Untangling Threads of Care: Exploring Family Practices that Support Elementary French Immersion Students in Mathematics in New Brunswick

by

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Abstract

This dissertation explores how parents support elementary students in French Immersion (FI) mathematics education in New Brunswick, Canada. Grounded in Bourdieu's theory of practice and feminist postmodern ethics of care, the study responds to exclusionary narratives that frame FI and mathematics as gatekeeping mechanisms in public education. The study centers parent voices to examine how they adopt the roles of learner, teacher, and leader in supporting their children's mathematics learning and schooling.

Six parents participated in in-depth interviews and journaling, generating rich qualitative data analyzed using a combination of poetic inquiry and reflexive thematic analysis. Findings suggest that parents perceive school mathematics as having changed, both in content and pedagogy, often requiring relearning. While parents expressed interest in supporting mathematics learning, they consistently prioritized literacy, particularly French language development, over numeracy. Parents viewed mathematics in French primarily as a vocabulary exercise, and some perceived it as a potential barrier to conceptual understanding.

Despite these tensions, parents engaged in mathematics at home through a blend of intentional and unintentional practices, ranging from worksheets and flashcards to board games and everyday problem-solving. Participants also described the role of "that parent" as someone who must advocate for accommodations and support while navigating concerns about being perceived negatively by educators. The relationship between home and school was described not as a single connection, but as a multistranded braid of relationships with teachers, staff, and community members.

The study highlights tensions between pedagogical shifts, language of instruction, and parental agency. It calls for expanded definitions of mathematics and parental involvement, emphasizing the need for parent-facing resources and improved communication between schools and families. The blending of poetic inquiry with reflexive thematic analysis deepened relational ethics and emotional resonance, offering a novel methodological contribution to mathematics education research. Ultimately, this work rehumanizes mathematics education by foregrounding care, connection, and the lived experiences of families navigating FI schooling.

Dedication

This work is dedicated to the families who have wondered whether French Immersion was meant for them, and to the students whose stories taught me how to listen. And it is for my children, Esther, Madeleine, and Jacob, who are writing their own stories in these same spaces.

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List of Symbols, Nomenclature, or Abbreviations

ASD-W = Anglophone School District West

FI = French immersion

FSL = French second language

MAPPS = Math and Parent Partnerships in the Southwest

NB = New Brunswick

PCNC = Parent-Child Numeracy Connections

REB = Research Ethics Board

UNB = University of New Brunswick

Chapter 1: Introduction

My life has been one of stories and storytelling. I have fond memories of sitting around the dinner table, listening to extended family members share cherished stories. The stories I remember best are the ones that changed the most, the ones that were told and retold, year after year, where the particular details were debated and negotiated with each retelling. These are the stories that have become as much a part of who I am as my own memories, the stories of things that happened long before I was born and yet, somehow, figured prominently in who I would become.

This study is an installment in the story of French immersion (FI). French immersion is a popular and contested language program in New Brunswick (NB). My doctoral research responds to a growing need for critical research in FI mathematics contexts, where both the discipline (mathematics) and the program (early FI) have been associated with gatekeeping in public education (Mady & Masson, 2018; Wagner, 2021). There are pervasive and convincing narratives—or stories—about which characteristics are a "good fit" for FI, and these exclusionary ideas often reflect a deficit orientation towards parents and caregivers. In contrast, I am setting out to explore emerging counternarratives that foreground relationships between home and school and how they impact families' experiences of learning mathematics in FI. This approach resists a school-centered orientation to family involvement and instead explores the possibility of a family orientation to student learning. In this study, I will explore the ways that parents and caregivers support children's mathematics learning and schooling.

Personal Academic and Professional Experience

I begin by sharing an excerpt from my own story. I was born in NB to a Francophone father and Anglophone mother, placing me within the province's history of English–French bilingualism. Perhaps the only thing my parents agreed on was the importance of learning both English and French. When they divorced and my access to French was limited to annual visits with my father's side of the family, the FI program might have been a natural choice. This was the program that would fulfill the promise of official language bilingualism. More importantly, it would permit communication with my monolingual Francophone relatives in Quebec. For my family, immersion was about maintaining the lines of communication.

I hated FI. The language was lifeless, and the topics were boring. I learned that Roch Voisine represented the pinnacle of French-Canadian music, and that many English words can pass for French if you add an "ay" sound to the ending. I also learned that you could get away with whispering in English if the teacher was not nearby. Much to my disappointment, you only earned stickers for your behaviour chart if you raised your hand and spoke in French. But I adapted. I learned the importance of reading and regurgitating, of sitting quietly at my desk, and of smiling at the teacher. Perhaps the most enduring thing I learned from being in FI is that we were different somehow from our English Prime[1] peers. Probably cooler. Definitely smarter. In short, *we* were better than *them*.

[1] In the Anglophone school sector in NB, there are two program options for students: French Immersion and English Prime. All students in Anglophone schools begin in the English Prime program. Parents can elect to enroll their children in FI in either Grade 1 (early FI) or in Grade 6 (late FI).

The first time I recognized this innate sense of elitism happened in the seventh grade. Previously, all of my classes were taken together with the same group of FI students. But beginning in Grade 7, we were to be combined with the English kids for homeroom, mathematics, English language arts, and science. In some ways, the differences were profound. Many of my new classmates refused to follow instructions. Several had teacher assistants. There were also a few older students, having been held back from passing a previous grade. *They* were not like *us*.

The thing is, the English kids lived in my neighbourhood. I was the only FI student on my street and one of two in our wing of the catchment area. Most of my FI classmates lived closer to the school in a modern subdivision, with beautiful parks and sidewalks. I lived between a bootlegger and an amateur car mechanic, complete with the dozen or so automotive works-in-progress scattered across the lawn. I was not a typical FI student, but until Grade 7, I did not really see the profound impact that the choice of language program was having on my school experience. And as I got to know my new classmates, I realized something quite startling: *they* were actually a lot like *me*.

Years later, when I decided to become a teacher and applied to UNB's Faculty of Education, I hid my English–French bilingualism. I do not have fond memories of FI, and I swore that I would not be a part of a program like that. A program that divides rather than unites, that excludes rather than includes. It was only after becoming a parent that I began to reconsider my position. I wanted my children to learn French, and I was confident in the effectiveness of the second language program. But how could I reconcile my confidence in its effectiveness with a history of distrust? I eventually explored the possibility of embracing my bilingualism as a substitute teacher, and I forwarded the

results of my Oral Proficiency Interview to District Office. Maybe FI did not have to be like I remembered it.

Background

The region known today as NB is located on the traditional lands of the Wolastoqiyik and Mi'kmaq peoples, many of whom were killed, displaced, or marginalized during European colonization. New Brunswick, Canada's only officially bilingual province, is located on the Atlantic coast of Canada. The province is composed of three urban centres (Saint John, Fredericton, and Moncton) and many smaller rural communities. It has a population of 775,000 (Statistics Canada, 2021), of which 65% are Anglophones, 32% are Francophones, and 34% are English–French bilinguals (Filion, 2018). The mantle of bilingualism is disproportionately carried by Francophones in the province, with 72% of Francophones and 15% of Anglophones describing themselves as bilingual (Fillion, 2018).

When looking at the geography of NB, there is a clear separation between French-speaking communities and English-speaking communities that can be traced to the colonial history of the region. French-speaking communities are distributed along the north shore and east coast of the province, whereas English-speaking communities are located in the central, western, and southern parts of the province. This distribution reflects the results of the 18th century Acadian expulsion, when the ruling British ordered the deportation of Acadians (i.e., French colonists) from the region and pushed them "to the margins of the territory" (Marshall & Bokhorst-Heng, 2020, p. 179). Up until the mid-20th century, assimilationist language and education policies resulted in the

accumulation of economic and political power for the Anglophone majority (Marshall & Bokhorst-Heng, 2020).

Two policy changes had an important impact on language rights and the potential distribution of power among Anglophones and Francophones in the province: the Government of Canada's Official Languages Act (1969), a federal policy that made English and French the official languages of Canada; and the New Brunswick Official Languages Act (1969), which guaranteed all citizens the right to access public services in the official language of their choice. This was an important development for Francophones, guaranteeing access to health care, public education, and social services in their first language. These two language acts established English and French as languages of power in NB, which carried with it a secondary effect: for Anglophones in NB, French linguistic skills became an expression of symbolic capital.

French Immersion Program

In 1965, an experimental FI program that would "promote functional bilingualism" (Lambert, 1974, p. 109) began with kindergarten students at the St. Lambert Elementary School in Quebec. Unlike earlier French second language (FSL) teaching methods, this program used a "direct native language approach" (Lambert, 1974, p. 109). In kindergarten and Grade 1, reading, writing, and mathematics were taught exclusively in French, with instruction in English incrementally introduced beginning in Grade 2. Since this first experiment, FI programs have developed across Canada with variations in entry point and instructional time in the target language. Factors that contributed to the spread of FI programs included a growing emphasis on English–French

bilingualism in the 1970s, dissatisfaction with the degree of proficiency obtained in existing FSL programs, and the St. Lambert experiment (Bruck & Swain, 1976).

Early research examining the FI program in Canada focused primarily on whether students would be at an academic disadvantage as compared to their peers in mainstream English programming. For example, a study comparing the standardized test results of FI students and non-FI students on a large-scale mathematics assessment noted that FI students equalled or outperformed their peers in mathematics by Grade 6 (Turnbull et al., 2003). Over time, stakeholders started asking about unstated but implicit assumptions concerning the suitability of immersion for underrepresented students in the language program, such as students outside of the middle class (e.g., Makropoulos, 2009), students with learning exceptionalities (e.g., Selvachandran et al., 2022), students of colour (e.g., Kunnas, 2019), or students whose first language was not English (e.g., Davis et al., 2019). Critical studies in FI research have questioned the role of gatekeepers in immersion (e.g., Mady & Masson, 2018) and have drawn attention to the gap between its intended effect of fostering intercultural communication and official language bilingualism and its widespread function of academic and social streaming (Gerbrandt, 2022).

Parents have been integral to the development of FI programming in Canada. The first FI classes began in 1965 at St. Lambert Elementary School in Quebec (Lambert, 1974) in response to concerns among Anglophone parents about the growing emphasis on French language in Quebec society (Swain & Lapkin, 1982). The countrywide spread of FI began thereafter, owing in large part to "parental pressure and involvement in program initiation and implementation" (Swain & Lapkin, 1982, p. 2) from the majority (i.e.,

Anglophone) group. The national spread of FI coincided with the Official Languages Act of 1969, which named French and English as the official languages of Canada. Immersion programs started popping up across the country, and New Brunswick's first pilot program began in Fredericton in 1973 (Hildebrand, 1974).

Parental support was a key requirement of FI from its inception, with Lambert (1974) having gone so far as to say that immersion could "never succeed without the full co-operation of parents, school officials, and evaluators" (p. 114). Hildebrand (1974) described FI parents and teachers as "active partners" (p. 185) who engaged in frequent communication and consultations in support of the program. Carey (1984) attributed the "phenomenal success" (p. 246) of FI to two factors: Anglophone parents who advocated for better French-language learning for their children; and the program itself, with its research-informed approach to language learning.

By the 1980s, an enrollment trend was observed. Parents who were choosing FI had higher incomes than the national average, and participation in FI might have been used as a proxy for social status for the middle class (Olson & Burns, 1983). Despite evidence suggesting that FI was equally suitable for all students of any socioeconomic status (Safty, 1991), middle-class students continued to be overrepresented (Parekh et al., 2011; Wise, 2011). Students were more likely to come from higher socioeconomic backgrounds than their mainstream English peers, and their parents were more likely to be in the top socioeconomic quartile and hold a post-secondary degree (M. Allen, 2004; Barrett DeWiele & Edgerton, 2021; Parekh et al., 2011).

French Immersion in New Brunswick

The government of NB oversees two public school systems, one for Anglophones and one for Francophones. French immersion is offered to students within the Anglophone school system. There are currently two entry points to FI in New Brunswick: early immersion beginning in Grade 1 and late immersion beginning in Grade 6 (Government of New Brunswick, 2018). In the elementary grades, students in FI spend at least 80% of instructional time learning in French (Government of New Brunswick, 2018). Elementary students in FI "acquire French as a second language through subject area content and learn about the language through French Immersion Language Arts" (Government of New Brunswick, 2018, p. 1). Mathematics is one of the subject areas that is taught in French in early FI.

On December 15, 2022, the provincial government issued a news release announcing their intention to replace the current FI program with a universal "French for all" framework that promised to improve the communicative skills of all Anglophone children in the province. Unlike the current FI program, this new framework would have seen students spending half the day learning in English and half the day learning in French (Poitras, 2022). In this new model, students would be learning mathematics in English.

In January 2023, results of a poll commissioned by Canadian Parents for French, a national lobby group, suggested a steep decline in popularity for the ruling Progressive Conservative party (Poitras, 2023). Two months later on February 17, 2023, following a period of intense public resistance to the proposed changes, the plan was cancelled. The complicated linguistic context of New Brunswick can help to explain the public's response to the announced changes. Given the demographics of many parents with

children in the FI program, it is perhaps unsurprising that they resisted the planned changes. English–French bilingualism is a valued form of symbolic capital among majority Anglophones. The FI program has been credited with a noticeable bump in English–French bilingualism among Anglophones, from 6% of the population in the 1970s to 15% of the population today (Filion, 2018).

Research Problem

I loved being an elementary FI teacher, and I worked hard to create a learning environment founded on principles of inclusion, equity, and kindness. But I soon learned that a positive classroom environment was insufficient to confront broader systemic challenges. One challenge that really surprised me was the relationship between learning mathematics in FI and perceptions of suitability for the program. I observed a troubling pattern across the different schools where I taught: students who experienced difficulties meeting provincially mandated mathematics benchmarks seemed to be at a greater risk of leaving the program. Whereas parents appeared to accept the possibility that students might not meet language benchmarks according to a linear timeline, they were less comfortable with their children missing targets in their learning of mathematics. Though learning benchmarks are not explicitly intended to force students out of the program, they seemed to function as barriers to continued enrollment. In a province where French is a language of power and linguistic tensions are always simmering, it is important to ask questions about who has the privilege of developing French language competencies and who does not. More research examining the role of parents and caregivers is needed to highlight the potential pathways for engaging with learning mathematics in FI.

Organization of the Dissertation

This dissertation is organized into five chapters. Chapter 1, the introduction, offers a brief overview of my positionality as a researcher and how it relates to the study context.

Chapter 2 comprises the theoretical framing of the research design and a comprehensive review of relevant literature. It begins with an overview of Bourdieu's theory of practice and how researchers have drawn from the concepts of habitus, field, and cultural capital in mathematics education and FI education. I then explain how I have learned from feminist postmodernism to develop a theoretical framework for this study that centres relationships and the concept of care. The chapter continues with a literature review of the role of parents in education before closing with the study's research questions.

Chapter 3 describes the research methodology, methods, and design. I begin by situating the research within a critical/transformative paradigm, relate its learnings from an Indigenous paradigm, and introduce poetic inquiry as the methodology. I then share a description of the study's methods, including ethical considerations, the research site, recruitment process, as well as data collection, organization, and analysis using poetic inquiry and reflexive thematic analysis.

Chapter 4 presents the study's findings in three waves. The first wave foregrounds poetic inquiry and is organized by participant. The second wave foregrounds reflexive thematic analysis and is organized by theme. The final wave is a collection of ten research poems that synthesize and represent the study findings.

Chapter 5 steps outside of the typical monograph structure and revisits some of the methodological choices that informed the structure of the study's findings.

Chapter 6 offers a discussion of the findings, organized by research question. I respond to each research question by making connections between my theoretical framework, my interpretation of data, and other pertinent research. I then discuss the implications of my findings as they relate to practice and research before sharing my concluding remarks.

Now that I have described the organization of this dissertation, let us step into the theoretical framing of the study.

Chapter 2: Theoretical Framework and Literature Review

Although I am completing a doctoral study within an educational context, the theories I draw from are borrowed from the educationally adjacent field of sociology. I have crafted together a study that explores education outside of schools, involving partners who might not always be considered educators, and asking questions about a dominant school subject in a sometimes contentious bilingual program. These choices are the result of several influences, which I will elaborate in this chapter. And this blurring of disciplinary boundaries will be echoed in the elaboration of my methodology.

In the introduction, I began with an overview of my research plans. This study is taking place in a New Brunswick context and explores emerging counternarratives that foreground relationships between home and school. In particular, it explores the possibility for a family-orientation to learning mathematics in the FI program. I now continue by sharing the foundational ideas that stimulated my interest in exploring mathematics education in elementary FI.

Bourdieu's (e.g., Bourdieu, 1977, 1990a) concepts of habitus, field, and cultural capital have shaped my understanding of public education. I start by defining these terms in relation to Bourdieu's theory of practice before turning to relevant studies that have borrowed from his ideas. There are numerous scholars in the fields of mathematics education and FI education who have adopted Bourdieu's concepts into their theoretical frameworks, and I will explain how their contributions to the field have informed my conceptualization of this project. I will then discuss the limitations of these concepts, noting why and how I have departed from Bourdieu's theory of practice. Importantly, this departure does not indicate a rejection of Bourdieu's ideas; instead, I liken it to knitting in

an additional and necessary thread, the scholarship of feminist postmodern theorists. This thread stabilized and humanized my imagined study, breathing life into what could have become a detached, procedural, and epistemologically inconsistent research design. This thread introduced the idea of an ethics of care, a concept that encapsulates a type of research that I never thought possible, a type of research that centres caring relationships. I then finish by reviewing literature that explores the role of parents in education before introducing my research questions.

A Bourdieuan Lens

After examining the underlying structures that contribute to persistent social inequalities, sociologist Pierre Bourdieu identified education as the primary tool for social reproduction (Bourdieu & Passeron, 1977). According to Bourdieu's work, the students who are most likely to be successful in school are the children of middle-class parents, a phenomenon that has less to do with biological factors (i.e., cognitive aptitude) and more to do with sociological ones (i.e., social class). In other words, though education may appear to offer opportunities for social mobility to everyone, it instead functions as an effective tool for reproducing pre-existing social classes. While building a sociological theory that could explain complex social practices, Bourdieu's theories are now inextricable from how I understand education: habitus, field, and cultural capital.

Habitus

The habitus, a "durably installed generative principle of regulated improvisations" (Bourdieu, 1977, p. 78), is the underlying framework of Bourdieu's theory of practice. The habitus is shaped by family upbringing and is "the product of internalization of the principles of a cultural arbitrary capable of perpetuating itself after PA [pedagogic action]

has ceased" (Bourdieu & Passeron, 1977, p. 31). This primary habitus is the basis for the formation of any subsequent habitus and provides structure to our beliefs, dispositions, and expressions of agency. Parents and family members are most likely to perform this pedagogic action, passing on values, beliefs, and dispositions to their children. Bourdieu (1984) described these principles as arbitrary, drawing attention to the different structured and structuring beliefs within each household. The habitus connects individuals to others whose experiences share the same structures, such as social class, gender, occupation, ethnicity, nationality, et cetera (Maton, 2008). The habitus is durable but not unchangeable, a "general, transposable disposition which carries out a systematic, universal application" (Bourdieu, 1984, p. 166). Its effect is twofold:

> The habitus is not only a structuring structure, which organizes practices and the perception of practices, but also a structured structure: the principle of division into logical classes which organizes the perception of the social world is itself the product of internalization of the division into social classes. (Bourdieu, 1984, p. 166)

And so, the habitus is neither static nor in a state of constant change, offering stability while simultaneously permitting adaptation and incremental modifications in response to new experiences (Edgerton & Roberts, 2014). The concept of habitus invites people to think relationally rather than dichotomously, bringing together "the existence of social regularities with the experience of agency" (Maton, 2008, p. 54). In this way the habitus shapes one's perception of the reasonable and unreasonable, their hopes and beliefs about what seems inevitable, obvious, or natural. The habitus determines "the parameters of people's sense of agency and possibility" (Edgerton & Roberts, 2014, p.

195). These "subjective expectations of objective probabilities" (Bourdieu, 1990b, p. 59) reflect a "system of dispositions—a past which survives in the present and tends to perpetuate itself into the future by making itself present in practices structured according to its principles" (Bourdieu, 1977, p. 82).

Schools and schooling influence the developing habitus of each student. Pedagogic actions have to "last a certain time" (Bourdieu & Passeron, 1977, p. 31) to produce an enduring habitus. The durability of the primary habitus means that the greater the difference between the primary habitus and the collective habitus of those holding pedagogic authority in schools, the longer it takes to adjust one's initial disposition to schooling. The effect of schooling can be described as the development of the secondary habitus through pedagogic action that is "shortened in duration, accelerated in pace, and explicit in organization" (Wacquant, 2014, p. 7). Students who enter schools sharing structures (e.g., social class, ethnicity, religion) with their teachers are predisposed to receive pedagogic work (i.e., be schooled). Education is "the process through which a cultural arbitrary is historically reproduced through the medium of the production of the habitus productive of practices conforming with that cultural arbitrary" (Bourdieu & Passeron, 1977, p. 32). Put another way, schools are responsible for moulding each student's habitus so that it conforms with the status quo, resulting in the development of the secondary habitus. But given the variances in primary habitus, some students are more likely than others to develop the preferred secondary habitus. Bourdieu and Wacquant (1992) described a "reasonable" habitus as the "possession of the minimum economic and cultural capital necessary actually to perceive and seize the 'potential

opportunities' formally offered to all" (p. 124). Lacking this, some students are less likely to access the same benefits as their more cultured peers.

Field

Bourdieu (1991) described the field as "an autonomous universe, a kind of arena in which people play a game which has certain rules, rules which are different from those of the game that is played in the adjacent space" (p. 215). This field, alternatively named a network or configuration of "objective relations" (Bourdieu & Wacquant, 1992, p. 97) consists of various positions occupied by people or institutions contained within a set of boundaries. The field is uneven, and agents have varying quantities and types of capital from the outset:

> The structure of the field, i.e., the unequal distribution of capital, is the source of the specific effects of capital, i.e., the appropriation of profits and the power to impose the laws of functioning of the field most favorable to capital and its reproduction. (Bourdieu, 1986, p. 19)

As Maton (2008) described, the relationship between the structure of the field and the habituses of the people therein is characterized by "varying degrees of fit or mismatch" (p. 56). This conjunction of habitus and field is the meeting of "subjective capacity and objective possibility" (Wacquant, 2014, p. 5). When a person's habitus aligns with the internal logic of the field, they are more likely to have a feel for the game, or "the sense of a capacity for practical anticipation for the 'upcoming' future contained in the present" (Bourdieu, 1990a, p. 66). The person might then use this knowledge to adopt a better position in the field, a position that supports their ability to accrue capital (Thomson, 2008). An agent's ability to accumulate capital depends on the "relative

weight of the different kinds of capital in the total set of their assets" (Bourdieu, 1991, p. 231). These assets are determined by both the volume and the composition of their pre-existing capital.

Bourdieu (Bourdieu, 1990a) noted that fields can be considered games "in themselves" and not "for themselves", where agents are born into the game rather whether they wish it or not (p. 67). The structure of the field is defined by the relations of force between agents, where the strategies people deploy are the result of both their current access to capital as well as the expected volume and structure of their future capital (Bourdieu & Wacquant, 1992).

Cultural Capital

Bourdieu (1986) proposed the concept of cultural capital as a way to explain the unequal academic achievement of children from different social classes. Bourdieu and Wacquant (1992) noticed that when controlled for economic position and social status, "students from more cultured families not only have higher rates of academic success but exhibit different modes and patterns of cultural consumption and expression" (p. 160). Bourdieu (1986) questioned the widely embraced belief in inherent ability and suggested that the transmission of cultural capital is a greater determinant of scholastic success than aptitude. Bourdieu and Passeron (1977) suggested that schooling reproduces how cultural capital is distributed among different social classes, which contributes to the reproduction of the social structure. Bourdieu (1986) described the three forms of cultural capital as embodied, objectified, and institutionalized:

> Cultural capital can exist in three forms: in the *embodied* state, i.e., in the form of long-lasting dispositions of the mind and body; in the *objectified* state, in the form

> of cultural goods (pictures, books, dictionaries, instruments, machines, etc.)… and in the *institutionalized* state, a form of objectification which must be set apart because, as will be seen in the case of educational qualifications, it confers entirely original properties on the cultural capital which it is presumed to guarantee. (p. 17)

The embodied form of cultural capital, which involves the conversion of external wealth into "an integral part of the person" (Bourdieu, 1986, p. 18), is not easily exchanged or transmitted. Instead, "because the social conditions of its transmission and acquisition are more disguised than those of economic capital, it is predisposed to function as symbolic capital, i.e., to be unrecognized as capital and recognized as legitimate competence" (Bourdieu, 1986, p. 18). Differences in embodied cultural capital influence how, when, and to what extent a child accumulates cultural capital in any form. Children born into families with "strong cultural capital" (Bourdieu, 1986, p. 19) benefit from a longer period of accumulation of cultural capital, as their families can provide them with the free time to do so.

Cultural capital in the objectified state is both material and transmissible, though material ownership does not necessarily constitute the means of consumption (Bourdieu, 1986). For instance, a painting may be passed down through generations, constituting a change in material ownership. But possession does not equate consumption, or in this case, the necessary embodied cultural capital to appreciate or value the painting. Current expressions of cultural capital in the objectified state might include designer sunglasses, non-fungible tokens, or membership to an art gallery. Bourdieu (1986) cautioned that this form of cultural capital exists "only insofar as it is appropriated by agents and

implemented and invested as a weapon and a stake in the struggles which go on in the fields of cultural production (the artistic field, the scientific field, etc.)" (p. 20). Its value is arbitrary and impermanent.

Cultural capital in the institutionalized state is "the objectification of cultural capital in the form of academic qualifications" (Bourdieu, 1986, p. 20). Bourdieu argued that this objectification explains the difference between the cultural capital of the self-taught learner and the cultural capital of the university graduate. While both might be able to demonstrate the same degree of learning, greater value is placed on the institutionalized form. Bourdieu (1986) likened this to "social alchemy" or "cultural capital by collective magic" (p. 20). This process allows the comparison of those who possess institutionalized qualifications and establishes a conversion rate between economic capital and cultural capital vis à vis academic qualifications.

Theory of Practice

Together, habitus, field, and cultural capital are the conceptual tools that inform Bourdieu's theory of practice:

> The theory of practice as practice insists, contrary to positivist materialism, that the objects of knowledge are constructed, not passively recorded, and contrary to intellectualist idealism, that the principle of this construction is the system of structured, structuring dispositions, the *habitus*, which is constituted in practice and is always oriented towards practical functions. (Bourdieu, 1990b, p. 52)

Practice refers to routine patterned behaviours, the actions people take without undue effort or thought. These are the things people do as a result of their internalized

dispositions as they navigate different social spaces with varying degrees of capital. In his effort to develop "a truly scientific knowledge of practice" (Bourdieu, 1990b, p. 27), Bourdieu (1984, p. 101) suggested an equation to represent the relationship between habitus, field, and cultural capital:

$$(\text{Cultural Capital} \times \text{Habitus}) + \text{Field} = \text{Practice}$$

This equation reveals how Bourdieu conceptualized human behaviour, which is particularly relevant to educational research. Alone, neither cultural capital nor habitus is sufficient to account for a student's success in school. One might have the ability to access and accrue the three forms of cultural capital, but the habitus shapes the eventual output or action. Grenfell (2003) explained: "Social agents are incorporated bodies who possess, indeed, are possessed by structural, generative schemes which operate by orientating social practice. This, in a nutshell, is Bourdieu's theory of practice" (p. 13).

There are many reasons why I have gravitated towards using Bourdieu's "thinking tools" (Maton, 2008) as part of my theoretical framework. Bourdieu's concepts of habitus, field, and cultural capital have shaped the way that I think about education. The concept of habitus informs how I understand the relationship between family and school in the New Brunswick context. It draws my attention to the structuring structure that is developed before students begin formal schooling outside the family home. Barrett DeWiele and Edgerton (2021) noted how "middle and upper class parentocratic tendencies toward *concerted cultivation* and strategic interventionist parental logic are emblematic of middle-class parents' *habitus*" (p. 10, emphasis in original). Put differently, children from middle-class families have a habitus that has been cultivated to successfully navigate public education with ease. I have revisited memories of

interactions with students and their families, piecing together the effect of differing habituses on how someone navigates the institution of education. This will enable me to look at the relationship between home and school as a relationship between manifestations of the primary habitus and the secondary habitus.

These thinking tools also encourage me to think of agents within the field of power, agents who are people and the institutions themselves. When I start to think about the internal logic of any field, I might start to notice the different experiences others could have when navigating these fields. I am mindful of the differences between fields, such as the "field of education" compared to the "field of mathematics education". In the context of mathematics education taught within the FI program, there are almost certainly rules that apply in this space that do not apply elsewhere. I imagine the existence of a subfield of FI mathematics education with its own set of rules, positions, and boundaries. Some students appear to grasp these unwritten rules with ease, while others do not. This extends well beyond reminders to speak in French and to show your work, which would be better described as explicit rules. Despite Bourdieu's resistance to defining precise boundaries between fields (Swartz, 1997), this distinction reflects the unique characteristics of FI programs. As Thomson (2008) pointed out, field "offers an epistemological and methodological approach to an historicized and particular understanding of social life" (p. 79). The experience of learning mathematics in a second language program is unlike what students experience in the English mainstream program. And I expect that the experiences of FI families are unlike the experiences of non-FI families.

I will now share an overview of literature that uses Bourdieu's theory of practice as a framework to study various aspects of mathematics education, noting the absence of studies within a bi/multilingual context. I will then review pertinent literature that uses Bourdieu's theory of practice as a framework to study aspects of FI education, again noting an absence of studies within a mathematics context. I will then compare and contrast how these two fields, mathematics education and FI education, have adopted and adapted Bourdieu's ideas.

Bourdieu and Mathematics Education Research

Bourdieu's theory of practice has been invoked in both quantitative and qualitative studies within the field of mathematics education. After reviewing the relevant literature, I have grouped these articles according to three primary themes: quantifying parental influence, equity issues in mathematics education, and structure and agency.

Quantifying Parental Influence. Several studies have measured parental influence on achievement in mathematics using quantitative methods. Quaye's (2020) mixed-methods doctoral study looked at the influence of social class, gender, ethnicity, and attitudes towards mathematics on mathematics achievement among secondary students in the United Kingdom, while Huang and Liang (2016) used data from the 2011 Trends in International Mathematics and Science Study to measure the influence of cultural capital on scholastic achievement among Grade 4 students from 32 different countries. Quaye's study measured participants' cultural capital using nine questions relating to both "highbrow" and "emerging" cultural capital activities, expanding on Bourdieu's description of cultural activities to include social media usage and participation in sports. Huang and Liang also expanded on Bourdieu's examples of

expressions of cultural capital to include parental expectations of children's education, reading time, reading attitude, possession of books, and education levels. Both studies questioned the impact of cultural capital on mathematics achievement, with Huang and Liang concluding that embodied cultural capital has a strong predictive influence on standardized test results and Quaye noting no correlation between cultural capital and educational attainment.

While both of these studies made meaningful contributions to exploring the relationship between cultural capital and mathematics education, I also notice how they illustrated some of the challenges associated with adopting Bourdieu's concepts into empirical research. First, they were epistemologically out of sync with Bourdieu's theory of practice. Bourdieu definitively rejected positivist ways of understanding the social world and developed a complex, multi-layered theory that offered a guide for sociology that has applications in educational research. These studies drew from Bourdieu's ideas and offered possibilities for networking a statistical analysis with a sociological theory, something that Bourdieu may not have envisioned as an extension of his work. Although these studies may not have foregrounded the relationship between the researcher and the researched, they still contributed to the development of Bourdieu's theories in mathematics education.

Bourdieu's theories are products of his experiences, just as any decision a researcher makes is influenced by context. In his rejection of positivism, Bourdieu did not simply embrace moral relativism. Instead, he attempted to measure the relations between different agents. If I endeavour to apply this theory that positions people as belonging to the dominant group or the dominated group, then I need to be equally aware

of the space between the researcher and the researched. To acknowledge the structuring effect of past experiences on present beliefs is to begin recognizing the effect of the habitus, the structuring structure that affects every thought, decision, and subsequent action one takes.

Both studies borrowed from Bourdieu's (1984) concepts without focusing on the relationship between habitus, cultural capital, and field. They are examples of how researchers might engage with some of Bourdieu's ideas without referring to the equation that represents Bourdieu's theory of practice. When I began thinking about Bourdieu's ideas, I mistakenly assumed that one must adhere completely to Bourdieu's principles. I have since come to value how researchers working across paradigms can learn from Bourdieu's ideas without focusing on the relationships between habitus, cultural capital, and field.

Equity Issues in Mathematics Education. Turning to qualitative studies, several researchers have drawn from Bourdieu's concepts to investigate equity issues relating to mathematics education. Jorgensen (Zevenbergen) consistently drew from Bourdieu's concepts of habitus and field in her research concerning ability grouping and academic streaming in mathematics education (Jorgensen et al., 2014; Zevenbergen, 2002, 2003, 2005). In one study (2002, 2003, 2005), she used semi-structured interviews with 96 secondary students in Australia to explore students' experiences learning mathematics. She found that teachers who experienced streaming as students were more likely to adopt this practice, "allowing for a certain degree of reproduction of the discipline" (Zevenbergen, 2002, p. 5). She attributed this structuring effect of school mathematics to the structuring practices of Bourdieu's field of power, and she concluded that teachers are

required to "reconstitute students' habitus so that they are more in line with the valued practices of the field in order that they have improved chances of success" (Zevenbergen, 2003, p. 10). In another study, Jorgensen et al. (2014) questioned the role of ability sorting in mathematics in the United Kingdom, examining how a student's habitus impacted their experience within the mathematics field. The authors drew from Bourdieu to counter "deficit and individualised thinking" (Jorgensen et al., 2014, p. 225). Using interviews with parents and participants, they highlighted how differences in social class have resulted in distinct primary habituses that affected participants' experiences in the field of mathematics education.

