our system of governance. However, the complexity of the topic seems to have left an impact as well, which likely impacted their feeling of future readiness for socialisation.

Research question 8 asks what events in a student’s education made the student feel prepared (or would have helped them feel prepared) for the future from a human capital perspective. Students from the TP group rated human capital highly in future readiness overall. Based on the interview data, students in the TP group often mentioned essentials mathematics as something that helped them feel prepared. Even participants who hadn’t taken the course felt they should have done so, like participant C3 who said, “I think if I had taken essentials, it would been very valuable because I heard what was going on in essentials and that… that is stuff preparing you for more basic life living”. Another common theme was the use of high stakes exams. Participant U1 mentioned that “there is a real big thing about learning how to take a test,

and test anxiety, that is really good for students to get through and work through". Based on the participants common responses, a combination of basic life skills and information (like that taught in essentials mathematics) and practice with high stakes exams and study skills helped the TP participants feel the most prepared for their futures. Overall, it appears that most participants valued rigour in their classwork, tighter deadlines to help them learn time management, and academic skills, except for our participants who were working only, who valued interpersonal skills and considered it a job skill. It appears that most participants viewed the concept of human capital mostly from a continuing education perspective.

The PBL group also rated their human capital readiness very high, but the themes which emerged were more focused around collaboration and learning to work as part of a group. For example, participant PC1 remarked, "I think that teamwork component was really valuable for the workplace, group project like where you're managing what you're doing… kind of taking ownership for yourself… really helped me to develop those skills". Participant PU4 also mentioned that "it gave me skills to work in a group and communicate well". The idea of exams also came up though, and participant PU7 represented the PBL group well when they said, "having that skill to study for certain exams and tests and just having that independence, that it's up to you to get the work done" when noting that the PBL experience could use some more testing. Given the high overall score for PBL in human capital, it seems the emphasis on collaboration within the pedagogy has served the group well in helping them feel prepared for their futures in terms of having developed human capital.

Research question 9 asks what events in a student's education made the student feel prepared (or would have helped them feel prepared) for the future from a subjectification perspective. Students from both the TP and PBL groups had rated human capital as their highest

future readiness score overall. For the traditional group, this appeared to be due to the different course offerings at the high school. It seemed like each participant wrote about a different class where they explored their particular area of interest or developed a talent, including business class, art class, physics class, and English Language Arts. Many of them talked about a time within that class where they were provided an opportunity to have agency in what they explored or created. For example, participant C3 said about their ELA class:

> There was a lot of freedom in what we were able to do for our projects. So whether that's like you could paint, you could draw, you could write a song, you could write a paper you... Yeah, basically write an article… do like literally anything.

They followed this up by emphasizing the importance that this freedom had for them, "I definitely found it more enjoyable to learn when I was doing something that I loved and valued". Participants generally discussed things like freedom and choice in their schoolwork as allowing them to develop and pursue their own interests, as well as things like self-study, elective options, and career fairs which exposed them to more opportunities.

In the PBL group, a common theme related to future readiness for human capital purposes was around the two related ideas of independence and taking responsibility. Participant PC1 mentioned that "the self-directed way of learning helped me to manage things on my own, take responsibility for myself…Which you need as an adult". Even within a group setting, the idea of responsibility came up when participant PU6 noted that "everybody's doing different parts and can focus on different things… to, you know, work together to maximize people's skill sets. And to learn new skills as well", which illustrates how students were looking at not just their individual responsibility (can I do my job?), but through a lens of group responsibility and how they (and others) could best contribute to a common task (how can we best do our job?).

Another common theme was exploring different interests to give people future direction. Participant PU4 mentioned that “getting people to figure out what they want to do in life is very important because a lot of people didn't, and still don't, know what to do and what makes them happy and what their interests are in”, while participant PC3 said, “the more you know about yourself as a person the less you have to figure out as soon as you get out of high school”. Participant PC2 even summed up the reason why they felt the PBL experiences made them feel more ready for life in terms of taking on responsibility for oneself: “if you give somebody a reason to feel good about something they've done, that will only push them to do better, more, or explore something further”.

Analysis and Discussion for Q2, Q14, Q10 and Q4

The purpose of research question 2 was to determine if differences exist between total future readiness scores while considering the life situations of participants a) within the TP group and b) within the PBL student group. This is reported in Tables 8 and 9.

Table 8

Total Future Readiness Scores for TP Group (n = 18)

Life Situation	Ordinal Values of Future Readiness		
	Median	*Mean*	*Standard Deviation*
College	3	3.12	1.22
University	3	3.07	1.23
Preparing to Study	4	3.39	1.22
Working	2	2.00	0.93

Table 9

Total Future Readiness Scores for PBL Group (n = 18)

Life Situation	Total Future Readiness Scores		
	Median	*Mean*	*Standard Deviation*
College	4	3.88	0.99
University	3	3.03	1.25
Preparing to Study	4	3.44	0.98
Working	3	3.09	1.04

Research question 2 addresses differences in total readiness between different life situations, and the survey data indicated that the TP group participants who went into the workforce and were not planning on future education felt the least prepared by their educational experiences, while participants who were working currently but planning on taking more education at a later time felt the most prepared. Interestingly, the results for both the participants attending college and those attending university were almost identical. The PBL group results indicate that students going to college felt most prepared for their futures with those preparing for future studies close behind, while participants who went straight into the workforce or straight into university both reported almost identical lower scores.

The purpose of research question 14 was to examine what differences in future readiness exist in each of the life situations across each pedagogy being used. The analysis for Q14 was based on the cross tab of results in Table 10 and the data was compared using the mean totals and standard deviations of the data for differences across the PBL or TP groups.

Table 10

Average overall future readiness by pedagogy and life situation

	Life situation (mean total points (SD))			
Pedagogy used	**Working**	**Plan to Attend**	**College**	**University**
TP (n=18)	22 (1.00)	37.25 (1.22)	34.33 (1.22)	33.80 (1.23)
PBL (n=18)	34 (1.04)	37.86 (0.98)	42.70 (0.99)	33.30 (1.25)
Difference	+12	+0.61	+8.37	-0.5

From the table above, we can see that students who were working or in college saw a large increase in their future readiness scores from being in the PBL group, while students who were planning to attend an educational institution or who were in university saw a negligible difference (positive or negative). Given the previously discussed themes which emerged from each group, it appears the emphasis on independence and group work in PBL make a large impact on the future readiness of students who are attending college or working, while helping to balance the lower amount of academic study skills and paper writing that worries both university students and those who wish to attend post-secondary education later.

The purpose of research question 10 was to explain how a participant's current life situation is related to their perceptions of future readiness. In the case of the TP group, the participant who went out into the workforce directly had a notable absence of academic themes in their interview, which makes sense for someone not pursuing further schooling. For this participant, social skills (interpersonal, teamwork, politics) were mentioned most often as being impactful for their future readiness, however these were often mentioned as things they wished they had done more. When discussing group projects, they mentioned that "I didn't love them. But it's probably a good thing to work, learn to work with other people. And I guess to learn to

work with different people" (Participant W1). Another notable point made by this participant was:

> I never felt like I knew what I wanted, I didn't feel like I knew what my options were like. I felt almost kicked out of school and said, 'go find something', because there's so many different options that I don't know where to begin. And everyone was pointing in the direction of post-secondary. (Participant W1)

This may indicate that the TP group was being overly prepared for post-secondary education to the detriment of students who are not going to be pursuing those options.

TP participants currently attending post-secondary programs (either university or college) had almost identical means and medians for their future readiness, and their interview data was very similar, with all participants reporting a lot of academic themes and a lot of social themes while not mentioning agency as much. It appears that from the students' perspective, an education system which focused heavily on academic skills and included some group discussion or other social dynamics was an effective method of preparing students for post-secondary education.

Participants from the TP group who were planning on attending post-secondary education in the future often discussed academic themes as well, but more as a future worry. For example, participant P5 felt like:

> now that I'm out of school, I'm like 'OK, how am I supposed to schedule this with my timetable that I don't even have? I don't know how to put classes where. How do I register?' So, I just feel like, there's like a lot of questions and a lot of unknown and stress.

Another common theme for this group was career and life skills. Participant P1 mentioned how, “essentials [math] kind of taught us about like, taxes, and where your money should go, or like what it will go towards, in terms of our house”. These themes make a lot of sense for this group, as they are navigating career and life issues for the first time, while still worrying about having the skills needed for success in future educational endeavors.

For the PBL group, the participant who went straight into the workforce mentioned collaboration and group work quite often as well, but in a much more positive light as compared to the TP group participant. “The group parts… Those are helpful in my opinion. Just because like, it would kind of help you understand like how to more work with people” (Participant PW1). Another common theme was the benefit of experiential learning, and the impact on their learning from more tactile experiences: “I do more of like a physical learning… like I understand the sciences we kind of did all that” (Participant PW1).

In the university life situation group, most of the participants mentioned academic skills as being important and often mentioned that they wished more writing and study skills were taught. Participant PU6 noted that “writing essays, writing exams, things like that definitely helped prepare more than projects, sadly” while participant PU7 observed that the PBL pedagogy was lacking in “skills to build up to university because we didn't have as many tests or big exams where there's that pressure on it”. However, this group also noted the importance of collaboration outside of their current studies with participant PU4 saying that “group work also helps. It’s, I think, more important in work life”. It appears that this holistic view of what readiness looks like outside of solely post-secondary purposes is what pushed this group's future readiness scores to be higher despite often noting that they didn’t feel as though they had been prepared specifically for university style assessments.

For the group of PBL participants who were attending college, there were similar themes to the university life situation regarding not being prepared for test taking. However, they differed in that the college life situation placed a heavier emphasis on the importance of independence, responsibility, and collaboration, which they felt they acquired through PBL. Participant PC2 noted the importance of "knowing how to help people with more critical words… not critical in the sense of being mean, but it's just evaluating", while participant PC1 noted that "I need to manage my own schedule so having those skills built, even if it wasn't the same kind of work, was helpful" and "if you think about like PBL, you're like… you're picking your own projects and learning your own things on your own". The non-university post-secondary education group sees very high value in the soft skills acquired through PBL and their application to their current life, and this corresponds to a high future readiness score.

The participant who was preparing for future studies from the PBL group also reported very high future readiness, with a lot of themes around social skills. Phrases like "have us share a lot", "group discussions like, almost every other class", "it really helped with like, group work", and "it's more about building relationships" helped to illustrate participant PP7's emphasis on the social aspect of their learning and they then linked those skills to their current situation: "I have to you know like, know how to talk with people and even like, my own coworkers". This participant did mention some similar themes to the other PBL groups in that "it didn't prepare me for, like, exams and tests", but overall, the focus on the benefits of collaboration made it clear that they felt quite prepared for their future.