While Bourdieu's framework offers valuable insight into the role of habitus and field on the practice of ability sorting, these studies leave an important question unanswered: how does one go about reconstituting a habitus? Social reproduction through education is effective because agents acquire principles unconsciously "through prolonged frequentation of masters who had themselves mastered them" (Bourdieu & Passeron, 1977, p. 61). I suspect that even if ability sorting were banned, the beliefs that led to ability sorting would persist. Mathematics teachers have been mathematics learners, and their views about learning mathematics have been shaped by their own experiences as students.

Other studies addressing equity issues related to mathematics education have drawn from Bourdieu's concepts to inform strengths-based approaches to educational practice. Yaro's (2021) case study networked the concepts of cultural capital and habitus to Afrocentrism in an effort to reveal the overlooked cultural capital of African immigrant families in Canada. He documented how parents resisted the "gatekeeping

function" (p. 165) of mathematics by leveraging their cultural, linguistic, technological/digital, and navigational capital to support their children's learning. Jorgensen (Zevenbergen) (2011, 2016) has drawn from Bourdieu to frame strengths-based research in Indigenous contexts, noting that schools that made their rules and expectations clear and explicit were equipping their Indigenous students and families with the necessary knowledge to navigate White, middle-class spaces. Jorgensen (2011) argued that Bourdieu offers tools to move away from deficit thinking in favour of the development of more accessible mathematics teaching, but cautioned that this is only possible if those who currently have power within the field are willing to "recognize the structuring practices that exclude participation" (p. 327). Similarly, Wright's (2017) participatory action research study drew from Bourdieu's theory of social reproduction to investigate how mathematics teachers might realize a humanistic vision of teaching mathematics for social justice. Wright (2017) facilitated a one-year collaboration involving five early-career teacher participants who designed classroom activities, selected data collection tools, and maintained personal journals that reflected their thinking. He concluded that "the adoption of more collaborative and problem-solving pedagogies should be accompanied by approaches in which the 'rules of the game' are made more visible to students" (p. 519). As they became more aware of their personal epistemologies and perspectives of mathematics education, participants became more committed to adopting student-centered, collaborative, discursive, and problem-solving pedagogies.

Each of these studies confronted the challenge of reconciling Bourdieu with action by focusing on the practices that supported student success. In this way, they might

be able to inform practitioners of ways to make mathematics education more equitable without exclusively focusing on the relation between agents. But it is necessary to note that this marked a step away from Bourdieu. His theory of practice, when followed to its logical conclusion, would suggest that any attempts to redistribute capital by sharing cultural knowledge (i.e., Jorgensen, 2011; 2016; Wright, 2017) or to expand ways of knowing mathematics beyond what is determined by the dominant (i.e., Yaro, 2021) do not account for the relationship between those who have power and those who do not. These changes might indeed result in more academic success for marginalized students, but they will not, according to the theory of practice, impact relations between the dominant and the dominated. What appears to be a reasonable step towards making visible the invisible underlying structure of the dominant cultural arbitrary might instead function as controlled mobility. Controlled mobility "entails assuming it possible to generalize to the whole class properties which sociologically can belong to certain members of the class only inasmuch as they remain reserved for a few, hence denied to the class as a whole" (Bourdieu & Passeron, 1977, p. 54).

Structure and Agency. Noyes (2003) combined participant observation, informal interviews, and video diaries to investigate the influence of family backgrounds on children's future dispositions to life and mathematics learning. He grounded the study using Bourdieu's concept of habitus and noted that both capital and conflict influence mathematics achievement. For students with greater cultural capital, "trajectories are more likely to be steeper, aided by the broad harmony of their own habitus to those of educators" (Noyes, 2003, p. 150), whereas any discordance between the family's habitus and the dominant cultural forms of the school was likely to result in conflict. He

documented how this conflict was often misinterpreted as manifestations of intelligence or innate ability, a misrecognition that might be described as a deficit way of thinking. Allen and Trinick (2021) offered an historical account of the suppression and revitalization of Māori language and culture in mathematics education in New Zealand, drawing from Bourdieu's concepts of capital, habitus, and field to frame their analysis of individual and collective agency during the COVID-19 pandemic. Unlike other Bourdieuan research in mathematics education that explored how the habitus and manifestations of cultural capital impact student learning (e.g., Jorgensen et al., 2014; Quaye, 2014), Allen and Trinick (2021) engaged in "the agency–structure sociological debate" (p. 354) by exploring the "misrepresentation in mathematics education of Māori cultural and linguistic aspirations" (p. 364). They determined that a lingering iniquitous power structure prevented the Māori-medium sector from meaningful participation and decision making within the mathematics education community, leading to vastly different experiences between English-medium and Māori-medium schoolchildren during the COVID-19 pandemic. By questioning the effect of agency within Bourdieuan framing, this study offered a different application of Bourdieu's theory of practice. It drew attention to the role of sociopolitical and historical context, which influenced the relationship between habitus, field, and cultural capital.

Bourdieu and French Immersion Education Research

Bourdieu's theories have been invoked in several qualitative and critical studies within the Canadian FI context. After surveying the relevant literature, I grouped these articles according to three themes: the relationship between cultural capital and immersion, investment theory, and theory meeting practice.

The Relationship Between Cultural Capital and Immersion. Most studies in FI education that have referred to Bourdieu as part of their theoretical frames have focused on the concept of cultural capital (e.g., Cepin, 2012; Kunnas, 2019; Lamarre, 1996; Makropoulos, 2005, 2010). Lamarre's (1996) comparative analysis of FI programs in British Columbia and Quebec explored how Anglophones were adapting "to the changing language status of French" (p. 6) in two distinct sociolinguistic and sociopolitical contexts. Using a combination of document analysis and interviews, Lamarre reported how the growing value of French language competency represented a form of cultural capital that extended beyond what Anglophone middle class families were able to provide their children. In this way, FI offered them an opportunity to secure more cultural capital and better economic prospects within an evolving social landscape. Kunnas (2019) also referred to Bourdieu's concept of cultural capital as part of their combined sociolinguistic analysis, interpretive policy analysis, and critical discourse analysis that investigated the ways documents "contribute to and/or reflect the social makeup of the FI program" (p. 7). Kunnas found that the most common identities of FI students in Ontario were White, middle-class, Toronto/Ontario born, and Anglophone. This analysis highlighted the relationship between language and power, noting a link between the accumulation of cultural and linguistic capital for FI students as compared to their non-FI peers.

Though neither of these studies mentioned the structure–agency debate, their results hinted at the impact of policy on social structure. While the higher value afforded to the French language may have been one of the intended effects, a Bourdieuan lens draws attention to unintended effects. I am reminded that Bourdieu's theory of practice argued that education "reproduces, rather than redistributes, the unequal distribution of

cultural capital" (Swartz, 1997, p. 199). The increasing status assigned to the French language, the language of a minority group in Canada, resulted in an increasing interest among Anglophones to learn the language. More specifically, interest among White, middle-class Anglophones increased. Changes to educational policy might be able to impact social structure, but their effect is complicated by the reproductive function of schools. Through public education, what Bourdieu and Passeron (1977) described as a system of social reproduction, FI may have emerged as a tool for transmitting cultural capital to some children and not others. And the children who are most successful in the program are those who reflect the identities of the dominant social group: White, Anglophone, and middle class (Kunnas, 2019).

Makropoulos's (2005, 2010) study also drew from Bourdieu's concept of cultural capital, this time questioning its influence on attrition from the FI program at the secondary level. Makropoulos highlighted the experiences of three Ottawa-area Grade 11 students of differing socioeconomic backgrounds who opted to remain in immersion. Unlike Kunnas (2019), who was interested in identifying the common identities of FI students, Makropoulos focused on successful FI students who lacked the traits most associated with success. Makropoulos's (2005) results revealed how despite different ethnic, linguistic, and racial backgrounds, these students shared similar ideals, viewing FI "as a valuable educational investment for their respective futures" (p. 1457) and placed importance on "personal gain and economic prosperity" (p. 1458). In a similar vein, Cepin's (2012) case study exploring the impact of neoliberalism on parents, educators, and policy makers in Toronto, Ontario noted that "enrolment in French Immersion may be strongly motivated by the value of the language as a 'hot commodity', rather than for

the bilingual integration the Canadian government would like it to be recognised for" (p. 101).

These studies offered suggestions as to how stakeholders might adapt FI policy, programming, or marketing to increase student diversity. If Makropoulos's (2005) case study were to be considered an example of success stories, it might be tempting to replicate the conditions that led to successful outcomes. But as Swartz (1997) explained, "lower-class survivors have compensated for their initial lack of capital by acquiring a scholastically based cultural capital through exceptional intellectual ability, individual effort, and unusual home or social circumstances" (p. 201). I would suggest that these internal attributes and how they affect success in FI could be further questioned and explored using the concepts of habitus and field, which do not appear in Makropoulos's (2005) work. Cepin's (2012) study similarly demonstrated the impact of internalized values on enrollment. Students who shared the values of the dominant social group (i.e., the White middle-class) were more likely to enroll and remain in immersion. Students and parents appear to be motivated by economic forces and view French–English bilingualism as a form of valuable capital in Canada.

Investment Theory. Not all studies that referred to Bourdieu's concepts as part of their theoretical frames have focused exclusively on cultural capital. Several scholars have combined the concept of language learner investment with symbolic capital (e.g., Dagenais, 2003) and habitus (e.g., Bokhorst-Heng & Marshall, 2019) to frame their qualitative research in FI. Language learner investment considers the ways that power dynamics and ideologies influence whether someone succeeds in gaining sufficient symbolic capital in the target language to be considered a legitimate speaker (Darvin &

Norton, 2015). Dagenais (2003) referred to the concept of investment in their longitudinal ethnographic study of 12 FI students from immigrant families in Vancouver, British Columbia. Dagenais found that parents "view multilingualism as linguistic capital convertible to economic capital on national and international markets" (p. 281). Parents also "associate multilingualism with symbolic capital such as increased social status and membership in a number of valued language communities" (p. 281). In other words, immigrant parents invested in FI education for their children as a means to acquire symbolic capital more broadly, and not just for economic capital in the form of future employment opportunities.

In New Brunswick, a collaboration between Bokhorst-Heng and Marshall (2019) drew from Bourdieu's concepts of symbolic capital and habitus to examine FI students' investment in their language learning. Bokhorst-Heng and Marshall (2019) used focus groups involving middle school students, collecting data using peer interviews, individual surveys, and group discussion. They noticed that students saw FI as a mechanism to acquire economic capital, which the authors attributed to neoliberal values (Marshall & Bokhorst-Heng, 2020). This corresponds with other studies that noted the priority given to economic reasons for participating in the FI program (Barrett DeWiele & Edgerton, 2021; Cepin, 2012). Marshall and Bokhorst-Heng (2020) suggested that increasing "educators' awareness of investment's three constructs (capital, identity, and ideology)—particularly in contexts where majority-language speakers learn minority languages for their instrumental value—might enable educators to provide students an alternative to the neoliberal discourses that frame such learning" (p. 614). I would suggest that it remains unknown how this might be achieved, as awareness of a concept does not necessarily

result in change. Changes to the habitus require pedagogic acts that endure long enough to ensure change, and the success of any given pedagogic act depends on the relationship between the existing habitus and the desired changes (Bourdieu & Passeron, 1977). When I think about policy as an agent of change, I wonder whether it can result in a change of habitus. In my experiences as a classroom teacher, I came to associate policy changes with one-time professional learning sessions. The collaboration between Marshall and Bokhorst-Heng (2020) has made me wonder about the potential for professional learning as an enduring pedagogic act capable of changing the habitus.

Theory Meeting Practice. Cormier's (2018) doctoral study explored the linguistic landscapes of three secondary schools in Manitoba and referred to Bourdieu's concepts of field, linguistic capital, and linguistic habitus. Using a linguistic landscape approach, Cormier combined photo elicitation with semi-structured interviews to explore student approaches to translanguaging. Cormier noted the difference between participating schools and suggested that each site could be considered a distinct educational field with its own unique rules and practices, noting how "certain forms of cultural capital are highly valued in some fields and not in others" (p. 66). She also theorized the difference between the habitus as "an attribute of individuals" (p. 69) and the collective habitus, which might "lead to discoveries about the aspects of habitus that are shared between members of a same group" (p. 70). Results indicated that participants choose FI for improved job opportunities, the result of the higher value given to the acquisition of cultural capital as opposed to the linguistic capital of speaking French in Canada. In other words, it was less about learning how to speak the language than it was about having that credential added to one's professional resume.

Cormier's (2018) approach was unique among the FI studies, as she incorporated the three concepts of Bourdieu's theory of practice (habitus, field, and cultural capital) and confronted the associated challenges with applying them to her analysis. For instance, Cormier's rationale behind labeling each school site as a distinct educational field raised the question of how to identify fields. Bourdieu has been criticized for not clearly defining field boundaries, which has led to some confusion about identifying fields for study (Thomson, 2008). Cormier's research invited further exploration of social fields, both within the context of FI education and beyond.

Bringing Mathematics Education and French Immersion Education Together

Studies in the field of FI education that have incorporated Bourdieu's concepts into their theoretical framing have been more attentive to issues of power and identity than studies within mathematics education that have drawn from his ideas. This distinction likely owes to the political context of second language instruction in Canada. Bourdieu's theory that accounted for the structuring structure of the habitus within the larger field of power offers a useful blueprint for mapping the interactions that occur within schools, between language communities, and among education stakeholders. Bourdieu's interest in recognizing the positioning of the researcher within these structures might be a natural fit for research involving second language instruction within the context of dominant and minority languages. Though numerous scholars use Bourdieu's concepts to describe inequities within the FI program, they do so to explore ways of improving student practice (e.g., improving enrolment, getting better grades). These are important and meaningful research goals because they impact the experiences of individual students. I would also invite Bourdieu's theories into critical studies that

examine the relationship between habitus, field, and cultural capital in FI contexts, perhaps to interrogate the potential for policy change as pedagogical action. As Williams and Choudry (2016) caution, "helping some learners succeed within this system implies ensuring they succeed relative to, and by virtue of, others' failure—reproducing and perpetuating inequality and social class structures in society" (p. 4). There is value in exploring ways to enact meaningful change at the individual level, but there is also value in exploring how Bourdieu's concepts relate to power relations within schools at the system level.

Bourdieu's theory of practice provided conceptual tools that help to reveal, understand, and describe power relations. But if education is better at reproducing inequalities than redistributing cultural capital, what can educators do to improve the system for marginalized students? Several researchers in mathematics education and FI education have used Bourdieu's concepts in their qualitative studies exploring possible courses of actions, and their results suggest that it may not be enough to describe systems of power. Given the sometimes incomplete or selective use of his concepts, there may be value in identifying instances when it becomes necessary to step outside of a Bourdieuan frame. After examining how others have engaged with Bourdieu's ideas in both mathematics education and FI education, I saw an opportunity to learn from Bourdieu while also learning from others, too. Rather than adhering to the boundaries of Bourdieu's theory of practice, scholars in both fields have connected these concepts to other theories and opened up a variety of methodologies that extended beyond what Bourdieu preferred. These scholars have opened a space to reimagine a separate set of practices, ones that are not defined by the dominant social group.

Confronting the Limitations of a Bourdieuan Framework

After thinking through my research context and reviewing the literature in mathematics education and FI education that drew from Bourdieu's theory of practice, I noticed a growing internal discomfort. Where were the people? Not the participants, or the subjects, or the data. Where were *the people*? The more I began to notice the physical manifestations of discomfort with my choices, the more I noticed the incongruities between my chosen methods and my personal values. I entered the doctoral program with a set of internalized assumptions about "good" research, and these assumptions could be placed within the positivist paradigm: large sample sizes increase validity, variables need to be controlled, and data are most meaningful when they can be represented using numbers. Importantly, these are not the assumptions or values that steer my personal life.

I turned to feminist literature and feminist approaches to research in education to settle my stomach. I was unsatisfied with approaches that brushed over or completely ignored the relationship between the researcher and the researched, a power dynamic that feminist researchers actively confront and explore (Sathyamala, 2022). I turned to feminist approaches as a way to explore the relationships that exist between home and school, teacher and student, parent and child, researcher and researched. I needed a research approach that prioritized relationship building over speedy and extractive data collection (Cadaval Narezo, 2022). And in turning to feminist theories and methods in educational research, I came "to think differently about what it is possible to know" (Gannon & Davies, 2011, p. 315).

Feminist Postmodernism

To confront the limitations of Bourdieu's theory of practice, I embraced the works of feminist postmodern thinkers. Feminist postmodernism troubles "that which is taken as stable/unquestionable truth" and contributes to "the lines of flight that may open up the not-yet-known" (Gannon & Davies, 2011, p. 314). I needed to take this step towards a feminist conceptualization of research, and this section explains how I have come to understand the influence of feminist theories and methods on my doctoral work.

Feminism and postmodernism "work similarly and differently to trouble foundational ontologies, methodologies, and epistemologies" (St. Pierre & Pillow, 2000, p. 2). Postmodern thinking wades into the murky margins of the scientific method and invites us to reconsider the structures upon which scientific thought rests. Feminist theorists working with the ideas of postmodernism have pursued the "political and epistemological project of asserting difference in a nonhierarchical manner, refusing to disembody and therefore to desexualize a vision of the subject" (Leach, 2000, p. 224). Feminist postmodernists have questioned Enlightenment beliefs about reason, historical progress, objectivity, and the scientific method (Lather, 1992; St. Pierre & Pillow, 2000). They have troubled binary categories of male and female, "making visible the constitutive force of linguistic practices and dismantling their apparent inevitability" (Gannon & Davies, 2011, p. 312). By making binary assumptions related to gender and sexuality visible, analysable, and revisable, feminist postmodernism invited scholars to question other binaries in the social world (Gannon & Davies, 2011). Postmodern thinking "offers critiques and methods for examining the functions and effects of any structure or grid of regularity that we put into place" (St. Pierre & Pillow, 2000, p. 6). Feminist postmodernism encourages suspicion of binary assumptions.

Another contribution of postmodern thinking has been its recognition of the constitutive relationship between the self and everything around it (Gannon & Davies, 2011). This means that every self is constituted in historically specific and socially regulated ways, ways that can be questioned or challenged, accepted or revised. Postmodernism "rejects notions of epistemological and methodological certainty provided by the natural sciences" (Collins, 2000, p. 41), which has resulted in a messy field that prioritizes "the process of exploration" (Gannon & Davies, 2011, p. 315) rather than strictly and unquestioningly adhering to predetermined methods. Put differently, to know something is to know it in context, which includes the relationship between the thing that is known and the person who claims to know it.

Gannon and Davies (2011) described all people as "subjects-in-process" as much as "subjects-in-relation," drawing attention to two key postmodern assumptions. First is the idea that everyone and everything is dynamic, unfinished, and incomplete. Second, people can be identified and understood only in relation to others. In a way, postmodern thinkers actively invite discussion about the uncomfortable topics that exist at the periphery of what an Enlightened thinker might consider worthwhile subjects. Rather than ignoring the liminal spaces rife with contradictions, tensions, and human incoherence, feminist postmodern researchers might re-imagine the aporias (Lather, 2006) as fertile ground for mining (Lather, 2007).

I was at once swept up in the ideas of feminist postmodernism and overwhelmed by them. This was where Bourdieu's concepts of habitus, field, and cultural capital stepped in. They served as interpretive "thinking tools" (Grenfell, 2008) that helped me to describe the world. A postmodern orientation invited me to trouble the determinism of

Bourdieu's theory of practice. And while I suspect there are limitations when working with any theory, I echo St. Pierre and Pillow (2000) in exploring "possibilities for different worlds that might, perhaps, not be so cruel to so many people" (p. 1). This is when I turned to the more concrete and tangible concept of care to help refine what a postmodern lens to my research could mean.

Feminist Ethics of Care

Care ethics are tucked within feminist postmodern approaches to moral education (Rabin, 2019) and foreground the duties of care that exist in the social world. Care is a holistic concept that unites the mind and body while resisting the Western assumption of rational mind over feeling body (Taggart, 2019). Rather than accepting the Enlightenment assumption that saw reason triumph over emotion, an ethics of care offers "an overarching moral framework for understanding how people can engage with each other in various spaces in civil society" (Langford, 2019, p. 4). The messy, postmodern way of thinking about the world made space for a feminist ethics of care that centres, accepts, and appreciates emotions such as sympathy, empathy, sensitivity, and responsiveness (Langford, 2019). Such a shift in mindset in the context of educational research can be considered a moral, political, and social act (Arndt & Tesar, 2019).

A key feature of an ethics of care is the importance of relational thinking. An ethics of care views people as relational beings and the human condition as a state of interdependence (Barnes, 2019). Care and ethical caring involve "diverse relationships, not all of which are face-to-face, and which frequently involve different people who occupy different positions at different times" (Barnes, 2019, p. 28). An ethics of care draws attention to the importance of reciprocal and ongoing trust in relationships. By

caring with, we stand together in solidarity; we share the responsibility of care with others and reject a unidirectional assumption of who gives and who receives care (Tronto, 2013). Ethical interactions are "frequently ordinary events" that can be described as either *care-full* or *care-less*, a distinction that highlights the potential contribution of every interaction to a relationship (Langford & White, 2019, p. 61). Ethical care processes are "dynamic, reiterative, reciprocal, and generative" (Langford & White, 2019, p. 61), a flowing-in and flowing-out that occurs as people interact with others. This ebb and flow relates to Taggart's (2019) "attitude of compassion toward oneself" (p.111), which he described as a necessary precondition for mindful and empathetic interactions with others. Ethical interactions are thus interactions within the self as well as interactions with others.

Perhaps care should be viewed as a radical resistance to patriarchal norms, where instead of feeling the need to justify its place in educational research, researchers ought to be questioning the dichotomy between professionalism and care. This binary worldview mirrors the tensions between an objective, dispassionate, scientific lens and the value of a subjective, passionate, and humanistic lens. An ethics of care is attentive to context and "requires a preparedness to listen to the particularity of the circumstances, experiences, and ideas of others" (Barnes, 2019, p. 26). In my research context, where political tensions are entangled with both a deeply rooted linguistic divide and a neoliberal assumption about public education, centering care as a research priority feels transgressive and necessary. But it is not without complications.

Feminist researchers have confronted challenges with navigating an ethics of care and power. Langford and White (2019) cautioned against making assumptions about who

needs care, as these assumptions are "prone to misinterpretation and infused with power relations" (p. 65). The focus on social relationships does not negate power imbalances between care-giver and care-receiver, who may find themselves shifting between these positions in any interaction. Invoking the concept of care as a moral and ethical framework in my research will require that I unpick "the ways in which care relations may be ones of subjugation, ambivalence, concern, and solidarity" (Rosen, 2019, p. 92).

Now that I have elaborated the theoretical underpinnings of my research, I turn to a closer look at the literature examining the role of parents in education, public discourses about mathematics education, and mathematics education in immersion contexts.

The Role of Parents in Education

There are few people who would dispute the idea that parents have a vital role in education; however, there are inconsistencies when beginning to try to define what that role is. Though schools once "embodied community" (Henry, 1996, p. 12), the 20th century professionalization of education and schooling separated schools from their surrounding communities, which has largely separated parents and caregivers from the educational lives of their children. Though the professionalization of schooling has led to an overall higher standard of educational outcomes for many students, the separation of schools from direct community influence may have contributed to the development of an oppositional relationship between parents and teachers (Lawson, 2003). Families are generally disconnected from decisions related to formal instruction (i.e., curriculum), which "contributes to the difficulties they experience in supporting their children's school learning" (Jay et al., 2017, p. 204).

From the school's perspective, parents and caregivers are the adults in a child's life responsible for making sure students attend school. When I think about my responsibilities as a parent, I might name such actions as ensuring my children arrive to school on time, are well-fed, wear appropriate clothing, and are ready to learn. This conception of the parent's role in schooling is consistent with what Lawson (2003) described as an "uninvolved parent," or someone whose role is largely fulfilled outside of the school building. Although these parents are doing many of the things that satisfy a child's physical and emotional needs for learning, these actions are largely unrecognized by schools. In the next section, I will briefly explore the role of parents and caregivers in education from a schoolcentric perspective, noting scholarship from the fields of mathematics education and FI education. I will then contrast the ways that researchers have explored alternatives to a schoolcentric orientation to the role of parents and caregivers. I conclude this section by exploring the possibilities for a reimagined relationship between home and school and what this implies for my doctoral research.

Schoolcentric Orientation to Parents

A schoolcentric orientation to parents generally views the relationship between home and school as one of "parental involvement." Parental involvement in schooling is associated with participation in school activities, such as through membership on Parent Teacher Associations or monitoring homework. A schoolcentric orientation views parental involvement as efforts to support teachers' needs and school-defined goals, such as reinforcing school-taught ideas at home, volunteering in schools, and attending parent–teacher conferences (Hornby & Blackwell, 2018; Lawson, 2003). Henry (1996) noted that although parental presence in schools and parental representation on governing

bodies had become routine, this did not mean "parents and educators necessarily work well together or equally share decision making" (p. 7). Lawson (2003) described this as a continuum of "schoolcentric parent involvement" (p. 79) that has dominated educational research, where parental involvement ranged from creating a structured environment for homework at home to serving as partners in school-related decision making. Efforts to bolster parent involvement in schooling can have the unintended consequence of confirming deficit-informed suspicions among teachers, which contributes "to a fairly systematic silencing of the strengths, struggles, and communitycentric worldviews" (Lawson, 2003, pp. 116–117) held by many parents. This perspective evaluates parents' activities from an institutional perspective (Jackson & Remillard, 2005). More recently, Goodall and Montgomery (2014) suggested that parents' participation or contribution to education exists on a continuum, with parental involvement on one end and parental engagement on the other end. Whereas parental involvement was characterized by school agency, parental engagement was characterized by increased parental agency. Scholars have noted that not only are these terms used interchangeably, parents and educators have different understandings of their respective responsibilities when it comes to a child's education (Gross et al., 2020).

In general, mathematics education research exploring parental involvement has taken a schoolcentric approach focused "on mathematical activity and outcomes that are defined by governments, schools, and teachers" (Jay et al., 2017, p. 205). Such studies have examined how parents support children by helping with mathematics homework (e.g., Baranovich et al., 2019; de Abreu & Cline, 2005) by attending family mathematics nights (e.g., Lopez & Donovan, 2009; Schussheim, 2004) or by improving their own

mathematics competency through school-organized workshops (e.g., Knapp et al., 2017; Muir, 2012). Many studies that adopted a schoolcentric orientation to mathematics education positioned parents in a passive role, where parental support was synonymous with efforts to support school practices. For example, Muir's (2012) call for "partnerships" between home and schools also cautioned about "the extent to which teachers can expect parents to follow, implement and support reform practices" (p. 2). This one-directional partnership positioned parents as potential obstacles to overcome rather than true partners who were invested in their children's success. Knapp et al. (2017) explored the role of "parental knowledge" on mathematics achievement and noted "children's mathematical learning is enhanced when schools embrace and develop parents as intellectual resources" (p. 92). At first glance, this suggested agency was squarely in the hands of schools and afforded parents a passive role in the relationship between home and school. However, the idea of parents as intellectual resources resisted the deficit view of parents' mathematical knowledge and its influence on student learning.

While these studies explored opportunities to foster home and school partnerships, the purpose and direction of such partnerships was at the discretion of the school. When parental involvement is equated with support for school-sanctioned learning activities, the parent's role is reduced to that of a worker bee. This perpetuates the oppositional divide between home and school. School-based initiatives "often overlook how parents are uniquely positioned to advocate for and support children's mathematical education across educational contexts" (Harper et al., 2021, p. 2). And when low achievement in mathematics is attributed to parents' challenges with "bridging the gap between their own

mathematics and the mathematics their children were learning at school" (de Abreu & Cline, 2005, p. 719), it signifies that binary assumptions of being able/unable to help children with learning at home have been accepted. In other words, low achievement in mathematics can be attributed parents' failure to activate their own mathematics knowledge at home. This is especially problematic when thinking about how many people have been scarred by school mathematics, identifiable by utterances of "I'm not a math person" when faced with the need to perform computations in social contexts. A schoolcentric orientation can inadvertently position these parents, who might be the majority of parents, as obstacles to student learning.

Before I continue with an overview of research exploring the role of parents in FI contexts, I want to point out that FI is an optional program with varying popularity across Canada, whereas mathematics is a mandatory course of study across all programs. This distinction might help to explain why studies involving parents in FI contexts have generally explored factors that influence enrollment decisions. Early research focused on parents' perspectives of the quality or relevance of the FI program (Bienvenue, 1986; McEachern, 1980). In their survey of FI and non-FI parents in Victoria, British Columbia, McEachern (1980) noted that FI parents believed their children would have better employment opportunities as a result of developing English–French bilingualism, while non-FI parents were skeptical that the potential benefits of bilingualism outweighed the risk to their English-language skills. Findings from a later survey of non-FI parents in Winnipeg, Manitoba suggested that the decision not to enroll a child in FI was influenced by concerns about the quality of the program, the quality of the teachers, and transportation required to bus students to regional schools. Here, the role of parents in FI

was understood as one of choosing to enroll their children, and researchers were curious to understand which factors influenced these decisions.

In their critical interpretive synthesis of empirical studies between 2000–2017 in the Canadian K–12 FSL context, Masson et al. (2021) found that studies involving parents explored challenges related to accessing the FI program (e.g., Cobb, 2015; Mady & Arnett, 2009), the relationship between Canadian bilingualism and FSL programs (e.g., Dagenais & Berron, 2001; Dagenais & Moore, 2008; Roy, 2012), and parental involvement in literacy (Dagenais, 2008, p. e.g.,; Dagenais & Berron, 2001; Moore & Sabatier, 2015). These categories suggested a shift away from viewing parents' role as one that is exclusively related to initial enrollment in the program. Instead, they introduced the complexity of access, which encompassed enrollment and withdrawal decisions. Cobb's (2015) case study examined the experiences of a mother of two children in the FI program in Ontario and noted that "the two special education issues of accessibility and exclusion can intensify in French immersion settings" (p. 181), while Mady and Arnett's (2009) analysis of an Ontario mother's journal highlighted lingering barriers that made it difficult for students with exceptional learning needs to be successful in FI. In both of these studies, the role of parents was that of an advocate. While advocacy suggested an active role for parents, the active piece was only related to ensuring their child had an opportunity to complete the program. Both studies described tensions when a FI student had special learning needs, tensions that resulted in a more adversarial relationship between home and school. It could be inferred that an active role for parents might sometimes only be available when a child experiences learning difficulties.

Masson et al. (2021) did not identify empirical studies that explicitly set out to examine parental involvement in their critical interpretive synthesis; instead, the authors assigned the label to studies that explored language practices in multilingual contexts. Their interpretation of "parental involvement" had a different meaning in the FI context from what has emerged in mathematics education research. They included Dagenais's (2003, 2008) longitudinal ethnographic study that suggested children from immigrant families have "dynamic and complex" (Dagenais & Berron, 2001, p. 152) language practices at home that support learning French in the FI program. They also included Moore and Sabatier's (2015) classroom ethnographic case study that explored how multilingual classroom books can foster relationships across linguistic and cultural communities between home and school. Both of these studies took place in British Columbia and resisted the Anglophone assumption of who enrolls in FI.

Though there were differences between how scholars in FI education and scholars in mathematics education examined the role of parents in education, there was one unexpected but unsurprising similarity. Much of the literature exploring the role of parents in education focused primarily on the role of mothers (e.g., Baranovich et al., 2019; Civil & Bernier, 2006; Cobb, 2015; de Abreu & Cline, 2005; Jackson & Remillard, 2005; Mady & Arnett, 2009; Quintos et al., 2019; Rahmawati & Amri, 2020; Schnee & Bose, 2010; Takeuchi, 2016; Wadham et al., 2022). For instance, a study that looked at "parental scaffolding in mathematics homework" (Baranovich et al., 2019, p. 174) only included mothers as participants. Even when fathers were included as part of a study, most participants were mothers (e.g., de Abreu & Cline, 2005). While some researchers acknowledged the overrepresentation of mothers among participants and hypothesized as

to why fathers were not as likely to participate, others did not. This highlights a gendered assumption of parental engagement, where the relationship between home and school assumes a relationship between a mother and the teacher. This oversimplification does not represent all families: there are many fathers, stepparents, grandparents, siblings, and other caregivers who share interest in the education of a child.

As a former classroom teacher, I recognize the appeal of a schoolcentric orientation to the role of parents. I operated within a system that valued the practices of homework and participation in school-organized events. I equated the completion of homework and attendance at after-school events to parent engagement. But I am coming to see danger in this line of thinking. When parenting is reduced to tacit support for school decisions, the othering of parents is embraced. The reality that public education has its own set of practices that are not value neutral is also ignored. In the next section, I share scholarship from mathematics education that offer alternatives to a schoolcentric orientation to parents and parental involvement in education.

Alternatives to a Schoolcentric Orientation to Parents

Researchers in the United States (e.g., Matthews et al., 2021; Schnee & Bose, 2010; Vomvoridi-Ivanovic et al., 2025) and the United Kingdom (e.g., Howker & Black, 2025; Jay et al., 2017) have explored alternatives to schoolcentric orientations by centering the perspectives of parents and exploring opportunities for researchers to help with misunderstandings between parents and schools. Some researchers in mathematics education have done this from the perspective of critical mathematics, a subfield of mathematics education research interested in rehumanizing or centering the human aspect of learning and doing mathematics. Researchers have explored the influence of race

(Matthews et al., 2021), culture (Schnee & Bose, 2010) and social class (Howker & Black, 2025; Jay et al., 2017) on parents' beliefs about their role in children's learning of mathematics. These studies "illuminated the multifaceted ways" (Schnee & Bose, 2010, p. 94) parents supported their children's learning by exploring questions related to how, why, and when parents choose to act. They questioned the researcher's role in "expanding and amplifying direct networks for Black parents to share, communicate, and advocate for their own needs and spaces around mathematics" (Matthews et al., 2021, p. 347). And they invited parents to deconstruct the school-centered understanding of parental involvement in mathematics education (Jay et al., 2017).