From these interviews, I suggest an answer to research question 4, "Is there an interaction between education type and life situation in terms of overall future readiness"? As each life situation has different needs, values and responsibilities, the different types of activities

emphasized within each type of education must have an impact on students' perceptions of future readiness. It seems clear that the increased interactivity, independence and social learning that occurs in PBL pedagogy has helped students feel more prepared for their futures, although a reduction in high stakes testing has caused post-secondary education bound students some worries.

Analysis and Discussion for Q3, Q11, Q5, and Q15

The purpose of research question 3 was to determine if differences exist between the values of future readiness in each of the different purposes of education while considering the participants life situation a) within the TP group and b) within the PBL student group. This is reported in Tables 11 and 12.

In addressing research question 3, which asked whether there were differences within groups when considering both the different purposes of education and a participants life situation, a clear difference in future readiness was apparent within the traditional pedagogy group. Readiness in socialisation was equal to or lower than the other purposes of education across every life situation. Interestingly, while the college and university groups reported similar levels of overall readiness, college students reported a high readiness in the human capital area while university students reported feeling more prepared in subjectification. Those who were preparing for future studies had generally high total readiness, reporting their lowest scores in socialization, like the other groups. Those who were working and not planning on more education, who generally had low total readiness scores, reported their highest readiness in human capital.

Table 11

Future Readiness Scores by Purpose of Education in TP Group (n = 18)

	Ordinal Values of Future Readiness		
College	*Median*	*Average*	*Standard Deviation*
Socialization	2.5	2.58	1.08
Human Capital	4	3.33	1.50
Subjectification	3.5	3.50	1.00
University			
Socialization	3	2.85	1.09
Human Capital	3	2.80	1.37
Subjectification	3.5	3.50	1.19
Preparing to Study			
Socialization	3	2.88	1.43
Human Capital	4	3.67	0.96
Subjectification	4	3.69	1.00
Working			
Socialization	2	1.63	0.52
Human Capital	2.5	2.50	1.38
Subjectification	2	2.00	0.76

The interview data from the TP group can be used to explain these results (research question 11). The low socialisation scores across the board appear to be due to the group having difficulty recalling information from their grade 9 social studies unit on Canadian identity and democracy. Many of them responded to a question about participation in Canadian society by referencing paying their taxes. College students reported high human capital which appears to be due to an increased ability to manage time and experience with exam writing. Participant C3 reported that “Exams, super helpful… maybe making it less of a scary thing” as well as a specific class that “helped me learn how to time manage better”. The university students, while similar in overall future readiness, reported a higher subjectification score, which indicates they

feel confident in their ability to explore their own interests or talents. This was demonstrated in their interviews when they discussed opportunities they had in school where “we were allowed to kind of go do our own thing” (participant U3) or had the “opportunity to choose our own project for something that we were interested in” (participant U1). Students who were going directly into the workforce reported generally low future readiness, which appears to be due to the heavier focus on exams and post-secondary preparedness skills instead of job skills and awareness. Participant W1 reported that “I don't think anything specifically prepared me for work”, “I remember thinking that I wish we did more of resumes and cover letters”, and “everyone was pointing in the direction of post-secondary. But I didn't know what to go to school for”.

Table 12

Future Readiness Scores by Purpose of Education in PBL Group (n = 18)

	Ordinal Values of Future Readiness		
College	*Median*	*Average*	*Standard Deviation*
Socialization	4	3.92	1.00
Human Capital	4	3.89	0.93
Subjectification	4	3.83	1.11
University			
Socialization	2	2.29	0.98
Human Capital	4	3.57	1.21
Subjectification	3	3.36	1.19
Preparing to Study			
Socialization	3	3.29	0.85
Human Capital	3	3.19	1.12
Subjectification	4	3.79	0.92
Working			
Socialization	4	3.25	1.50
Human Capital	3.5	3.33	0.71
Subjectification	2.5	2.75	0.96

Clear differences in future readiness were less apparent within the project-based learning pedagogy group. For college-bound students, their future readiness scores were quite high and virtually identical for all purposes of education. Participants who went into university, however, felt distinctly less prepared in socialisation as compared to human capital. Participants taking a year off but planning to pursue future studies reported subjectification as their highest area of readiness, while students who went directly to the workforce indicated subjectification was their lowest with socialization as the highest.

The interview data from the PBL group can be used to explain these results (research question 11). The high future readiness scores for non-university post-secondary attendees appears to be due to the increase in independence, time management, and group work required in PBL. Participant PC2 mentioned specifically that "all the collaborative aspects and talking to each other and knowing how to… phrase things as a group to help each other grow" was helpful to them. Participant PC1 leaned more into the independent aspects of PBL when they discussed how "when I took ELA, I chose to do a paper in like, the Chicago style. Which is a new style for me" and how that helped prepare them for writing papers at college.

Participants who attended university reported lower readiness in socialisation, which appears to be due to an increased understanding of how complex our political system is and an increased workload. The university bound participants clearly recalled learning about Canadian identity, global issues, government and the complexities involved with our system of governance. For example, participant PU6 touched on "the one project about designing like a government system and stuff makes you think about just how complex it is and how…like, how things work", while participant PU7 discussed how they learned "a lot of issues involving the indigenous community and stuff like that" and "a lot of real world problems", but has now found

that “my studies sort of took over, so I'm not as involved in the community as I was in high school”.

The subset of participants who are planning on future studies reported high subjectification which appears due to PBL pushing them to “step out of their comfort zone” (Participant PP7) or an increase in independence and responsibility. Participant PP7 noted that “having teachers give you the like, more responsibility of like, finishing work on your own. I think also helped out a lot”.

Interestingly, participants who went directly into the workforce reported subjectification as their lowest and socialisation as their highest purpose of education in terms of future readiness. Socialisation appears to be rated highly because of recall of information about Canadian politics, as well as having a good understanding of paying taxes and Canadian law as these subjects were covered a few times in Essentials math, social studies, and law. The repetition across classes was specifically mentioned by Participant PW1: “it also kind of helped because we went over all that again”.

In addressing research question 5, which explored if there was an interaction between education type and life situation in terms of each of the three purposes of education, differences appeared in almost every category when comparing future readiness scores in each purpose of education across life situations (See Table 13).

The purpose of research question 15 is to determine if there are significant differences in future readiness in each of the purposes of education in students who received PBL as opposed to TP when considering life situation. This data should indicate whether life situation is a moderating variable if significant interactions are found. Analysis of research question 15 was based on the data in Table 13.

Table 13

Life Situation and Education Comparison Future Readiness Scores (n = 18)

Measure of Future Readiness	Life Situation							
	University		College/Institute		Working then Education		Working Only	
	PBL	*TP*	*PBL*	*TP*	*PBL*	*TP*	*PBL*	*TP*
Socialisation	2	3	4	2.5	3	3	4	2
Human Capital	4	3	4	4	3	4	3.5	2.5
Subjectification	3	3.5	4	3.5	4	4	2.5	2

In addressing research question 15, life situation had a distinct impact on how participants felt prepared for their futures and which purpose of education they perceived as being best prepared for. For university bound participants, the traditional pedagogy made them feel more ready for their futures from socialisation and subjectification perspectives, but less prepared from a human capital purpose of education. For participants attending college or other post-secondary education, the PBL group felt equally as prepared in human capital, but more prepared in both the socialisation and subjectification purposes of education. For participants taking a gap year, traditional pedagogy offered an advantage in future readiness from a human capital perspective, while being identical to PBL in socialisation and subjectification. Finally, for participants who went straight into the workforce, PBL offered an advantage in future readiness across all purposes of education.

Analysis and Discussion for Q16

The final research question addressed was research question 16, which read: “How do differences in the pedagogy impact how students feel prepared for their futures?” This

comparative question allowed me to sum up and integrate the discussions above to examine how differences in pedagogy impacted how students felt prepared for their futures.

University. In terms of overall future readiness, participants who went directly into university reported almost identical future readiness scores but for different reasons. PBL participants reported a mean total of 33.3 points in overall readiness with a standard deviation of (1.23), while TP participants reported a mean total of 33.8 points with a standard deviation of (1.25).

Although these scores are almost identical, the PBL participants' interview data indicated that a reduction in the amount of essay writing, testing, and high stakes exams had a detrimental impact on how prepared they felt for university studies. Participant PU7 noted that the PBL pedagogy was lacking in "skills to build up to university because we didn't have as many tests or big exams where there's that pressure on it". However, there was a general recognition that an increase in ability to collaborate effectively will be useful in other aspects of life, which helped raise their overall readiness. Participant PU4 indicated that "group work also helps. It's, I think, more important in work life".

Conversely, the TP participants felt more knowledgeable about studying and dealing with test anxiety, and thus more prepared. Participant U1 noted that "there is a real big thing about learning how to take a test, and test anxiety, that is really good for students to get through and work through".

Working. In terms of overall future readiness, participants who entered the workforce with no future educational plans reported quite different levels of readiness, depending on whether they were from the PBL or the TP group. PBL participants reported a mean total score

of 34 points with a standard deviation of 1.04, while the TP group had a mean total score of 22 points with a standard deviation of (1.00) (See Table 10).

Based on the interview data it appears that an increased focus on collaborative skills had a large positive impact on students who entered the workforce and were working as part of a team or interfacing with the public. Participant PW1 noted that in his experience “the group parts… Those are helpful in my opinion. Just because like, it would kind of help you understand like how to more work with people”.

Interviews with the TP group indicated that they felt that an increased focus on testing and note taking left them feeling less prepared for their futures as those skills were not utilized. Participant W1 noticed that “I don't think anything specifically prepared me for work”. Often it felt like school was only “pointing in the direction of post-secondary” (Participant W1) instead of teaching workforce or life skills. They also remembered “thinking that I wish we did more of resumes and cover letters”.

College. Participants who attended a post-secondary institution other than a university also reported a large difference in overall future readiness, depending on which group they belonged to. Participants who experienced PBL pedagogy reported a mean total score of 42.7 points with a standard deviation of (0.99), while the TP group reported a mean total score of 34.33 points with a standard deviation of (1.22).

Interviews with the PBL group indicated that an emphasis on collaborative exercises, managing project timelines and independent learning helped participants feel more prepared for their futures. Participant PC1 said “I need to manage my own schedule so having those skills built, even if it wasn't the same kind of work, was helpful”. This group rarely mentioned exams or test taking as being impactful on their future readiness.

Interestingly, the TP group had very similar themes to the university group, where exams, testing, rigour and time management played a large role in how prepared students felt. Of note, the TP group reported much lower readiness despite having written more exams. Participant C3 supported this when they noted that “exams, super helpful… maybe making it less of a scary thing”.

Socialisation. One particular purpose of education stood out in this study as having interesting results. Within socialisation the PBL group reported a mean score of 3 with a standard deviation of (1.13) points, while the TP group reported a mean score of 2.68 with a standard deviation of (1.25).

The PBL group reported higher scores in socialisation as the learning around Canadian identity and institutions appeared to have been more clearly remembered and understood. They recalled details of their government exploration, and the critical thinking involved. Notably, they had lower socialisation scores compared to the scores for the other two purposes of education, but this may be due to the complexity of the topic which was often remarked upon. Participant PU6 discussed this complexity when they discussed “the one project about designing…a government system and stuff makes you think about just how complex it is and how… things work and how to look at how society functions”.

Socialisation as a purpose of education did not appear to be served as well under the traditional model of education. Participants struggled to recall basic information about Canadian identity or governance, or find its relevance to their lives. Participant W1 summed up their experience when stating “they've taught us things. But it never really stuck for me”.

Summary

For the TP group, the theme that emerged most clearly was that students who plan on working and not pursuing further education have a unique set of skills they consider valuable to future readiness compared to students who plan to have post-secondary involvement. They also tended to see themselves as less ready for their futures. Academic and social skills were very highly valued for their contribution to future readiness; however, they only serve the portion of our school populations who attend or plan to attend post-secondary institutions. Social skills were highly valued across the entire student population and had a lasting impact on preparing students for life after school.

For the PBL group the central theme that emerged was that students found significant value in the independence, choice, and collaborative aspects of the pedagogy. Participants who attended university did note that they missed the more traditional practices of intense note writing, test taking, and exam writing, which are still prevalent at universities, but also noted the benefits of collaboration and found their independent learning skills useful to make up for the lack of exam experience. The socialisation aspect of education appeared to be better served as students had better recall and understanding of our democratic systems, as well as an ability to discuss and think critically about politics. Participants who either went to a non-university post-secondary institution or directly into the work force reported high future readiness and indicated increased collaborative skills and independence as major contributing factors.

Overall, the PBL pedagogy had an advantage in student self-report future readiness for students who are attending post-secondary institutions other than university, or who are entering the work force directly. For students who are attending university or taking a gap year and

planning on attending further studies, this type of pedagogy does not meaningfully impact overall future readiness (although students report feeling prepared in different ways).

Limitations and Recommendations

Education is a complex field, and there are many considerations within the scope of this research which may have impacted the results. COVID-19, the length of time between graduation and the research program, the dynamics of a particular class, and regular school changes such as professional development and staff turnover may all have had some level of impact. There are several possible future research opportunities that could help give consideration to some of these issues.

The impact that the COVID-19 pandemic may have had on the educational experiences of the participants should not be discounted. As groups were spaced a year apart, they had different years of their high school experience interrupted by school shutdowns, return to school mandates, both of which impacted things like collaborative experience and lab work, and online learning. Particularly with PBL, which is a collaborative pedagogy, COVID may have impacted the efficacy of the pedagogy and how prepared students then felt for life after school.

Another consideration is that these students are reporting their future readiness after several months of experience post-high school but may not have yet fully experienced different facets of the human experience which could impact their perception of how prepared high school made them for life. Some students may not yet have experience with living on their own, voting, purchasing a vehicle, filing taxes independently, working in an industry or starting a career.

The dynamics of the class of each year were not explored or documented and may also have had an impact on their views of future readiness. It is possible that year-to-year class dynamics may be different and impact the way students respond to questions of future

preparedness. The number of students who went directly to work and who signed up to participate in the study was also low, which will have a direct impact on how reliable the quantitative data is for that life situation.

One facet of education which may also have impacted students' high school experiences includes ongoing professional development within the school and the division, and staff turnover. As the school implements different initiatives and staff attend different professional development opportunities, it is likely that the landscape of teaching within the building would shift. It is possible that these shifts might impact student future readiness, or the pedagogy being implemented, and make it harder to tell by how much, or the differences reported are specifically from the implementation of PBL, or from regular shifts occurring within education.

To address some of these limitations, future research in this area could include a longitudinal study of students from a school (or division) which is implementing project-based learning. This could allow for a longer-term view of how students' education impacted them, including how it helps them deal with ongoing challenges in life. A similar study including larger numbers of participants would also help clarify whether differences found were statistically significant. Increasing the number of schools involved would also help account for the differences between schools, like school culture, PD, and staff turnover.

Conclusion

As a practicing educator in a school which rolled out a project-based learning program, I was highly motivated to explore the impact of this emerging pedagogy on students as compared to traditional practices. Ongoing questions from other administrators, educators, community parents, and other stakeholders in education about the efficacy of PBL, coupled with a lack of

research in this area in my particular context, also contributed to the need to understand what impacts educational reform may have in my community.

Overall, project-based learning showed improved self-reported student readiness for students who were attending college or going directly into the workforce without plans for further education. For students who were taking a year off but planning future studies, or who attended university directly out of high school, there were no discernable differences in future readiness reported. Based on the results of the interviews, an emphasis on independence and collaborative problem solving were the biggest strengths of the PBL pedagogy to high school graduates. However, for university bound students there was a noted concern about being less prepared for high stakes testing.

Given these results, it appears that the adoption of PBL in my local context is aiding students in their future readiness, however introducing facets of testing or high stakes exams could help the portion of our students planning to attend university. To best balance the needs of the entire student population against the students planning on attending university, it may be best practice to introduce high stakes testing in courses which are more specialized towards university attendance, such as precalculus math, grades 11 and 12 sciences, or literary focus ELA.

The results from this study support the work of Thomas (2000), who conducted a literature review on PBL and found evidence that student attitudes towards learning improved in PBL classrooms. He found that PBL was either “equivalent or slightly better than other models of instruction for producing gains in general academic achievement and for developing lower-level cognitive skills in traditional subject matter areas” (p. 34), which aligns with the findings of this study, which noted equivalent or better student self-reported future readiness. He also noted that there was some evidence to support enhanced depth of knowledge in subject matter areas,

which implied better critical thinking and problem solving. These were both areas supported by qualitative evidence in this study. Finally, he concluded that there is "ample evidence that PBL is an effective method for teaching students complex processes and procedures such as planning, communicating, problem solving, and decision making" (p. 35), which were areas often mentioned as strengths in their future readiness by students who experienced PBL pedagogy. It appears that this study aligns well with and supports the general consensus from the literature that project-based learning is a more effective emerging pedagogy than traditional practices.

References

Akpan, G. A., Usoro, H. S., Akpan, I. G. & Ekpo, A. B. (2010). Effects of team teaching on students' performance in introductory technology in secondary schools in Akwa Ibom State, Nigeria. *African Research Review*, *4*(3b), 41-54.

Al Saaideh, M. (2011). A rationale to adopt team teaching in prevocational education in Jordan. *Journal of Instructional Psychology, 37*(4), 269-285. https://www.researchgate.net/publication/271836383_A_rationale_to_adopt_team_teaching_in_pre-vocational_education_in_jordan

Anderson, T. & Dron, J. (2020). Three generations of distance education pedagogy. *International Review of Research in Open and Distributed Learning, 12*(3), 80-97. https://doi.org/10.19173/irrodl.v12i3.890

Antoniou, P. (2012). The short- and long-term effects of secondary schools upon students' academic success and development. *Educational Research and Evaluation*, *18*(7), 621–639. http://dx.doi.org.uml.idm.oclc.org/10.1080/13803611.2012.707826

Arnold, K. D., & Mihut, G. (2020). Post-secondary outcomes of innovative high schools: The Big Picture longitudinal study. *Teachers College Record*, *122*(8). http://www.proquest.com/eric/docview/2488233363/7684B4BCC82048FFPQ/6

Arnold, K. D., Wartman, K. L., Brown, P. G., Gismondi, A. N., Pesce, J. R., & Stanfield, D. (2016). The connector study: A strategy for collecting post-graduation data about low-income high school students. *Journal of Education for Students Placed at Risk (JESPAR)*, *21*(3), 174–189. https://doi.org/10.1080/10824669.2016.1172230

Baloche, L., Hynes, J. L., & Berger, H. A. (1996). Moving toward the integration of professional and general education. *Action in Teacher Education, 18*, 1–9.

Barman, C. (2002). Guest Editorial: How do you define inquiry? *Science & Children, 40*(2), 8–9.

Barrow, L. H. (2006). A Brief History of Inquiry: From Dewey to Standards. *Journal of Science Teacher Education*, *17*(3), 265–278. http://www.jstor.org/stable/43156392

Biesta, G. (2009). Good education in an age of measurement: On the need to reconnect with the question of purpose in education. *Educational Assessment, Evaluation and Accountability, 21*(1), 33–46.

Biesta G. (2020). Risking ourselves in education: Qualification, socialisation, and subjectification revisited. *Educational Theory, 70*(1), 81–98. https://doi-org.uml.idm.oclc.org/10.1111/edth.12411

Biggs, J. (1996). Enhancing teaching through constructive alignment. *Higher education, 32*(3), 347–364.

Boss, S., & Larmer, J. (2018). *Project based teaching: How to create rigorous and engaging learning experiences*. ASCD.

Brassler, M., & Dettmers, J. (2017). How to Enhance Interdisciplinary Competence—Interdisciplinary Problem-Based Learning versus Interdisciplinary Project-Based Learning. *Interdisciplinary Journal of Problem-Based Learning, 11*(2). https://doi.org/10.7771/1541-5015.1686

Brinkmann, S. (2018). The interview. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (pp. 576–599). SAGE.

Buchanan, S. M. C., 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), pp. 23–39.

Buck Institute for Education. (n.d.). *What is PBL?* PBLWorks. Retrieved October 26, 2021, from https://www.pblworks.org/what-is-pbl

Butlin, G. (1999). Determinants of postsecondary participation. *Education Quarterly Review, 5*(3), 9–35.

Carnevale, A. P., & Smith, N. (2013). Workplace basics: The skills employees need and employers want. *Human Resource Development International*, *16*(5), 491–501. https://doi.org/10.1080/13678868.2013.821267

Carter, S. (2002). *The Impact of Parent/Family Involvement of Student Outcomes: An Annotated Bibliography of Research from the Past Decade*. https://eric.ed.gov/?id=ED476296

Castillo-Montoya, M. (2016). Preparing for interview research: The interview protocol refinement framework. *The Qualitative Report*, *21*(5), 811–831. https://doi.org/10.46743/2160-3715/2016.2337

Chun Tie, Y., Birks, M., & Francis, K. (2019). Grounded theory research: A design framework for novice researchers. *SAGE Open Medicine*, *7*. https://doi.org/10.1177/2050312118822927

Coalition for Evidence-Based Policy. (2014). *Which comparison-group ("quasi-experimental") study designs are most likely to produce valid estimates of a program's impact?: A brief overview and sample review form.* https://evidencebasedprograms.org/document/validity-of-comparison-group-designs-updated-december-2018/

Collier, K. G. (1959). *The social purposes of education.* Routledge. https://api.taylorfrancis.com/content/books/mono/download?identifierName=doi&identifierValue=10.4324/9781315008103&type=googlepdf

Cotton, K. (1982). Effects of interdisciplinary team teaching: Research synthesis. *Northwest Regional Educational Laboratory.* https://files.eric.ed.gov/fulltext/ED230533.pdf

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice*, *39*(3), 124–130. https://doi.org/10.1207/s15430421tip3903_2

Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). SAGE.