Critical studies in mathematics education research offer reconceptualizations of both how to conduct research in the field and which topics warrant closer scrutiny. Of particular interest to this study's research design, Vomvordi-Ivanovic et al.'s (2025) collaborative autoethnography examined the affordances of motherhood in relation to their personal responsibilities as mathematics teacher educators, noting the opportunity to serve as boundary brokers between fellow parents and schools. Similarly, Howker and Black (2025) noted how a researcher with insider knowledge and experiences was well suited to doing research with parents. In their case, the primary researcher was the parent of children who attended the same school as participants, which resulted in a set of shared experiences that enriched data collection. Both of these studies offered insight into how mathematics education researchers might draw from their experiences as parents, researchers, and mathematics specialists, which is relevant to my personal research context.

Two projects that contributed to a centering of parents' perspectives were the Math and Parent Partnerships in the Southwest (MAPPS) project (Civil et al., 2005; Civil & Bernier, 2006) and the Parent–Child Numeracy Connections (PCNC) project (Jackson & Remillard, 2005), both of which took place in the United States. The MAPPS project focused on Latinx parents and aimed "to expand the vision of parent participation in school mathematics" (Civil et al., 2005, p. 60) in three ways: first, the researchers invited parents to participate in mathematics awareness workshops to develop their own mathematics learning; second, they invited parents to leadership development sessions to learn how to facilitate future workshops; and third, they invited parents to participate in Math for Parents courses where they could explore mathematics concepts in more depth while teaching fellow parents (Civil et al., 2005). By looking at parents as learners, teachers, and leaders, this study resisted the pathologizing and narrow view of parents as extensions of a school's efforts to educate. This offered the alternative to parental participation where parents are instead viewed as intellectual resources (Civil & Bernier, 2006).

A redistribution of power occurred during the MAPPS project, particularly when parents were responsible for leading workshops that teachers attended (Civil et al., 2005; Civil & Bernier, 2006). This shift in authority countered the assumption that educational authority is primarily derived from schools. While researchers noted that there were some challenges with ensuring that the mathematical concepts were elaborated in ways that reflected a high degree of conceptual understanding, this is something that also happens in mathematics classrooms. I bring this up to remind myself that everyone in a teaching position makes mistakes at some point. While subject area mastery is an important piece

of being a teacher, it is not the only important piece. As a teacher, I need to value the many different facets of helping someone to learn. One way to do this is seeing the role of parents as one that includes opportunities to be learners, teachers, and leaders.

While the MAPPS project was a participatory effort that scaffolded a reimagined and multifaceted role for parents in mathematics education, the PCNC project aimed to "(a) understand how parents act as resources for their children, (b) consider how they might be supported in doing so, and (c) make their practices more apparent in schools" (Jackson & Remillard, 2005, p. 55). The authors described this as an alternative to a schoolcentric orientation to education, instead suggesting the opportunity to view education as planned opportunities for learning that involves parents.

Jackson and Remillard's (2005) reconceptualization of parental involvement explored ways Black mothers were involved in children's *learning*, children's *schooling*, and in children's *school*. They described involvement in children's learning as "the ways that parents work to structure, foster, and support their children's learning in a variety of contexts, not just those that are related to school" (Jackson & Remillard, 2005, p. 68). This recognizes the less visible ways that parental involvement manifests, such as when learning is not directed towards institutional goals (e.g., curriculum objectives) or in school spaces (e.g., within schools). The authors described involvement in children's *schooling* as "the ways parents took active roles in supporting their children's progress in school… [that] includes assisting with homework and communicating with the teacher when difficulties arose" (Jackson & Remillard, 2005, p. 68). This distinction between learning and schooling recognizes the arbitrary nature of school-specific activities without ignoring their value in a mathematics education. The authors described

involvement in children's *school* as "the ways parents have an active presence in the school through volunteering and attending school functions" (Jackson & Remillard, 2005, p. 68). This distinction referred to a parent's physical presence in the school building, something that has sometimes been regarded as a sufficient signal for parental involvement. Together, these three types of parental involvement drew attention to the interaction between the spaces where mathematics education happens, as well as the practices that occured in them.

This "rethinking" of the role of parents has become more common in mathematics educational research; however, dominant discourses in schools might still reflect a deficit orientation to parents (Schnee & Bose, 2010). This might explain why some parents see mathematics education as a shared responsibility between parents and teachers, while teachers still see it as primarily their responsibility (Wilder, 2017). Indeed, this tension was particularly evident in studies that occurred in the context of emergency at-home learning during the COVID-19 pandemic (e.g., P. Allen & Trinick, 2021; Harper et al., 2021; Matthews et al., 2021; Murphy et al., 2023). During school closures, parents were suddenly relied upon to serve as teachers, monitors, and facilitators of student learning. The "history of devaluing parental engagement in the evolution of mathematics education" (Harper et al., 2023, p. 18) led to some parents feeling abandoned during the pandemic.

Research Questions

After reviewing relevant literature, I reflected on the types of questions that might delve a little more deeply into an understudied context. I began my doctoral studies partly because of the relationships I made with students and their families. After having the

opportunity to sit with my assumptions about FI stability/instability, my reflections on relevant research in the field, and my intentions as an educational researcher, I decided to ask the following questions:

1. How are caregivers supporting children in elementary FI mathematics?
    a. How are caregivers of students in the FI program supporting their children's mathematics *learning*?
    b. How are caregivers of students in the FI program supporting their children's mathematics *schooling*?
2. How do caregivers adopt the roles of *learner*, *teacher*, and *leader* to support their children in mathematics?
3. How does the relationship between home and school influence the roles that caregivers adopt and the ways that they support mathematics learning and schooling?

Each of these questions can be traced to the theories described in this chapter. The first question connected to Bourdieu's (1984) concepts of field and cultural capital, looking at how caregivers intentionally and unintentionally leverage cultural capital to support their children's mathematics learning in two social fields (i.e., home and school). It also examined parents' engagement in both of these spaces by seeking manifestations of embodied, objectified, and institutionalized cultural capital as expressions of parental support. The distinction between mathematics learning and mathematics schooling drew from Jackson and Remillard (2005) and teases apart conceptions of school mathematics from conceptions of mathematics as an everyday activity.

The second question connected to Bourdieu's (1984) concepts of habitus and cultural capital by noticing how personal values manifest in caregiver actions. I began with the roles identified by Civil et al. (2005) and explored how they are made possible by an internalized set of assumptions about a caregiver's role in education that leverages cultural capital.

The third question connected to Bourdieu's (1984) theory of practice, which described human activity as a reflection of the relationship between habitus, field, and cultural capital. The relationship between these concepts offered the tools to examine relationships between caregivers, care-receivers, school personnel, and the broader school community, as well as how these relationships interact with the intentional and unintentional ways that caregivers support their children's mathematics learning and schooling. This interpretation of theory of practice reflected a postmodern curiosity in the relationships between and across people.

These questions aimed to achieve several things. They explored the dual elements of schooling and learning, which invited an expanded understanding of what it means to be supporting a child in mathematics. They also foregrounded the voices of caregivers as they related to the experience of learning mathematics in FI. Rather than focusing my study on what happened within a classroom, the questions explored what happens outside school walls. These questions rejected deficit assumptions of uninvolved parents and assumed an active foundation of care. There are many ways that caregivers support children's mathematics learning that extend beyond doing homework, and more research is needed to share these stories.

Chapter Summary

I opened this chapter by introducing Bourdieu's concepts of habitus, field, and cultural capital as the foundation of my theoretical framework. I explained how I strengthened this framing by learning from feminist postmodern scholarship, whose insights about care and representation profoundly impacted how I conceptualized doing educational research. I then reviewed literature that explored parental involvement in education, which helped to further refine the methodological choices I will be introducing in the next chapter. I finished by introducing my research questions and connecting them to existing scholarship in the field. The next chapter will discuss my methodological decisions in detail.

Chapter 3: Methodology

As a doctoral student, I needed to unlearn several assumptions about educational research before building a methodology that satisfied my personal moral framework. People are messy, and no amount of quantitative data, accounting for variables, or maintaining distance could counter this reality. It is not surprising that the process of thinking through my research methodology led to a period of disorientation. It was a site of collision among conflicting and competing beliefs about the kind of research that I ought to be doing. Academia is a space steeped in White, male, and privileged traditions. It is a space steeped in suspicion of "the other" in all its forms. The other includes researchers themselves, those who are not White, are not male, and whose personal privileges do not mirror those of their colleagues. The other includes ways of thinking about the world, ways that extend beyond extractive and hierarchical assumptions about human existence. And the other includes the choice of where to direct the researcher's gaze—inward as well as outward, and certainly the spaces in between. As a result of this process of learning and unlearning, I hesitate to pinpoint this study within a clearly defined and bounded philosophical worldview. Though it has characteristics of scholarship from a critical/transformative paradigm (Kivunja & Kuyini, 2017), my thinking has also been influenced by Wilson's (2020) articulation of an Indigenous paradigm. There is overlap between the ontological, epistemological, axiological, and methodological assumptions of critical/transformative and Indigenous Paradigms; however, the key differences are important to explore further.

Critical/Transformative Paradigm

This study shared a critical/transformative interest in addressing "the political, social and economic issues, which lead to social oppression, conflict, struggle, and power structures at whatever levels these might occur" (Kivunja & Kuyini, 2017, p. 35). In this space, researchers are interested in going beyond understanding a phenomenon and seek to explore ways of enacting meaningful change. A critical/transformative ontology is one of historical realism, which is "the view that reality has been shaped by social, political, cultural, economic, ethnic, and gender values" (Scotland, 2012, p. 13). In such a paradigm, realities are understood as socially constructed "through the interaction between language and aspects of an independent world" (Scotland, 2012, p. 13). A critical/transformative epistemology is transactional (Kivunja & Kuyini, 2017) and subjective (Scotland, 2012), where knowledge is generated through interactions between the researcher and participants.

Scholarship in the critical/transformative paradigm is focused on social power structures and imagines how things ought to be (Scotland, 2012). Though it has an axiology that "respects cultural norms" (Kivunja & Kuyini, 2017, p. 35), it also critiques them:

> The critical paradigm asks the axiological question: what is intrinsically worthwhile? Thus, the critical paradigm is normative; it considers how things ought to be; it judges reality. The utopian aspirations of the critical paradigm may never be realized but a more democratic society may materialize. (Scotland, 2012, p. 13)

It follows, then, that a study in this paradigm would need a methodology that accounts for multiple, socially constructed realities, where knowledge is mediated by

language, and explores the possibilities for a better future. In their characterization of the critical paradigm, Lincoln et al. (2018) described the researcher's posture as a "transformative intellectual" (p. 218), something that draws attention to the activist assumption of research related to social justice. Interestingly, this is one of the ideas that troubles me. Before I explore why I needed to blur the lines between genres (Lincoln et al., 2018), I will describe the philosophical underpinnings of the other paradigm that influenced my research design.

Indigenous Paradigm

In an Indigenous paradigm, "knowledge is seen as belonging to the cosmos of which we are a part and where researchers are only the interpreters of the knowledge" (Wilson, 2020, p. 38). Like the critical/transformative paradigm, an Indigenous ontology accepts the existence of multiple realities. However, reality is understood as "the relationship one has with the truth" (Wilson, 2020, p. 73). This perspective extends the importance of relationships to include the nature of reality itself, where "reality *is* relationships or sets of relationships" (Wilson, 2020, p. 73, emphasis in original). An Indigenous epistemology can be understood as systems of knowledge in context:

> It is important to recognize that the epistemology includes entire systems of knowledge and relationships. These relationships are with the cosmos around us, as well as with concepts. They thus include interpersonal, intrapersonal, environmental and spiritual relationships, and relationships with ideas (Wilson, 2020, p. 74).

From this understanding of researchers as interpreters who experience reality through relationships with people, ideas, living things and non-living things, Wilson (2020) linked

an Indigenous axiology to the notion of "relational accountability" (p. 77). The fundamental criterion for engaging in morally and ethically responsible research is thus accountability to our relations, including the people, things, and ideas in the research relationship.

I situate this project within the critical/transformative paradigm and continue to learn from Indigenous teachings. In this space, there are multiple realities and relationships that are critical for understanding the world around me. I am drawn to the critical/transformative understanding of knowledge, where it is something that is contextually situated and mediated by language. I am also influenced by the critical/transformative interest in confronting systems of power, where scholars question norms and imagine other ways of being. However, I find myself wondering about the advocacy/activist piece; while I do sometimes consider myself an activist and am committed to advocating for causes that I believe in, I wonder about positioning myself as a person who is advocating on behalf of another. I want to engage in research with, not research on behalf of. This is a tension I felt from the beginning of my doctoral studies, and I expect that it will be a companion throughout my academic career. This is perhaps why I am so drawn to the Indigenous valuing of relationships, where relationships are fundamental when considering what is worth knowing, how to approach answering questions, and the accountability one has to the people and the ideas involved in a research project. I am not doing research in an Indigenous context, and I cannot in good faith make claims to doing research from an Indigenous perspective. Instead, I commit to continue learning from an Indigenous conceptualization of relationships.

Blurring Lines Between Genres

Borrowing ideas from two distinct paradigms is an example of what Lincoln et al. (2018) described as the blurring of boundaries that has been taking place in the past 30 years. I expect that I have been influenced by postpositivist, constructivist, transformative, and pragmatic traditions in educational research (Creswell, 2018), in both visible and hidden ways. Planning a research project makes visible the arbitrary and important choices that researchers make. I wanted to resist the assumption that "voice can speak the truth of consciousness and experience" (Mazzei & Jackson, 2009, p. 1). Some choices appeared near the surface, such as which data collection methods to use or how to connect with potential participants. Each research paradigm has its own traditions that help with decisions about which methods would be most appropriate for the task at hand.

Decisions about research design are also connected to decisions about representation. The more I thought about the (im)possibilities of representation, the closer I drifted towards an arts-based approach to qualitative research. An arts-based approach to research "carries the potential to jar people into seeing and/or thinking differently, feeling more deeply, learning something new, or building understandings across similarities or differences" (Leavy, 2018, p. 9). Given my interest in listening to the experiences of parents, I explored how feminist researchers interact with stories. We listen to the experiences of others and witness "the deep-rooted communal connections" (Toliver, 2021, p. xiv) cultivated in family history. Stories help us to develop a sense of self, a sense of community, and a sense of belonging. In short, storytelling is integral to human existence. In her description of ethnography, Britzman (2000) drew attention to the importance of how good stories "blur traditional distinctions among the writer, the

reader, the stories, and how the stories are told" (p. 27). This reminds me of Leavy's (2018) description of arts-based research as a "transdisciplinary approach to knowledge building that combines the tenets of the creative arts in research contexts" (p. 4).

I will now explain how I have drawn from Poetic Inquiry, an arts-based approach to qualitative research with feminist roots (Faulkner, 2019) to inform my research methods.

Research Design: Poetic Inquiry

My early childhood was filled with poetry, such as in nursery rhymes (e.g., "Hickory dickory dock, the mouse ran up the clock"), children's songs (e.g., "The wheels on the bus go round and round"), or board books (e.g., "Goodnight room / Goodnight moon / Goodnight cow jumping over the moon"). These early encounters with rhythm and rhyme were playful and enchanting. I learned to notice the way words felt in my mouth and on my heart, and I later shared this interest with my own children. I started "poking around in research poetry" (Lahman et al., 2019, p. 218) after attending a two-day workshop at a mathematics education conference. The workshop was organized by three mathematics education researchers (Hare et al., 2024) who were engaging with poetic methods (or what they called *poeticy)* in exciting ways.

My favorite definition of poetic inquiry is a simple one: "the use of poetry as/in/for inquiry" (Faulkner, 2018, p. 210). Poetic inquiry requires that researchers reject notions of distant or dispassionate approaches to research. Poetic inquiry is a method, a research approach, a methodology, and a tool (Cooms & Saunders, 2024; Faulkner, 2018; Galvin & Prendergast, 2016; Hockett & Walter, 2025; James, 2017; Lahman et al., 2019; Owton, 2017; Sameshima et al., 2017; Vincent, 2022). It fits within a critical/interpretive

paradigm, a space where researchers might be interested in understanding "the more complex, interchanging, subjective, emotional and individual lived experiences" (Owton, 2017, pp. 16–17) of people. Poetic inquiry offers researchers "a means of relating the data of research in a way that is germane to rethinking both how we do research and how we mobilize knowledge and share our findings" (James, 2017, p. 23). It is an approach to research that encourages pathways towards actively undermining and disrupting power imbalances between researcher and participant, reducing the hierarchical separation between them. Poetic inquirers do this through dialogue, relationships, and an ethic of caring that invites expressiveness, emotion, and empathy (Owton, 2017). Poetic methods can also facilitate communication between data and intended audience (Cahnmann, 2003).

Researchers turn to poetry for "its slipperiness and ambiguity, its precision and distinctiveness" (Faulkner, 2018, p. 209). Poetry engages readers in a form of dialogue where multiple meanings are expected, and differences in interpretation are permitted. Cahnmann (2003) summarized it nicely: "Once we realize that all claims to 'scientific truth' are suspect, influenced by the culturally bound nature of the researcher's text, we can free ourselves to write in ways that name and claim feeling, story, and relationship" (p. 33). Poetry inspires, stimulates, and develops qualitative research (Darmer, 2006). It offers a way forward when exploring and portraying what it is to be human. Its openness to interpretation allows for multiple entry points, invites personal connection and meaning making from the reader. Richardson (2018) suggested that a poem can bring people together in a way that prose cannot, where readers might uncover unexpected

common ground or encounter experiences that challenge their assumptions about others. Poetry "invites the reader to 'step into' another person's experience" (Owton, 2017, p. 8).

Poetic inquiry fosters researcher reflection (de Gennaro et al., 2021), at once more "linguistically economical—concisely meaningful—and more stirring in its aesthetic representations" (Hockett & Walter, 2025, p. 331) than academic writing. Researchers have turned to poetic inquiry as a path towards understanding human experiences in a postmodern world. Eisner (1997) carefully considered the challenges and opportunities that alternative forms of data representation might offer researchers:

> The concept of alternative forms of data representation presents another image. It is an image that acknowledges the variety of ways through which our experience is coded. It is about the ways in which the transformation of experience from the personal to the public can occur. It is about what we can learn from each of these transformations. It is about the trade-offs that are inevitable in the selection of any option. It is about exploring the edges and reexamining the meaning of research. (Eisner, 1997, p. 7)

Human behaviour is complex. A traditional approach to doing or representing research is well suited to understanding parts of the human experience; however, "nontraditional forms [of research] help disrupt the hegemony inherent in traditional texts and evoke emotional responses that bring the reader/viewer closer to the work" (Butler-Kisber, 2002, p. 230).

Laurel Richardson (1994) and Corinne Glesne (1997) were trailblazers in poetic inquiry. Richardson experimented with poetic representation throughout her career (e.g., Richardson, 1994, 2001, 2018), taking "advantage of the postmodernist moment to

examine how we do our work, for whom we write, and the consequences of our activities on ourselves, others, and the future of ethnography" (Richardson, 1994, p. 7). Glesne (1997) was interested in exploring "the possibilities and questions created when research is depicted through a creative form of writing" (Glesne, 1997, p. 203) that she named poetic transcription. In the years since poetic representation emerged as a way to represent interview data, a variety of terms have been suggested to describe the products, including *transcription poems*, *data poems*, and *found poems* (Lahman et al., 2010). Recently, Lahman et al. (2019) offered the general term *research poetry* as a way to acknowledge its close link to a research activity, as opposed to poetry that is composed for purely aesthetic purposes. I have adopted *research poems* to describe the poetry from this poetic inquiry, and I will use that term throughout when describing poetic representations of interview data.

Research poetry involves crafting poems "through the concentrated language of interviewee, shaped by researcher to give pleasure and truth" (Glesne, 1997, p. 213). Poems might be crafted to illustrate a theme, or they might be used to capture a story (Owton, 2017). Like Glesne (1997), I saw poetic inquiry as "a way of reframing an 'either/or' perspective into one of 'both/and,' of moving from dichotomous thinking to more divergent thought" (p. 205). It asks the researcher to reflect about their own experiences in relation to what participants describe while stepping into the representation of what participants had to say. The researcher brings readers closer to participants by filtering through interview transcripts to carefully select words and phrases that reveal the interconnection of participant thoughts. It is perhaps a third voice (Glesne, 1997), a blend of researcher and participant perspectives that together represent

an idea. Poetic inquiry "unmasks both the participant and the researcher" (Miller et al., 2015, p. 415).

Poetic inquiry is a good fit for researchers who are particularly attentive to their relationship with audience, as poetry invites readers to attend to the written word "with their minds, feelings, and self-reflection" (Glesne, 1997, p. 215). This invitation extends beyond the analytical to also include the sentimental, ephemeral, and embodied ways of being human. I was drawn to research poetry for its potential to reduce the distance between researcher and audience by attending to the human need for scientific and aesthetic ways of understanding. The crafting of poems "opens up a spirit of discovery and creation in the researcher, and in the reader, who may begin to think about the process and product of research in very different ways" (Glesne, 1997, p. 216). It created a space where I could connect with both the reader and the participants. Like Miller and colleagues (2015), I turned to poetic inquiry to help me "think with rather than about" (p. 416) participants' experiences, which satisfied one of my values as a researcher. It was a way to "honor the wisdom" (Riquino et al., 2023, p. 723) shared by my participants at the intersection of deeply personal human sentiment and the analytical lens of qualitative research.

Poetic inquiry that comes from research involving human participants requires attention to the relationship between researcher and participant. I have come to expand my understanding of respectful, reciprocal relationships between researcher and participants to include a recognition of intimacy. Intimacy does not appear spontaneously, nor is it something that can be forced. I liken intimacy to the feeling of closeness that may or may not develop over the course of a new relationship, whether that

relationship is with a participant or with someone in my day-to-day life. As Butler-Kisber (2002) described it, "a working collaboration between the interviewer and interviewee that is built on trust and reciprocity over time is most conducive for producing a context in which interesting and important stories will emerge" (p. 235). I found that the closer I felt to my participants, the more I recognized the affordances of research poetry. It helped me let go of the idea of speaking for others. I came to see this process as a way of noticing the utterances that stimulated connection and reflection.

Evaluating Poetry

Even among researchers there can be some trepidation in incorporating poetic methods. Not unlike the childhood trauma of learning mathematics at school, learning poetry at school can leave a bitter aftertaste. Lahman and colleagues (2019) recounted how "the idea of reading poetry brings up a past full of negative experiences" (p. 219) for some researchers. Moreover, some research poets (e.g., Owton, 2017) have suggested that poetic inquiry should be reserved for those who publish poems outside of academic journals. As a novice researcher, I am already grappling with lingering whispers of imposter syndrome; while I may dislike the notion of gatekeeping in educational contexts, I acknowledge that gatekeepers hold a good deal of influence over me. But there are other research poets (e.g., Butler-Kisber, 2020; Faulkner, 2018) who have suggested that a commitment to reading and studying poetry as a craft is enough to be invited into the field.

One of the challenges I have confronted with poetry is that for many, poems may not actually be more accessible than academic writing. Poetry can be intimidating, both in its composition and its interpretation. I see a connection between school mathematics

and school poetry, where students can learn what it is to be "good at math" or "good at poetry." This is not the type of poetry that I aim to contribute. Much like I see the value in noticing the mathematical in the everyday, so too do I wish to share the joy of describing life experiences poetically with others. The type of poetry I am writing is intended for a mixed audience that includes and extends beyond the academic world. It extends beyond and outside classroom walls. It is a meeting ground open to parents and teachers and researchers alike.

Research poetry is composed by someone who must communicate their intent to a general audience (Lahman et al., 2019). While some might argue that poems too have intended meanings, I have come to know poetry as a medium that invites multiple interpretations. Telling the stories of others is the impossible art of crafting representations of human experiences, something that can never be completely witnessed or retold. But the writing process itself helps to reveal "a certain clarity that comes with specificity" (Davies, 2004, p. 4). Through writing, participant stories can be "deconstructed and broken open" (Davies, 2004, p. 5) to reveal how they are at the intersection of the imagined and the real. And I elected to tell participant stories through research poems.

To help with evaluating my research poems, I turned to Owton's (2017) checklist of qualities that can help research poets maintain "a good standard of research that merges artistic and scientific principles" (p. 107):

1. Artistic concentration: focuses attention on considerations of the history and the presence of craft in poetry.

2. Embodied experience: recognises the need for audiences to *feel* with, rather than about a poem, to experience emotions and feelings in situ.
3. Discovery/surprise: the poem teaches us to see something familiar in new ways or ways that might be surprising. We learn something new about the human condition and ourselves.
4. Conditional: the partiality of the story should also be recognized through poetry, point of view as conditional whilst presenting what we may call narrative truth.
5. Narrative truths: the facts presented should ring true, regardless of whether events, feelings, emotions and images 'actually' happened.
6. Transformation: is about providing new insight, giving perspective or advocating for social change. (Owton, 2017, p. 106)

There are many ways of composing poems within the umbrella of poetic inquiry, and not every item in this checklist applies to every research poem. However, it offered a useful starting point for evaluating an alternative form of data representation.

Methods

Ethics

Like Brooks (2017), I wonder whether researchers sometimes view others as objects, things that we evaluate in terms of whether we have power over them. Bourdieu took this view, naming people and institutions as agents operating in a field of power (Bourdieu & Wacquant, 1992). As a researcher and a feminist, I wanted to explore possibilities of "power with" while resisting "the colonial hope of speaking for" (Lather, 2007, p. 38). By foregrounding relationships, the research process could become "a

change-enhancing, reciprocally educative encounter" (Lather, 1992, p. 92). Like other feminist researchers, I value interactive methods for doing respectful research and resist privileging approaches that value prediction and control (Lather, 1992). I value listening to stories in all their subjective, emotional, contextualized, and human glory. Though there is a strong tradition in empirical research that uses dehumanizing vocabulary (i.e., "research participants", "sub-cases"), I stress that I sat with people. People have complex needs and exist beyond the limits of a bounded social space. I had and continue to hold an obligation to respond to their concerns.

In Canada, all university-based research involving human participants needs to meet an institutionalized ethical standard. After successfully defending my research proposal, I submitted an application to the Research Ethics Board (REB) at the University of New Brunswick. The REB process is a necessary protective measure that outlines a minimum duty of care from both the researcher and their sponsoring institution towards participants. Tilley (2016) described the purpose of REB as the consideration of "the ethical implications" (p. 108) of the proposed research, but she also warned that meeting the minimum standard may not be enough for a researcher interested in engaging in respectful, human-centered research. This warning makes sense when researchers pause to question whose interests are protected by the REB. Do they serve to protect participants, communities, researchers, or institutions? In Canada, universities are "ideologically constructed as public institutions" (Lewis, 2008, p. 692), which means that institutional interests could be conflated with public interests. This is problematic when public interests are dictated by the values and ideologies of those who hold power. While

REBs may serve as a layer of protection for research participants, I remained equally mindful of a relational understanding of ethics and consent.

I committed to conceptualizing my research as relational and caring, which went beyond an institutional threshold for meeting ethical standards. There was (and is) a duty of care that exists between the researcher and the research-ee, something that is unavoidably unidirectional in some instances. An ethics of care did not replace the institutionalized mechanisms that control how research with human participants proceeds; instead, it offered theoretical tools that created space for confronting the assumptions that underlie them. Research in the social sciences can be extractive, and I was mindful of my own positioning as I navigated consent. On the one hand, my identity as a fellow caregiver of children in FI may have shortened the distance between researcher and research-ee and provided an empathetic lens; on the other hand, my identity as a former FI teacher might have associated me with the other—that is, teachers. Being a mother, a teacher, and a researcher, I know how discussing issues related to children and education can make me feel vulnerable. A further ethical consideration was confidentiality, something that can be interpreted as a protective measure undertaken on behalf of participants. However, I challenge that this needs to extend beyond another unidirectional understanding of the relationship between the researcher and participants. I cannot prioritize my research agenda over their complex socioemotional well-being. There was no experiment being conducted; no treatment being applied or withheld. By institutional standards, this study was considered a minimal risk to participants. But given the sociopolitical context of this study, there was some social risk if confidentiality was not maintained.

I listened to participants' hopes for what this research might contribute to education in the province. After data collection ended, I contacted participants to share interview transcripts and opened the floor for clarifications. And when I began composing research poems, I shared poems with participants to solicit their feedback. These actions helped me to resist two-dimensional, static narratives. Each participant is a whole person with individual needs, motivations, and insecurities. These steps allowed help me to respectfully engage in shared meaning making while following through with my promise to step towards a reciprocal relationship. For me, this meant listening to their stories, negotiating meaning, and validating their feelings about the process. This connects to how Gannon and Davies (2011) described a particular concern of post-structural ethics and respect:

> Post-structural ethics in contrast [to the liberal-humanist desire for control] struggles toward a different kind of respect for the other, one which does not divide researcher from researched, but comprehends their mutual embeddedness in discourse and relations of power. The research cannot thus be totally planned in advance but maintains its openness to the other, and to the ethical demands that arise in the encounter with the other, where the researcher will become someone-she-was-not-already. (p. 315)

I designed this study to be relational and dynamic, a type of research that welcomed change and flexibility of thought.

Research Site

I chose NB as the area for this study. This is the province where I live, work, and play, and it is the context within which I began asking questions about the relationship

between mathematics and enrollment in FI. Anglophone schools in New Brunswick are divided into four districts: Anglophone North School District, Anglophone East School District, Anglophone South School District, and Anglophone West School District (ASD-W). Though I reached out to all four Anglophone districts and went across the province to share my call for participants, all participants had children attending schools in ASD-W.

Anglophone West School District encompasses approximately 1/3 of the province of NB and includes 70 schools. Parent participants were attached to five different schools in ASD-W, including one Grade K–2 school, one Grade 3–5 school, one Grade K–5 school, and two Grade 6 – 8 schools. These schools ranged in size from 200–700 students and were located in two different municipalities: one rural and one urban.

Recruitment

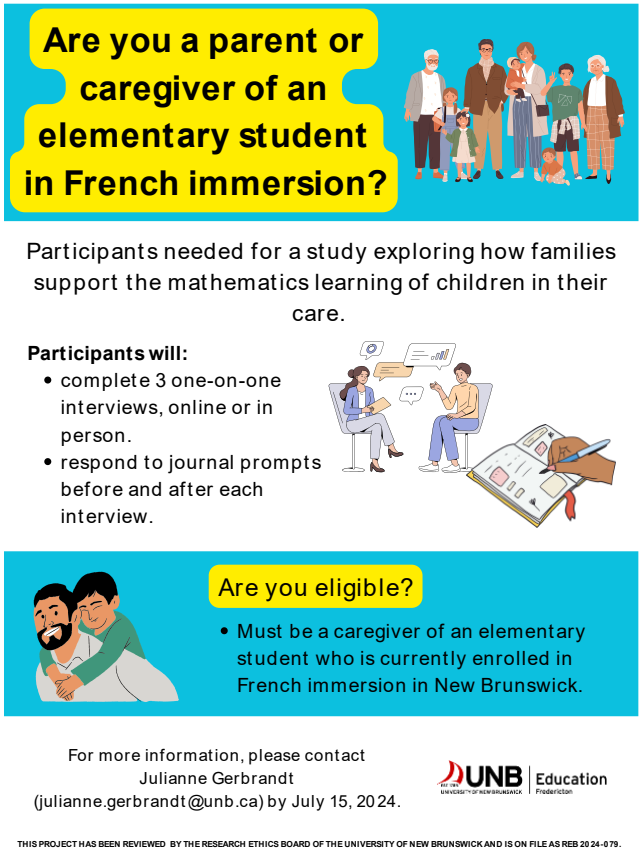
After obtaining REB approval, I attempted to recruit parents and caregivers through a combination of opportunistic and purposeful sampling. I initially tried recruiting participants through school districts. Although this study occurred outside schools, it is inextricably linked to public education. The primary inclusion criterion for participation was having an elementary-aged child enrolled in FI, which made recruitment through schools a logical approach. Unfortunately, I was unable to recruit through school districts. Superintendents were reluctant to distribute information about this study to parents' e-mail addresses.

Participant recruitment outside of schools was complicated and at times frustrating. I began by using social media, where an advocate for FI in New Brunswick mistook my study for a government initiative and publicly discredited it. I visited family

resource centres, community libraries, and multicultural centres across the province to put up eye-catching posters (see Figure 1). I exchanged emails with organizations that run community programming for parents, and I traveled across the province to have face-to-face conversations with community leaders who expressed support for the study. None of these conversations resulted in recruitment.

Figure 1

Recruitment Poster



After two months of failed recruitment attempts, I reached out to the parent of a former student to see if she might know anyone who would be willing to participate. Thus began the first of what I have coined "sticky sampling," a similar recruitment method to snowball sampling (Merriam, 1998). Each sticky sample began with a personal

connection (see Table 1). The parent of a former student became my first participant, and she connected me to another parent whom she knew through her volunteer work at an elementary school. The next sticky sample began with my husband, who shared details of my study among his network of dad friends. Two of his acquaintances were interested in participating. The third sticky sample came from me reaching out to someone who had contributed an opinion piece that I saw shared on social media. Not only did he agree to participate, but he connected me with another father who was interested in the study.

Table 1

Participant Recruitment

	Participant	How they were recruited	Children
Sticky Sample 1	Sally[2]	Direct message via Facebook (Sally is the parent of one of my former students)	Kate, Grade 2 French immersion Nate, Grade 4 French immersion Frank, Grade 7 English Prime
	Megan	Friend of Sally	Anna, Grade 1 French immersion
Sticky Sample 2	Roderick	Direct message via Facebook (I read an online opinion piece he wrote)	Sue, Grade 1 French immersion Margaret, Grade 4 French immersion Vicky, Grade 7 French immersion

[2] All names of participants and children are pseudonyms.

	Simon	Friend of Roderick	Riley, Infant Kim, Preschool Ben, Grade 1 French immersion
Sticky Sample 3	George	Heard about study through my spouse	Karmen, Preschool Grant, kindergarten English Prime Miley, Grade 1 French immersion
	Val	Heard about study through my spouse	River, Grade 1 French immersion Destiny, Grade 3 French immersion

There were three criteria that determined someone's eligibility for participating in this study:

1. Participants are caregivers of an elementary-aged child who is a) currently enrolled in FI or b) currently enrolled in English Prime but was enrolled in FI within the past year.
2. Participants are willing to complete a minimum of three 30–45-minute individual interviews.
3. Participants are willing to write a minimum of six journal entries.

I hoped to recruit a minimum of five and a maximum of 15 participants. While there is a lot of discussion about the ideal number of participants in qualitative research, there is no consensus (Baker & Edwards, 2012). I decided on this window based on Creswell's (2018) suggestion that the number be somewhere between one and 30, depending on the research design. Given my interest in relationship-building and a

commitment to an ethics of care, this range presented the opportunity to gather the rich, detailed, and subjective data that can answer my research questions. I recruited six participants in total: two mothers and four fathers.

Data Collection

As I became increasingly entangled in the weavings of feminist postmodern thinking, I was attentive to the methods that best fit my research. My understanding of qualitative research evolved over time. I am no longer under the illusion that my research can reveal a truth, and a part of me laments the naïve assumptions that propelled me down this path in the first place. I entered Lather's (2007) "noninnocent arena" (p. x), a space for inquiry "between an impossible certainty and an interminable deconstruction, a science of both reverence and mistrust, the science possible after our disappointment in science" (p. x). This was a space where time expanded to accommodate the need for internal and external dialogue (Cadaval Narezo, 2022), a space where what was felt "on the skin and in the heart" (Dupuis et al., 2022, p. 11) informed subsequent steps in the research process.

Though there are a variety of methods that might be included within the umbrella of a feminist methodology, Dupuis et al. (2022) highlighted the importance of relationships and human emotion in research:

> In the sharing of a quiet look of understanding while having a coffee with a research participant, in the sinking into the listening to often-told stories, in moments of mutual support, our own and others' emotions are brought out and their importance for the research process is examined. (p. 14)

Feminist methods facilitate encounters where the researcher and participants can share, care, bond, and think together (Cadaval Narezo, 2022). Sathyamala (2022) suggested that a feminist methodology needs "to be lived rather than applied" (p. 161). I turned to individual interviews and journaling to help identify, document, and share the ways that parents and caregivers of elementary FI students support their mathematical learning outside of schools. Because there may be different interpretations of what counts as support, I wanted to engage participants with multiple ways of surfacing their contributions. I will now explain the sources of data for analysis and how these data were organized.

Individual Interviews. I was interested in parent and caregiver perspectives on ways to support children with their learning of mathematics in FI, and I believed that individual interviews were the best approach to hearing their stories. Interviews are one of the most common methods used in qualitative research, as they give researchers the opportunity to gain insight into different perspectives on a given topic (Fontana & Frey, 2003). As a classroom teacher, I quickly learned the importance of developing respectful relationships with parents and caregivers, and communication was a key component of building relationships. But as I started to think about how interview research might mirror the conversations I had with parents and caregivers as a classroom teacher, I started to recognize how my previous assumptions reflected a simplified understanding of interview research. Interviewing is far more complex than asking questions and getting answers. DeVault and Gross (2007) described the complexity of human talk:

> …the flexibility and productive powers of language; the subtle shades of meaning conveyed through the nuances of speech, gesture, and expression; issues of

> translation; the ineluctable locatedness of any moment or stretch of talk; the specialized vocabularies of particular settings and groups; the organizing effects of format and genre; the injuries and uses of silence; the challenges inherent in listening; and so on. (DeVault & Gross, 2007, p. 173)

This study used a combination of semistructured and unstructured approaches to individual in-depth interviews with participants. Brinkmann (2018) described qualitative interviews as existing on a continuum, with one end comprising a rigidly structured set of pre-determined questions and the other end comprising a broad, open-ended invitation to speak freely. Each end of the continuum represents a theoretical extreme, with all interview approaches existing somewhere along its length. My approach to interviewing was closer to the unstructured end of Brinkmann's continuum, where "the main role of the interviewer is to listen" (Brinkmann, 2018, p. 1002). I was also mindful of moments when it became necessary to refocus the conversation on issues related to my research topic. I saw this as a negotiation between an unstructured and a semistructured approach to qualitative interviewing. This negotiation reflected the difference between an interview and an everyday conversation; as much as I engaged in genuine, meaningful, caring conversations with participants, I was also engaged in knowledge production.

Rather than composing a prescribed checklist of questions to ask, I organized interviews using general themes and open-ended questions to explore. This provided a "conversational structure that is flexible enough for interviewees to be able to raise questions and concerns in their own words and from their own perspectives" (Brinkmann, 2018, p. 1001). My role shifted between active listener and active participant, where the interview was a negotiated text constructed by both the interviewer and the interviewee

(Fontana & Frey, 2003). My conception of a dual role of listener/participant reflected what Borer and Fontana (2012) described as an example of a postmodern sensibility, where "the boundaries between, and respective roles of, interviewer and interviewee have become blurred as the traditional relationship between the two is no longer seen as natural and is criticized for reproducing societal power dynamics" (Borer & Fontana, 2012, pp. 46–47). The interview is a site where the interviewer and the interviewee "can get together and create new possibilities for subjectivity and action" (Brinkmann, 2018, p. 1013). Further, postmodern interviewing invited "representational invention, where the dividing line between fact and fiction is blurred to encourage richer understanding. *Reflexivity*, *poetics*, and *power* are the watchwords as the interview process is refracted through the lenses of language, knowledge, culture, and difference" (Gubrium & Holstein, 2003, p. 3, emphasis in original). I interpreted the notion of "representational invention" as what becomes possible when responses to interview questions are not understood as absolute truths. Instead, they are representations of communication intent. With these ideas in mind, research poetry became a generative method for representing and analyzing data.

I decided to do three interviews with each participant because relationship building takes time. Earthy and Cronin (2008) listed the following advantages of conducting multiple interviews:

- It may assist the development of trust and rapport between the researcher and interviewee.
- It may be less exhausting for both parties, particularly in comparison with a single attempt to capture a person's life story.

- For interviewees who are unwell or who find aspects of the conversation distressing, the possibility of ending the interview knowing that the conversation can continue on another day may be particularly helpful.
- The gap between interviews provides an opportunity for both the interviewee and the researcher to reflect.
- Aspects discussed in one interview can be clarified and explored in greater depth in a subsequent conversation. (p. 431)

One interview felt too quick and out of sync from the type of in-depth conversations that I hoped to have with each person. Two interviews might have instead operated as an introduction and a farewell, without the opportunity for intimacy in between. And so, three interviews felt like the ideal number of interactions to engage in trust-full dialogue with participants that would result in a manageable quantity of data. Each interview focused on one of the research questions as a main point of interest, with interviews two and three beginning with an overview of what was discussed in the previous interview.

Interviews took place over a period of five months, beginning in June 2024 and concluding in November 2024 (see Table 2 for an overview of interviews). The combined total interview time for all six participants was just over twenty hours, or 1215 minutes. Five out of six participants completed three interviews, while one participant met with me four times to answer all interview questions. The interviews varied in location, length, and time of day. Three participants elected to do interviews in person: Megan and Roderick hosted me in their homes, while Sally met with me in a busy coffee shop. These in-person interviews were the longest and the most in-depth, with every interview lasting

more than one hour. These participants were more likely to ask me questions and to share what they had been thinking about in between interviews. Each of these participants made references to their journals during our conversations and I felt that I got to know them more intimately than the other participants.

Table 2

Overview of Interviews

Participant	Interview Length	Interview location
Sally	Interview 1: 65 minutes Interview 2: 114 minutes Interview 3: 126 minutes	Coffee shop
Megan	Interview 1: 68 minutes Interview 2: 133 minutes Interview 3a: 98 minutes Interview 3b: 136 minutes	Public playground; participant's home
George	Interview 1: 45 minutes Interview 2: 75 minutes Interview 3: 68 minutes	Microsoft Teams
Roderick	Interview 1: 83 minutes Interview 2: 114 minutes Interview 3: 66 minutes	Participant's home
Val	Interview 1: 27 minutes Interview 2: 33 minutes Interview 3: 22 minutes	Microsoft Teams (cameras off)
Simon	Interview 1: 53 minutes Interview 2: 67 minutes Interview 3: 64 minutes	Microsoft Teams

George preferred meeting on Microsoft Teams in the evenings, whereas Simon preferred meeting on Microsoft Teams during the day. In both of these cases, childcare was given as the reason why they elected to meet me online rather than in person. Val was the only participant who did not use a face-to-face method of communication. One interview occurred while he was walking his dog, while the other two took place on Microsoft Teams with the cameras off. Of the three participants who elected to be interviewed through technology, I found it most difficult to build a connection with Val. He experienced several technical difficulties when we tried to meet, and I suspect that is one of the reasons why our interviews were the briefest and ranged from 22 to 33 minutes in length.

There are many considerations when thinking about offering participant choice in qualitative research. It is important that participants feel comfortable, and I wanted to honour their preferences. However, I believe this directly impacted the quality and quantity of my data. In the future, as I set out to engage in respectful research involving people, I will talk about the implications of choice. Perhaps it is not enough to offer choice. Perhaps as the researcher I have an ethical responsibility to share with them potential implications of their choices. Each participant expressed hope that their participation would contribute to improving education in some way.

The first interview focused on connecting with participants and establishing a relationship. We discussed their experiences having a child (or children) in the FI program and how they saw the relationship between learning mathematics in a second language and their responsibilities as a parent. I asked the following questions in the first interview:

1. Can you tell me a story about your experience having a child learning mathematics in the French immersion program?
2. How do you support your child in their learning of mathematics at home?
3. How do you support your child in their learning of mathematics at school?

The second interview explored the distinct roles that parents adopt when supporting their children in mathematics. I asked the following questions in the second interview:

1. Now that some time has passed since our first conversation, are there any reflections or ideas that you would like to share?
2. Can you tell me a story about when you adopted the role of learner of mathematics to support your child? How did you know you needed to adopt this role? What was the outcome?
3. Can you tell me a story about when you adopted the role of teacher of mathematics to support your child? How did you know you needed to adopt this role? What was the outcome?
4. Can you tell me a story about when you adopted a leadership role to support your child? How did you know you needed to adopt this role? What was the outcome? Are there any difficulties with adopting different roles to support your child?

The third and final interview centred around the relationships that parents develop with their child's school. I prepared the following five questions for this final interview:

1. Can you tell me a story about your relationship with your child's school? How would you describe this relationship?

2. How did your relationship with people in the school influence the way you supported your child? How might one's relationship with the school influence how they support their child in mathematics?
3. How would a caregiver know when to adopt the role of learner to support their child? What does a learner caregiver look like? What sort of things do they do? What sort of ways do they act?
4. How would a caregiver know when to adopt the role of teacher to support their child? What does a teacher caregiver look like? What sort of things do they do? What sort of ways do they act?
5. How would a caregiver know when to adopt the role of leader to support their child? What does a leader caregiver look like? What sort of things do they do? What sort of ways do they act?

After conducting the final interview with Participants A, D and E, I noticed that four of the questions were too abstract and needed rephrasing. I listened to the interview recordings and noted what I asked as follow-up questions to decide which questions to ask the remaining participants instead. I replaced questions #2, #3, #4, and #5 with the following ones:

6. How does a relationship develop between home and school? What things do schools do? What things do parents do? Where do these ideas come from?
7. Do you know anyone who would describe their relationship with their child's school differently?

8. How does the relationship between home and school impact the student's schooling and learning?

After each interview, I transcribed the audio data using the transcription tool in Microsoft Word. I then listened to each recording three times (once at .75 speed and twice at normal speed), making corrections as I went. I made decisions about how to represent changes in volume, tone, or nonverbal gestures that I noted in my observation notes. I noted details such as when a child interrupted to offer a cup of tea, when the noise of a lawnmower distracted a speaker from their line of thinking, or when we laughed. I felt it was important to make reference to these often-hidden details, as they were part of the encounter between researcher and participant.

Journaling. In addition to engaging in a series of interviews, participants were invited to write in personal journals throughout the study. Though the terms *diary*, *log*, or *journal* might sometimes be used interchangeably to describe personal records "of ongoing events in their lives and in their surrounding social environments" (Vannini, 2008, p. 764), the term personal journal is typically used to describe a note-keeping tool that explores "the rich personal experiences and emotions of participants' inner lives" (Smith-Sullivan, 2008, p. 214). Personal journals are a space where participants can "feel comfortable with their degrees of self-disclosure" (Smith-Sullivan, 2008, p. 214). This method of data collection offered participants a separate way to voice their thoughts, beliefs, and feelings about supporting the mathematics learning of their children. I encouraged participants to bring their journals to every interview.

In their reflection on journaling as a data collection method in nursing research, Hayman et al. (2012) identified three challenges that social scientists should consider

during the design phase of their research: poor participation, feeling exposed, and staying on track. They attributed poor participation to a lack of writing confidence among participants, the time required to write a lengthy reflection, and anxiety about sharing personal information. To offset these challenges, they recommended that researchers offer clear instructions "that [give] participants a sense of direction and expectation without restraining their creativity" (Hayman et al., 2012, p. 29). They recommended that researchers check in with participants throughout the journaling process. They also emphasized the importance of "promoting comfort" (Hayman et al., 2012, p. 30), which might look like personal responses to journal entries, visible privacy clauses on each journal page, or sharing your own responses to the journal prompts.

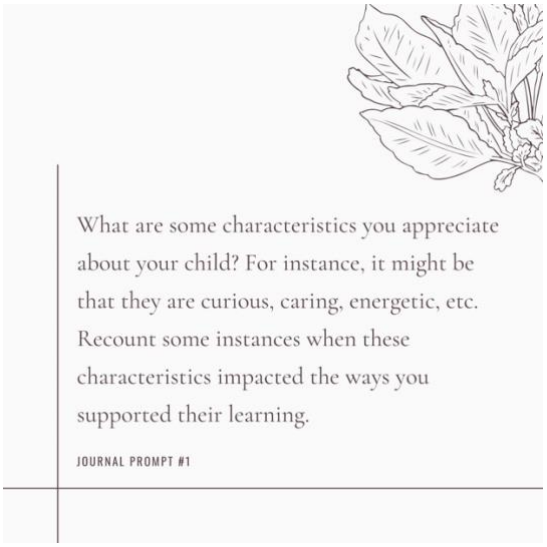
At the beginning of the study, each participant was given the option to use an online journal or a physical journal for their reflections. I dropped off journaling supplies—a notebook and colourful pens—to Sally and Roderick. Megan preferred providing her own journal, while George and Simon kept online journals. Most participants completed all of their journal responses; however, Val did not. Once Val communicated that he was not writing down his responses but rather thought about them before our interviews, I began making time at the start of each interview to discuss his responses to the journaling prompt. He seemed interested in responding to the journaling prompts, but I suspect that journaling was not an activity he practiced in day-to-day life.

Participants used journals to record responses to specific prompts (see Appendix B) as well as for any additional entries that they found relevant to the study, which was a combination of time-based and event-based diary entries (Bolger et al., 2003). Before each interview, I emailed participants a journaling prompt to stimulate their thinking

about the interview topic. Each participant responded to the same three pre-interview prompts. Figure 1 shows the journal prompt that every participant—me included—responded to before the first interview.

Figure 2

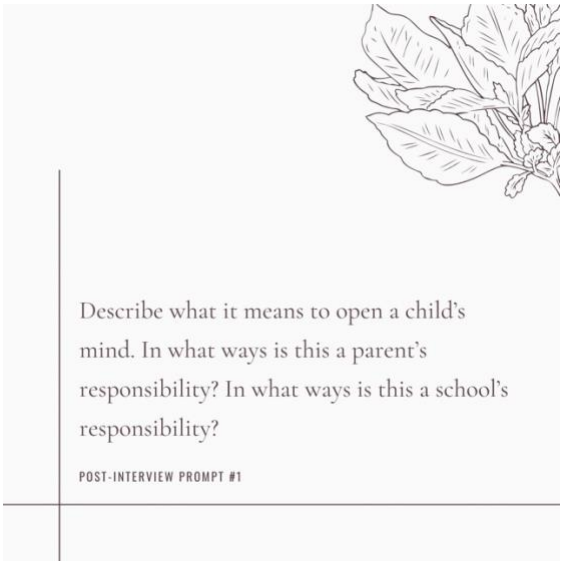
Journal Prompt #1



After each interview, I listened to the recording and jotted initial ideas for the follow-up journal prompt. Sometimes I knew right away what I wanted to ask and just needed to think about how to word it, while other times I needed more time to think about the direction I wanted to take. I wanted prompts to be responsive to what participants had to say. It was not enough for me to be curious; I also wanted to notice which topic might be valuable for them to explore in more depth. Participants did not respond to the same post-interview journaling prompts. For example, Megan used the term "open her mind" during the first interview, and her post-interview prompt (see Figure 2) asked her to elaborate about how opening a child's mind was a shared responsibility between home and school.

Figure 3

Megan Post-Interview Prompt #1



Similar to participants, I also responded to journal prompts in a personal journal throughout the study. Qualitative researchers use journals or researcher diaries "to record and reflect their own behaviors, attitudes, feelings, and thought processes to provide a multilayered facet to their academic studies" (Smith-Sullivan, 2008, p. 214). I wanted to blur the line between fieldnotes and journaling as a way to acknowledge how my observations and interpretations coexisted and were often intertwined (Jang, 2020). I am mindful of my identity as a bilingual, White, middle-class woman, as well as my position as a FI student, educator, and researcher in New Brunswick. Rather than seeing these macro and micro elements of my identity as obstacles to overcome, I followed Bourdieu's footsteps towards a reflexive sociology capable of "bridging the gap between objectivism and social constructionism" (Dean, 2017, p. 13).

I maintained this journal for collecting observations, reflections, questions, and emerging ideas throughout the study. These dated notes included both planned (i.e., my responses to the set journaling prompts) and unplanned (i.e., reflections during

interviews) entries. I documented research choices, unexpected challenges, and developing thoughts. This resulted in a combination of observational data, reflexive questions, and preliminary data analysis.

Data Analysis

I return here to Lather's (2007) advice to her graduate students: it is important to learn how to interpret and understand the world before attempting to deconstruct it. While I am deeply influenced by the postmodern suspicion of predetermined steps, I am also vulnerable to worries about legitimacy and rigour. I found myself in the space between certainty and uncertainty, between following a set of clear, comfortable, and arbitrary steps and floating off untethered into a twisted tangle of ill-defined steps. I reminded myself of the two previously mentioned assumptions of postmodernism: first, that everyone and everything is dynamic and unfinished, and discourses and practices can only be identified and understood in relation to one another. With these key ideas in mind, I drew from poetic inquiry and reflexive thematic analysis as complementary analytical methods.

Poetic inquiry. Poetry, or poetic methods, entered my research process as a way to engage with participant ideas I valued but did not agree with, to step closer to a person while donning my researcher hat. I came to poetry for its potential as a common language shared between and across different perspectives. My process occurred in four steps.

Step One: Immersion and Catch. As I became more intimately familiar with my data, I moved back and forth between the audio recordings and the written transcription slowly appearing on my screen. By the time I finished cleaning my transcriptions, I had listened to each recording at least three times at various speeds. The more I immersed

myself in the data, the more I noticed segments of conversation that stood out. Prendergast (2015) described this as a "catch" and identified the following characteristics as guiding her choices when composing research poems:

- Aesthetic power
- Imagery, metaphor
- Capturing a moment
- Truthtelling, bravery, vulnerability
- Critical insight, often through empathy
- Surprise and the unexpected

I elected to "catch" the material for my transcription poems from the written transcriptions rather than from the oral recordings. I needed to trust my transcription choices, which included noting environmental noises (e.g., a barking dog), unexpected but welcomed interruptions (e.g., a curious child offering me a cup of garden tea), or changes in tone. I was interested in noticing meaning conveyed through things other than the words themselves, things like volume, ambient noise, and gestures. This again is a reminder of how any text, whether written, oral or visual, is a representation and not a certainty. This movement back and forth ensured that each poem reflected my impressions of each participant (Latta & Thompson, 2011). As I reread transcripts and listened to audio recordings again and again, I attempted to get closer to what each participant wanted to communicate. This process was a negotiation, where I followed my research questions, explored unexpected topics as they emerged, and accepted the impossibility of fully understanding what a person has to say.

I frequently returned to my research questions during this stage so that I could keep sight of the purpose of this study. I created a new document for each participant that I named their catch ("Participant A catch"). This step served as a form of data reduction, as I was able to concentrate my attention on the parts of interviews that had some of Prendergast's (2015) characteristics mentioned above.

Step Two: Arrangement. After finishing each catch, I started the process of arranging poems. I began by going through the entire catch and highlighting sentences or word groups that stood out. Whereas the catch reduced data—on average, catch documents had 1/3 the total words of the three interviews combined—this step pinpointed the moments that felt most important and relevant to my research questions. In Table 3, I share an example of how I arranged segments of interview data into poems. It is important to point out that not every highlighted word appeared in a poem; instead, I treated these excerpts as my crafting supplies for stitching together the final poem. By composing the poems from a catch rather than from the complete transcripts, I was more focused and less overwhelmed.

Table 3

From Catch to Arrangement

Original Text from Catch	Draft Poem
My biggest drive so this is Anna she's just finished Grade 1 so she just finished her first year in French Immersion and as my daughter I have a poor filter around my daughter and I'm like you learned nothing in school this year and I am so disappointed especially in math I come from a very mathy family shall we say	You learned nothing in school this year I am so disappointed Especially in math I love mathematics (I think I love it?)

and so like I almost like I almost did mathematics in university at University of Waterloo like I you know I love mathematics I think I love it because there's always an answer except when you get really high up you know and then

These early poems were sorted according to research question, and I quickly saw how a picture of each participant began to emerge. At first, I resisted moving around a transcript to pull words to suit my poetic preferences. I wanted to maintain the participant's voice so that I could sit with it rather than reshape it to my own interpretation. I loosened this criterion as time went on, particularly as I crafted poems about recurring topics. For instance, George mentioned Smarties in two interviews (see Table 4). Rather than only using the words from a single interview, I collected the thoughts and ideas across our conversations that related to the use of Smarties as a mathematical tool.

Table 4

Example of Poem from Multiple Interviews

	Original Text	Poem
Interview 1	And it's it's like a TV show about these characters that do math and they count, and each one has a different personality. And so it's showing that to her little brother. Uh, but then there's also advanced episodes, and they just watched whatever was on and like he learned how to count. Like really quickly after watching that made a huge difference. Like after we spent like a year on it, he just picked it up within like 2 weeks. It was just like,	**Counting to 10** 10 Smarties on a table Sliding on a table I'm gonna slide them 1 2 3 4 5

	Oh my God. Like like, like you couldn't bribe him with Smarties to count the Smarties. He just he would give up. He just he would just get frustrated and walk away.	He's not allowed to touch He'll just grab them He'll just eat them
Interview 2	I was trying to teach him how to count so I would take like 10 Smarties and I would count them first. I wouldn't let them eat them and then I would get him to try to repeat it. And then, but he he'd have to get it all right to be able to eat the Smarties. I we might have been doing 5 at the start because I think we gave up on 10 and we went down to 5. They're like, they're like on a table. We're together and you're, like, sliding them on the table. So you're going like 12345 now. Now you do it, buddy, and it's like and then it's. So I'm gonna slide them buddy because he's not allowed to touch them because then he'll try. He'll just grab them and eat them, and then he might be like one.	"How many's this?" *12345* Memorized You couldn't bribe him with Smarties to count

Step Three: Flow. The third step attended to technical considerations. One of the challenges of composing poetry as a novice poet is its compressed form, which makes "every word, punctuation, and space" (Lahman et al., 2019, p. 225) a weighty decision. This challenge is also one of the affordances of composing research poems, where researchers reduce "large quantities of data into potent, compelling, and affective bodies of content that capture the natural rhythms and language of participant contributions" (Riquino et al., 2023, p. 723). I generally preferred composing poems using free verse, a type of poem composed of "nonmetrical, nonrhyming lines that closely follow the natural rhythms of speech" ("Free verse", 2025). I attended to flow in free verse poems by

making decisions about stanza, typographical emphasis, word choice, and page layout. I also composed several haiku poems, which required attending to different technical considerations. Whereas free verse poems served as representations of what participants said and how they said it, haiku poems served as concise, incisive representations of their ideas. Table 5 shows an example of a poem that attended to the technical requirements of haiku.

Table 5

Example of Poem that Attended to Flow

Original Text	Poem
Yeah. out-of-the-box. And yeah, thinking about. Different ways or Frank has an entire Lego Army base that lives, lives under his bed, and so essentially we have a coffee table that we took the legs off of. So. It can slide. In and it's him under his bed. And so he had. He had an entire Lego base. Which Lego doesn't make army LEGO. I've heard. LEGO LEGO, I think, has stated they will never make army stuff. It's against their. Beliefs or. Yeah. So he created it entirely on his own, out of his own head and watching YouTube videos here and there to help create it. But he had an entire base, and it was amazing. And Bill had a few barbecues last year with guys from work and Frank would bring them in as a tour of, like, come look at it and that. They would come out. And be like. How did he do that? And then, like I have no answer, he just sits there and tinkers away, and he is now he demolished half the base and he's actually now doing more of a town. With the base, which is kind of cool for where we live. But again, yeah, just tinkering away and looking at a scale very	**LEGO** coffee table or living hiding LEGO base tinker math at scale

much math and making you know things
the right spot, but. Yeah. We do math all
the time.

While composing research poems, I created mini poetry collections where I wrote and rewrote the poems I had previously drafted on my laptop. This act allowed me to feel the poems, the ideas, differently. By flipping a page or touching a poem, I could see how the poems connected across research questions and across participants. It also allowed me some distance to again revise and reconfigure the poems as I experimented with space and layout.

Step Four: Distance. The last step was to put the poems away for a while. Given that this is a dissertation, I did not feel that I could step away from the poems for months at a time. However, I ensured there was at least a week between each step, and I returned to the poems after doing reflexive thematic analysis.

Throughout the process, I kept a poetry journal where I collected examples and ideas from poets who inspired or challenged my thinking. In this journal, I composed poems every day, and I explored a variety of poetic techniques. Whereas composing research poems restricted me to using participants' words, this daily practice allowed me to develop poetic technique.

Reflexive Thematic Analysis. After reaching step four and needing to put aside the research poems for a period of time, I began reflexive thematic analysis. In qualitative research, thematic analysis is the process of untangling and simplifying collected data so that they can be sorted into "meaningful and manageable codes, categories and themes" (Peel, 2020, p. 7). It involves forming codes to describe data, forming themes to describe the codes, and defining themes to help with interpretation both during and after data

collection (Castleberry & Nolen, 2018). Thematic analysis is a multi-leveled analytic process that cycles between descriptive accounts, general themes, and abstract theory building (Merriam, 1998). This iterative process is cyclical rather than linear and begins during data collection.

My approach to engaging in thematic analysis was informed by Braun and Clarke's (2022) reflexive thematic analysis, which has drawn attention to the relationship between the researcher, their research decisions, and their subsequent interpretation of collected data. Rather than seeking ways to minimize the effects of subjectivity on knowledge generation, reflexive thematic analysis treats subjectivity as a resource (Braun & Clarke, 2022). The aim of a reflexive thematic analysis is not to pursue an objective analysis and interpretation of data; instead, it aims to develop an analysis that can be described as "compelling, insightful, complex, thoughtful, rich, complex, deep, [or] nuanced" (Braun & Clarke, 2022, p. 8). This approach to data analysis is both an art than a science, where researchers acknowledge and question the theoretical assumptions that underpin their interpretations of data.

My approach to reflexive thematic analysis unfolded in six stages: (a) dataset familiarization; (b) data coding; (c) initial theme generation; (d) theme development and review; (e) theme refining, defining, and naming; and (f) writing up. I turn now to describing how the second wave of data analysis occured.

Stage 1: Dataset Familiarization. By the time I shifted into reflexive thematic analysis, I was already familiar with the data. During the immersion and catch phase of my poetic process, I had listened to each audio recording, read and re-read each transcript, and highlighted segments of conversation that stirred me. Similar to Miller et

al. (2015), Braun and Clarke (2022) described this initial step of dataset familiarization as immersion, which involved "deep engagement to identify the rich diversity of meaning, particularly interesting or intriguing elements, as well as *possible* patternings across the dataset" (p. 43, emphasis in original). Whereas dataset familiarization began with attempts to understand *what* participants had to say at a surface level, reflexive thematic analysis also involved critical engagement and asked *why* and *how* participants expressed their ideas. I used the comment feature of Microsoft Word to keep track of critical impressions.

To illustrate how reflexive thematic analysis complemented poetic inquiry, Table 6 contrasts what I noticed during Step One: Immersion and catch from poetic inquiry to Stage 1: Dataset Familiarization from reflexive thematic analysis.

Table 6

Critical Impressions

Original Text from Step One: Immersion and catch	Critical Impressions from Stage 1: Dataset Familiarization
My biggest drive so this is Anna she's just finished Grade 1 so she just finished her first year in French Immersion and as my daughter I have a poor filter around my daughter and I'm like you learned nothing in school this year and I am so disappointed especially in math I come from a very mathy family shall we say and so like I almost like I almost did mathematics in university at University of Waterloo like I you know I love mathematics I think I love it because there's always an answer except when you get really high up you know and then	-Could there be other/hidden motivators? - "Poor" filter, suggests this is not a good thing, maybe wants to protect her daughter from what she believes -why especially in math? Importance of subject or was math the worst (compared to science, art, etc.) -Positions herself here as "mathy" (maybe to get me on her side?) -Cultural capital, University of Waterloo

Stage 2: Data Coding. Thematic coding is a systematic process that involves flagging data relevant to the research questions (Braun & Clarke, 2022). After finishing dataset familiarisation, I transferred interview files from Microsoft Word to NVivo, a qualitative data analysis software package to assist with data analysis. I coded each transcript by interview, beginning with Participant A Interview 1, then Participant B Interview 1, and so on. This coding order helped with consistency across interviews, enabling me to better notice how each participant responded to the same set of questions. Though I used some semantic codes, which reflected the specific language used by participants, many of the codes at this stage focused on implicit meanings of the data and are better described as latent codes, which reflect a more conceptual level of meaning (Braun & Clarke, 2022).

For the second round of coding, I focused on code refinement. Rather than coding by interview, in this round I coded each transcript by participant, beginning with Participant A Interview 1, Participant A Interview 2, and so on. This coding order helped me to see patterns across interviews, while still attending to the unique perspectives of each participant. From the beginning of this round of coding, I experienced technical challenges using NVivo. The software frequently froze during coding sessions, resulting in long pauses and a frustrating analysis process. By the time I had finished a second round of coding, I decided to try a different piece of software. A colleague recommended QualCoder, an open-source qualitative data analysis software package that shared many of the same data analysis features of NVivo. Importantly, it did not freeze or unexpectedly shut down, so I switched to using QualCoder instead of NVivo. Code refinement involved combining codes that had overlap in meaning, deleting codes that no

longer felt relevant, and renaming codes to better fit the dataset as a whole. I began this round of coding with an overwhelming 97 distinct codes and ended it with a more reasonable 27 codes.

The third and final round of coding involved code grouping. At this stage, I revisited each transcript in reverse order, beginning with Participant F Interview 1, Participant F Interview 2, and so on. As I was moving more towards abstraction, I wanted to see data differently without losing a sense of participant voice. I used Post It notes to jot down each code name and started grouping them on my workspace wall. Table 7 shows how I grouped my refined codes, which helped in the articulation of initial themes.

Table 7

Grouping Refined Codes

Refined Codes	Code Groupings
That parent	Things parents do
Knowing child's learning needs	
Inclusion	
Habitus	
Other parents	
Parents can only do so much	
Natural teaching	
inclusion	
Cultural capital	Family resources
Technology	
What is mathematics	Conceptions of mathematics
Traditional vs. modern schooling	
Mathematics is not the same	
Math confidence	

Positive-negative binary Math is fun Positive struggle Mathematics is not the same	
Learning mathematics in FI French immersion Education goals	Conceptions of FI
Multiple relationships Communication tools Good relationship traits Bad relationship traits Back and forth communication	Relationships between home and school

Stage 3: Initial Theme Generation. Braun and Clarke (2022) compared initial theme generation to an adventure, where researchers find, lose, and find their way again. This was perhaps the most challenging part of the process for me, as I did not expect to feel lost after getting to know my data so well. The development of themes is generative and involves "engaging with the data codes to explore areas where there is some similarity of meaning" (Braun & Clarke, 2022, p. 79). I found it important to revisit my research questions at this stage. I rewrote my research questions on Post It notes, stuck them to my office wall, and started to see connections between grouped codes and research questions. Table 8 summarizes this connection between research questions and initial themes.

Table 8

Initial Themes

Research Questions	Initial Themes
1. How are caregivers supporting children in elementary FI mathematics?	Intentional and unintentional family practices

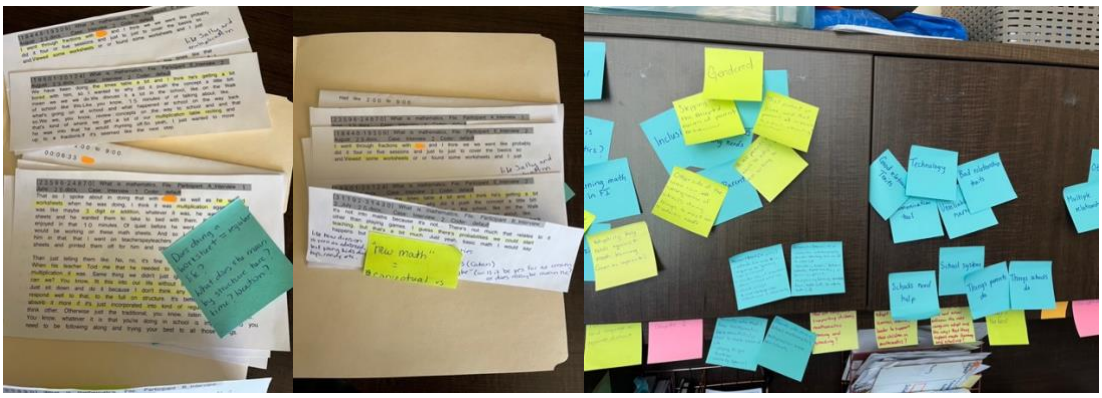
a. How are caregivers of students in the FI program supporting their children's mathematics *learning*?	
b. How are caregivers of students in the FI program supporting their children's mathematics *schooling*?	School mathematics evokes binary ways of thinking Cognitive dissonance and learning mathematics in FI
2. How do caregivers adopt the roles of *learner*, *teacher*, and *leader* to support their children in mathematics?	"That parent" as activation of parental agency
3. How does the relationship between home and school influence the roles that caregivers adopt and the ways that they support mathematics learning and schooling?	A closer relationship leads to more friction

Stage 4: Theme Development and Review. After generating initial themes, I returned to my data to compare them to code groupings. This stage involved asking whether each initial theme fit well with what had been coded. I checked for whether themes were coherent, distinct, and comprehensive enough (Braun & Clarke, 2022). I noticed right away that each of these initial themes spoke to a part of what I interpreted from the data, but none of them spoke to the entirety of what was coded in each grouping. For example, I initially named a theme "that parent as activation of parental agency," which spoke to some of the codes related to "things parents do". However, the theme did not capture ideas related to how parents make decisions based on knowing their child's learning needs or the effect of habitus on expressions of parental agency. I needed to revisit my coded data and reconsider how I grouped codes. While this was a frustrating discovery, it was also an important one. At this point, I used QualCoder to identify and print every coded segment for each of the 27 codes. I followed Braun and Clarke's (2022)

advice to use thematic mapping to help with visualising the story my data was starting to tell. I identified which text segments were most salient for each code grouping and used highlighters to help with noticing the language that informed my decisions (see Figure 3 below). This tactile experience helped me to distance myself from the data in a way that digital coding could not. In the end, I identified five distinct themes and four subthemes.