Chi, B., Jastrzab, J., & Melchior, A. (2006). Developing indicators and measures of civic outcomes for elementary school students. CIRCLE working paper 47. In *Center for Information and Research on Civic Learning and Engagement (CIRCLE), University of Maryland*. The Center for Information and Research on Civic Learning and Engagement (CIRCLE). https://eric.ed.gov/?id=ED494039

Davis, J. R. (1995). *Interdisciplinary courses and team teaching*. American Council on Education and the Oryx Press.

Dewey, J. (1938). *Experience and education*. Macmillan.

Dickson, A. H. (2011). The first steps on the ladder to college success: Understanding the secondary school level factors that determine the college enrollment and retention outcomes of high school graduates in Massachusetts. In *ProQuest LLC* (p. 340). http://www.proquest.com/eric/docview/964190499/F912AE13528B4568PQ/4

Dorier, J., & Maass, K. (2012). The PRIMAS project: Promoting inquiry-based learning (IBL) in mathematics and science education across Europe: PRIMAS context analysis for the implementation of IBL: International synthesis report. *PRIMAS* (1). https://primas-

project.eu/wp-content/uploads/sites/323/2017/11/FINAL_WP2_ContextAnalysis_licence_150708.pdf

Educational Policies Commission. (1938). *The purposes of education in American democracy*. National Education Association of the United States, and the American Association of School Administrators.

Ellerbrock, C. R. (2012). Creating a family-like ninth-grade environment through interdisciplinary teaming. *Urban Education*, *47*(1), 32–64. https://doi.org/10.1177/0042085911427736

Entwistle, N., & Tait, H. (1995). Approaches to studying and perceptions of the learning environment across disciplines. *New Directions for Teaching and Learning, 1995(*64), 93-103. https://doi.org/10.1002/tl.37219956413

Falkenberg, T. (2021, June 10). *The proposed K-12 education reform: What does it mean? Why does it matter? Part 1: School system organization, leadership, and purpose* [PowerPoint slides]. University of Manitoba Faculty of Education. https://www.youtube.com/watch?v=5FvXAb6gpIw

Field, M., Lee, R., & Field, M. L. (1994). Assessing interdisciplinary learning. *New Directions for Teaching and Learning, 58*, 69–84.

Fink, A. (2017). *How to conduct surveys: A step-by-step guide* (6th ed.). SAGE Publications.

Fleming, D. J., Lavertu, S., & Crawford, W. (2018). High school options and post-secondary student success: The Catholic school advantage. *Journal of Catholic Education*, *21*(2), 26.

Fournier-Sylvester, N. (2014). A/Political education: A survey of Quebec students' perceptions of their citizenship education. *Canadian Journal of Education*, *37*(3), 1-23.

https://uml.idm.oclc.org/login?url=https://www-proquest-com.uml.idm.oclc.org/scholarly-journals/political-education-survey-quebec-students/docview/1697504708/se-2?accountid=14569

Fullan, M., Quinn, J., & McEachen, J. (2018). *Deep learning: Engage the world, change the world*. Corwin, a SAGE Publishing Company.

Gainous, J., & Martens, A. M. (2012). The effectiveness of civic education: Are "good" teachers actually good for "all" students? *American Politics Research*, *40*(2), 232–266. https://doi.org/10.1177/1532673X11419492

Gehlbach, H., & Hough, H. J. (2018). Measuring social emotional learning through student surveys in the CORE districts: A pragmatic approach to validity and reliability. *Stanford, CA: Policy Analysis for California Education (PACE)*. Retrieved from https://edpolicyinca.org/publications/measuring-social-emotional-learning-through-student-surveys-core-districts

Gillies, D. (2011). State education as high-yield investment: Human capital theory in European policy discourse. *Journal of Pedagogy, 2*(2), 224–245.

Gläser, J., & Laudel, G. (2013). Life with and without coding: Two methods for early-stage data analysis in qualitative research aiming at causal explanations. *Forum Qualitative Sozialforschung Forum: Qualitative Social Research*, *14*(2). https://doi.org/10.17169/fqs-14.2.1886

Government of Manitoba. (n.d.). *Student Services | Manitoba Education*. Retrieved October 26, 2021, from https://www.edu.gov.mb.ca/k12/specedu/aep/index.html

Government of Manitoba. (2021). *Better education starts today: Putting students first*. https://manitoba.ca/asset_library/en/proactive/2020_2021/better-education-starts-today-report.pdf

GraphPad Software. (2021). *GraphPad Prism 9 statistics guide – Which multiple comparisons tests does Prism offer?* Graphpad. Retrieved July 12, 2021, from https://www.graphpad.com/guides/prism/latest/statistics/stat_summary_of_multiple_comparison.htm

Groves, R. M., Fowler, F. J. Jr., Coupler, M. P., Lepkowski, J. M., Singer, E., Tourangeau, R. (2009). *Survey Methodology* (2nd ed.). Wiley.

Guetterman, T. C. (2019). Joint displays to facilitate integration of qualitative and quantitative research [PowerPoint]. https://www.ualberta.ca/international-institute-for-qualitative-methodology/media-library/international-institute-of-qualitative-methods/webinars/mixed-methods/2019/t-guetterman-mm-aug27-2019-final.pdf

Hall, T. (2002). *Differentiated instruction: Effective classroom practices report*. National Center on Accessing the General Curriculum.

Hammond, L. D., Austin, K., Orcutt, S., & Rosso, J. (2001). *How people learn: Introduction to learning theories* [Online Course]. The Learning Classroom: Theory Into Practice. https://www.learner.org/series/the-learning-classroom-theory-into-practice/

Heimstra, R. (n.d.). *Quantitative research proposal sample.* Rogheimstra. https://roghiemstra.com/quantproposal.pdf

Hernandez-Gantes, V. M., Keighobadi, S., & Fletcher, E. C. Jr. (2018). Building community bonds, bridges, and linkages to promote the career readiness of high school students in

the United States. *Journal of Education and Work*, *31*(2), 190–203. https://doi.org/10.1080/13639080.2018.1434871

Holm, M. (2011). Project-based instruction: A review of the literature on effectiveness in prekindergarten through 12th grade classrooms. *InSight: Rivier Academic Journal*, *7*(2), 1–13.

Hotaling, N., Fasse, B. B., Bost, L. F., Herman, C. D., & Forest, C. R. (2012). A quantitative analysis of the effects of a multidisciplinary engineering capstone design course. *Journal of Engineering Education, 101*(4), 630–645.

Howard-Payne, L. (2016). Glaser or Strauss? Considerations for selecting a grounded theory study. *South African Journal of Psychology*, *46*(1), 50–62. https://doi.org/10.1177/0081246315593071

Howe, E., & Ruberg, A. (2019). DigiPen: Secondary school project-based learning in game design, digital arts and life skills. *The Canadian Journal of Action Research*, *20*(2), 28–47.

Hrivnak, J., Southam, C., U'Ren, B. & West, J. (2017). Interdisciplinary team teaching: Leveraging pedagogical differences to enhance business student cognitive capabilities. In *Proceedings of the Eastern Academy of Management (EAM) International Conference: Managing in a Global Economy* (pp. 1–22) http://eami.upscholar.com/2017/modules/request.php?module=oc_proceedings&action=view.php&id=32&type=1&a=Accept

Humphreys, A., Post, T., & Ellis, A. (1981). *Interdisciplinary methods: A thematic approach.* Goodyear Publishing Company.

Huysken, K., Olivey, H., McElmurry, K., Gao, M., & Avis, P. (2019). Assessing collaborative, project-based learning models in introductory science courses. *Journal of the Scholarship of Teaching and Learning*, *19*(1). https://doi.org/10.14434/josotl.v19i1.26777

Ivanitskaya, L., Clark, D., Montgomery, G., & Primeau, R. (2002). Interdisciplinary learning: Process and outcomes. *Innovative Higher Education*, *27*(2), 95–111. https://doi.org/10.1023/A:1021105309984

Jacobs, H. H. (1989). The growing need for interdisciplinary curriculum content. In H. H. Jacobs (Ed.), *Interdisciplinary curriculum: Design and implementation* (pp. 1–11). Association for Supervision and Curriculum Development.

Jones, K. (1983). *Beyond progressive education*. Macmillan Press.

Khalaf, B. K., & Zin, Z. B. M. (2018). Traditional and inquiry-based learning pedagogy: A systematic critical review. *International Journal of Instruction*, *11*(4), 545–564. https://doi.org/10.12973/iji.2018.11434a

Kearns, L.L. (2011). High-stakes Standardized testing and marginalized youth: An examination of the impact on those who fail. *Canadian Journal of Education / Revue Canadienne de l'éducation*, *34*(2), 112–130. http://www.jstor.org/stable/canajeducrevucan.34.2.112

Kennedy, A. (2015). What do professional learning policies say about purposes of teacher education? *Asia-Pacific Journal of Teacher Education*, *43*(3), 183–194. https://doi.org/10.1080/1359866X.2014.940279

Keselman, A. (2003). Supporting inquiry learning by promoting normative understanding of multivariable causality. *Journal of Research in Science Teaching, 40*(9), 898–921.

Kingston, S. (2018). Project based learning & student achievement: What does the research tell us? *PBL Evidence Matters, 1*(1), 1–11.

https://www.pblworks.org/sites/default/files/2019-01/PBL_Evidence_Matters_Volume_I.pdf

Klenowski, V. & Wyatt-Smith, C. (2012). The impact of high stakes testing: the Australian story. *Assessment in Education: Principles, Policy & Practice, 19*(1), 65–79. DOI: 10.1080/0969594X.2011.592972

Kodkanon, K., Pinit, P., & Murphy, E. (2018). High-school teachers' experiences of interdisciplinary team teaching. *Issues in Educational Research, 28*(4), 967–989. http://www.iier.org.au/iier28/kodkanon.pdf

Kohn, A. (2015). *Progressive education: Why it's hard to beat, but also hard to find.* Bank Street College of Education. https://educate.bankstreet.edu/progressive/2

Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, *19*(3), 267–277. https://doi.org/10.1177/1365480216659733

Lake, K. (1994). Integrated curriculum. In *School Improvement Research Series*, (CloseUp #16). Retrieved from https://educationnorthwest.org/sites/default/files/integrated-curriculum.pdf

Larmer, J., Mergendoller, J., & Boss, S. (2015). *Setting the Standard for Project Based Learning*. ASCD.

Lederman, N. (2003). Letters: Learning about inquiry. *Science & Children, 40*(8), 9.

Lee, V. E., & Frank, K. A. (1990). Students' Characteristics that Facilitate the Transfer from Two-Year to Four-Year Colleges. *Sociology of Education*, *63*(3), 178–193. https://doi.org/10.2307/2112836

Leeuw, E. D., Hox, J. J., & Dillman, D. A. (2008). *International Handbook of Survey Methodology*. Taylor & Francis.

Lincoln, Y. S., & Guba, E. (1985). *Naturalistic Inquiry* (1st ed.). SAGE Publications.

Lipson, M., Valencia, S., Wixson, K., & Peters, C. (1993). Integration and thematic teaching: Integration to improve teaching and learning. *Language Arts, 70*(4), 252–264. https://www.jstor.org/stable/41482091

Little, A. & Hoel, A. (2011). Interdisciplinary team teaching: An effective method to transform student attitudes. *The Journal of Effective Teaching*, *11*(1), 36–44. https://files.eric.ed.gov/fulltext/EJ1092163.pdf

Mansilla, V. B., Duraisingh, E. D., Wolfe, C. R., & Haynes, C. (2009). Targeted assessment rubric: An empirically grounded rubric for interdisciplinary writing. *The Journal of Higher Education*, *80*(3), 334–353. https://doi.org/10.1080/00221546.2009.11779016

Manitoba Education. (2019). *High School Graduation Rates and Student Achievement Statistics | Manitoba Education*. Government of Manitoba Department of Education. https://www.edu.gov.mb.ca/k12/grad_rates/index.html

Mills, J., Birks, M., & Hoare, K. (2014). *Qualitative Methodology: A Practical Guide*. SAGE Publications, Inc. https://doi.org/10.4135/9781473920163

Minstrell, J. (2000). Implications for teaching and learning inquiry: A summary. In J. Minstrell & E. van Zee (Eds.), *Inquiring into inquiry learning and teaching in science* (pp. 471–496). American Association for the Advancement of Science.

Mishkind, A. (2014). Overview: State definitions of college and career readiness. In *College and Career Readiness and Success Center*. College and Career Readiness and Success Center. https://eric.ed.gov/?id=ED555670

Mitchell, T. R., Thompson, L., Peterson, E., & Cronk, R. (1997). Temporal adjustments in the evaluation of events: The "rosy view." *Journal of Experimental Social Psychology*, *33*(4), 421–448. https://doi.org/10.1006/jesp.1997.1333

Morse, J. (2018). Reframing rigor in qualitative inquiry. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (pp. 797–817). SAGE.

Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research, 40*(2), 120–123.

My Byline Media. (n.d.). *Free readability formulas: Free readability tools: Readability calculators.* Readabilityformulas. https://readabilityformulas.com/freetests/six-readability-formulas.php.

Newman, L., Wagner, M., Cameto, R., & Knokey, A.-M. (2009). The post-high school outcomes of youth with disabilities up to 4 years after high school: A report from the National Longitudinal Transition Study-2 (NLTS2). NCSER 2009-3017. In *National Center for Special Education Research*. National Center for Special Education Research.

Ornstein, A., & Hunkins, F. (2016). *Curriculum: Foundations, principles, and issues* (7th ed.). Pearson.

Palmer, J. (1991). Planning wheels turn curriculum around. *Educational Leadership, 49(*2), 57–60.

Pedaste, M., & Sarapuu, T. (2006). Developing an effective support system for inquiry learning in a Web-based environment. *Journal of Computer Assisted Learning, 22*(1), 47–62.

Penrose, A. M., & Geisler, C. (1994). Reading and writing without authority. *College Composition and Communication, 45*(4), 505–520.

Reed, P. B., & Selbee, L. K. (2001). The civic core in Canada: Disproportionality in charitable giving, volunteering, and civic participation. *Nonprofit and Voluntary Sector Quarterly*, *30*(4), 761–780. https://doi.org/10.1177/0899764001304008

Rennie Center for Education Research & Policy. (2020). Measuring student success: Innovative approaches to understanding diverse learners. Condition of education in the commonwealth [2020 action guide]. In *Rennie Center for Education Research & Policy*. Rennie Center for Education Research & Policy. https://eric.ed.gov/?id=ED603739

Roberts, F. P. (2016). *Experiential learning in a traditional classroom; Experiential pedagogy, traditional pedagogy, and student preference* [M.A. thesis, Prescott College]. ProQuest Dissertations and Theses. http://www.proquest.com/eric/docview/1849016284/abstract/D6FD1EC8F6084EB8PQ/1

Rohan, M. J., & Zanna, M. P. (1996). Value transmission in families. In C. Seligman, J. M. Olson, & M. P. Zanna (Eds.), *The psychology of values: The Ontario symposium,* Vol. 8, pp. 253–276). Lawrence Erlbaum Associates, Inc.

Samsudin, M. A., Jamali, S. M., Md Zain, A. N., & Ale Ebrahim, N. (2020). The effect of STEM project based learning on self-efficacy among high-school physics students. *Turkish Journal of Science Education*, *17*(1), 94–108. https://doi.org/10.36681/tused.2020.15

Saunders-Stewart, K. S., Gyles, P. D. T., & Shore, B. M. (2012). Student outcomes in inquiry instruction: A literature-derived inventory. *Journal of Advanced Academics*, *23*(1), 5–31. https://doi.org/10.1177/1932202X11429860

Schiro, M. (2008). *Curriculum theory: Conflicting visions and enduring concerns*. SAGE Publications.

Schommer, M. (1994). Synthesizing epistemological belief research: Tentative understandings and provocative confusions. *Educational Psychology Review, 6*, 293–319.

Schoonenboom, J., & Johnson, R. B. (2017). How to Construct a Mixed Methods Research Design. *Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, *69*(S2), 107–131. https://doi.org/10.1007/s11577-017-0454-1

Schulz, W., & Sibberns, H. (Eds .). (2004). *IEA civic education study: Technical report.* International Association for the Evaluation of Educational Achievement. https://www.iea.nl/publications/technical-reports/iea-civic-education-study-technical-report

Schwartz, R. B. (2014). The pursuit of pathways: Combining rigorous academics with career training. *The American Educator*, *38*(3), 24.

Shoemaker, B. (1989). Integrative education: A curriculum for the twenty-first century. *Oregon School Study Council, 33*(2).

Siegle, D. (2023). *Open, In Vivo, Axial, and Selective Coding | Educational Research Basics by Del Siegle*. https://researchbasics.education.uconn.edu/open-in-vivo-axial-and-selective-coding/

Statistics Canada. (2021a). *The Daily — Education Indicators in Canada*. https://www150.statcan.gc.ca/n1/daily-quotidien/210518/dq210518d-eng.htm

Statistics Canada. (2021b). *Education Highlight Tables, 2016 Census*. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/edu-sco/Table.cfm?Lang=E&T=11&Geo=00&View=2&Age=2

Stewart, T. & Perry, B. (2005). Interdisciplinary team teaching as a model for teacher development. *TESL-EJ, 9*(2), 1–17. https://files.eric.ed.gov/fulltext/EJ1065845.pdf

Syvertsen, A. K., Wray-Lake, L., Flanagan, C. A., Osgood, D. W., & Briddell, L. (2011). Thirty-year trends in U.S. adolescents' civic engagement: A story of changing participation and educational differences. *Journal of Research on Adolescence*, *21*(3), 586–594. https://doi.org/10.1111/j.1532-7795.2010.00706.x

Tatto, M. T. (1998). The influence of teacher education on teachers' beliefs about purposes of education, roles, and practice. *Journal of Teacher Education, 49*(1), 66–77. https://doi.org/10.1177/0022487198049001008

Tedeschi, S. E. J., Brodersen, R. M., Schramm, K., Haines, M., Liu, J., McCullough, D., Eide, M., & Cherasaro, T. (2021). Measuring civic readiness: A review of survey scales. REL 2021-068. *Regional Educational Laboratory Central*. Institute of Education Sciences. https://eric.ed.gov/?id=ED611679

Thomas, J. W. (2000). *A review of research on project-based learning*. Autodesk Foundation.

Time.Graphics. (n.d.). *Free online timeline maker*. Retrieved August 18, 2021, from https://time.graphics/

Tomkowicz, J., Bushnik, T. (2003). *Who goes to post-secondary education and when: Pathways chosen by 20 year-olds.* Statistics Canada. https://www150.statcan.gc.ca/n1/pub/81-595-m/81-595-m2003006-eng.pdf

Trauth-Nare, A., & Buck, G. (2011). Assessment for learning: Using formative assessment in problem - and project-based learning. *The Science Teacher*, *78*(1), 34–39. http://www.jstor.com/stable/24122198

University of Manitoba (2003). *Participant information and consent form.* University of Manitoba. Retrieved August 11, 2012, from

https://www.umanitoba.ca/research/orec/ethics_medicine/media/Informed_Consent_Form_Template_for_Clinical_Trials.doc

Waukesha County Center for Growth. (n.d.) *Workforce Readiness Dashboards*. Retrieved June 6, 2021, from https://www.waukesha.org/workforce-development/develop/workforce-readiness-dashboards/

Wenglinsky, H. (2004). Facts or critical thinking skills? What NAEP results say. *Educational Leadership, 62*(1), 32–35.

Williams, M. K. (2017). John Dewey in the 21st century. *Journal of Inquiry & Action in Education, 9*(1). 91–102. https://files.eric.ed.gov/fulltext/EJ1158258.pdf