Figure 4

Thematic Mapping



Stage 5: Theme Refining, Defining, and Naming. After narrowing my analysis down to five themes and four subthemes, I started refining, defining, and naming them. Braun and Clarke (2022) likened this to writing an abstract for each theme. Just as an effective abstract offers an overview of a paper's overall structure and story, so too does a theme definition communicate its core idea and how it contributes to the overall story of the data. And much like a catchy title draws in potential readers, so too does naming themes influence how readers perceive them. Table 9 summarizes how I named and defined themes.

Table 9

Refining, Defining, and Naming Themes

Refined Themes	Theme Definitions

School mathematics has changed	Parents perceived that school mathematics is different from it was when they were students. This sense of mathematics being different applied to both how their children are being taught (i.e., mathematics pedagogies) as well as what is being taught (i.e., mathematics content).
French literacy skills first Subtheme: Learning mathematics in FI is perceived to be about learning vocabulary Subtheme: Learning mathematics in FI is perceived as a potential barrier	Although parents expressed interest in supporting their children's mathematics learning and schooling, they described literacy skills as being more important than numeracy skills. In particular, when parents were worried that their child was not meeting expectations in reading, they paused any intentional mathematics learning at home in favour of focusing exclusively on developing reading skills.
Mathematics at home is intentional and unintentional, direct and indirect	Parents described intentionally supporting their children by doing activities that could also take place in a mathematics classroom (e.g., worksheets, playing math games, calculating sales tax). Parents also indirectly supported their children in mathematics when engaging in mathematical activities that are not perceived as mathematical (e.g., playing board games or doing puzzles).
"That parent" compensates for a stretched school system Subtheme: Parents do not want to be perceived badly by the school	Parents described needing to adopt a set of practices when their child's individual learning needs were not being met in the classroom. This role requires parents to do things that are outside what they see as their supposed domain.
A holistic view of the relationship between home and school Subtheme: Some parents perceive a disconnect between home and school	Parents perceived the relationship between home and school as a set of relationships spanning an extended period of time.

Stage 6: Writing Up. The linear representation of this analytic process cannot quite capture how much cycling back and forth took place, particularly as I moved

between poetic inquiry and reflexive thematic analysis. The final stage of reflexive thematic analysis was completed during the process of writing up the study findings, which will be presented in the next chapter.

Pulling Things Together

As I creep towards defending this research, I feel the burden of making knowledge claims. To do research involving people is to commit "the violence of interpretation" (St. Pierre, 2000, p. 273). But this is a necessary and unavoidable complexity that I must confront, and I am comforted by the belief it is better to grapple with this tension than to intentionally ignore it. While I may not find the "certainty of uncertainty" (Mazzei & Jackson, 2009, p. 45) exhilarating, I am ready to take a tentative step into the dark.

I am both resentful and grateful to have been infected with postmodern ways of thinking. They have offered tools that opened my mind to new ways of thinking, impossibly complex and uncomfortable ways of thinking. I am recognizing that representation occurs in a liminal space, and one of my moral responsibilities is to trudge ever closer to its edges in pursuit of respectful, caring, and ethical representation.

As a researcher, I am learning to trust my gut. I have loathed the expression to "go with your gut" for as long as I can remember. The word "gut", for me, is unpleasant to say, to hear, or to think about. Moreover, it does not place the mind in a position above the body. As someone who has spent much of her life cultivating the mind and finding great satisfaction in intellectual pursuits, the idea of believing a physical response over a rationalized one was absurd. And yet, as I have met more people and engaged with "the other," I have come to see the folly of trusting the mind as anything other than a socially

constructed bias machine in action. My gut connects me to the ideas that have not yet bubbled to the surface, to the ideas that have been punched down by my internalized hierarchical assumptions about the world I live in. In situations where reason and logic offer permission while my gut protests, I am coming to recognize the limitations of the mind in isolation. It was my gut that led me to poetic inquiry.

This research is meant to be provocative, important work informed by deliberate choices. I fixed my gaze on how families navigate school mathematics in the FI program, and this choice was an act of care. This research contributes to discourses concerned with the relationship between families, schools, and education. It may not be provocative to say that there is a relationship between a child's home life and their experiences with schooling; however, I posit that stories of parents and caregivers supporting the learning of mathematics outside of the classroom is a much needed counternarrative to the deficit-based discourses that dominate in NB schools.

Although my research took place outside of school buildings, it is deeply connected to what happens within classrooms. Just as ocean tides predictably ebb and flow, so too must there be a relationship between schools and communities that permits the "inward and outward flows of ideas, reflections, and actions" (Smith, 2005, p. 116). By reimagining school mathematics as something that must be viewed relationally, centering the people and the relationships between them as opposed to the unilateral direction of school mathematics, we–parents, teachers, and researchers–can plot the path to an equitable, respectful, and desirable future for all.

I was inspired by the important scholarship of postmodern feminists, whose experimentation with texts and representation opened possibilities for thinking outside of

a classical structure. These texts invited me to trouble notions of what counts as legitimate forms of scientific writing and representing and led me to poetic inquiry. Though my research is not exclusively about the lives of women, I see now that a feminist methodology is more than research about women or even research that is designed for women. Instead, I am proposing a feminist methodology that imagines possibilities for research *with*, a care*full* approach to research that does not devalue relationships, context, or people.

Chapter Summary

I opened this chapter by sharing the epistemological, axiological, ontological, and methodological assumptions that informed this study before introducing poetic inquiry as the research design. I then described the various methods that contributed to the overall design, with particular attention to how data analysis occurred in waves of poetic inquiry and reflexive thematic analysis. The next chapter will share the study's findings in three sections, or waves of analysis.

Chapter 4: Results

I begin this chapter by returning to the research questions that guided this study:

1. How are caregivers supporting children in elementary FI mathematics?
    a. How are caregivers of students in the FI program supporting their children's mathematics *learning*?
    b. How are caregivers of students in the FI program supporting their children's mathematics *schooling*?
2. How do caregivers adopt the roles of *learner*, *teacher*, and *leader* to support their children in mathematics?
3. How does the relationship between home and school influence the roles that caregivers adopt and the ways that they support mathematics learning and schooling?

In the previous chapter, I described several challenges related to participant recruitment. Though I set out to recruit caregivers, a term that extends beyond parents and guardians to include others who might support mathematics learning and schooling of children in their care (e.g., grandparents, aunts and uncles, older siblings, or neighbours), all participants were parents of elementary French immersion (FI) students. As such, my research questions needed to be adjusted to better represent participant perspectives. Here are the revised research questions:

1. How are parents supporting children in elementary FI mathematics?
    a. How are parents of students in the FI program supporting their children's mathematics *learning*?

b. How are parents of students in the FI program supporting their children's mathematics *schooling*?

2. How do parents adopt the roles of *learner*, *teacher*, and *leader* to support their children in mathematics?
3. How does the relationship between home and school influence the roles that parents adopt and the ways that they support mathematics learning and schooling?

I draw attention to the replacement of "caregiver" with "parent" for three reasons. First, I value transparency in educational research. To simply replace the original research questions with these modified questions would offer a sanitized and simplified representation of my thought process. I intended to recruit caregivers, and I did not foresee the ensuing recruitment hurdles. Second, whereas it was accurate to describe my *imagined* participants as caregivers, my *actual* participants describe themselves as parents. This precision of language is respectful, intentional, and values their perspectives as parents. Third, I recognize that readers may have wondered why my research questions focus on caregivers, whereas my results and discussion focus more narrowly on parents. By explicitly revising the terminology used in the research questions, I can better represent the analytical process that transpired.

As described in the methodology chapter, data collection included individual in-depth interviews and journaling with six parents of elementary FI students. Data analysis involved cycling between poetic inquiry and reflexive thematic analysis. This movement back and forth encouraged me to think deeply, feel freely, and become intimately familiar with my data. It is important to point out that this process was not linear no matter how I organize this chapter. There was movement back and forth and back again as I questioned

what each perspective contributed to my interpretation of the data. This chapter is divided into three sections—or waves—to represent the general progression of data analysis, which together informed the results of the study.

The first wave introduces participants. I start with a brief participant description followed by three poems: one about mathematics learning, one about mathematics schooling, and one about their relationship with the school. These monovocal research poems–poems written using the words of a single participant–serve to bring the reader into conversation with us, the participants and the researcher. By combining participant descriptions with research poems composed using their words, I represent the individual perspectives of each parent. The second wave shifts into reflexive thematic analysis, organized by theme. Whereas the first wave separated participants so that they could be introduced individually, this section draws connections between them. Each theme is introduced by a monovocal research poem and transitions into reporting results of the thematic analysis. The third and final wave is a collection of 10 polyvocal research poems–poems written using the words of multiple participants. Each polyvocal poem weaves together multiple voices, synthesizing and representing study findings. This movement from individual stories towards general experiences echoes my analytical process of interpreting data.

First Wave: Monovocal Research Poems

Sally

Sally was the first participant who joined the study. She lives in a small town in NB with her husband and three children. Sally is originally from Ontario but has lived in NB since before her children began school. Her husband is a member of the Canadian Armed Forces, and Sally frequently talked about the unique experience of parenting as a military family. She is involved in several parent committees and volunteers frequently at the elementary school. Sally was a stay-at-home mom up until recently, when she started substitute teaching in a local elementary school. Two of her children are elementary FI students: at the time of the interviews, Sally's youngest child was entering Grade 3, and her middle child was entering Grade 5. Her eldest child, Frank, registered in FI in Grade 1, but his parents removed him from FI in Grade 4. Sally and I spoke in a busy coffee shop, where she sipped on iced tea while answering interview questions.

Sally admitted that she worried she would not have anything to contribute to this study, as she and her husband are more concerned with raising "good little humans" than they are with high academic achievement. It did not take long, however, to see the mathematical in their everyday practices come up in the interviews. Though Frank is now in middle school and part of the English Prime program, Sally talked about his experiences in FI more frequently than she spoke about the other two. Neither Sally nor her husband Bill speak French.

Catapults

A summer of
neighbourhood catapults, full blown
shooting over the trees
into the schoolyard.

It started getting too far.

They loaded it up
took it to where it's all fields.
Two dads
all these boys
shooting and trying and finding the weight.
That was a fun summer—
watching these yahoos
praying they didn't hurt themselves.

Scratch 30

What a year.
I had to sit off screen the entire time
it was the only way to keep him

she would always start with scratch 30
I'd be there with him
to do scratch 30

the speed was too much
I sat right beside him
scribbled little answers down for him

I can push us through that first hour
We have to do it
We have to try
We have to push ourselves a little bit
it's not a kid who doesn't want to do something
it's a kid that is going to crack

Becoming Jane

I always knew I wanted to be the Volunteering Parent.
My best friend's mom was a stay-at-home mom
at the school every Friday serving hot dogs
all our field trips
on the PTA
my second mom was always there
I always knew I wanted to be Jane when I grew up.

in this military lifestyle
being home made sense

The K–2 school asked for volunteers
hot lunch program, fundraising, book fairs
all moms for the most part
building relationships for years and years and years
where we all belong.

Megan

Megan was the second participant to join the study. Megan lives in the same small town as Sally and is also married to a member of the Canadian Armed Forces. Megan has one child who had just finished Grade 1 at the time of interviews. Megan is from Ontario, and she moved to NB when her husband was posted here for work. Megan is a stay-at-home mom who describes herself as being very involved in her daughter's education. She volunteers regularly at her daughter's elementary school, helping to count money for the hot lunch program and chaperoning field trips. I first met Megan at a community park, where she and I spoke for an hour and a half while her 7-year-old daughter (Anna) played contentedly on the playground equipment. Our subsequent conversations took place in Megan's home while Anna was in daycare or at school.

Megan had a low opinion of the public education system in New Brunswick and worried about her child's academic future. Megan described education as a shared responsibility between home and school, which has led to frustration with the lack of communication from her daughter's teachers. Megan expressed mathematical confidence, as well as her belief in the need for mathematical competence to live an independent and financially secure life. Megan did not view FI as a pathway for official language bilingualism; rather, she saw learning French as a foundational skill that Anna will need to further develop outside of K–12 schooling. Megan learned some French in school but does not describe herself as bilingual.

What Time is it Mr. Wolf?

We have a big clock
a big clock right there.
Somebody in her class had a watch
her mother being
her mother says “I’ll get you a watch”
do you know how hard it was to find a kids’ watch with a face?
estimation crept in
How many times
How many breaths
How many minutes are left
estimating and approximating and distancing.
It’s a half hour down to the city and
she is starting to understand.

Low Expectations

she will end up with this New Brunswick education.

the curriculum is not asking enough

skip counting by two in Grade 2

Grade 2s in other places learning multiplication

I tried looking at the curriculum

I'm not sure it's current

I talked to the principal

could she skip a grade? *No.*

at the end of the day she's still getting a New Brunswick education.

December (aka Parent Teacher Interviews)

Teacher interviews in friggin' December
I don't talk to the teacher face-to-face a whole lot
the first time you talk to your kid's teacher—
December
I don't want to know what she's doing well
I want to know what you're noticing
I want to know what she could be working on
and then to find out
"we don't really do math in the first half of the year of Grade 1"
you haven't touched math up to December
How can I rely on the school system?

George

George was the third participant who joined the study. He lives in a small city in NB with his wife and three children. George is originally from Ontario and remembers moving to New Brunswick in Grade 4, when he felt like a "smarty pants" for being ahead of his classmates in mathematics. At the time of the study, his eldest child was in Grade 2 FI, the middle child was in kindergarten, and the youngest was not yet in school. George works from home and is the primary parent after school. He is not involved with any parent groups at the school, but he participates regularly in school organized events. We met online in the evenings using Microsoft Teams with our cameras on, juggling bedtime routines with conversations about mathematics at home.

George enjoyed learning mathematics as a student. Many of the activities that he described doing at home were similar to the sort of school mathematics that he remembers from childhood. These activities were largely calculation-focused, such as counting time or memorizing multiplication facts. He had an idea of what his children were learning at school, but he generally waits for guidance from the teacher to initiate at home learning. He did not describe having a close relationship with the school, though he wondered whether the psychoeducational assessment scheduled for his youngest child would change that. George was confident that he could help his children with any challenges they might experience with mathematics. George did not describe himself as bilingual, though he was learning French in his spare time.

The Multiplication Chart

I had done up a multiplication chart for her
I had 2, 3, 4, 5
like 2–9
I forgot to put the 1
(t*he 1 category would have been pointless anyways*) so
she filled it out
she knew most of them
had a lot of them memorized
she just knew from so many times
the ones she didn't know you'd see her
there, just kind of adding them up
then she'd get it
math learning in French
doesn't really seem like there's much I have to do

Not too Worried

They do patterns and stuff at school
I have no idea what kind of patterns they were
they weren't just learning their numbers and how to add, subtract
I think they were doing other stuff
if she was lagging then for sure I would probably sit her down
she was scoring 3s[3] in math but I don't know what they used to grade her
she can multiply so I'm not too worried about the numbers

[3] NB uses a 4-point scale to report student learning in Grades k–8. On this scale, a 3 means the student has demonstrated "a *solid* understanding of the outcomes addressed to date" (Government of New Brunswick, 2023, emphasis in original).

Building a Relationship

I would like to talk to his teacher
a one-on-one
he has some very specific things
she'll figure out soon

He saw a pediatrician last spring
He was assessed
He had his asthma and got puffers
He also has a fair amount of ADHD[4]

the pediatrician gave us a thing the teacher's supposed to fill out
an appointment next month with the pediatrician
but we haven't had a chance to talk to his teacher
might be some more relationship building in the near future

she emailed us this week
said he seemed tired yesterday
unwell and crying in the afternoon (*she thought he was sick*)
he put his head down and yawned (*he'll make himself look tired*)
Tuesday he was coughing really bad (*he was fine*)
"Where is his puffer?"

we have to get him a second puffer to leave at the school and
we can't just do that overnight

We're starting to build a relationship with the school

---

[4] Attention deficit hyperactivity disorder

Roderick

Roderick was the fourth participant who joined the study. I reached out to Roderick after reading an opinion article he had written in an online newsletter. Our children are the same ages and attend the same schools, but we had never met before the first interview. Roderick has lived in NB his entire life. He has been living in the same small city for most of his life and knows many people in the community. He is a stay-at-home father of three children registered in FI: at the time of the study, the eldest was in Grade 7, the middle was in Grade 5, and the youngest was in Grade 2. He is not a member of any parent committees, but he volunteers frequently at the elementary school and occasionally at the middle school. We talked over coffee on his front porch during the summer months while his children were home.

Roderick described mathematics as something that did not come easily to him, despite his father being a mathematics teacher. At-home learning during the COVID-19 pandemic frequently came up in our conversations, and he described the challenges of meeting the learning needs of multiple children. He did not learn French in school, though he has been studying French in adulthood and tries to engage his children in French at home. Roderick described himself as fortunate that his children love school.

The Inheritance Games

We play a lot of board games
RACK-O is math-oriented now that I think about it
you have to get the cards in
ascending
        sequential
                numerical order
my wife plays it with the kids.

Floor Plan is another one
my eldest daughter's favourite
you get a piece of graph paper and you draw one pink one blue and one green
you roll the dice and
designing houses makes it fun
my wife's favorite thing to do when she was little
never in a million years would I think about math when the kids are playing Floor Plan

Family Ties

my parents were both teachers
my dad will make up math problems for our kids
a math teacher for thirty years in middle school
he'll sit there and write out math equations on a piece of paper and
he'll explain it to them.
not in French, but
he's a numbers person.

The Psychologist

My middle child was down and I couldn't unwind what was going on
tried nipping around the edges
after two weeks, a call from school at 9:00am

We went right into the garden and talked for hours
a flu bug had gone through their classroom
she was afraid that she was going to throw up
We unwound what was happening that day

I talked to her guidance counselor and her teachers and it still pops up but that was the biggest parenting win I had last year.

Val

Val was the fifth participant who joined the study. Val has two children in FI: at the time of interviews, the eldest was in Grade 4 and the youngest was in Grade 2. He and his wife moved to NB from Quebec when their eldest child was in Grade 1. Both of Val's children are visible minorities, and his eldest child has accommodations as part of a personalized learning plan. Before the study took place, he and his wife had to advocate for their eldest child to be moved into a different FI class after learning of racist practices in the classroom. Val is not a member of any parent committees and does not volunteer at the school. We met online using Microsoft Teams with cameras off, once while he walked his dog and twice while he worked from home.

Val studied mathematics in university and is confident he can help his children with any struggles they might have with the subject. He sees many opportunities to support his children in mathematics through play and problem solving at home. He describes himself as the family's IT expert and finds ways to use technology to entertain and educate his children. Val also described feeling guilty that he has not done more at home to support his children with learning mathematics. Though Val does not speak French, he encourages his children to practice saying mathematics terms in both English and French at home.

Computational Thinking

they'll do the Rubik's Cube
we have an abacus
Dollar Store calculators
puzzles together on the couch
shared problem solving and LEGOS
games that are difficult
puzzle games
thinking games
not click click click games
on them for hours
willing to engage with problem solving
a video game *factori*
a real real building game
complexity and depth for him
she does them a bit but would rather play with the horses

Walking Home

I quiz them and if they don't explain it well
I ask again until
I understand.
sometimes it's hard
    trying to understand what the teacher was telling them
    trying to figure out if they understood it too
she conflated a cube with a square

Last Year

accommodations
defined our relationship
with the school last year

Simon

Simon was the sixth participant who joined the study. He is a stay-at-home father of three children: at the time of our conversations, the eldest was in Grade 1 FI while the other two were not yet school aged. Simon is originally from Nova Scotia and moved to NB before his eldest child began school. Though he does not participate in any parent committees, he describes feeling like a member of the school community. He regularly participates in school organized events and looks forward to growing his relationships with school staff. We met online using Microsoft Teams with the video on and while his younger children were at home.

Physical fitness and physical literacy are important to both Simon and his wife, and they prioritize this for their children as well. His wife is a physician, and he believes that being a stay-at-home dad helps everyone with his wife's busy schedule. He was in FI as a child up until high school, but he is hesitant to describe himself as bilingual. Simon took several mathematics courses during university and believes that he and his wife talk about mathematics in a neutral way.

What if?

yesterday or the day before
I was going for a run and he wanted to ride his bike
he went like eight and a half k

he had done a triathlon
a kilometer and a half bike ride around the lake

trying to count how many one and a halfs go into eight and a half
we would say *what if*?
What if you have 1 ½ and you add 1 ½? What do you get?
He's like, "well, three"
What if we keep doing that?
1-2-3-4-5 almost six of those
What you did last weekend, we just did

yesterday or the day before.

Sidewalk Chalk and Other Stuff

it was March
we were taking him out of school for
a month

he was having a hard time learning from us
he would just get frustrated really easily
(I don't think that happened at school)
he definitely got frustrated with us really easily

one thing we found that helped was going outside
we would go outside and use sidewalk chalk
writing numbers, addition, subtraction
we would go outside and use sidewalk chalk
reading, writing, stuff like that

outside
seems to do him a lot of good

Windows

we get those newsletters every week
not a two-way conversation but at least there's some communication
last year there were paper copies
things they're doing in class
things you can do at home
some of those things we do

I have a hard time coming up with things to do at home
I don't know how much I should be doing
he spends so many hours at school
he's only in grade one
How much should I really be doing at home?
I have this urge
and I don't know why
"do schoolwork so you don't fall behind"
(or maybe so you can excel?)
maybe we shouldn't be doing that…

newsletters and parent teacher
meet and greet this year (we couldn't do the scheduling)
I really like the ones last year
the kids teach the adults what they've been learning
not just a conversation with the teacher

Did you go to the picnic this year?
Did we make it to the sliding party?
then there's the skating party.
a little window with the Christmas performances
little windows into his world
some people are dissatisfied with the level of communication but
the windows that we get seem satisfactory to me

Second Wave: Reflexive Thematic Analysis

Now that I have introduced participants and shared initial findings related to their experiences supporting their children in mathematics schooling, mathematics learning, and the relationship between home and school, I am stepping into the second wave. This section focuses on findings from the reflexive thematic analysis. Each theme begins with a monovocal research poem, followed by further supporting examples from interviews and journals.

Theme 1: School Mathematics has Changed

Doubles + 2

sheets I see
the kids bring them home
they look like sheets that we would have done
they look the same but
it just looks like a basic math sheet
it doesn't look any different

they do all their math centers
nine different buckets
it's doubles + 2
What does that mean?
it doesn't mean anything to see it
instructions at the top
the wording means something to you
the wording means nothing to me

I ask *what does this mean?* and
they're like "I don't know"

I would say "I borrow,

I borrow one from over here”
What does borrowing 1 mean?
as a kid I could have never told you.
This is what you do:
you ~~cross~~ this one out
change the number
and put the little one over
there.

While each parent described varying degrees of familiarity with what is currently taught at school, they perceived that school mathematics is different from it was when they were students. This sense of mathematics being different applied to both *how* their children were being taught (i.e., mathematics pedagogies) as well as *what* was being taught (i.e., mathematics content). In general, when parents talked about the mathematics their children were learning in school, they spoke almost exclusively about concepts or ideas that would fall under the number category in the New Brunswick curriculum. The New Brunswick curriculum is divided into four content strands: number, patterns and relations, shape and space, and statistics and probability. Yet when parents spoke about the mathematics that their children were learning and doing at school, they were almost always describing mathematical ideas that fall within the number strand:

> As far as math goes for her for Grade 2 I think she's set, like, I think she like. I think she can do all of it, like she can multiply, and she can add, subtract. I think she can divide a little bit too. I think she knows it's like kind of the opposite. Um I don't know what else they would have to do in Grade 2. (George)

> I do always, of course, read their homework and try to make sure that they can do that or “are you able to do that?” And they usually are. I guess we did do the

> addition and subtraction homework, but the bigger numbers and carries and stuff. (Val)
>
> So one thing that we found that helped with that was basically just like going outside. So we would, we'd go outside and just basically use like sidewalk chalk and uh, we would like do like writing of numbers or like addition or subtraction and like reading writing stuff like that. But just like doing it on the sidewalk and just being outside. (Simon)

Just like with George and Val, Simon listed addition, subtraction and writing numbers as the mathematics ideas that Simon worked on with his child. All of these concepts would fall within the number strand of the NB curriculum. While parents had some awareness that other concepts are taught in mathematics at school, they almost exclusively referred to mathematics concepts that fit within the number strand.

Parents expressed uncertainty with respect to how mathematics was taught at school. Megan brought up “the shift in the way they’ve been teaching math in the last few years” several times during our conversations, which she described as the result of “new math”:

> I feel like that's going to be a thing because I do know a lot of I I know a lot of teachers. I used to hang out with a lot of teachers and like we would generically call it the new math, but I'm it's like I don't know, 20 years old now. But like I don't, I don't do like I do long division. Like if I have to do division, I do long division. I don't know that there's the thing with the box and like. Yeah, I don't know that. I have no idea about that. (Megan)

Though Megan was aware of an alternative approach to teaching division, she did not know how to do it. She suspected that changes to how mathematics concepts were taught would eventually become "a thing," perhaps a challenge to overcome, as her daughter, Anna, gets older.

Sally also brought up the challenge of figuring out current approaches to teaching mathematics. Her eldest son, Frank, has dyscalculia and experiences short term memory loss, which made it difficult for him to explain how something was taught at school. When Frank brought homework home, Sally was not confident that Frank could explain how he was expected to solve problems. On top of that, she did not feel confident that she could teach him the way that she learned how to do something. She shared an example of Frank needing help with fractions:

> Number one off the top of our heads, we don't even know what to do. But then we know even if we did know what to do, it's not the way he's going to be doing it. And so we essentially Googled and then watched the YouTube video and we're like, OK. So we taught ourselves from the YouTube video and then showed Frank. And he was like, I don't know. But Frank isn't a reliable source, either. So we were like, okay, well, let's just do it this way and then we did it and then it was a friend who teaches high school math that I showed her, and she's like ohh, that's way more complex than it needs to be… Yeah so then we like wrote a note to his teacher actually apologizing, being like we wasted all this focus and energy showing him a wrong way… and now he's, you know, going to come to school and you're going to show him another way. (Sally)

In this example, Sally illustrated how trying to assist Frank might unintentionally cause harm. She worried that she may have expended Frank's cognitive resources in pursuing a wrong strategy. Sally did not remember how she learned to multiply fractions, but there were also examples of when she and other parents noticed a different approach to teaching a mathematical concept from how they recall learning it as a child. Sally has noticed that there is more emphasis on "understanding what multiplication does" and how it appears in real life rather than focusing on memorizing a multiplication table or "knowing 4 times 5 right off the bat." She described this as "a bit of a shift" in how multiplication is taught, where multiplication is "knowing that [4 * 5 means] four groups of five."

Changes to how multiplication is taught also came up in conversations with Roderick:

> She's [Vicky] going into Grade 7 this year and how they teach multiplication, and they're like all of those things were taught differently now, not completely differently, but how to approach problems. (Roderick)

Parents sometimes described the differences between what they learned in mathematics and what their children are learning as relatively small. This sense that things were not taught completely differently was evident in Megan's observation that her daughter was learning multiple strategies for doing calculations rather than focusing on one, whereas Megan felt like she was only taught one strategy for things like addition, subtraction, multiplication, and division. Val noticed that some of the vocabulary for describing mathematics has changed since he was a child, but he attributed his mathematical competence for making sense of the changes. He said he has not "been too

confused other than just idioms or whatever for math, multiplication and stuff. And their carry over strategies." On a similar note, Megan noticed that the timing of when concepts are taught has changed since she was a child:

> Like I remember my mother mocking me as a child because I didn't learn how to tell time for Grade 1. I'm like I don't think the school has even bothered my child to tell time by Grade 1. So the standards have changed, I guess, over the years. (Megan)

Sometimes parents described having the sense that mathematics is taught differently, without knowing how exactly it was different. Roderick shared that he knows "the way math is taught now is different" and he figures out how things have changed by asking his children to explain it to him. Roderick described this as "relearning, kind-of." Though he recognized the mathematics content, he did not recognize the pedagogies used to teach it.

Theme 2: French Literacy Skills First

Walking to School
counting in French on the walk to school
a bit competitive
I encouraged him to count his numbers to 100
to engage her
a year or two older than him

For him it's always been a game.
How high can he count
through 20 to 100
able to learn all the numbers in French.
He was into counting

Her less so

15 minutes of walking
15 minutes of talking
15 minutes of multiplication table reciting

I try to engage her
always less interested
always less comfortable
always pushing against it

We've done a lot of work with her reading in French
he hasn't had any complaints about
his language or
his reading
he can in fact read quite well.
So, I've been able to do a little extra with math
with him
multiplication tables
fractions
even talked about limits but not with
her.

She's good at it her marks were fine
It's not gonna be the core of her life work the way it might be for him

A bookmark for expectations per grade
He had whatever it was over the average
over the middle
hard to get so I guess he's okay.

On her report card she was the middle number for math
Suspicious of grade inflation

Suspicious of average results
Hear too much of those kind of stories
But if he got a 4[5]
I'm not worried

Although parents expressed interest in supporting their children's mathematics learning and schooling, they generally described literacy skills as being more important than numeracy skills. In particular, when parents were worried that their child was not meeting expectations in reading, they paused any intentional mathematics learning at home in favor of focusing exclusively on developing reading skills. Several participants described needing to make choices about which school subjects to prioritize at home and reinforcing literacy skills was generally described as a bigger priority than reinforcing mathematics skills. For instance, George explained that when his daughter, Miley, was in Grade 1, she got a 2 ("Approaching Expectations") on her report card for reading in French. This result indicated that Miley was not yet meeting grade level expectations, so George paused the mathematics learning they would normally do in favour of working on reading in French. For George, once Miley is meeting expectations in French literacy, he can engage in some form of mathematics enrichment at home:

> Once Miley's got her, like, reading kinda down, I'd like to teach her like a lot of advanced mathematical concepts. There's some good resources on YouTube that I

[5] NB uses a 4-point scale to report student learning in Grades K–8. On this scale, a 4 means the student has demonstrated "a *thorough* understanding of outcomes addressed to date" (Government of New Brunswick, 2023, emphasis in original).

think will make it interesting. She'll think it's pretty neat, but I just need to, I have to hit step one before I can go on to on to the next kind of step. (George)

This view of literacy skills as pre-emptive to mathematics skills was echoed by Val. Val shared that for one of his children, Destiny, the focus has been on extra help developing her language skills at home rather than doing anything related to mathematics:

> We've done a lot of work with her [Destiny's] reading and particularly in French, and are still doing it in the summer here, but uh, she hasn't really needed any help in math and and unfortunately, because of all the help she's needed in in language, I haven't taken the time with her, whereas River has been the opposite. He hasn't had any complaints about his language or his reading, and he can in fact read quite well. And so I've been able to do a little extra with math and because it's something I want to do, I've done that with him. (Val)

Even when there was no prompt from the school, both George and Roderick described reading as a first step whereas mathematics could be inferred to be a second step.

> So I figured reading would be kinda like a... well, I mean first you learn to talk or whatever, but like reading is like probably the most fundamental skill because once you have that, you can learn just about anything like in the world that you want to learn, you can get a textbook or you can get like a how-to book or you can read directions or you can follow a set of instructions. I feel like if you didn't know math, but you knew how to read, you could essentially get like a math book. (George)

> Reading is the most important thing you can do. If you can read, you can do anything. You can read any manual that you want. You can read math books. You can read about any topic that you ever want. That's like after you have that skill. Then you can do anything... I think that that is like foundational to success in education in general, like learning how to read is Step One. (Roderick)

Subtheme: Learning Mathematics in FI is Learning Vocabulary. Parents of FI students expressed conflicting views about the relationship between the language of instruction and the content being taught. Simon, a bilingual Anglophone who "can get by in French" but whose "French is by no means perfect," was unconcerned about drawing from his knowledge of French to support his child, Ben:

> It doesn't really matter to me like what language you're using to learn it [math] cause it's all just numbers like it's all kind of it goes like it shouldn't be that different from language to language. (Simon)

Simon did not describe any hesitancy about helping Ben in mathematics. This confidence may be explained by his eldest child being in Grade 1 at the time of the study; it may be that Simon has not yet noticed any differences between his experiences of school mathematics and what Ben is experiencing at school mathematics. It may also be that Simon has been able to recognize the mathematics that Ben is doing.

George voiced conflicting views about the influence of language in learning and doing mathematics. When he does mathematics at home with Miley, he does it in English because he thinks in English:

> I think in English. So if I'm thinking French numbers in my head, I probably already converted them to English. I'm already going for quatre, like I'm not just thinking of the number four as quatre. (George)

He went on to say that when it comes to helping Miley with mathematics homework that comes home in French, he could go online to look up any unknown terms. For George, learning mathematics in French means learning different words to describe the same things. There was no compounding complexity of new pedagogies or different content in addition to the unfamiliar language of instruction.

In general, parents were reluctant to describe an at-home activity as doing mathematics when the language piece was more visible. For instance, several participants shared how they encouraged their children to practice counting aloud in French. Val described getting his children to count in French on the walk to school, admitting that he did not know whether counting in French counted as doing math. Simon also described counting to 10 with his child who had just started Grade 1 FI:

> We've counted to ten with him in French, which he seemed super excited about, but yeah, we haven't really done much with him in terms of like mathematics. (Simon)

While counting was viewed as an example of doing mathematics at home, the idea of counting in French seemed to shift it towards being viewed as a vocabulary activity rather than a mathematics activity:

> Grade 1 French immersion, basically just she's just learning how to count to 100 in French. (George)

> I don't know what they worked on other than she would come home and start instead of in English saying, you know, eight plus seven is fifteen, she'd be doing, she'd say it in French. (Megan)

> We always use the words, like soustraction words with the homework, even when we're speaking English just for fun. (Val)

In these examples, knowledge of French terms was viewed as a bonus, something that might be required in FI classrooms but is somewhat disconnected from practicing mathematics skills. This detached view of French language from conceptions of mathematics was common among participants.

Whereas George and Val shared the belief that French literacy goals were flagged as first priorities and mathematics goals were secondary, Megan expressed some frustration at this approach in her daughter's school. She recounted being told by Anna's Grade 1 teacher that the focus until December was developing students' emerging French vocabulary rather than learning mathematics. The idea that her daughter had not been learning mathematics at school for several months bothered Megan, who said "being in French immersion shouldn't be setting my child back." Whether there was no mathematics instruction whatsoever or whether the focus was developing a foundation for students to learn the language needed to engage in mathematics in a FI environment is unknown; however, the message received by the parent was that the intent was to teach language first, then content later. She has heard from other parents that the focus of FI is "to make sure they get their French, you know, get a solid foundation of French" before learning other content such as mathematics. To that end, Megan thought "they're so worried about French that they [teachers] just drop math." She went on to say:

> I'm absolutely disappointed in the New Brunswick curriculum in that there's just basic like kindergarten, I think the expectations are counting to 20 or something like that. And I'm like my daughter was counting to 100 before she started kindergarten in French or in in French to 20 in English to 100. And I don't think that expectation like. So I feel like she's learned nothing in mathematics, maybe a bit on shapes. I think they did 2D3D shapes this year, and that was about the only thing that that I can pinpoint. (Megan)

Although Anna may have learned ways of expressing her mathematics knowledge in a new language, for Megan, this did not qualify as an expansion of her knowledge of mathematics.

Two participants described mathematics as a motivating factor for learning French. Both Simon and Val shared how they saw a connection between an interest in mathematics and an interest in learning more French:

> He's been super excited about learning French recently, so like, he'll be counting in French, or telling us like different French words. So we'll, I mean, my wife doesn't really know as much French, but we'll try to talk about those words or talk about new words or help him out with the counting. Like he'll just try to count as high as he can go. (Simon)

> For River, it's always been a game to like, how high can he count consecutively and numbers like when he was younger so that he was excited to be able to in class they would have their game, Who can count through 20, Who can count to 100, or whatever, or just doing math with numbers. So he wanted to be able to learn all the numbers in French. (Val)

In each of these examples, parents noticed that their children were interested in numbers, which the parents then used as a launching pad to practice counting numbers in French.

Subtheme: Learning Mathematics in FI is a Potential Barrier. Several participants described FI as a potential barrier to learning mathematics. The impact of studying mathematics in French was more apparent when participants described their own schooling experiences. For instance, Roderick's partner, George's partner, and Simon all switched from the FI program in high school so that they could continue studying mathematics while obtaining high marks:

> When we were in school, it was like, you need to do science and math… if you want to become anything, you got to focus on this, and you got to have good marks on that. And she just thought like, she could have done them all in French, but I think she just was like, "I want, I need to have high marks." (Roderick)

> I was in French immersion up until Grade 9 and then I think at the time I switched out because I wanted options for like calculus courses and stuff like that. (Simon)

In both of these cases, participants had experiences where learning mathematics in FI was viewed as a barrier to meeting their future academic goals. Roderick believed that learning mathematics in a second language would result in a lower grade, thus limiting one's access to post-secondary education. Roderick went on to share that he "always thought that learning math would be hard in French," but that he was starting to believe it might just be about "knowing the vocabulary" since someone could struggle in mathematics in any language. Now that he has children in FI, he believes that "the language part" is not the barrier, but that math is just challenging to learn. Simon's

experience was that the option to continue studying mathematics in French was unavailable, so he elected to leave FI.

For Sally, a monolingual Anglophone, she worried about her ability to support her kids at home as they learned mathematics in French at school:

> I can say going into French immersion it was very, I guess, nerve wracking in that sense of "How are we going to help our children in as very English people?" and especially when it comes to math, on top of that, because math is not the same as it was when we were kids, and then you add in the French factor to it. (Sally)

Sally felt that in addition to a different language of instruction, her children were learning a different mathematics from what she experienced as a child

Theme 3: Mathematics at Home is Intentional and Unintentional, Direct and Indirect

Unlike with the previous sections, I have organized this theme into three subsections that exist in tension. Each subsection begins with a monovocal research poem to illustrate the distinctions between them. In the discussion chapter, I will discuss these tensions in more detail.

Intentional and Direct

Monitoring homework
always read their homework
are you able to do that?
addition and subtraction
bigger numbers and carries and stuff
always say *soustraction*

When parents described ways that they supported their children in mathematics learning, they frequently referred to activities that could also take place in a classroom. For example, this included things like printing off worksheets for extra practice, playing mathematics games that were sent home in a homework folder, teaching their child how to calculate sales tax, or practicing multiplication facts at the dinner table. Each of these activities were examples of mathematics activities that parents intentionally engaged in with their children; the parents described these as mathematical activities and referred to these activities as things they did to help their children be successful at math.

After noticing that River was having no difficulties with reciting the multiplication table, Val decided that he was ready to start learning about fractions:

> I went through fractions with River and I think we went like probably did it four or five sessions and just to just to cover the basics and viewed some worksheets or found some worksheets and I just printed them and it did take like, you know a few times like that before bed. He's happy to have a second to stay up later if I if I give him a pen or challenge stuff. (Val)

When I asked Val what the outcome was, he laughed and said that River may or may not have picked something up about fractions. For Val, the focus was not on teaching a new concept and believing that it was now understood; rather, doing mathematics at home was simply part of daily life. Sally also talked about incorporating worksheets as part of a bedtime routine:

> Nate wanted worksheets when he was doing, I think it was multiplication again. But it was like maybe 3 digit or addition, whatever it was, he wanted math sheets and he wanted them to take to bed with them. So that he enjoyed in that 10

> minutes of quiet before he went to sleep. He would be working on these math sheets. And so I felt like I supported him in that, that I went on teacherspayteachers and found some free sheets and printed them off for him. (Sally)

Unlike River, Sally's son Nate requested worksheets so that he could get extra mathematics practice. In this instance, the child initiated the mathematics practice at home, and a parent supported him by finding and providing the materials. Though Sally responded to Nate's request, she directly supported his mathematics learning by fulfilling the request.

Another way that parents described directly supporting their children's mathematics learning involved identifying teachable moments involving money. Megan spoke about teaching Anna how to be responsible with money from an early age, such as when shopping for clothing:

> Like, you know, I take her shopping and we were looking. We were at Mark's[6] and I was looking at a pair of pants. And there was $60.00 on it, but there were 40% off and I I know she doesn't get that math, but I walked her through. I was like, well, the quickest way is the way I do it is take 10% cause 10% of anything is easy, 10% of 60 is just $6 of it. And then you have four of those. So you can do 4 times 6. (Megan).

[6] Mark's is a Canadian clothing retailer.

In this example, Megan vocalized her thinking when calculating the total cost of a discounted item. Megan knew that Anna had not yet learned about percentages, but this did not deter her from making this a mathematical lesson. Throughout our conversations, Megan spoke about money sense frequently. She valued financial literacy and intentionally sought opportunities to develop Anna's number sense. Roderick also spoke about involving his children in conversations about money:

> I started it with Vicky, who's now twelve and yeah, I do it with all the kids. When they're in the car with me when I get gas at the gas pump, I say, how much do you think it's going to be? There's half a tank or the full tank or whatever it is. What's your guess? (Roderick)

Unlike Megan, Roderick described a situation where he wanted to encourage his children to offer estimates of the total cost to buy gas. He shared that his two elder children have become very quick and accurate at making these estimations. Unlike Megan, he did not describe modeling his own approach to estimating the total cost; instead, he encouraged his three children to choose their own strategies.

Another way that parents directly and intentionally supported their children in learning mathematics was by engaging in the materials sent home by their teachers. Here are two examples:

> I remember like last year they would send home different like math like mathematical games. Just every week or couple weeks they'd send something home in his communication bag and we would we try to kind of like, go over those things. Yeah, I would say like the games and then kind of just doing

> whatever like math-oriented things came home in his communication bag. (Simon)
>
> I know that there was a newsletter that came to home with the first of the month every every month, obviously, and then no, just a classroom one and it said what they were working on. But if I asked Anna about something, she's like, I don't know. Like there was like I have. She wouldn't tell me. So then then I read her report card at the end of the year and said they worked on 2D versus 3D shapes. (Megan)

Most participants described paying attention to and valuing the suggested mathematics activities that were sent home by teachers. Simon in particular expressed gratitude for these games, as he wanted to help his son with learning mathematics at home, but he did not necessarily know how to go about it. Megan mentioned receiving a monthly newsletter that included information about targeted mathematics learning objectives. She regretted not receiving more information about what Anna was doing in the classroom so that she could reinforce more mathematics ideas at home.

Intentional and Indirect

Nerdy Logic Puzzle People

We set the table.
My wife does logic puzzles to relax
My eldest is trying to figure them out too
Her grandparents were nerdy logic puzzle people
And my kids do the same thing.

In addition to the at-home practices that directly and intentionally supported mathematics learning, parents also described indirect ways that they supported their

children. For example, this included things like comparing the length of a bike ride to a triathlon they completed in the past, drawing scale diagrams of sports cars, playing board games like Floor Plan or RACK-O, or playing puzzle games on a tablet. Each of these activities were chosen for a purpose other than practicing or building mathematics skills; however, parents recognized these unintentional ways of building mathematics skills as an important part of their day to day lives. Here are several examples:

> Yeah, Ben and I went for a bike ride and I was going for a run and he just wanted to ride his bike. So he rode, he went like 8 1/2 Km and then the previous weekend he had done this like triathlon thing where it was like he did a kilometer and a half bike ride around the lake and so we were trying to count like how many 1 1/2s would go into like 8 and 1/2. (Simon)

> They solve puzzles together, whether it's the Zelda dungeons or the physical puzzles they do, they will sit on the couch and one of them will do it. One of them will comment. Yeah. So I do kind of think those are, I mean, they're logic puzzles. They're kind of math and they're not always with numbers, although sometimes they are. But yeah, I guess that that's sort of the shared problem solving and technically LEGO, we'll do LEGOS together sometimes. (Val)

> And our kids do the same because my wife does logic puzzles to relax. Vicky is trying to figure out how to do logic puzzles. But that's my wife's parents were nerdy logic puzzle people, and that's how she does it. That's why it's in Sudoku. And like, that's what she does to relax. Believe it or not, even after long days, we'll do that. And that's, our kids do the same thing. It's not guaranteed that that's what they're going to do, but we set the table for them. (Roderick)

In each of these examples, parents described activities that may not be immediately recognized as mathematics; however, they are all examples of mathematics manifesting in daily family rhythms. Simon and his wife valued physical literacy, and he shared how he used mathematics to calculate remaining distances to stay motivated when running or cycling. In turn, he started talking to Ben about distances, fractions, and time when they went running or cycling together. These are all concepts that will show up in Ben's mathematics education, but when he encounters them in school, he will have already encountered them with his dad. In Val's family, everyone enjoyed playing video games. Val is a computer scientist, and he intentionally sought out digital games that would engage both the adults and the children alike. He noticed that both of his children enjoyed problem solving in video games. Although these problems do not necessarily involve numbers and figures, they generally involve strategic thinking and spatial reasoning. And Roderick described a family practice that was introduced to him by his wife and her parents. Roderick's wife and children enjoyed unwinding by doing logic puzzles such as Sudoku. This was a family practice that Roderick's wife experienced as a child and they have now continued with their own children. Playing with decontextualized numbers was one of their preferred ways to relax and connect as a family.

Unintentional and Indirect

On Time and Ready to Learn

get to school on time
go in with an open mind
capacity to do that every day—
that's my job.

Parents also described supporting their children's schooling more broadly in ways that extended beyond practices that would indirectly support mathematics learning alone. Sally shared that her husband, Bill, experienced struggles in the school environment that mirrored those of their eldest son, Frank. As a result, Bill intentionally engaged Frank in hands on learning at home:

> Bill is very much [like our eldest son] Frank which helps us understand [Frank] even better because Bill can remember what it was like to be in school and kind of the struggles and how that structure of school didn't work for him. And so he is very, very hands on. And so I find that, yeah, he just naturally then is more hands on with the kids and showing them things. So it's more of a yeah, using your hands and exploring and doing things without again being aware that that's how we're doing it, but it's just... It would not be natural for him to sit down and… The only pen and paper he would do would be drawing, lots of demonstrating with drawings for the kids, but definitely not "let's sit down and do a worksheet!" (Sally)

Sally spoke about a summer of catapults, an army base made out of LEGO bricks, and an afternoon of mini sticks in Frank's new middle school. Though these activities were not intentionally selected to help Frank in mathematics, they were family practices that supported Frank's mathematics learning. The catapults involved measurement, estimation, and calculation. The LEGO army base involved spatial reasoning with its scale representations of the local military base. And a special day touring Frank's new middle school involving an impromptu game of mini sticks greatly reduced Frank's

anxiety about the first day of school. These were all examples of parents supporting their child's continued learning.

Another example of parents indirectly and unintentionally supporting mathematics learning related to developing general learning habits:

> They get to school on time every day, they're at school and they're ready to go to school and they're prepared to be at like to learn, like they go in with an open mind. Like they know that the school is important, and we reinforce that listening to your teachers are important and doing what you're asked is important. And I think that not all kids get that. (Roderick)

Roderick spoke passionately about the importance of developing learning habits that reflected his family's values. This included arriving at school on time, respecting teachers, and being open to a variety of perspectives. He talked about these as fundamental building blocks for education. Though he frequently described himself as being fortunate that his children enjoy going to school, he also attributed their overall academic successes to these habits. He did not cultivate these habits to support his children in mathematics; rather, these habits support his children with schooling in a more general sense. Simon described something similar:

> …making sure he's like fed well, making sure he has breakfast, making sure he gets enough sleep the night before, making sure he's going with food and water. Yeah, basically just making sure he's like, ready for the school day physically and hopefully mentally. Yeah. One other thing that probably helps, we'll walk to school and yeah, I feel like even just that little bit of like physical activity is probably a good thing in the morning too. I mean, at least I know it helps me, kind

> of. It helps me in terms of my mood and my ability to tackle problems and stuff like that. So maybe that helps him in terms of his like mood and ability to kind of carry out things at school. (Simon)

Here, Simon spoke about some of the things that take place before Ben walks into the school. By taking care of Ben's physical needs, Simon and his wife believed they were setting him up for a positive learning experience at school.

Theme 4: "That parent" Compensates for a Stretched School System

That Parent
I don't want to come off as
the angry parent
barking.
I'm aware.
see behind the curtain
see the teachers and the principals
see how they react.
You see it.
You can see what happens.
I never want to be
that person
that parent
the one mom in an uproar
running people over with
a little bit more of a bite.

Several participants described needing to adopt a set of practices when their child's individual learning needs were not being met by the school. They used the term "that parent" to describe someone who advocated for their child or children in spite of the

potential harm it might cause to their relationship with the teacher and school staff. Several parents described feeling that their child's learning needs were overlooked at school, which led them to speak up. Val described the challenge of supporting a child who needed accommodations at school:

> We had to sort of discover what accommodations and supports might be there when we were asking for help with Destiny. I don't know. I think, you know, I'm glad that they were there when we went looking and there was people there to talk to for help with the school. (Val)

Val described needing to take initiative when Destiny's learning needs were left unmet, which neither he nor his wife felt prepared to do. They relied on their network of parent friends to help with navigating accommodations, classroom change requests, and how to escalate the situation when they felt the school ignored their concerns. Another part of being "that parent" was the sense that parents were needing to do things that they believed were part of the school's responsibility. For instance, Megan was surprised to learn that Anna's teacher was not correcting spelling mistakes and felt like she "had to talk with her teacher" about it:

> I was like you need to correct her spelling mistake […] I know all kids learn differently, but I was like for my kid, you need to correct her because if you don't, then she comes home and I correct her. She hates it coming from me. From you, it's a learning experience. For me, it's me picking on her. She's like, well, my teacher doesn't say anything. I'm like yes, because they just don't correct you. Like I don't know what to say to you about that. (Megan)

In this example, Megan suggested that correcting spelling was something that a classroom teacher does, and she shared how Anna reacted differently when her mother took on that role instead. Similarly, Sally described being reluctant to force her children to do homework and "taking on the same role of the people you [Frank] don't like." Frank associated corrections and homework with school, which was not a place where he felt particularly safe, comfortable, or capable.

Sally went on to share how the transition to middle school was difficult for Frank in part because there was an expectation that he would seek help when needed. She explained that a teacher's passive open-door policy would not be enough because "he's never gonna come" and will instead "quietly suffer" rather than asking for help. She felt that it was the school's responsibility—in this case, the resource teacher's responsibility—to "take an active role" with helping kids who need more help, but that "just wasn't happening" for her child. As a result, she established a proactive approach to support her child:

> And you know, continued follow-ups with teachers and meetings with teachers and meetings with resource, which again felt like it was failing us like again, it felt like the system was failing us and that Frank needs more help. (Sally)

These experiences with a "failing" school system left Sally concerned for the "gray kids," the students who were generally well-behaved and were either just meeting the requirements to pass or were slightly below expectations. She described these students as "the ones who are the 'in-between' of needing support" or the kids who "are just going to slide through" and were therefore not getting the attention they needed. This led her to "have a disappointment with the entire school system of the amount of kids in the class

and needs in the class without the [necessary] supports." Sally described a classroom scenario where student needs were triaged but only the most extreme cases get looked after, while the other students who could also use more direct support from their teachers were left to fend for themselves. Megan voiced something similar, though she spoke to the lack of attention for students who were surpassing unnecessarily low expectations:

> She knows all her stuff so she almost gets ignored because she's not the squeaky wheel in the classroom, right?... I hate that we're teaching almost to the lowest common denominator as opposed to meeting kids individually because you can't tell me in a classroom of 15 kids they're going to be all at the same like level. (Megan)

Roderick described knowing when to become that parent as "a gut feeling" that came from knowing his kids. He also added that this intuition can extend beyond a parent's children to include any children in their care to see "if they're in a good place." For Megan, she knew she needed to take action when she noticed that Anna was not struggling "in anything in any way." Even though Anna's teachers have always said Anna is "doing great," Megan believed that "nobody should be flying that high at that age." Megan later clarified that she wants to see her child being challenged at school so that she can experience what it is like to overcome a frustration or a struggle. This is what has led Megan to asking Anna's teachers to correct Anna's spelling mistakes.

For Sally, "it was very easy to know when we had to be leaders in and had to champion for [Frank]". After the initial reluctance to use her relationships with school staff to seek special treatment, Sally stopped hesitating to make requests of the school. This included requesting certain teachers, requesting that her children not have specific

teachers, and constantly monitoring whether the accommodations outlined in her child's Personalized Learning Plan were in effect. She suspected that this was a common experience for parents of children with special learning needs, noting that she had "plenty of friends" with neurodivergent children who "know they're taking on that role, knowing that they have to because nobody else is going to do it for you." Sally "never went into any of these roles hoping to get special treatment" but acknowledged that by "doing so much" at the school "it helps a little bit or makes me more comfortable in asking for those things." While she may not have initiated the practice of volunteering in her child's school to get special treatment, she recognized that her contributions have afforded a listening ear from the school principal. She described being mindful of "not wanting to abuse my power," which suggested that she came into this role reluctantly or unwillingly. There was a tension between her wanting "to volunteer because I want to, and I want to do good things," while also refusing to sit back and assume that the school would take care of her children's learning needs.

There was one description of "that parent" that suggested the possibility of a counternarrative:

> What's stopping me from having the relationship with the school and the people in the school that I want to have? And so after last time, I'm like, I'm going to, I'm going to talk to [Anna's teacher] and I'm going to, you know, like be straight up and be like, "hey, I'm that parent if you need something in your classroom, help with a fun project, with something, anything. I absolutely would love to be that parent to help out if you want it." I just haven't done that yet. (Megan)

In this example, “that parent” was imagined as a supportive ally who worked with school staff to meet shared goals for student learning.

Subtheme: Parents Do Not Want to be Perceived Badly by the School

Stepping on toes

Teachers give off this feeling
“Don’t ask me to do anything else”
“I’m overworked”
“My time is valuable”
“Stop asking me to do other things”
I am trying to understand
I don’t think teachers are approachable
people are tense
a stiffness
it wouldn’t take a lot for the whole thing to shatter
I would never offer it but
I would help if you want help.

Three participants described worrying how teachers and administrators might respond to feedback or offers of support. “That parent” was angry, pushy, stupid, critical, obnoxious or unrealistic:

> I’m always conscious of I don’t want to come off like that. Like I don’t want to come off as the angry parent and I’m very much aware, I guess, I’ve been in the school enough as well and see behind the curtain to see how the teachers and principals—who are all just human beings—react to the negative. And it doesn’t (pause) it isn’t (pause) well, you know, and not as if they are telling me secrets or

whatever. But you see it. You can see the just what happens. And so very much I never want to be that person. (Sally)

Megan described feeling like she got off on the wrong foot with her daughter's teacher after asking for clarification about a book log that came home:

> Why are you sending a book journal with no books? It's pretty much what it was. And do you want English and French [books] like I don't know if she perceived that to be a stupid question because it's a French immersion class, but I was like, I don't know, maybe you're just encouraging kids to read. And I don't know you. Literally I read it like three times because I don't like asking a stupid question. […] it just feels like we don't have a good base to start from, and I want her to realize or or look at me more as like an ally, a friend, a helper. Like I can be that for her in the classroom. But now it's just like frankly we've had some weird ass conversations up till now. I don't I don't and then do I seem like a pushy parent? (Megan)

Both Roderick and Megan described it as a worry about overstepping:

> I think being willing to be the person that steps up to do these things is scary, potentially, and people don't want to overstep and everyone's like worried about stepping on somebody else's toes. (Roderick)

> I feel like it has like if the teacher asked it of me, I would totally do it. If I I I would never offer it up because I'd feel like they think I'm stepping on their toes. (Megan)

Megan worried that asking too many questions could harm the way her daughter's teacher viewed her as a potential resource to support the classroom. She was also concerned that offering to come in or to offer support might be too pushy, which was similar to how Rodrick noted the reluctance to step on people's toes. Megan talked about the difficulty with offering to help out a teacher as being interpreted as stepping into the domain of the teacher's responsibilities.

Participants described the challenge of wanting to step in and help teachers to lighten the load of an overworked school system while worrying about how such an offer might be interpreted:

> I am one of those obnoxious parents. I'm sure her teacher this year hated me because I am. I get it, but I'm like I I know she doesn't hate me. I'm sure she much rather hates the the parents who don't give a crap about their kids. (Megan)

> I have a acquaintance essentially that would be more of the angry parent and more of the she has two boys that are high needs both on the spectrum both with EAs [educational assistants] and she is more of the just kind of come at them like she has very high expectations that sometimes are not realistic of like what the school is and I think that I have been seeing the school not respond as positively [to her]. (Sally)

> It's funny because I am close with the teachers and the administrators… if something comes up that you have to be like, be the like parent, like push back or something, it's something that I have to think about, you know what I mean like that, to keep all of those relationships strong. (Roderick)

Theme 5: A Holistic View of the Relationship Between Home and School

I know them

one of our kids had them for a teacher
a kid I've looked after was in their class
I've known the gym teacher for twenty years
I've been around for a long time
The administration the custodian the people working in the cafeteria the office
I'd like to know them all
I trust our teachers

When asked about the relationship between home and school, parents described multiple relationships with a variety of people. For parents who regularly volunteer in school settings, such as Megan and Sally, they described getting to know teachers, administrators, support staff, other parents, and students:

> Yeah, so I think being at the school and being involved and knowing the school has just probably helped build a community for our kids to make them feel like a community. (Sally)

Sally had been volunteering as a member of a parent school support committee since her eldest child entered kindergarten. Ever since, she helped out with hot lunch programs, organizing book fairs, and general fund raising. Sally also worked as a substitute teacher in the elementary school that two of her children attend, which deepened her connections with the people in that school.

Like Sally, Megan had been volunteering in her child's school since her daughter Anna entered kindergarten. Megan developed relationships with the school principal and

many teachers in the building. She volunteered for every field trip and felt like she knew most of the children who attended the small school. She light-heartedly described her initial disappointment to learn that Anna would have a Grade 2 teacher who was new to the school building:

> I'm just so mad because I was like I've built up so much street cred in kindergarten and Grade 1 to get a teacher that's never been in that school before, knows nothing of me. Like, seriously, I was expecting this next year when she moves to a new school for 3–4–5 that I was like, OK, I'm going to have to, you know, start over again there, but not for the third year at the same school where like literally a lot of students know me, a lot of the teachers recognize me and know me and stuff like… frig! That's annoying! (Megan)

Megan saw her time helping out at the school as a social investment that did not guarantee returns. She shared a story about how Anna's new teacher insisted on confirming Anna's after-school transportation arrangements. At first Megan was confused, since the administrative staff knew that Megan stayed at home and met Anna at her bus stop every day. While the transportation arrangements were unchanged, this episode reinforced Megan's feeling that she was starting all over with the task of building a relationship with a new teacher to the school.

For parents of multiple children in elementary school, such as Val and Roderick, they described how they have gotten to know and predict school rhythms or specific teacher practices:

> I appreciate the teachers there. I know it's not a possibility for everybody, but they so far are like, River has always had the [same] teacher that Destiny has had,

> which has been extra easy to kind of pick up that relationship and, you know, get her emails, you know what she does. So that's great. (Val)

Val's younger child had always had the same teacher as his older sibling, which resulted in a continuation of one relationship with a teacher rather than beginning an entirely new relationship with two teachers. Several participants described the frustrations of adjusting their communication expectations each year as their children move from one grade to the next. For instance, Megan recounted how “spoiled” she was by Anna's kindergarten teacher who sent regular messages and photos of Anna engaging in classroom activities. This was in sharp contrast to the Grade 1 teacher, who did not share this practice and seldom sent home personalized updates on student learning. Val liked the predictability of knowing a teacher’s rhythms, such as how often they sent home parent newsletters or their stance on homework. Although he did not say that his children have all had the same teachers, Roderick expressed something similar:

> I love it because I see the kids, and they all seem happy. And I have a relationship with a lot of the kids that go there because we we've had kids there for six years now. And we have had three in there at one time, but now there's only two. And I have four more years of kids going to be there. So I want it to be a priority relationship in there. (Roderick)

Roderick not only described his relationship with the school as one that included his relationships with many of the students who go there, he identified this relationship as one that would last a long time and needed to be a priority in his life. By being in the school, he saw his children in that context, and his observations led him to believe that his children were happy in their school environment. Later in the conversation, Roderick

described his relationship with the school as one of the most important relationships in his life.

Although Simon had only one child attending school at the time of this study, his description of the school community was similar to Roderick's:

> It seems like there's a community surrounding [Ben's school], like [Ben's school] seems like almost like an anchor in the community to develop that sense of community. At least that's what it's felt like for us. Like having to drop Ben off and pick him up and get in those little interactions with the people involved in the school or even the crossing guards. Those little interactions. I think I feel like some people take those small interactions for granted or that maybe they don't matter, but just to get the little interactions like with the crossing guards or with people outside the school or some people you know outside the school, like friends, whatever, like, just those little like, "hey, how you doing? What's new in your life?" Those sort of interactions like. At least for me, that adds a lot to my life and also sense of community, and I feel like I get a lot of that just from the interactions surrounding the school. (Simon)

Simon stated that he and his wife chose their home for its proximity to the local elementary school. He liked that he could walk Ben to and from school, and he valued the relationships he was making with other parents at dismissal. Simon did not feel like he knows Ben's teacher very well, but he made eye contact with her every day when he picked Ben up from school. He regularly chatted with the school principal and felt connected to the school community.

Subtheme: Some Parents Perceive a Disconnect Between Home and School

Outsider

Her school is doing a family picnic soon
the June picnic got canceled
They think it's helping to bridge the divide but honestly
    You go upstairs
    You grab your kid
    You take them outside
    You eat lunch with your kid outside
no integration between parents and school
not a tour
I'm not allowed to walk around the halls

on these occasions
I'm gonna go up there
I want to see…
where does she sit?
how is the classroom set up?
are the kids seated in rows?
do they have a carpet area where they sit and read stories?
what do they do?
    I don't know.

Although parents generally related stories that show a variety of relationships with people in the school community, several participants described a disconnect between home and school. These parents felt like they did not always know enough about their child's learning. Megan shared how she valued receiving newsletters with classroom updates, and that she particularly liked the personalized learning updates that she received from Anna's kindergarten teacher. The kindergarten teacher used digital tools to

regularly send home pictures of Anna learning in the classroom. In contrast, when Anna entered Grade 1, Megan started to feel less connected to Anna's progress at school:

> It might also be a bit of a disconnect between school and home in that she is, as most kids are, horrible at sharing information. They're great at sharing horrible information, horrible at sharing good information. (Megan)

Anna's Grade 1 teacher did not use the same digital tools as her kindergarten teacher, so Megan had fewer concrete examples of classroom activities to spark conversation with her daughter. Megan described trying to talk to Anna about what she was learning at school but noted that Anna does not recount the details that Megan was most interested in hearing. For Megan, "good information" would include details about what students were learning in mathematics or what stories their teacher had been reading to them. Anna was "great at sharing horrible information," which included recounting details about social relationships and classroom antics. Megan suspected that schools assumed children tell their parents more about what they were learning than what happened in reality, which resulted in a feeling of disconnection.

George also brought up feeling frustrated as a result of limited communication between home and school:

> It was like late November last year. We got a report card and it's like, "oh, Miley's falling behind in like two categories" or something. It's like, "oh, why didn't [her teacher] let us know this before the report card came out?" This is something we could have been working on for weeks. So then we had to like, we felt like at that point, OK, now we have to like, spend all of our evenings getting you [Miley] caught up. Luckily Grant [a younger sibling] wasn't in school, so we didn't have

> two kids [in school]. We just had one kid. And so we spent a lot of time get just trying to get her caught up. (George)

George described being surprised to learn that Miley was struggling in French speaking and French reading, something that he felt should have been communicated sooner. When asked about how this influenced his relationship with the school, he replied that "less feedback doesn't really build like a robust relationship." George described feeling like he needed to spend evenings with Miley to work on speaking and reading, which interfered with the other family activities that he would have otherwise done. He shared how he did not know whether his at-home efforts were helping until the second report card came home because there were no further progress updates from the teacher. George described not wanting to "nag the teacher for that stuff." He wanted her teacher to take initiative with communicating learning needs.

Unlike Megan and George, Sally was satisfied with the amount of communication she had with school staff; however, she had noticed that other parents felt disconnected from the school community:

> I don't know where the disconnect is. It's hard for me to see because again, I've been so connected for so long that I don't know what the other side is, where you feel disconnected. (Sally)

In our conversations, Sally talked about noticing that fewer and fewer parents volunteered to help out with school events. She also described the challenge of managing a school's social media page, where some parents used the space to voice their frustrations with the school. She recounted a story about how the administration's decision to cancel the annual Christmas concert led to a social media campaign organized

by parents. Though the campaign was able to drum up support, the school principal announced that the decision to discontinue the annual concert was irreversible, no matter how many disappointed parents decided to join the Parent School Support Committee or complain online.

Third Wave: Polyvocal Research Poems

Now that the second wave is complete, it is time to step into the third and final wave of the study's results. This section comprises ten polyvocal research poems. Each of these poems includes multiple voices and draws from multiple interviews, following the progression of themes introduced in the second wave.

Poem #1

I was aware of the shift
Math is taught different now
to look at the new way… it's been on my mind
I've thought about it
let the school run with it

Their strategies for subtraction and carries
They do grouping and different methods
different than what I use
I don't do new math
I do long division

I was taught to add and subtract and multiply in a certain way
She adds differently
it comes out of her mouth
(Why is she saying that number?)
It's never the way I would have done it

They don't teach it lining by units
always written across
We try to get her to write it above—
She won't.

I’ve had to learn how the kids learn to count

What does that mean?
The wording means something to you
The wording means nothing to me

I don’t understand
I sit down and (re)learn what they’re doing
It’s going to get worse as they get older

Poem #2

Once she has her reading down
I'd like to teach her advanced mathematical concepts
Calculus by Grade 6

Once she has her reading down
more r o o m to engage her with math
more time to engage her with math

We've done a lot of work with her reading
Evenings, summer—
still
Complaints about her language and
never
enough
resources

she can do anything
any books
any topic
once she has her reading down she can do anything.

Poem #3

Math is kind of funny
I'm not really worried
'cause I can get by in French
It doesn't really matter
'cause it's all just numbers.

Poem #4

I wouldn't want to learn math in French
Hard to learn both at the same time

French immersion until Grade 9

OUT

Couldn't get calculus in French.

French immersion until Grade 11
You got to focus on science
You got to focus on math
You got to have good marks on that

OUT

Hard to learn both at the same time
I wouldn't want to learn math in French

Poem #5

Trying to add
What's 1 + 0?
a conscious moment
whiteboard on our fridge

What's half of 12?
A little bit of repetition
A little bit of frustration
happy to stay up later

youngest one eager
desperate to figure out the number

a measuring wheel in the snowbank
fallen off the back of a truck, dropped
two weeks measuring
                our neighborhood
                from there to the court
                laps around our island
counting, counting in groups of ten, counting to occupy as much time as possible.