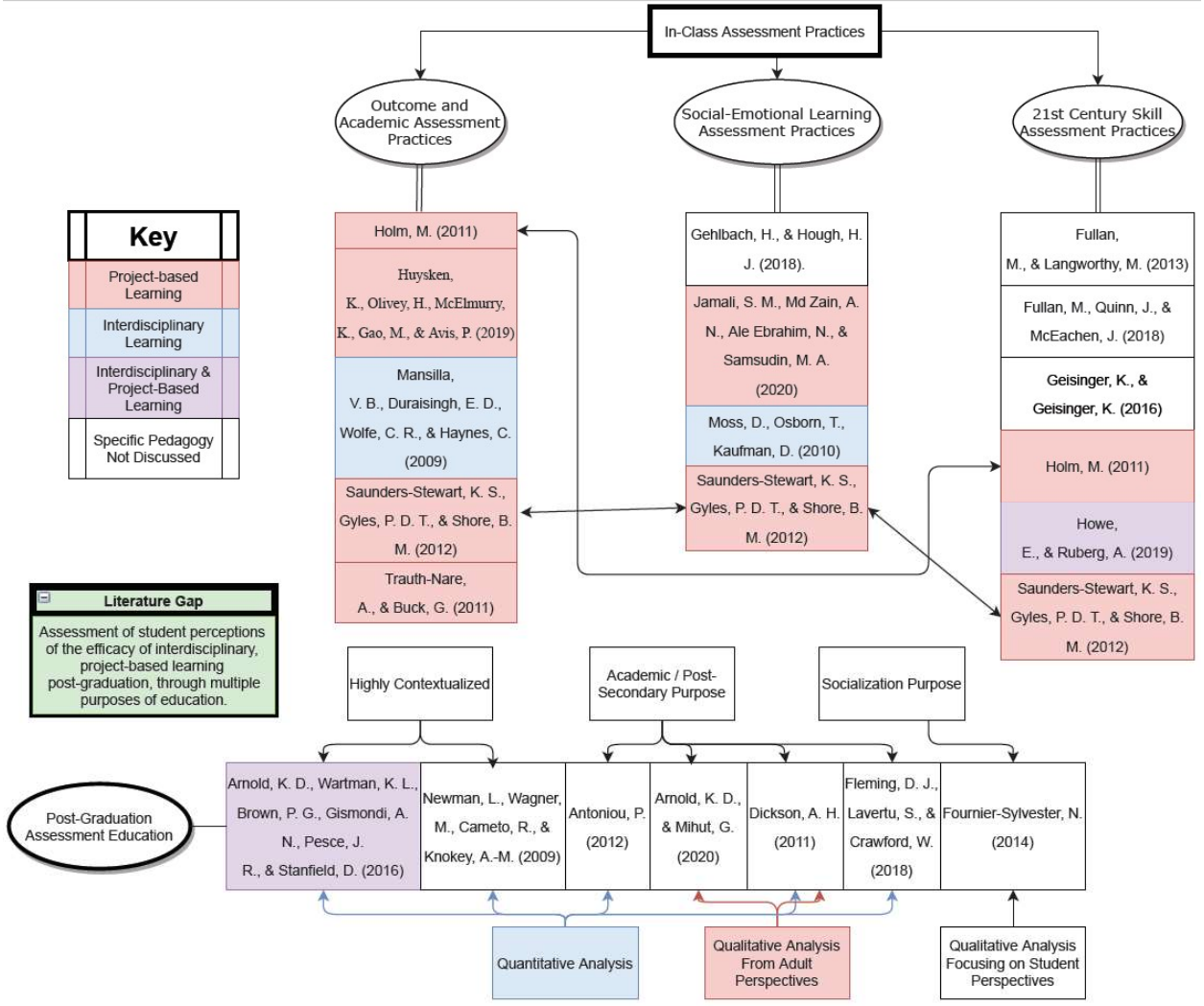
Wicks, R. H., LeBlanc Wicks, J., Morimoto, S. A., Maxwell, A., & Ricker Schulte, S. (2014). Correlates of political and civic engagement among youth during the 2012 presidential campaign. *American Behavioral Scientist, 58*(5), 622–644. https://doi .org/10 .1177%2F0002764213515226

Wolf, S. J., & Fraser, B. J. (2008). Learning environment, attitudes and achievement among middle-school science students using inquiry-based laboratory activities. *Research in science education, 38(*3), 321–341.

Yang, Q., & Zhu, C. (2021). Socially constructed teacher professionalism: An historical analysis of teacher education reform policies of Canadian case. *International Education Studies*, *14*(3), 1–14.

Appendix A

Literature Map



Appendix B

Interview Protocol

[Script prior to interview]

I'd like to thank you for being willing to participate in the interview aspect of my study. I'm seeking to understand how students feel their education prepared them for their futures. I also seek to understand what facets of a student's education impacts their perceptions of future readiness and if those perceptions change based on their life circumstances.

Our interview today will last approximately one hour during which I will be asking you about your current life situation, your high school education, different experiences you had during high school and how those experiences did or did not help you feel prepared for your future.

[review consent]

During the survey, you indicated that I have your permission to interview you. As part of this process, I will take some notes and make an audio recording of our conversation. Are you ok with me recording our conversation today?

___Yes ___No

If yes: Thank you! Please let me know if at any point you want me to turn off the recorder or keep something you said off the record.

If no: Thank you for letting me know. I will only take notes of our conversation.

Before we begin the interview, do you mind if we go over a consent form?

[Get signed consent form / provide a copy to participant]

[Discuss any questions]

If any questions (or other questions) arise at any point in this study, you can feel free to ask them at any time. I would be more than happy to answer your questions.

[Start audio recording]

For the record today is [date, time, and place of the interview]. I am here to interview you about your education experiences for a research study on student future readiness after high school, and your name is? _____

Introductory Question

1. Based on the information you provided in the survey you are currently (life situation). How do you like it so far?

Transition Question

2. How did you find the transition from high school to (current life situation)?

Key Questions

3. What classroom experiences during your high school education helped prepare you for your future (what you are doing now)? (Specific lessons/types of lessons, group vs. individual work, types of assessment, etc.)
    a. What about those experiences was most helpful?
4. What kinds of classroom experiences do you think were missing from your classroom high school education that you feel would have better prepared you for life right now?
5. In terms of being prepared to participate in Canadian society and/or democracy, how do you feel your high school experiences provided you with the background you needed?
    a. What experiences helped? What other experiences might have been beneficial?

   b. Is being prepared to be a Canadian citizen something you feel is valuable to teach in high school? Why or why not?

6. What about your classroom high school experiences would you say prepared you to earn a living and participate in the economy (including further education)?
   a. Is being prepared to earn a living something you feel is valuable to learn in high school? Why or why not?
7. Can you describe any high school classroom experiences which you feel have prepared you to explore your own interests or talents?
   a. Do you think being given the skills to explore personal interests or talents is important to a high school education? Why or why not?
8. Do you feel like any project-based learning you did helped you feel more prepared for your future as compared to more traditional practices like assignments and tests?
   a. What parts of project-based learning do you feel were helpful in preparing you?
   b. What parts of project-based learning do you feel were not helpful or missing?

Closing Question

9. Before we conclude this interview, is there anything else about your high school experiences (positive or negative) that you feel impacted how prepared you are for the future that we have not had a chance to talk about?

[Conclude interview]

Thank you again so much for your time today. Once the results of this study are complete, I'll send a copy to the email address you provided for the survey. Would it be alright to contact you again in case I have any follow up questions or want to verify something you said?

Appendix C

Survey Instrument

This survey will collect your perceptions of how high school prepared you for your current life situation. Results from the survey will help determine if changes in teaching style have significant impacts on student future readiness. No personal information will be published without your explicit consent. Every effort will be made to ensure data is anonymized and your name and/or place of work/study will not be revealed. Only deidentified data will be shared in any publications resulting from this study. Data will be stored in password protected files and destroyed after seven years from study completion. There is a small risk of loss of confidentiality if data were to become public despite the aforementioned protections.

This study has been reviewed and approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus, which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find about more about the REB, contact the Human Ethics Officer at 204-474-7122 or HumanEthics@umanitoba.ca.

Your participation in this study is voluntary. You may withdraw your consent at any time, confident that any data received will not be used. By completing and submitting this survey you acknowledge that you have understood the above information and give consent for the data you provide to be used in the study.

1. To confirm your enrollment in the survey and identify yourself for a potential interview later, what is your name (first and last)?

_____.

2. Which of the following best describes your current situation?
    - Working and I plan to continue working.
    - Working and I plan to attend an educational institution in the future.
    - Currently attending a college or training institute.
    - Currently attending a university.
    - Other (please describe): _____

For the next few questions, please indicate how much you feel your high school experiences prepared you for each of the following:

3. Voting or other political activities.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

4. Exploring my own interests.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

5. Acquiring basic skills and knowledge required to succeed at what I am doing (reading, writing, math).

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

6. Understanding and discussing politics and political issues.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

7. Understanding and developing my own natural talents.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

8. Earning a living by providing skills or abilities.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

9. Helping people or solving problems for others.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

10. Understanding the impacts of my choices on others.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

11. The ability to excel as part of a team or group in a work/school situation.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

12. Making a positive difference in my community.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

13. Thinking for myself and recognizing social pressures.

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

Project-based learning is a type of teaching based on an essential question which involves continued cycles of questioning, student choice and freedom within the project, reflection, revisions, and presenting the final product publicly to an authentic audience. Based on this:

14. How often would you say you experienced project-based learning during high school?

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

Thank you for your time. If you have any questions, you can ask them now or later, even after the study has started. If you wish to ask questions later, you may contact any of the following:

- Christopher Burns, umburns8@myumanitoba.ca
- Dr. Thomas Falkenberg, Thomas.Falkenberg@umanitoba.ca

Appendix D

Codebook for Survey Instrument

This survey will collect your perceptions of how high school prepared you for your current life situation. Results from the survey will help determine if changes in teaching style have significant impacts on student future readiness. No personal information will be published without your explicit consent. Every effort will be made to ensure data is anonymized and your name and/or place of work/study will not be revealed. Only deidentified data will be shared in any publications resulting from this study. Data will be stored in password protected files and destroyed after seven years from study completion. There is a small risk of loss of confidentiality if data were to become public despite the aforementioned protections.

This study has been reviewed and approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus, which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find about more about the REB, contact the Human Ethics Officer at 204-474-7122 or HumanEthics@umanitoba.ca.

Your participation in this study is voluntary. You may withdraw your consent at any time, confident that any data received will not be used. By completing and submitting this survey you acknowledge that you have understood the above information and give consent for the data you provide to be used in the study.

1. To confirm your enrollment in the survey and identify yourself for a potential interview later, what is your name (first and last)? [NAME]

   _____.

2. Which of the following best describes your current situation? [LSIT]
   - Working and I plan to continue working.[1]
   - Working and I plan to attend an educational institution in the future. [2]
   - Currently attending a college or training institute. [3]
   - Currently attending a university. [4]
   - Other (please describe): _____ [5]

For the next few questions, please indicate how much you feel your high school experiences prepared you for each of the following:

3. Voting or other political activities. [SO]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

4. Exploring my own interests. [SU]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

5. Acquiring basic skills and knowledge required to succeed at what I am doing (reading, writing, math). [HC]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

6. Understanding and discussing politics and political issues. [SO]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

7. Understanding and developing my own natural talents. [SU]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

8. Earning a living by providing skills or abilities. [HC]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

9. Helping people or solving problems for others. [SO]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

10. Understanding the impacts of my choices on others. [SU]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

11. The ability to excel as part of a team or group in a work/school situation. [HC]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

12. Making a positive difference in my community. [SO]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

13. Thinking for myself and recognizing social pressures. [SU]

None or very little	A little	Somewhat	A fair amount	A large amount
1	2	3	4	5

Project-based learning is a type of teaching based on an essential question which involves continued cycles of questioning, student choice and freedom within the project, reflection, revisions, and presenting the final product publicly to an authentic audience. Based on this:

14. How often would you say you experienced project-based learning during high school? [PBL]

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

15. Would you be willing to be contacted for an interview at a later date? [CONTACT]
    - Yes [1]
    - No [2]

Thank you for your time. If you have any questions, you can ask them now or later, even after the study has started. If you wish to ask questions later, you may contact any of the following:

- Christopher Burns, umburns8@myumanitoba.ca
- Dr. Thomas Falkenberg, Thomas.Falkenberg@umanitoba.ca

Variable Name	Variable Label	Values: Labels and Codes
NAME	Participant name	First and last name
LSIT	Life Situation	1: Working and plans to continue work 2: Working and plans to pursue education 3: Attending college or institute 4: Attending University 5: Other; described as text
SO	Socialisation	1: None or very little 2: A little 3: Somewhat 4: A fair amount 5: A large amount
SU	Subjectification	1: None or very little 2: A little 3: Somewhat 4: A fair amount 5: A large amount
HC	Human Capital	1: None or very little 2: A little 3: Somewhat 4: A fair amount 5: A large amount
PBL	Experienced PBL	1: None or very little 2: A little 3: Somewhat 4: A fair amount 5: A large amount
CONTACT	Willing to be contacted for interview	1: Yes 2: No