Poem #6

You get me thinking
How do we talk about math?
We don't
I don't
talk about mathematics as like a thing
it's just
it's sort of like
I don't know
I mean
I guess
We kind of view it as something you just
kind of
You have to
KNOW
not inherently like a good
thing or a bad
thing
We don't put any particular spin on math
it's just something you kind of have to know
We do math all the time.

Poem #7

You know your kids and can feel
if you're watching, you'll know
I am one of those obnoxious parents
the squeaky wheel
I'm not the teacher's favorite parent

I see the principal as a person of authority
"yes ma'am, we will work harder on that"
back to the little girl who doesn't feel big enough to speak up

being the volunteer mom
not wanting to abuse my power
Here to volunteer
Here to do good things but also
Here to benefit me and my family

reaching a point
I have no choice
I sat back and I let things happen to us
I can't let that happen again

conversations with the principal
defensive of her school
protective of her school
asking about education
busy meeting basic needs

We lived through it
that Grade 4 feeling
Our kid coming home, uncomfortable in the classroom
Our kid with his adjusted curriculum
Our kid with his stuff

Our kid with his needs that should be met
He could still be in French immersion and
He could have done just fine
I cry about it

We've suffered
through years of those English classes of messy classrooms, disastrous classrooms
out of control
His chaotic classroom—that's what it is—an absolute mess
We want to be with the snobby French kids
the better option
the less chaotic option
heartbreaking

having him switch classrooms—
the leaders failed us
follow-ups and meetings with teachers, meetings with resource
He needs more help
He is never going to come through your open door
He is going to quietly suffer
It was always us leading but I don't see it as me being a leader
Just me
Just mom.

Poem #8

a small interconnected community
to step up is scary
worried about stepping on toes
afraid of offending
I don't want to be that person
I will do anything
ask me and
I will do it
I go to track and field and Terry Fox but
I don't want to impose
I don't want to seem like that parent do I seem pushy I don't want to be a burden but
I will always do what's best for my child.

Poem #9

When his teacher comes out of the building
eye contact
waves
We have never said words to each other but
little interactions with people in the school
“Hey, how you doing?”
“What’s new?”
adds a lot to my life
interwoven into the school
general community feeling
community surrounding the school

I walk ten kids to school every morning
Being the dad that is there
The Primary Caregiver
making it a little less lonely for other dads

Poem #10

When she started kindergarten
I'm sending my child off
I have no idea what happens inside those walls

I don't know what to ask
I have no concept
communication that comes home once a month
did you do that?
counting by twos up to 20
Review done.
I hope it's more than that for the month of September
counting by twos backwards starting at 21
"You can't" she says.

Talking it through with him
seeing if it made sense to him
"It could be"
"I don't know"
"That looks about right"
He's an unreliable narrator, you know.

The teacher sent home this book log thing
a week into school
Track books that you read at home
English and French books?
She circled *French*
and that was it.
What books is she supposed to be reading?
We're still in the process of assessing their reading levels
Who the hell is we?

Chapter Summary

This chapter presented the study's findings in three sections, or waves. The first wave introduced participants using a combination of monovocal research poems and descriptive prose. I then moved into the second wave, where I introduced the study's themes using monovocal research poems and then elaborated each theme using excerpts from interviews and journals. The third and final wave presented a collection of ten polyvocal research poems that synthesized the study's findings in poetic form. The next chapter will explain in more detail how I blended poetic inquiry with reflexive thematic analysis to represent, analyze, and interpret these results.

Chapter 5: Interlude

Now that I have reached the end of the results chapter, I would like to explain more about the methodological decisions that shaped it. I believe this explanation will serve to further illuminate the analysis and results, setting the foundation for the coming discussion.

Organization by Waves

I have always felt connected to the ocean. I can spend hours sitting on a rocky beach, listening as relentless ocean waves crash onto the shore. When the challenges of daily life leave me feeling untethered, the sights, sounds, and smells of the ocean bring me back to earth and back to myself. In particular, the predictable and reliable rhythm of ocean waves has taught me to think about relationships in terms of ebb and flow. When the tide comes in, its waves wash away sandcastles and chase sunbathers away. And when the tide goes out, rippling sands reveal treasures like sea glass, seashells, and driftwood. Ocean waves rearrange the landscape and make visible previously obscured hidden gems. And each wave of the findings chapter is a rearrangement of the data collected in this study.

First Wave

The first wave of results offers an initial introduction to the study's participants and their perspectives about mathematics learning and schooling. I decided to introduce participants in the order that they joined the study so that readers might experience something similar to what I experienced as I got to know them. I strongly believe that the order of interviews influenced my representations and interpretations of what participants had to say. Each interview contributed to my developing understanding of participant

perspectives, and the order that I heard their stories sculpted the early narrative taking shape in my head.

Once I completed interviewing all six participants, I began composing monovocal research poems in the same order as I conducted interviews. As I went through a catch, or the highlighted segments from all interviews with a single participant, I started to piece together poems. Each set of interview questions corresponded with one of my research questions, and I started composing poems according to each question. For some participants, I composed multiple poems per research question. For others, I struggled to compose any. I noted these differences in my researcher journal, observing that online interviews resulted in fewer poems.

After going through each catch, I compiled a collection of monovocal research poems for every participant. At this point, I emailed every participant their collection of poems and asked whether they consented to me using the poems as data. I also asked them to verify whether the poems aligned with their perspectives; I wanted to ensure that I was not misrepresenting what they had to say. This period of member checking was more nerve-wracking than submitting my dissertation proposal for initial feedback, but participant feedback was fundamentally important.

They loved the poems.

Second Wave

Once I confirmed consent to use the monovocal research poems, I embarked on the next stage of analysis. My initial plan was to divide the results chapter into two parts, one for the findings from poetic inquiry and one for the findings from reflexive thematic

analysis. I saw these analytical approaches as contributing complementary but distinct insights. Importantly, at this point, I had not yet selected which poems to include in the section dedicated to poetic analysis. I set aside the poems to work on reflexive thematic analysis.

I knew before starting data collection that I would ultimately be coding and analyzing transcripts, developing themes, and thinking about how everything would fit together. However, I did not anticipate just how difficult coding and subsequent data analysis would be. On the one hand, I could vocalize how this approach to data analysis was surfacing different interpretations than the monovocal research poems did. On the other hand, I found it difficult to put these findings into writing. I spent hours and days, weeks and months agonizing over transcripts. Whereas I found it easy to surrender to the evocative effect of research poems, I questioned my capacity for thematic analysis.

I ultimately organized themes according to how they coalesced in my writing. I played with their order until it felt right, when I could discuss findings and show connections across themes. I wrote about each theme and pulled excerpts from interviews. Over time, engaging in this writing process revealed my thematic analysis. I noticed how this section of the chapter looked and felt more traditionally scholarly, even though I felt less confident than I had when composing the research poems. I then started to wonder whether any of the research poems might integrate into the thematic analysis. This idea of combining poetic inquiry with reflexive thematic analysis resulted in an outpouring of analytical creativity.

To begin, I returned to the first wave. I selected three poems for each participant: one about mathematics learning, one about mathematics schooling, and one about their

relationship with their child's school. When I look at each set of three poems, I can hear that parent's voice. I can see their unique perspective as a part of the larger study. This first wave became an introduction to the voices and perspectives of individual participants.

Next, I considered which poems might fit within the thematic analysis. My decisions were guided by identifying which poems illustrated the varied themes and subthemes. These poems hint at common experiences. Though all of the poems in the second wave were monovocal, they described practices or perspectives shared by multiple participants. This resulted in some repetition in my writing, where lines from poems were also included in the description of themes. I did this intentionally for two reasons. First, I wanted to support my claim that poems were generated from ideas and phrases from participants rather than opportunistically ripped and snipped out of context. And second, I wanted the reader to think and feel. Reading participant words in paragraphs is different from feeling their experiences through poems.

Third Wave

And then I reached the third wave of the results chapter. I am not a poet, and I do not describe this dissertation as employing an arts-based methodology. That said, the inclusion of an arts-based method resulted in a deep, reflexive analysis. I consider this third wave of results the sea glass of my findings. I composed ten polyvocal research poems and arranged them to match the narrative rhythm of the second wave. Whereas the first wave introduced participants and the second wave began the process of showing their shared experiences, the third wave invited the reader to be moved. The third wave was meant to wash over the reader, leaving tidal ripples in its wake. I hope that readers

finished the third wave with curiosity and a sense of longing, wondering what comes next.

Before continuing with the discussion, I invite readers to take a moment to pause, to notice, and to feel. I often catch myself rushing through scholarly readings, caught up in a whirlwind of thinking and reasoning and figuring things out. Academic spaces do not often make space for us—the human beings in these spaces—to feel. My hope is that the organization of this dissertation has carved out a teeny space for some sentiment. We can learn so much by attending to what we feel.

Chapter Summary

This brief chapter explained the procedural and methodological decisions that shaped how I presented the study's findings.

Chapter 6: Discussion and Conclusion

In this chapter, I begin by summarizing key findings from data analysis before responding to each of the research questions. The discussion is informed by the theoretical framework that underpinned the research design as well as relevant research undertaken in the field. Though there is limited research in elementary French immersion (FI) mathematics contexts, I draw parallels from other research examining parental involvement in mathematics more broadly. This study examines the ways that parents of elementary FI students support their children in mathematics.

While analyzing data collected from my interviews with parents of elementary FI students, I identified five primary themes and four subthemes. The first theme described how parents perceive changes to school mathematics with respect to what is taught and how it is taught. The second theme described how parents prioritize literacy skills over numeracy skills, and I shared how parents often pause mathematics at home to focus on developing reading skills when their children struggle with reading. This theme also had two subthemes related to the particularities of learning mathematics in the FI program: parents described learning mathematics in French as primarily an exercise in learning vocabulary and several parents described learning mathematics in FI as a potential barrier to academic success. The third theme described the multiple ways parents engage in mathematics learning at home, noting how it is at times direct and intentional (e.g., practicing multiplication facts), indirect and intentional (e.g., playing board games), or indirect and unintentional (e.g., promoting physical literacy). The fourth theme introduced "that parent" as a role that parents adopt when their child's individual learning needs are unmet in the classroom. This theme also had one subtheme: parents do not want

to be perceived badly by members of the school community by crossing the invisible boundary between home and school. The fifth theme suggested a holistic view of the relationship between home and school, noting that parents perceive this relationship as a set of personal connections that span an extended period of time. This theme also had one subtheme: some parents perceive a disconnect between home and school, which they attribute to poor communication practices.

Having reviewed the study's findings, I will now discuss how they relate to my responses to the original research questions that framed this study. I remind readers that although I set out to explore the perspectives of caregivers of elementary FI students, I revised my research questions to reflect how all participants are parents of FI students.

RQ1. How are Parents Supporting Children in Elementary FI Mathematics?

There has been limited research at the intersection of FI education and mathematics education, and no previous research has examined the perspectives of parents of FI students as potential agents of support as their children learn mathematics content through the target language. Whereas research involving parents of FI students has focused on access for students with special education needs (e.g., Cobb, 2015; Mady & Arnett, 2009) or approaches to supporting the language development of multilingual children (e.g., Dagenais & Berron, 2001; Dagenais & Moore, 2008; Moore & Sabatier, 2015), this study aimed to contribute insight into how parents support the mathematics learning of their children.

There are many ways that parents and caregivers support children in elementary FI mathematics. During our conversations, participants recounted direct and intentional instances of doing school mathematics at home more frequently than indirect and

unintentional examples. This might be because they find it easier to recognize mathematics when it more closely resembles what they remember as school mathematics, which would largely include solving a set of problems using paper and pencil. An example of this would be Roderick's father who regularly prepares a set of mathematics questions for his grandchildren to solve, or George asking his child Miley to fill in a blank multiplication table. Both of these activities might be done in a classroom. When I think back to my own experience learning mathematics at school, I can remember filling in multiplication tables and answering seemingly endless pages of mathematics questions. It is not surprising that parents might offer these at-home iterations of school-based mathematics as examples of how they support their children in elementary FI mathematics. They were once students of elementary mathematics, and it is likely that their conceptions of supporting children in mathematics would mirror what they experienced as children learning mathematics. This limited conception of what counts as expressions of parental support from the vantage point of homes would benefit from expansion beyond the schoolcentric notion of which practices are valued (Schnee & Bose, 2010). A narrow set of criteria for what counts as supporting children in mathematics results in some family practices going unrecognized by both the school and the parents themselves (Jay et al., 2017; Wager & Whyte, 2013). Parents may share a narrow view of mathematics as something that is rigidly right or wrong and separate from other subjects (Jay et al., 2017).

How are Parents of Students in the FI Program Supporting Their Children's Mathematics Learning?

After hours of conversations with participants, I have come to think of parental involvement in mathematics learning as family practices that involve any of Bishop's

(1988) six universal mathematical activities: counting, locating, measuring, designing, playing, and explaining. Mathematics is a fundamental expression of human life. Parents support their children's mathematics learning by involving their children in mathematical tasks (Harper et al., 2021; Yaro, 2021) and by inviting their children to see the world mathematically. These findings correlate with what Jackson and Remillard (2005) found in their study with mothers of school-aged children in the United States. Jackson and Remillard noticed that parents support their children's mathematics learning in a variety of contexts, such as at home or while running errands. They described this as engaging in informal learning activities that were not connected to particular school practices but were nonetheless supporting a child's learning.

Manifestations of parental support for mathematics learning might include conversations about calculating sales tax, making comparisons between the length of a triathlon to a recent bike ride, or curating a collection of video games that develop complex problem-solving skills. Parents support mathematics learning by sharing their mathematical practices with their children, such as vocalizing how, why, and when they might estimate the time needed to travel somewhere. They also support mathematics learning by relating mathematical ways of thinking to their children's interests, such as talking about scale diagrams of model cars, counting down the days until a visit from their grandparents, or encouraging their child to volunteer at a farmers market. Parents are perhaps uniquely positioned to make visible the mathematical in the everyday, though not all parents recognize a connection between these practices and learning mathematics at school.

Perhaps unsurprisingly, even though their children were learning mathematics in French, parents described mathematics learning at home as something they do in English. Other studies have shown that parents face particular challenges when trying to help their children with mathematics at home when the parents studied mathematics in a different language from the language of mathematics instruction for their children (Civil et al., 2008; MacDonald et al., 2025; Yaro, 2021). Importantly, in these other studies, children were learning mathematics in the dominant language of the community, whereas their parents had learned mathematics elsewhere and in another language. Participants in this study learned mathematics in English and currently live in a region of the province where English is the dominant language; they may not question the language of mathematics instruction because they have the security of knowing how to discuss mathematics in the dominant language in their local context. This might help to explain why they did not question whether their children would be able to transfer their mathematical knowledge from school (i.e., in French) to the home environment (i.e., in English).

Another approach to make sense of manifestations of parental support is to consider family values and beliefs. Parental support for mathematics learning is reflected in the activities that take place in the home field. The habitus organizes parents' practices and their perception of these practices (Bourdieu, 1984). It structures their beliefs about what they should/should not do, and it influences their perceptions of what is possible to do. Parents bring in their lived experiences to inform how they view the mathematics education of their children. The habitus influences whether mathematics is recognized as integral to human life, a uniquely school activity, or something in between. When parents

support their children's mathematics learning, they engage in activities made possible by the habitus.

Each participant described a set of practices in their respective homes (i.e., in unique social fields), and the mathematical activities they described as natural fits to their family rhythms were practices that aligned with their values and beliefs (i.e., their habitus). Parents generally support mathematics learning at home by engaging in mathematical activities with their children that integrate seamlessly into their family habitus. In their unique home field, there is a set of unwritten rules that dictate which activities are valued. This list of rules applies to the choices they make about describing activities as mathematical and whether or not they consider a mathematical activity as valuable. In Megan's family, mathematical activities are valued when they spark her daughter Anna's curiosity, foster short-term and long-term independence, involve play, and do not involve worksheets. Mathematical activities include doing things like playing Yahtzee and vocalizing strategies for in-game decision making and telling time using an analog watch.

Cultural capital manifests in a variety of family practices that support mathematics learning. For instance, Roderick's description of intergenerational puzzle playing as a way to unwind is an example of embodied cultural capital. Embodied cultural capital is wealth that has been converted into "an integral part of the person" (Bourdieu, 1986, p. 18). Roderick's family intrinsically values doing "nerdy logic puzzles." This practice is an example of doing something mathematical as a worthwhile way to find joy in the human experience. Roderick's family has the economic means for multiple adults to be home in the evenings with their children rather than working outside

of the home. They have the necessary mathematical competence to experience success while doing these puzzles. And valuing logical puzzles as a choice activity has the secondary effect of enhancing mathematics skills. Doing puzzles together is viewed as a worthwhile task in their family, and this family practice potentially contributes to valuing similar mathematical tasks in different social fields, such as at school.

Another manifestation of cultural capital relates to tangible possessions that support mathematics learning in the home field. For example, in the poem "Computational Thinking," Val described a variety of possessions that represent cultural capital in its objectified state. This form of cultural capital manifests in "cultural goods (pictures, books, dictionaries, instruments, machines, etc.)" (Bourdieu, 1986, p. 17). Val's family values owning items for the children to explore mathematics through play. This includes things like an abacus, Rubik's Cubes, calculators, puzzles, LEGO blocks, and video games. While possession does not guarantee the necessary embodied cultural capital to see the potential mathematical value of any of these items, Val described them as intentional purchases that fostered curiosity and made mathematics a part of day-to-day life at home.

Bourdieu (1986) described a third state of cultural capital as the institutionalized form, which might operate in the background when thinking about how parents supported their children's mathematics learning. Institutionalized cultural capital appears in the education histories of parents and how these experiences influence their parenting choices. For example, Megan, Val, Simon, and George all described studying mathematics at the post-secondary level. They talked about the importance of getting good grades in mathematics, both with respect to their own school experiences as well as

their hopes for their children. When it comes to thinking about mathematics learning at home, each of these participants confidently expressed their ability to help their children understand school mathematics. It perhaps makes sense that the institutionalized form of cultural capital seems to relate more to mathematics schooling as opposed to mathematics learning, given that mathematics schooling refers to learning mathematics within the institution of school.

How are Parents of Students in the FI program Supporting their Children's Mathematics Schooling?

Participants described a variety of activities that supported their children's mathematics schooling. In particular, they often referred to activities that they themselves may have experienced in mathematics classrooms. This included printing off worksheets for extra calculation practice, playing math games with their children that had been sent home by their teachers, or encouraging their children to memorize multiplication facts using a combination of flash cards and rapid-fire questioning. They described these activities as reviewing, anticipating, or reinforcing the mathematics taught at school.

It is interesting to consider how this echoes findings from Murphy et al.'s (2023) typology of parental engagement in mathematics education during emergency at-home learning during COVID-19. The way that parents engaged in at-home mathematics learning was influenced by their mathematics content knowledge and their familiarity with current mathematics pedagogies. Parents with limited mathematics content or pedagogy knowledges were more likely to act as monitors who reinforced the mathematics work sent home from schools, whereas parents with more familiarity with

either content or pedagogy were more likely to seek opportunities to act as facilitators. Even though I collected data several years after emergency at-home learning ended in this province, participants described their approaches to supporting the mathematics schooling of their children in ways that echo the facilitator role that Murphy et al. (2023) described. For instance, after noticing that his child River was answering multiplication questions with speed and accuracy, Val decided to introduce fractions as a logical next step. Val reviewed a mathematics concept River was familiar with and anticipated a subsequent one. The choice of appropriate mathematics activities was grounded in Val's experiences as a mathematics student, but his adoption of a facilitator role suggests that parents are continuing to translocate mathematics learning (Murphy et al., 2023) from classrooms to family homes.

Participants also described engaging in a set of practices that supported their children's schooling more broadly, such as ensuring that their children were well-fed, arrived at school on time, respected their teachers, and valued well-being. These examples suggest that parents view their children's education as something that extends beyond any single school subject. Even though our discussions centred on mathematics, parents made frequent connections between what they considered to be good parenting practices and academic success, which mirrors findings from research involving multilingual parents (e.g., Chval et al., 2021).

Thinking about how Bourdieu and Passeron (1977) described schooling as the intentional development of the secondary habitus, the success of which might be influenced by similarities between the child's primary (i.e., family) habitus and the intended secondary habitus mediated by cultural capital, I turn now to explore

manifestations of cultural capital in mathematics learning. Participants described drawing from cultural capital to enhance, enrich, or reinforce their children's mathematics learning and schooling.

Reviewing, anticipating, or reinforcing school mathematics at home are intentional choices that suggest flexibility in the development of the primary habitus. Though Bourdieu and Passeron (1977) described the development of habitus as something that begins with the primary habitus in the family home and develops into the secondary habitus as a result of formal schooling, I would suggest that this representation is an oversimplification. Rather than viewing education as developing the primary habitus to align with the secondary habitus, which reflects Enlightenment ideas about progress, it might be helpful to consider how the primary and secondary habitus shape each other. The act of replicating school practices that the participants experienced as students in the past demonstrate value for formal education, but the expansion of activities to extend beyond what they experienced as students suggests that parents also resist the unidirectional assumption of progress towards the secondary habitus. There may be more ebb and flow between the practices that occur at home and at school, which results in the potential for change to both the primary habitus as well as to the secondary habitus.

Just as Jackson and Remillard (2005) found that parents engaged in the mathematics schooling of their children to varying degrees, so too did my results suggest that the extent to which parents engage in direct and intentional mathematics schooling at home varied. I am particularly intrigued by the paradox that this presents. Parents more readily recounted examples of mathematics schooling as practices that supported their children at home, but they described engaging in mathematics learning activities much

more frequently overall. I will elaborate this further in my response to the second research question.

RQ2. How do Parents Adopt the Roles of Learner, Teacher, and Leader to Support Their Children in Mathematics?

Learner Role

The roles of learner and teacher were entangled within participants' conceptions of mathematics. Parents' perceptions of when, how, and whether to adopt specific roles to support their children in mathematics were connected to their sense that school mathematics has changed. One of the study's findings was how parents conceptualized "new mathematics." The idea of "new math" in a Canadian context can be traced back to the 1960s (O'Shea, 2003), when provinces across the country introduced mathematics curriculum that reflected a discovery approach to learning (Rodney et al., 2016). In recent years, the term "new math" has been evoked when changes are proposed to Canadian mathematics curriculum, even when the changes have little in common with the changes proposed in the 1960s (Chernoff, 2019). Participants described noticing that current pedagogical practices differed from what they remember experiencing as elementary students, which prompted a response. Not every participant described this reaction as adopting a learner role. For parents who expressed confidence in their mathematics competence, they did not see themselves needing to become learners; instead, they described needing to tread carefully so as not to inadvertently dismiss current pedagogies. Among parent participants, Megan, George, Val, and Simon all described studying mathematics at the post-secondary level. Each of them was successful enough in school mathematics to continue learning mathematics beyond what was required to graduate

from high school. These four participants believed that their own mathematics understanding was enough to support their children as mathematics learners. This suggests that they view differences in mathematics (i.e., new mathematics) as relating more to pedagogical changes than content changes, and they do not need to learn different pedagogies to be supportive parents.

In contrast, both Sally and Roderick described moments of needing to learn or re-learn mathematics to support their children. This "kind-of" (Roderick) relearning occurs when a parent is confronted with a mathematics concept that they previously learned but learned differently, perhaps using a different approach or a different language. It also includes mathematics procedures that may have been situationally memorized but only partially understood. An example of this can be found in the poem "Doubles +2". At the end of the poem, Sally recalls how she learned to add with regrouping. She reflected that although it was the process she memorized, she could not have explained why it worked. And when her children come home using different strategies for solving addition problems with regrouping, she does not have the conceptual understanding to translate new mathematics into the operational understanding she memorized as a child. "Kind-of" relearning involves recognizing a mathematical concept but perhaps incompletely, which necessitates further remembering or relearning in order to support one's child.

If new mathematics were entirely new, the need for kind-of relearning would not exist. It would be a fresh slate, a new learning. Sally and Roderick described needing to relearn mathematics concepts, whereas the other participants did not describe needing to relearn. This awareness of relearning may be because both Sally and Roderick have children who are no longer in elementary school, which means they have had more years

of encountering new mathematics. It may also be that having less confidence in their mathematics competence primed them for assuming they would need to work on their own mathematics skills to support their children. Roderick described himself as "not a numbers person," and shared how mathematics did not come easily to him despite having a parent who taught mathematics at the high school level. Perhaps someone who sees himself as "not a numbers person" is more likely to become a parent who assumes they will need to relearn concepts and bolster their mathematics knowledge to help their children with learning mathematics.

Another way that parents described adopting a learner role related to the language of mathematics instruction. Several participants described wanting to learn the vocabulary of mathematics instruction. Some did this by studying French in their spare time, using online tools like Duolingo or borrowing French books from the public library. Others did this by asking their children to teach them. This echoes findings in mathematics education research that parents learn mathematics for and from their children (Ginsburg et al., 2008). Participants in this study similarly described learning French for and from their children. However, they did not appear to consider learning how to communicate mathematical ideas in French as important. It would be more accurate to describe this learning as more of a side effect to having a child registered in FI, where parents' interest in learning French seemed to be more for cosmetic as opposed to functional purposes.

I expected that elements of the primary habitus (Bourdieu, 1977) would come through strongly in conversations with parents about the roles they adopt to support their children; however, the connection between habitus and how parents described the learner,

teacher, and leader roles is more difficult to define than I had anticipated. I identified three ways that parents described becoming learners of mathematics to support their children. One way was to refresh their own content knowledge by consulting a digital tool, such as looking for relevant videos on YouTube. This might be described as knowing that parents have both the cultural capital to access relevant material (i.e., mathematics videos) as well as the necessary habitus (i.e., parents should do what they can to help their children with mathematics) to see this as something that parents ought to do.

Another way that parents described becoming learners of mathematics relates more directly to social capital, which refers to "material and immaterial resources that individuals and families are able to access through their social ties" (Horvat et al., 2003, p. 323). Both Roderick and Sally frequently mentioned turning to personal networks for help with middle school mathematics homework. This is similar to other findings that have suggested middle class families draw from their social networks to support their children's education (e.g., Barton et al., 2004; Horvat et al., 2003). For instance, when Sally was uncertain about her own mathematics competence, she turned to a teacher friend for help. Though Bourdieu (1993) suggested that social capital can be both converted into economic capital or converted from economic capital, my findings suggest that conversion is a multi-step process involving cultural capital. Table 10 uses Sally's example of asking a friend for help with fractions to illustrate how social capital might be converted into economic capital.

Table 10

Converting Social Capital into Economic Capital

Manifestation of Social Capital	Conversion Process	Manifestation of Economic Capital
Friendship with mathematics teacher	• Good grades at school (institutionalized cultural capital) • Increased self-confidence in mathematics (embodied cultural capital)	• Academic scholarship • Employment opportunities

Sally's friendship with a high school mathematics teacher with the necessary content knowledge is a manifestation of social capital that has the potential to be converted into economic capital. First, however, is the process of converting that social capital into cultural capital, such as in the form of a good grade (i.e., an institutionalized manifestation of cultural capital) or perhaps a mindset shift (i.e., an embodied manifestation of cultural capital). Either one of these manifestations of cultural capital might then be exchanged for economic capital, like an academic scholarship or employment. The accrual of social capital does not guarantee conversion for economic capital; however, it opens opportunities for developing cultural capital that may not have otherwise occurred.

The third way that parents described adopting a learner role is linked to language. Parents described needing to learn both the terminology associated with new mathematics as well as French ways of talking mathematically. The connection to habitus here is nuanced. Parents wanted to talk to their children about what was the same or different in comparing old mathematics with new mathematics, which demonstrated a value or belief

that this is a conversation worth having. This interest in understanding current mathematics pedagogies is reflected in other studies (e.g., Civil et al., 2025; Muir, 2012; Remillard & Jackson, 2006). These conversations about new mathematics suggest a habitus that values talking about mathematics.

Some participants voiced limited interest in the language of mathematics instruction. They may have encouraged their children to use *soustraction* instead of subtraction, but they did not describe engaging in conversations about noticing differences in how mathematics is communicated in English and French or in how learning mathematics in another language might result in different understandings of mathematics concepts. This perspective echoes findings from other studies that suggested parents of FI students value French language competency for its potential impact on greater economic capital (Lamarre, 1996; Marshall & Bokhorst-Heng, 2020). Learning how to communicate mathematical thinking in French is not what parents prioritized; if anything, learning mathematics in French was viewed as a potential limitation to mathematical understanding among participants. Even though their study occurred in a different linguistic and cultural context, there are parallels in how Remillard and Jackson's (2005) parent participants conceptualized school mathematics as binary and computational and how this study's participants conceptualized the role of the language of instruction. It raises questions about the interplay of a narrow view of school mathematics taught in a target language valued for its potential economic and social gain. I would argue that valuing language for its potential economic capital is akin to restricting oneself to only eating the cherry on a delicious ice cream sundae.

Teacher Role

I turn now to discussing the ways that parents adopted a teacher role to support their children in learning mathematics. Consistent with findings from other studies (e.g., Takeuchi, 2016; Wager & Whyte, 2013), participants described intentionally teaching early mathematics concepts to their children at home, such as how to count, how to use a calendar, or how to estimate and measure time. Parents described this as something that occurred naturally to do, though they did not remember learning these concepts from their own parents. Parents seemed to view these early mathematics concepts as things that parents ought to teach to their children, though they also expected that their children would continue expanding their knowledge of these concepts while at school. Such a perspective echoes other findings that suggested parents view mathematics as a responsibility shared equally between home and school (Wilder, 2017). This reminds me again of Bourdieu and Passeron's (1977) discussion of the primary habitus, where children develop an initial sense of what is possible to know, what is valuable to know, and how one goes about developing this knowledge. Though I would argue that all children experience mathematics before entering school, not all children have experienced mathematics that has been named mathematics. Parents may engage in mathematical practices without recognizing them as mathematical (Jay et al., 2013).

Similar to how parents described their approaches to supporting mathematics schooling, they described adopting a teacher role as doing the things that they remember their mathematics teachers doing at school. This included things like finding and printing off mathematics worksheets or doing flash cards together. However, a key difference between when a parent adopted this role and a teacher at school is that the parent is able to respond directly and immediately to the child's individual needs in a way that teachers

may not be able to do (Baranovich et al., 2019). For instance, Sally described becoming a co-learner as well as a teacher to her child, sitting beside him when he engaged in mathematics learning at home. This echoes other research that noted how parents of elementary students often learn mathematics for, from, or with their children (Ginsburg et al., 2008). Parents are better positioned to adopt a one-on-one teacher role with their children as compared to classroom teachers. Whereas teachers are assigned a large group of students with a variety of likes, needs, and behaviours, parents might be better able to respond and adapt to their child's individual learning needs in a way that cannot be replicated at school (Baranovich et al., 2019). For instance, Simon described regularly relating mathematics to physical activity with Ben, which he noticed as something that seems to be particularly effective for his child.

Several participants associated becoming teachers of mathematics as a protective measure for their children. For example, Megan repeatedly described the importance of financial literacy and how it relates to independence, suggesting that knowledge of mathematics is fundamental "to be successful in life." Megan adopts the teacher role out of fear, hoping to make up for any shortcomings that might exist in school mathematics. Simon described something similar. Simon feels as though he needs to be doing more mathematics at home with Ben, though he was unable to identify where this urgency originates. These perspectives are manifestations of "parentocratic ideology" (Barrett DeWiele & Edgerton, 2016, p. 205), which Barrett DeWiele and Edgerton (2016) described as the compulsion to micromanage a child's developmental and educational career in an effort to accumulate "a portfolio of assets (experiences, skills, accomplishments and credentials)" (p. 205) to realize social mobility. In Bourdieuan

terms, parents sharing this ideology share a habitus that compels them to create opportunities for their children to accrue cultural capital, which might later be exchanged for economic capital.

Sally, George, and Val each described traditional teaching approaches (Miedijensky & Sasson, 2022) in how they supported their children in mathematics at home when adopting a teacher role, such as rote memorization and repetition. Sally and Val provided worksheets to their children, and George prepared a multiplication chart for Miley to fill in. These are practices that they would have experienced as students, but they did not necessarily experience them as children at home. When confronted with current ideas about how mathematics should be taught, teachers struggle to adjust their pedagogical methods (Zevenbergen, 2002, 2003, 2005). My findings suggest that just as deeply held beliefs about how people learn can result in teachers promoting "the same conservative teaching approaches that they themselves experienced as successful learners of mathematics" (Wright, 2012, p. 8), so too can such ingrained beliefs influence how parents adopt a teaching role. Former students of school mathematics have internalized assumptions about which mathematics is worth teaching, how it ought to be taught, and when it should be introduced.

Interestingly, Simon's example of using sidewalk chalk to practice addition and subtraction outside is an example of extending a conservative approach to include a modern conception of physical literacy and well-being. Simon's primary habitus did not include valuing physical activity or awareness of a mind–body connection during schooling. As an adult, he began incorporating running and physical activity into his daily life, which he is now incorporating into his approaches to parenting. When he

brought his son Ben outside to learn mathematics, he did this as a response to recognizing that working inside with pencil and paper was ineffective. This suggests that while parents might begin with emulating what they experienced as children, they sometimes modify their approaches to include practices that they have learned in other contexts. Simon blended a known teaching practice (i.e., practicing addition and subtraction facts) with a preferred environment (i.e., outside). Put differently, a mathematics practice encountered in the school field was modified after being translocated into the home field.

Leader Role

In contrast to the learner and teacher roles, parents had a hard time recounting examples of becoming a leader to support their children in mathematics. Participants described volunteering at the school as a more general way to adopt a leadership role, but they seemed reluctant to describe this as a role that impacts their child's mathematics learning. This is in contrast to how participants described support for mathematics learning as a holistic act that includes attending to their children's basic needs, such as bringing their kids to school with full bellies and open minds.

Both Sally and Megan interpreted the role of leader as one of advocacy, which entailed communicating their expectations with teachers and administrators and following up if these expectations were unmet. One of the key findings of this study related to the description of "that parent" as a role parents reluctantly but willingly adopted to support their children's mathematics learning, and I would suggest that this was the primary way that participants recognized a leadership role in their child's education. This finding corresponds with other research that documented the hurdles parents of FI students face when their child has been diagnosed with a learning

exceptionality (e.g., Cobb, 2015; Mady & Arnett, 2009). However, rather than being an experience reserved for parents of children with learning exceptionalities, my findings suggest that any parent who believes their child has unique learning needs might adopt this role. But this raises an important question: what does "that parent" mean?