Appendix E

Interview Protocol Design Matrix

	Qualitative Research Questions				
	What factors in a student's educational background do participants describe as being impactful on their total future readiness?	What events in a student's education make the student feel prepared (or would have helped them feel prepared) for their future from a socialisation perspective?	What events in a student's education make the student feel prepared (or would have helped them feel prepared) for their future from a human capital perspective?	What events in a student's education make the student feel prepared (or would have helped them feel prepared) for their future from a subjectification perspective?	How is a participant's current life situation related to their perceptions of their future readiness?
Question 3	X				X
Question 3a	X				
Question 4	X				X
Question 5	X	X			X
Question 5a		X			
Question 5b		X			
Question 6	X		X		X
Question 6a			X		
Question 7	X			X	X
Question 7a				X	
Question 8	X				X
Question 8a	X				X
Question 8b	X				X
Question 9	X				X

Appendix F

Distribution of Participants for Interview Selection (Traditional Pedagogy)

Life Situation	ID	Individual Readiness Ordinal Value					Group Readiness Ordinal Value		
		Total	SO	HC	SU		Medians	Average	ST DEV
	C1	3	2.75	4.00	3.25	Socialization	2.5	2.58	1.08
College	C2	3	3.00	2.67	4.25	Human Cap	4.0	3.33	1.50
	C3	3	2.00	3.33	3.00	Subjectification	3.5	3.50	1.00
	U1	2	2.25	2.00	2.00	Socialization	3.0	2.85	1.09
	U2	2	2.50	1.33	3.50	Human Cap	3.0	2.80	1.37
University	U3	3	2.25	2.67	4.25	Subjectification	3.5	3.50	1.19
	U4	4	4.25	4.00	3.75				
	U5	4	3.00	4.00	4.00				
	P1	3	2.50	3.33	3.75	Socialization	3.0	2.88	1.43
	P2	4	3.00	3.33	4.00	Human Cap	4.0	3.67	0.96
	P3	3	2.50	4.00	3.25	Subjectification	4.0	3.69	1.00
	P4	4	3.50	4.00	4.00				
Preparing to Study	P5	4	4.25	3.67	4.50				
	P6	4	4.00	4.33	4.25				
	P7	2	2.00	2.67	2.75				
	P8	3	1.25	4.00	3.00				
	W1	1	1.75	2.00	1.50	Socialization	2.0	1.63	0.52
Working	W2	2	1.50	3.00	2.50	Human Cap	2.5	2.50	1.38
						Subjectification	2.0	2.00	0.76

Appendix G

Distribution of Participants for Interview Selection (Project-Based Pedagogy)

Life Situation	ID	Individual Readiness Ordinal Value					Group Readiness Ordinal Value		
		Total	SO	HC	SU		Medians	Average	ST DEV
	PC1	4	3.00	4.00	3.75	Socialization	4.0	3.92	1.00
College	PC2	4	4.50	3.33	4.25	Human Cap	4.0	3.89	0.93
	PC3	4	4.25	4.33	3.50	Subjectification	4.0	3.83	1.11
	PU1	3	3.00	3.67	2.25	Socialization	2.0	2.29	0.98
	PU2	4	3.00	3.33	4.25	Human Cap	4.0	3.57	1.21
	PU3	2	1.75	3.33	2.75	Subjectification	3.0	3.36	1.19
University	PU4	3	2.00	3.67	2.50				
	PU5	3	1.25	3.00	4.25				
	PU6	4	3.00	4.00	4.25				
	PU7	3	2.00	4.00	3.25				
	PP1	2	2.75	2.00	2.50	Socialization	3.0	3.29	0.85
	PP2	4	4.25	3.67	4.50	Human Cap	3.0	3.19	1.12
	PP3	4	3.75	4.33	3.75	Subjectification	4.0	3.79	0.92
Preparing to Study	PP4	3	2.50	3.00	3.75				
	PP5	4	3.75	3.33	4.25				
	PP6	3	3.00	2.33	4.00				
	PP7	4	3	3.666666667	3.75				
	PW1	3	3.25	3.333333333	2.75	Socialization	4.0	3.25	1.50
Working						Human Cap	3.5	3.33	0.71
						Subjectification	2.5	2.75	0.96

Appendix H

Participant Selection Joint Display (Traditional Pedagogy)

ID	Individual Readiness Ordinal Value				Group Readiness Ordinal Value				Survey	Rationale
	Total	SO	HC	SU		Medians	Average	ST DEV		
C1	3	2.75	4.00	3.25	Socialization	2.5	2.58	1.08	N	Did not respond
C2	3	3.00	2.67	4.25	Human Cap	4.0	3.33	1.50		---
C3	3	2.00	3.33	3.00	Subjectification	3.5	3.50	1.00	Y	Close to average
U1	2	2.25	2.00	2.00	Socialization	3.0	2.85	1.09	Y	Unprepared
U2	2	2.50	1.33	3.50	Human Cap	3.0	2.80	1.37		---
U3	3	2.25	2.67	4.25	Subjectification	3.5	3.50	1.19	Y	Close to average
U4	4	4.25	4.00	3.75						---
U5	4	3.00	4.00	4.00					Y	Very prepared
P1	3	2.50	3.33	3.75	Socialization	3.0	2.88	1.43	Y	Slightly under prepared in most categories
P2	4	3.00	3.33	4.00	Human Cap	4.0	3.67	0.96		---
P3	3	2.50	4.00	3.25	Subjectification	4.0	3.69	1.00	Y	Close to average
P4	4	3.50	4.00	4.00						---
P5	4	4.25	3.67	4.50					Y	Highest in group
P6	4	4.00	4.33	4.25						---
P7	2	2.00	2.67	2.75					N	Did not wish to be interviewed
P8	3	1.25	4.00	3.00						---
W1	1	1.75	2.00	1.50	Socialization	2.0	1.63	0.52	Y	Low participant count
W2	2	1.50	3.00	2.50	Human Cap	2.5	2.50	1.38	N	Did not respond
					Subjectification	2.0	2.00	0.76		

Appendix I

Participant Selection Joint Display (Project-Based Pedagogy)

ID	Individual Readiness Ordinal Value					Group Readiness Ordinal Value			Survey	Rationale
	Total	SO	HC	SU		Medians	Average	ST DEV		
PC1	4	3.00	4.00	3.75	Socialization	4.0	3.92	1.00	Y	Only 3 interviews
PC2	4	4.50	3.33	4.25	Human Cap	4.0	3.89	0.93	Y	needed for
PC3	4	4.25	4.33	3.50	Subjectification	4.0	3.83	1.11	Y	entire group
PU1	3	3.00	3.67	2.25	Socialization	2.0	2.29	0.98	N	Did not wish to be interviewed
PU2	4	3.00	3.33	4.25	Human Cap	4.0	3.57	1.21		---
PU3	2	1.75	3.33	2.75	Subjectification	3.0	3.36	1.19	N	Did not wish to be interviewed
PU4	3	2.00	3.67	2.50					Y	Lowest in group who agreed to interview
PU5	3	1.25	3.00	4.25						---
PU6	4	3.00	4.00	4.25					Y	Highest in group
PU7	3	2.00	4.00	3.25					Y	Group representative
PP1	2	2.75	2.00	2.50	Socialization	3.0	3.29	0.85	Y	Lowest in group
PP2	4	4.25	3.67	4.50	Human Cap	3.0	3.19	1.12	Y	Highest in group
PP3	4	3.75	4.33	3.75	Subjectification	4.0	3.79	0.92		---
PP4	3	2.50	3.00	3.75						---
PP5	4	3.75	3.33	4.25					N	Did not wish to be interviewed
PP6	3	3.00	2.33	4.00						---
PP7	4	3	3.67	3.75					Y	Group representative
PW1	3	3.25	3.33	2.75	Socialization	4.0	3.25	1.50	Y	Only participant
					Human Cap	3.5	3.33	0.71		
					Subjectification	2.5	2.75	0.96		

Appendix J

Raw Survey Data (Traditional Pedagogy)

Life Situation	Participant ID	Ordinal Value of Participant Response										
		Q1 - SO	Q2 - SU	Q3 - HC	Q4 - SO	Q5 - SU	Q6 - HC	Q7 - SO	Q8 - SU	Q9 - HC	Q10 - SO	Q11 - SU
College	C1	2	4	5	4	4	3	2	2	4	3	3
	C2	3	5	3	2	4	4	4	3	1	3	5
	C3	1	3	5	1	2	1	4	3	4	2	4
University	U1	2	2	1	3	1	2	2	3	3	2	2
	U2	3	5	1	3	2	1	3	3	2	1	4
	U3	2	4	3	1	5	1	3	4	4	3	4
	U4	4	3	5	4	3	3	4	4	4	5	5
	U5	2	5	4	2	5	4	4	3	4	4	3
Preparing to Study	P1	2	4	4	2	3	3	4	4	3	2	4
	P2	1	5	3	2	4	3	5	4	4	4	3
	P3	2	3	5	2	4	3	5	4	4	1	2
	P4	3	4	3	2	4	4	5	4	5	4	4
	P5	4	5	4	5	3	2	4	5	5	4	5
	P6	4	5	4	3	4	4	5	5	5	4	3
	P7	1	3	2	1	3	2	3	1	4	3	4
	P8	1	4	5	1	2	4	2	4	3	1	2
Working	W1	2	2	3	2	1	1	2	1	2	1	2
	W2	1	3	4	1	3	1	2	2	4	2	2

Appendix K

Tallied Future Readiness Responses (Traditional Pedagogy)

	SO	SU	HC	SO	SU	HC	SO	SU	HC	SO	SU
A large amount	0	6	5	1	1	0	4	2	3	1	3
A fair amount	3	5	5	2	2	5	6	7	9	5	6
Somewhat	3	5	5	3	3	5	3	5	3	4	4
A little	7	2	1	7	7	3	5	2	2	4	5
None or very little	5	0	2	5	5	5	0	2	1	4	0

Appendix L

Raw Survey Data (Project-Based Pedagogy)

Life Situation	Participant ID	Ordinal Value of Participant Response										
		Q1 - SO	Q2 - SU	Q3 - HC	Q4 - SO	Q5 - SU	Q6 - HC	Q7 - SO	Q8 - SU	Q9 - HC	Q10 - SO	Q11 - SU
College	PC1	3	5	4	2	5	4	3	2	4	4	3
	PC2	4	4	3	5	4	2	5	5	5	4	4
	PC3	3	2	4	5	4	4	5	5	5	4	3
University	PU1	2	1	5	3	2	1	4	2	5	3	4
	PU2	3	4	4	2	4	3	4	4	3	3	5
	PU3	2	3	3	2	3	3	1	2	4	2	3
	PU4	2	2	5	2	2	2	2	3	4	2	3
	PU5	1	5	4	2	3	1	1	4	4	1	5
	PU6	4	5	4	2	4	3	2	5	5	4	3
	PU7	1	5	4	1	2	3	3	4	5	3	2
Preparing to Study	PP1	2	2	3	3	2	1	3	4	2	3	2
	PP2	4	5	4	5	5	3	4	4	4	4	4
	PP3	4	5	5	3	3	3	4	4	5	4	3
	PP4	3	3	4	2	4	2	2	4	3	3	4
	PP5	3	5	4	4	5	2	3	3	4	5	4
	PP6	3	4	3	2	3	1	3	4	3	4	5
	PP7	3	4	4	2	3	4	4	4	3	3	4
Working	PW1	4	3	4	1	2	3	4	4	3	4	2

Appendix M

Tallied Future Readiness Responses (Project-Based Pedagogy)

	SO	SU	HC	SO	SU	HC	SO	SU	HC	SO	SU
A large amount	0	7	3	3	3	0	2	3	6	1	3
A fair amount	5	4	11	1	5	3	6	10	6	8	6
Somewhat	7	3	4	3	5	7	5	2	5	6	6
A little	4	2	0	9	5	4	3	3	1	2	3
None or very little	2	1	0	2	0	4	2	0	0	1	0

Appendix N

Survey Consent Form

Research Project Title: Impacts of Interdisciplinary Project-Based Learning on High School Students' Future-Readiness

Principal Investigator and contact information: Christopher Burns (umburns8@myumanitoba.ca)

Research Supervisor and contact information: Dr. Thomas Falkenberg (Thomas.Falkenberg@umanitoba.ca)

Information about the Study and Participating in the Study

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

Purpose of the Study

Teaching and learning are evolving and are different from what many people are used to. These changes are also taking place in your high school. In order to make sure we are doing the best job we can do, and in order to ensure our students are getting the best education we can provide, we want to understand your experiences in education and if you feel like high school has prepared you for the future. This part of the study will be used to determine what impact your education had on your future readiness. I am hopeful that our teaching practice can be improved to help

guide students better, to better prepare all students for their futures, and to ensure that changes being made are fair and based in research.

Type of Research

Online survey.

Selection of Participants

The survey population is all students from the graduating classes of 2022 or 2023 who did not have an individualized education plan and were not involved in the FLEX program for more than one year.

Voluntary Participation

Participating in this study is completely voluntary. You can choose to withdraw from the study at any time, including during or after the survey (for the withdrawal process, see below). You do not have to give consent today if you wish to consider things.

Procedure

You will be asked a series of questions through Microsoft Forms regarding your perspectives on how you feel your education prepared you for different facets of your life now, using an online survey. You will also be asked if you are willing to be contacted at a future date for an in-person interview about your survey results. All information recorded is confidential and no one else except for me and my thesis supervisor will have access to them. All survey data will be destroyed after seven years from the completion of the study, which will be approximately July, 2031.

Duration

The time commitment for this survey is around ten minutes.

Risks and Discomforts

Generally, there are no risks expected for participants that go beyond those they would experience in the normal course of their life. You must know that you do not have to answer any question or take part in the study if you feel the question(s) are too personal or if talking about them makes you uncomfortable.

Benefits

This research will provide benefits for the field of education in providing evidence for or against the emerging changes in teaching practice. You will also receive the benefit of having your voice heard in future education. Beyond these benefits, the research will have ongoing benefits to the entire school community as findings can be used to improve teaching and learning for all students in your high school learning community, both current and future.

Confidentiality:

The information that I collect from you in the survey will be kept confidential. Information about you that will be collected from the research will be stored in University-provided individual file storage through OneDrive and only my thesis supervisor and I will be able to see it. Any information from the survey will be analyzed and reported in aggregate when it is reported upon in my thesis and other publications, and individual data will not be reported on. Survey information will be password protected at all times. All data linked to you will be destroyed seven years after the completion of the study, which will be approximately July, 2031.

Sharing of Research Findings

The findings of the study will be published in my M.Ed. thesis and possibly other publications and in presentations in different venues such as the administration of Niverville High School as well as the Hanover School Division. You can receive a summary of the study's findings, which will be available approximately September 2024. If you would like to receive a summary of the study's findings, please provide your contact information (mailing address or email address) here:

Right to refuse or withdraw

You have the right to refuse to answer any of the questions on the survey and you have the right to withdraw from the study at any time, including the right to have your data removed from the study. If you decide not to participate in the study anymore, please contact me using the contact information below and state that you want to withdraw from the study. If the survey has already happened, please let me know if you want me to remove your survey data from the study. Withdrawing your data from the study will not be possible anymore once I have begun analysis of the data (approximately March of the year in which the survey takes place).

Who to Contact

If you have any questions, you may ask them now or later, even after the study has started. If you wish to ask questions later or if you wish to withdraw from the study, you may contact any of the following:

Christopher Burns, umburns8@myumanitoba.ca

Thomas Falkenberg, Thomas.Falkenberg@umanitoba.ca

You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation. The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Officer at 204-474-7122 or HumanEthics@umanitoba.ca. A copy of this consent form has been given to you to keep for your records and reference.

Appendix O

Interview Consent Form

Informed Consent Form for participating in research titled: "Impacts of Interdisciplinary Project-Based Learning on Student Future-Readiness: A Mixed Methods Study".

Principle Researcher: Christopher Burns

Principle Research Contact: umburns8@myumanitoba.ca

Thesis Advisor: Dr. Thomas Falkenberg

Advisor Contact: Thomas.Falkenberg@umanitoba.ca

Organization: University of Manitoba

Project: Impacts of Interdisciplinary Project-Based Learning on High School Students' Future-Readiness

This Informed Consent Form has two parts:

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you agree to participate)

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

Part I: Information Sheet

Introduction

My name is Christopher Burns, I am a teacher at a rural Manitoba high school. I am also a graduate student at the Faculty of Education, University of Manitoba, doing my master's research. I am inviting you to participate in my master's research, which is a mixed methods research project to understand the impacts of emerging teaching practices on students' future readiness. You will be asked a few open-ended questions about your current life situation and educational history. You may talk to anyone you feel comfortable talking with about the research and you can take time to think about whether you want to participate or not. If you have any questions or concerns, please feel free to ask at any point (my contact information is listed below).

Purpose

Teaching and learning are evolving and are different from what many people are used to. These changes are also taking place in your high school. In order to make sure we are doing the best job we can do, and in order to ensure our students are getting the best education we can provide, we want to understand your experiences in education and if you feel like high school has prepared you for the future. This part of the study follows up on the initial survey to help understand what facets of your education you found helpful (or not). I am hopeful that our teaching practice can be improved to help guide students better, to better prepare all students for their futures, and to ensure that changes being made are fair and based on research.

Type of Research Intervention

Interview

Selection of Participants

Participants for this interview were selected based on the results of the survey. Participants were chosen for diverse opinions or differing perspectives on future readiness, as well as how well the participant represented the group being explored, their current location/accessibility, and how much contact they had with me during their education (where less contact would be desirable to reduce potential bias's).

Voluntary Participation

Participating in this study is completely voluntary. You can choose to withdraw from the study at any time, including during or after the interview (for the withdrawal process, see below). You do not have to give consent today if you wish to consider things.

Procedure

You will be asked a series of open-ended interview questions. Your responses will be noted, and audio recorded on a personal cellular device which is password protected to ensure the accuracy of what was said. Audio and/or video will also be recorded if Zoom or Teams is used for the interview. The digital files and any transcripts created will be stored in University-provided Individual File Storage through OneDrive and removed from the recording device as soon as possible.

You will be provided (via your indicated method of communication) a copy of the transcript once it is completed (within the next two weeks) so you can verify the accuracy of the data and ensure it reflects your experiences and opinions correctly. Please review this document and respond via email if it is accurate. If you do not respond within two weeks, I will assume that you agree that the contents of the transcript are an accurate portrayal of your experiences and opinions.

The questions will revolve around your current life situation, how your educational experiences contributed to your feelings of future readiness, and what experiences you feel were missing or

not helpful. If you do not wish to answer some of the questions, you may skip them and move on to the next one. All information recorded is confidential and no one else except for me and my thesis supervisor will have access to them. All interview recordings and data will be destroyed after seven years from the completion of the study, which will be approximately July 2031.

Duration

The time commitment for this interview is around one hour. You will also be contacted with a copy of the transcript of our interview. If you choose to read through the transcript of our interview to ensure that what was recorded is accurate and encapsulates your perspectives honestly this will take you some time, which may differ depending on the duration of our interview.

Risks and Discomforts

Generally, there are no risks expected for participants that go beyond those they would experience in the normal course of their life. There is a risk that participants may share some personal or confidential information by chance, or that they may feel uncomfortable talking about some of the topics. You must know that you do not have to answer any questions or take part in the study if you feel the question(s) are too personal or if talking about them makes you uncomfortable.

Benefits

This research will provide benefits for the field of education in providing evidence for or against the emerging changes in teaching practice. You will also receive the benefit of having your voice heard in future education. Beyond these benefits, the research will have ongoing benefits to the entire school community as findings can be used to improve teaching and learning for all students in your high school learning community, both current and future.

Confidentiality:

The information that I collect from you in the interview will be kept confidential and will be stored in University-provided individual file storage through OneDrive where only my thesis supervisor and I will be able to access it. Any information about you will have a code on it instead of your name when it is reported upon in my thesis and other publications, and participant identifying information will not be shared with anyone beyond the scope of this project. Only my thesis advisor and I will know what your code is. This code will be numeric in nature (e.g., participant 1, participant 2). All data linked to you will be destroyed seven years after the completion of the study, which will be approximately July 2031.

Sharing of Research Findings

The findings of the study will be published in my M.Ed. thesis and possibly other publications and in presentations in different venues such as for the administration of Niverville High School as well as the Hanover School Division. You can receive a summary of the study's findings, which will be available approximately September 2024. If you would like to receive a summary of the study's findings, please provide your contact information (mailing address or email address) here:

Right to refuse or withdraw

You have the right to refuse to answer any of the questions I will ask you during the interview and you have the right to withdraw from the study at any time, including the right to have your data removed from the study. If you decide not to participate in the study anymore, please contact me using the contact information below and state that you want to withdraw from the study. If the interview has already happened, please let me know if you want me to remove your interview data from the study. Withdrawing your data from the study will not be possible anymore once I have begun analysis of the data (approximately June of the year the interview takes place).

Who to Contact

If you have any questions, you may ask them now or later, even after the study has started. If you wish to ask questions later or if you wish to withdraw from the study, you may contact any of the following:

- Christopher Burns, umburns8@myumanitoba.ca
- Dr. Thomas Falkenberg, Thomas.Falkenberg@umanitoba.ca