To deconstruct the role of "that parent," I will begin by drawing attention to the use of "that" as an adjective describing a person. The word "that" is vague and can include a wide spectrum of undesirable, and in some cases, pervasive practices. In Western popular culture, there is a construct of "that guy" as someone exhibiting unflattering, socially unacceptable behaviours (Baldoni, 2016; Bergsrom et al., 2016). "That guy" might be uncomfortable purchasing birth control located among feminine hygiene products (e.g., Breny & Lombardi, 2019), engage in sexual violence against women (e.g., Matas, 2012; Police Scotland, 2024), or practice poor hygiene (e.g., @sacked_pn, 2025). The term "that guy" is therefore at once difficult to define with precision while also being recognizable to the general public.

The use of the term "that parent" seems to operate in similar ways, without including criminal behaviours. Participants described "that parent" as someone who steps outside of the social norms of what parents are expected (and permitted) to do. This might include initiating conversations with the classroom teacher, using their social capital to get special treatment at school, or insisting that they be involved in making decisions about their child's schooling. However, there are some noticeable differences in how the term "that parent" operates. To start, participants described "that parent" as something that a person becomes with reluctance. Parents choose to adopt this role and rebel against the social norms imposed by the system of public education. Whereas "that

guy" can be thought of as goofy, violent, or gross, "that parent" is recognized as someone who stepped outside of social norms, advocated for their child, and accepted the social consequences of the misstep.

It also bears mentioning that even though the term "that parent" is gender inclusive, the descriptions of that parent were gendered. When participants described knowing someone who adopted the role, they described mothers. And even when father participants described "that parent," they described that parent as either gender neutral or referred to female acquaintances who had adopted the role. That this role would be associated with mothers is perhaps unsurprising. Just as much of the previous research involving parents has largely and almost exclusively involved mothers (e.g., Baranovich et al., 2019; Civil & Bernier, 2006; Cobb, 2015; de Abreu & Cline, 2005; Jackson & Remillard, 2005; Mady & Arnett, 2009; Quintos et al., 2019; Rahmawati & Amri, 2020; Schnee & Bose, 2010; Takeuchi, 2016; Wadham et al., 2022), there is a lingering societal assumption that parenthood is synonymous with motherhood. Participants were able to name examples of mothers who had adopted the role, but they did not (or perhaps could not) name any fathers. I am left wondering whether this generation of stay-at-home or work-from-home fathers will also become "that parent," though I suspect that the criteria for such a designation will shift once more men adopt the set of practices that it entails. In patriarchal societies, women are judged differently than men.

RQ3. How does the Relationship Between Home and School Influence the Roles Parents Adopt and the Ways that they Support Mathematics Learning and Schooling?

Relationships, not Relationship

One of the surprising findings from this study relates to how parents view the relationship between home and school. In my time as a classroom teacher, I understood the relationship between home and school as the relationship between parents and their child's classroom teacher. But from my conversations with participants, I have come to realize that parents who are not also teachers have different conceptions of the connection between home and school. The findings suggest that parents view the relationship between home and school as a complex set of multiple relationships with multiple people in the school building. Rather than the primary connection between parent and teacher that I imagined, participants described having many different relationships with many different people connected to the school. This set of relationships aligns with an Ecologies of Parental Engagement (EPE) framework (Barton et al., 2004), which views parental engagement in education as "a set of relationships and actions that cut across individuals, circumstances, and events that are produced and bounded by the context in which that engagement takes place" (p. 6). Barton et al. (2004) introduced the EPE framework as an alternative to simplistic and schoolcentric assumptions about parental involvement in education. This framework "extends the study of parent engagement beyond the actions and reactions of individual parents to include analyses of the social networks and interactions that exist between and *among* parents, teachers, and other school—community agents" (Alameda-Lawson & Lawson, 2019, p. 1087, emphasis in original). I set out to explore the relationship between home and school from the perspectives of parents, but I was confronted with the challenge of understanding these relationships without fully grasping how parents develop connections with the classroom teacher, the general school staff, and the broader school community.

Parents generally described having distant but respectful relationships with their child's classroom teachers. They talked about how regular classroom newsletters and personalized updates on student learning made them feel more connected to the learning that takes place during the school day. For parents who do not volunteer in the school, they may not interact with their child's classroom teacher more than twice a year at parent teacher interviews. While the classroom teacher may view the parent as the primary point of contact in the home, the parent does not necessarily view the teacher as the primary point of contact in the school. For parents, there are multiple people connected to the school who might assist them with supporting their child's learning needs, including other teachers, administrators, support staff, and fellow parents.

In addition to relationships with their child's classroom teacher, participants described relationships with other school employees. This category includes other teachers in the building, administrators, educational assistants, and any other personnel employed within the school building. While parents may only interact face-to-face with a classroom teacher once or twice a year, they may have frequent interactions with other adults in the building. For example, Simon recounted having more conversations with Ben's principal then with Ben's classroom teacher. Even though these conversations may have been informal, they left Simon feeling like a known and valued member of the school community. Similarly, Roderick described knowing most of the school staff and has the impression that after being connected to the school for seven years, that the school staff has a large enough sample size of Roderick's family to know them well.

The final category extends beyond school staff and encompasses other parents, students, volunteers, crossing guards, bus drivers, and any other people who are affiliated

with the school in some capacity. All participants described having regular interactions with members of the broader school community. For example, Sally described building relationships with other mothers through volunteering at the school, something that may have contributed to her feelings of closeness with the school community. Similarly, George described getting to know teachers, parents, and other students through school-organized events like the annual school picnic.

Unanswered Question

I feel unsettled with my response to the third research question that guided this study. I can see now that my initial conceptualization of how parents are connected to their children's schools was naive and informed by the lingering dominance of my teacher perspective. As a classroom teacher, I was aware of my connection to each student's family. I understood this connection as singular and falsely assumed that it represented a family's sole connection to the wider school community. I am still trying to make sense of how families and schools are connected and the ways in which these relationships influence the learning experiences of students. If anything, my ignorance of these multiple connections between home and school denotes the importance of further inquiry. Earlier in this chapter I shared an example of how social capital can be converted into cultural capital and then exchanged for economic capital. The complex relationships that families form with schools are representations of the social capital exchanged in educational spaces. I cannot say that my results confirm Bourdieu's (1993) assertion that social capital can be exchanged for cultural capital; further theoretical investigation is needed to refine the relationship between these concepts in the context of education.

Another opportunity for further inquiry with respect to the relationship between home and school relates to the distinction between proactive and reactive relationship building. For example, Megan described the relationship with her daughter's school as an investment that did not necessarily offer guaranteed returns. Megan expected that her ongoing and consistent presence in the school building meant that the school staff (i.e., teachers, administrators, support staff) would come to know her over time. When she found out that Anna's Grade 2 teacher was new to the school, Megan was disappointed that her investment in building these relationships and establishing a school presence would be unrecognized by the new teacher. This proactive approach to relationship building suggests a specific type of social capital that parents may intentionally or sometimes unintentionally accrue within a school building. It is a type of social capital that affords the benefit of the doubt when miscommunications occur or opens the line of communication to make special requests.

In contrast, Megan also described feeling disconnected from Anna's school. In spite of her proactive attempts to build relationships with school personnel, she did not feel like she knows what was going on in Anna's classroom. She felt overwhelmingly dissatisfied with the lack of insight into the learning that takes place at school. Megan is interested in engaging in the education of her child but needs more information about current mathematics pedagogies and the rationale behind them. Megan has the necessary cultural and social capital to compensate for the lack of two-way communication with Anna's classroom teacher, but what about the parents who have not had the opportunities to accrue sufficient capital to compensate in a comparable way? And what other ways

might parents take action to engage in the education of their children when they are dissatisfied with classroom communication?

When a classroom teacher begins a personal relationship with a new student and their family, this relationship represents a single line between the home and the school. But when parents develop relationships with multiple people across all three categories, their connection with the school might be viewed as a multistranded braid. Perhaps I need to learn more about how to weave, strengthen, and value these multistranded braids between home and school.

Remaining Tensions

Before I move forward into a discussion of the implications of this study, I want to dedicate some space to some of its unresolved tensions. I set out to reconcile my reservations with Bourdieu's (1990b) theory of practice by interweaving a feminist postmodern concept of care. I cannot say that I feel reconciled. I can articulate how this study was designed to foster the development of respectful, care-filled relationships with participants so that together we could become curious about their experiences supporting their children at home. And yet I still find it challenging to connect their stories to the present task, where I attempt to represent, analyze, and communicate meaning to my readers. My multiple identities—researcher, parent, teacher—contribute complementary and conflicting insights. As a researcher, I yearn for theory that allows abstraction without dehumanization. As a parent, I lament over the overwhelmed school system of my children. And as a teacher, I just want every child to have the opportunity to feel like a confident and competent mathematics learner, teacher, and doer. These are not

competing goals, but they do exist in tension. And I have come to recognize that these tensions are experienced by parents, too.

Implications

Practical Implications

This study has shown that parents support the mathematics education of their children in a variety of ways. However, they encounter challenges with expressing this support when both the language of instruction (i.e., learning mathematics in FI) and the content language (i.e., the language of new mathematics) is different from their own experiences as students. As a former classroom teacher, I see opportunities for improving dialogue between home and school. Just as teachers function as intermediaries between curriculum and students, so too might they function as intermediaries between content and parents. Unfortunately, teachers in NB are often caught in the riptide of continuously changing FI programming and curriculum content. They are unlikely to have the time or resources to translate current mathematics pedagogies into practices and procedures more familiar to parents. Instead, they need support from mathematics curriculum developers and mathematics education researchers to develop parent-facing mathematics resources. These resources would not serve as remedial exercises or efforts to compensate for a lack of mathematics knowledge; rather, they could invite parents into contemporary conversations about mathematics education by relating what they may have experienced as students to how and what their children are currently learning in school. Moreover, an implication for instructors in teacher education programs might be to include topics related to communicating the connection between language and mathematics with parents. Elementary FI teachers are both language and content teachers, and they might

be particularly aware of how to distinguish the language of instruction (i.e., French) from the particular language associated with mathematics, known as the mathematics register (Halliday, 1978; Herbel-Eisenmann & Crespo, 2023). However, they may not have learned how to communicate this with parents in a way that might foster generative dialogue.

The relationship between home and school is a series of connections between the members of a family and the multiple people who work and volunteer in schools. My naïve understanding of the relationship between home and school may be mine alone; however, I suspect that it is not. This braided conceptualization of the relationship between home and school requires a perspective shift for classroom teachers. Teachers, principals, and other school staff need to engage in regular dialogue with families to expand their awareness, acceptance, and appreciation for varied expressions of parental support. Not every parent expresses their support for their child's learning in ways that are recognized or valued by classroom teachers. They may be operating according to a separate set of values, or they may be constrained by competing demands for their limited time and attention. This is not to suggest that teachers are to blame when parental expressions of support go unnoticed. Teachers in NB operate within an education system that was designed for an imagined homogeneous student population; as its population has diversified, teachers are charged with the task of implementing culturally responsive practices that they did not experience as students. Increasing linguistic and cultural diversity leads to new challenges and opportunities for educators and the communities they serve (Wadham et al., 2022). And this study has shown that not only are parents

aware that teachers are facing intense pressures, they are also willing and interested in working together towards improvements. This is important. Teachers, you are not alone.

One of the beautiful discoveries from this research is how parents connect with their children using mathematics. Participants described intentionally doing mathematics together with their children as a way to reinvest in shared interests and engage in play. By intentionally expanding what is recognized as mathematics, perhaps we—mathematics doers, teachers, and learners—open the possibility for inviting connection through mathematics. This might look like classroom teachers inviting students to become amateur sleuths, searching for mathematics in their lives outside of school as they appear in interactions with friends and family. It might look like parents noticing which mathematical activities evoke feelings of closeness with their children. And it might look like a mathematics curriculum that includes contextual expressions of mathematics that take place in social settings. For example, many participants described the preparation of food as a family activity that blended mathematics with connection. Rather than introducing fractions using a written example of how to bake cookies, this activity could be reimagined as an embodied experience of preparing and eating cookies together while recognizing it as a mathematics activity.

Research Implications

This study contributes to the limited body of research in FI mathematics education contexts, and it is the first study to my knowledge that considered the perspectives of parents of students in elementary FI mathematics. Though the findings offer glimpses into manifestations of parental support and the roles parents adopt to support their children in mathematics, these findings are not generalizable to other contexts or

representative of any population. Despite my efforts to recruit participants from a variety of regions in the province, many perspectives are missing. I did not ask participants questions about their socioeconomic backgrounds, but I heard stories about road trips, vacations, and extracurricular activities that suggested a middle-class lifestyle. Every participant graduated from high school and obtained some form of post-secondary education. And everyone presented as White, cis-gendered, and involved in a heterosexual long-term relationship. I wanted to include a multitude of voices, but I was unable to recruit participants outside of my own communities. Even though participants were not from my personal social network, we shared cultural and linguistic identities. In some cases, our children attended the same schools; in other cases, their children attended a school where I once taught. These commonalities made for moments of mutual understanding and insights that may have been missed by an outsider. However, they may have also limited my awareness of points of departure or disagreement. I suspect that this is difficult to avoid when engaging in research that foregrounds relationship building; however, I also believe that it can be mitigated by intentionally building relationships and establishing trust with specific communities. Rather than casting a wide net and wishing for general uptake, a narrower focus involving targeted communities might increase participation (Yaremych & Persky, 2023). Looking back, it makes sense that the dominant voices in my community (i.e., White, middle-class, educated, heteronormative, cisgender, able-bodied, and so on) were the ones to accept the invitation to share their experiences with me. More research is needed in NB to include perspectives of parents and caregivers of elementary FI students whose voices are missing from this study.

I did not set out to incorporate an arts-based method in this study, and I wonder what it would have looked like if I started with poetic inquiry in mind. Given that few researchers are using poetic methods in mathematics education research, there are few footsteps to follow; however, research poetry has several affordances that warrant further development. First, it invites an unfamiliar perspective when analyzing interview data. By foregrounding sentiment, research poems might allow access to insights that would have otherwise remained overlooked. When composing poems, I was able to think back to the conversations that took place with participants. I could hear their voices, visualize their gestures, and remember how it felt to be on the other side of the table or screen. Participant journals offered further insight into participant thinking, showing me which words they selected when thinking deeply rather than the spontaneous utterances that might never repeat. Future research might explore how research poems can be composed from different data collection methods that extend beyond interviews and journaling.

Second, something can be learned from the emotional response that readers have to research poems. Several participants reached out to express how powerful it was to read their feelings in poetic form. I sent transcripts and draft poems to participants for member-checking purposes, and the two representations evoked different responses from them. Participants expressed embarrassment when reading through transcripts of interviews, noting how disorganized their comments may have been or how they seemed to dominate the conversation. In contrast, they described feeling emotional when reading distilled representations of their complex feelings about mathematics education in the form of a research poem. Like Miller and colleagues (2015), I turned to poetic inquiry to help me "think with rather than about" (p. 416) participants' experiences, which satisfied

one of my values as a researcher. Poetry is a form of communication that evokes sentiment, bringing readers into conversation with the researcher and participants alike. As a mathematics education researcher, I turned to poetic methods as a way to better understand the family practices that support mathematics learning at home. Through research poems I came to better understand how mathematics is lived and learned outside of mathematics classrooms. Poetic methods in mathematics education juxtapose emotion, subjectivity, and the senses. They elicited my curiosity about mathematical ways of being human. Future research might explore how poetic methods offer pathways toward healing some of the trauma that parents expressed as they described their relationships with mathematics. Even among those who have not experienced mathematics trauma, there are many who do not see or notice how mathematics interacts in their daily lives. Poetry distills and invites the poet and audience alike to notice things hidden in plain sight.

Parents and caregivers play an important part in the education of their children. During this study, I spoke with parents about the mathematical hopes and fears they had for their children. I heard from parents who loved mathematics and hoped to share that love with their children, parents who dreaded mathematics class and hoped their children did not inherit their mathematical deficiencies, and parents who landed somewhere in between these drastically different experiences. I wonder how poetic methods might help open communication between elementary FI classroom teachers and parents whose experiences with mathematics schooling left them believing they were "not a math person." More research is needed in order to continue exploring the potential for mathematical empathy across home and school through arts-informed research methods.

Concluding Remarks

This study sought to answer several research questions: How are parents supporting children in elementary FI mathematics? How are parents of students in the FI program supporting their children's mathematics learning? How are parents of students in the FI program supporting their children's mathematics schooling? How do parents adopt the roles of learner, teacher, and leader to support their children in mathematics? How does the relationship between home and school influence the roles that parents adopt and the ways that they support mathematics learning and schooling? To answer these questions, I developed a theoretical frame informed by Bourdieu's theory of practice tempered by a postmodern feminist perspective. The abundance of deficit views towards parental involvement in mathematics education has impacted how teachers, researchers, education stakeholders, and parents themselves conceptualize mathematics at home. I elected to approach this research from an assumption of care, one that presupposed parents and caregivers experience mathematics in their everyday lives and involve their children in these experiences.

Mathematics is a universal human activity; however, feeling like one is good at mathematics is not a universal experience. Rather than contributing to the body of research interested in exploring how parents' lack of mathematics competence impacts the mathematics learning of their children, I elected to use individual interviews and participant journaling to listen to stories of parental support. Data analysis occurred in three waves, beginning with the composition of monovocal research poems, continuing with reflexive thematic analysis to identify overarching themes, and ending with composing polyvocal research poems that synthesized participants' experiences.

The findings from this study suggest that parents believe school mathematics has changed both with respect to how it is taught (mathematics pedagogy) as well as with respect to what is taught (mathematics content). Results also suggested that parents view learning mathematics in FI as a potential barrier to learning mathematics. Parents described supporting their children in mathematics in a variety of ways, including directly (i.e., setting out to teach something mathematical) and indirectly (i.e., doing something with their child that happens to involve mathematics), intentionally and unintentionally. Participants believed the public education system in NB is stretched thin for resources, and they monitor their children for indicators that they need their parents to step in and advocate for their children's learning needs. In response to these and other barriers, parents described the role of "that parent" as a way to advocate for their children. Results also suggested that parents value their relationships with schools and do not want to be perceived badly by teachers. They want to collaborate with schools and teachers to improve public education but do not know how to communicate their willingness to help without crossing a social boundary. Ultimately, parents viewed their relationship with the school as multiple connections with many different people, including teachers, principals, other parents, other students, school staff, and community volunteers. They described feelings of disconnection between home and school but expressed interest in working together with teachers and other education stakeholders.

This qualitative, postmodern leaning and arts-based study aimed to explore manifestations of parental support in elementary FI mathematics in a NB context. I did not set out to define, understand, or fix a problem. Rather, I wanted to make a meaningful contribution that might help families and schools feel a little less distant in the context of

learning mathematics in FI. Reaching the end of this chapter, I find myself returning to the faces and stories that inspired me to ask questions about learning mathematics in FI. I remember my own experiences, moving between schools, learning mathematics in French and in English, and feeling somehow different from the kids who only learned mathematics in English. I remember sitting across from worried parents during parent–teacher conferences and needing to find the words to describe their child's progress learning content using language that their parents did not understand. While more research is needed to continue unraveling the braided relationship between home and school, this study adds to the research conversation by humanizing parents of FI students and sharing their expressions of mathematical care.

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Appendix A: Letter to Superintendents

Dear (name of Superintendent),

My name is Julianne Gerbrandt and I am a PhD student in Education Studies at the University of New Brunswick. The name of my doctoral project is *Untangling Threads of Care: Exploring Family Practices that Support Elementary French Immersion Students in Mathematics in New Brunswick*. I am seeking your permission to recruit participants through schools in your district. Parents and caregivers would be invited to engage in individual interviews with me and in journal writing. Please find attached a copy of letters to be sent via email to parents and caregivers of students currently registered in early French immersion in (name of district). This proposed research focuses on exploring the ways that families support mathematics learning. (The letter describes the project in detail.) Learning more about this important topic will contribute to strengthening relationships between home and school, something that has the potential to benefit students, parents, and teachers alike. This project has been reviewed by the Research Ethics Board of the University of New Brunswick and is on file as REB 2024-079.

If you would like further information, you may contact me at 506-453-5136 or julianne.gerbrandt@unb.ca, or one of my supervisors, Dr. Karla Culligan, at 506-453-5136; kculliga@unb.ca or Dr. David Wagner, at 506-453-3569; dwagner@unb.ca. Should you wish to speak to someone not directly involved in this project you may contact Dr. Sharon Wahl, Dean of Education, at the Faculty of Education at 506-453-4778 or swahl@unb.ca. A report of the results will be available to (name of district) once the project has ended. I look forward to your reply and thank you for your consideration of this request.

Sincerely,

Julianne Gerbrandt, BA, BEd, MEd

Appendix B: Information Letter

Title of Study: Untangling Threads of Care: Exploring Family Practices that Support Elementary French Immersion Students in Mathematics in New Brunswick
Researcher: Julianne Gerbrandt
May 2024

Dear Parents/Guardians of elementary French immersion students in New Brunswick,

I am Julianne Gerbrandt, a former French immersion (FI) teacher at Hubbard Elementary School in ASD-W and now a PhD candidate in the Faculty of Education at the University of New Brunswick. I am currently recruiting participants for a study that seeks to better understand the many ways that families support the mathematics learning of children in their care. Through journaling and semi-structured in-depth interviews with caregivers of children enrolled in the early FI program, I aim to identify and explore the different practices that caregivers adopt to help their children learn mathematics outside of school. Questions will focus on sharing stories about the experiences of having a child learning mathematics in the FI program, the different roles caregivers might play to support their child's learning, and relationships between home and school.

This study is important because it explores the particular experience of families who have children registered in FI, a popular second language program that has been controversially associated with academic streaming. Similarly, the discipline of mathematics can often function as an academic ability sorter, a function that has negative long-term implications on someone's future academic and career prospects. Importantly, this study explores the experiences of families outside of school buildings. Instead of asking *if* parents and caregivers are doing things to support FI students as they learn mathematics in French, this study explores *how* and *when* it happens. It also explores ways that parents and caregivers support student learning that go beyond the tasks set out by the schools themselves (e.g., homework). I believe that learning more about this important topic will contribute to strengthening relationships between home and school and help us to better value the roles that parents and caregivers play in education.

You are being invited to take part in the study. I am seeking participants who identify as caregivers of elementary FI students, which includes mothers, fathers, LGBTQI2S+ caregivers, grandparents, or siblings. If you agree to take part in this study, you are agreeing to a) engage in three one-on-one interviews with me over a period of several weeks; and b) respond to six journal prompts, one before and one after each interview:
a) Each interview will be 30–45 minutes in length and will take place either online via MS Teams or in-person at an agreed-upon location. With your permission, I will audio record the interview, but you may still complete the interview even if you do not wish to be audio recorded. In this case, I will take down notes instead. In-person interview recordings will be transferred from the recorder into an external drive that is password protected. If you prefer to meet online, MS Teams has technical,

administrative, and physical safeguards to protect recorded information from loss, misuse, and unauthorized access, disclosure, alteration, or destruction. However, no Internet transmission is ever fully secure.

b) Before and after each interview, you will be invited to respond to a journal prompt. Responses to journals may be recorded in a physical notebook (i.e., a diary), or through the use of a digital tool (e.g., typed using a word processor). You are welcome to use speech-to-text software and/or voice memos to record your responses to journal prompts. We will talk about your journal responses during interviews, and you can choose how much or how little to share. With your permission, I will collect journal responses at the end of the study and include them as sources of data.

In order to participate, you must be 19 years of age or older and identify as a caregiver of a child in early FI. Your participation in this research is entirely voluntary and you have the right to withdraw at any time without any negative consequences. You have the right to end an interview at any time. You can also choose to not answer any interview question at any time. Please be assured that any data, digital or physical, will be kept in a secured, locked place at the Second Language Research Institute of Canada at the University of New Brunswick. You also have the right to withdraw your data from the study at any time, without penalty. I will be the only person who has access to identifiable information. Your anonymity will be protected when results are shared by using pseudonyms. Detailed reports on the research findings will be published in journals and developed into presentations for education stakeholders, including teachers, administrators, and government officials.

If you would like further information, you may contact me at 506-453-5136 or julianne.gerbrandt@unb.ca, or one of my supervisors, Dr. Karla Culligan, at 506-453-5136; kculliga@unb.ca or Dr. David Wagner, at 506-453-3569; dwagner@unb.ca. Should you wish to speak to someone not directly involved in this project you may contact Dr. Sharon Wahl, Dean of Education, at the Faculty of Education at 506-453-4778 or swahl@unb.ca. This project has been reviewed by the Research Ethics Board of the University of New Brunswick and is on file as REB 2024-079.

Sincerely,

Julianne Gerbrandt, BA, BEd, MEd

Appendix C: Consent Form

I, (please print) _____, have read the description of the project entitled *Untangling Threads of Care: Exploring Family Practices that Support Elementary French Immersion Students in Mathematics in New Brunswick* and understand the purpose and nature of the project as well as the procedures involved. I hereby agree to participate in the project as indicated (check all that apply):

_____ I agree that my interview can be audio recorded.

_____ I agree to the collection of my journal responses.

_____ I would like to receive a copy of the research report when the project is finished. Please send it to the following email address:

_____

Participants are reminded that all results will be made anonymous and that you may choose to withdraw from all or part of the project at any time.

Signed: _____

Date: _____

Appendix D: Interview Guide

Length of Interview	3 × 30–45 minutes
Introduction	1. Welcome • *The purpose of these interviews is to talk about the ways you support your child's learning of mathematics as a student in French immersion. There will be three interviews in total. The first interview will give us the chance to get to know one another and to begin the conversation about the ways you are involved in supporting your child's mathematics learning and schooling. The second interview will continue this conversation and look more deeply at how you may adopt different roles (as a learner, a teacher, or a leader) to support your child in mathematics. The final interview will focus on exploring the relationship between home and school. These conversations can help us to better understand the ways that caregivers are involved in their child's learning. For this study, participants were chosen based on their willingness to engage in conversation about the research topic and having a child registered in elementary French immersion in New Brunswick.* 2. Explain purpose of recording equipment and transcription • *The interview is being conducted using Microsoft Teams and will be recorded. This recording will be stored on my personal computer until transcribed, after which it will be deleted. The transcription will help me better understand and remember our conversation.* 3. Inform participant that information will be kept private. 4. Share that the participant may end the session at any time or refrain from answering any question(s). 5. Note that breaks are available if required.
Informed Consent	1. Review Informed Consent with participant • At this point, I would like to confirm that you give your consent to participate in this interview today.
Interview Overview	*Each interview will consist of several main questions followed by follow-up questions that will vary depending on your responses. You may choose not to answer a question. Please let me know if you*

(Suggested script)	*would rather not answer something. Your answers and any identifying information will be kept confidential. As discussed, I will be recording the discussion to ensure that I can accurately capture and transcribe your responses. No one outside of our conversation will have access to these recordings, and they will be destroyed once transcribed. Do you have any questions for me before we begin?*
Main Questions	First interview 1. Can you tell me a story about your experience having a child learning mathematics in the French immersion program? 2. How do you support your child in their learning of mathematics at home? 3. How do you support your child in their learning of mathematics at school?
	Second interview 1. Now that some time has passed since our first conversation, are there any reflections or ideas that you would like to share? 2. Can you tell me a story about when you adopted the role of "learner of mathematics" to support your child? How did you know you needed to adopt this role? What was the outcome? 3. Can you tell me a story about when you adopted the role of "teacher of mathematics" to support your child? How did you know you needed to adopt this role? What was the outcome? • Can you tell me a story about when you adopted a leadership role to support your child? How did you know you needed to adopt this role? What was the outcome? Are there any difficulties with adopting different roles to support your child?
	Third interview 1. Can you tell me a story about your relationship with your child's school? How would you describe this relationship? 2. How did your relationship with people in the school influence the way you supported your child? How might one's relationship with a school influence how they support their child in mathematics?

	3. How would a caregiver know when to adopt the role of learner to support their child? What does a learner-caregiver look like? What sort of things do they do? What sort of ways do they act? 4. How would a caregiver know when to adopt the role of teacher to support their child? What does a teacher-caregiver look like? What sort of things do they do? What sort of ways do they act? 5. How would a caregiver know when to adopt the role of leader to support their child? What does a leader-caregiver look like? What sort of things do they do? What sort of ways do they act?
Added Questions	6. How does a relationship develop between home and school? What things do schools do? What things do parents do? Where do these ideas come from? 7. Do you know anyone who would describe their relationship with their child's school differently? 8. How does the relationship between home and school impact the student's schooling and learning?
General Themes	Mathematics at home vs. mathematics at school Mathematics learning vs. mathematics schooling Language and mathematics Relationship between home and school Roles in learning (role of caregiver vs. role of school)
Conclusion	1. Paraphrase the overall themes of conversation 2. Ask if they have anything to add 3. Ask if they have any questions 4. Reiterate privacy and confidentiality considerations (name will be removed, video will be deleted once transcribed, pseudonym)

Appendix E: Journal Prompts

Supporting children in mathematics	Before interview reflection	What are some characteristics you appreciate about your child? For instance, it might be that they are curious, caring, energetic, etc. Recount some instances when these characteristics impacted the way you supported their learning.
	After interview response	a) What counts as doing mathematics at home? How does your family make decisions about what mathematics to do at home and when to do it? Do you approach it the same way with each child? b) Describe what it means to open a child's mind. In what ways is this a parent's responsibility? In what ways is this a school's responsibility? c) During the interview, you mentioned how you like the idea of using space travel or dinosaurs as ways to hook Miley's interest in learning a mathematics concept. Can you think of any examples when you incorporated her interests and/or imagination when doing mathematics at home? d) The topic of the COVID-19 pandemic came up throughout the interview. Can you think of an example of how you supported your children in mathematics at home before the pandemic? What about after the pandemic? To what extent did emergency at-home learning impact your approach to supporting the education of your children? e) When you think about supporting your children in mathematics, do you focus more on supporting their mathematics schooling (i.e., helping them with the things they are learning in school), or on supporting their mathematics

		learning (i.e., helping them with exploring general concepts in mathematics that may not be a part of the curriculum)? Can you think of any examples? f) During our conversation, you recounted several examples of doing mathematics with your children. What counts as doing mathematics at home? How does your family make decisions about what mathematics to do at home and when to do it?
Adopting roles of learner, teacher, leader	Before interview reflection	There are many different roles that we take on when caring for children. For instance, we might act as cheerleaders when they confront challenges, project managers when they have a lot of things to do, or counsellors when they are looking for emotional support. Describe a time when you took on a role to support your child's learning. What did you do? How did it make you feel?
	After interview response	a) When you think about the roles you adopt to support your children in mathematics, which role(s) bring the most joy? Which roles are you reluctant to adopt? And can you imagine any roles that you would like to explore stepping into? b) During the interview, you described moments when you adopted the role of "teacher of mathematics." Do you adopt this role out of hope (e.g., trying to plant seeds of interest), out of fear (e.g., trying to protect her), or for other reasons? c) When we talked about adopting the role of teacher, you mentioned the importance of cooperation. Can you think of an example of when you've successfully gotten Miley's attention? What did you do? Why do you think it worked? Can you think of an example of when you tried to adopt the role of

		teacher but did not get Miley's cooperation? What did you do differently? d) The idea of community came up throughout our conversation. If you were to describe a parental role as being a community builder, how might that role support a child as they are learning mathematics at home? How might that role support a child as they are learning mathematics at school? e) During our conversation, you said: "I want to imagine my kids are going to find their own way." What roles do you adopt to support this goal? Can you think of any examples? f) During the interview, you described moments when you adopted the role of "teacher of mathematics." Do you adopt this role out of hope (e.g., trying to plant seeds of interest), out of fear (e.g., trying to make up for something that's missing), or for other reasons?
Relationship between home and school	Before interview reflection	How would you describe your relationship with your child's school? Can you think of any examples that demonstrate this relationship?
	After interview response	

Curriculum Vitae

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Ontario Tech University, 2020, Master of Education

University of New Brunswick, 2011, Bachelor of Education

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Publications:

Gerbrandt, J & Vautour, L. (in press) What if mentors were among us? Exploring the potential for critical transformative mentorship in teacher education. In C. Smith & G. Salinitri (Eds.), *Mentoring to support teacher candidate development.* Springer Nature.

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Conference Presentations:

Yaro, K., Gerbrandt, J. & De Simone, Cristina. (2025, June 14–16). *Engaging families in mathematics: Tensions and possibilities* [Invited Workshop]. Canadian Mathematics Education Study Group, Lethbridge, Alberta.

Dockrill Garrett, M. & Gerbrandt, J. (2025, June 2). *Reflective practices in FSL research: Teacher-researcher perspectives and positionality.* [Paper presentation]. Canadian Association of Applied Linguistics (ACLA), Toronto, Canada.

Gerbrandt, J. (2025, June 2). *Family practices that support FI students: Learning from "that parent."* [Poster presentation]. Canadian Association of Applied Linguistics (ACLA), Toronto, Canada.

Gerbrandt, J. (2025, May 24). *Listening to "that parent."* [Paper presentation]. Atlantic Education Graduate Student Conference, Fredericton, Canada.

Wagner, D., DeWolfe, S., Gerbrandt, J., & Estallo, Z. (2025, February 4). *Active listening for storylines experienced by Indigenous and newly migrated mathematics students* [Paper presentation]. Congress of the European Society for Research in Mathematics Education, Bozen-Bolzano, Italy.

Wagner, D., Andersson, A., DeWolfe, S., Gerbrandt, J., Huru, H. L., Simensen, A. M., & Wirkola, E. (2025, January 22). *Reflections on abstraction in a world where attachment to place matters* [Paper presentation]. ICMI Study 27: Mathematics Education and the Socio-Ecological, Quezon City, Philippines.

Gerbrandt, J. (2024, July 19). *Surfacing family practices that support French immersion students in mathematics* [Poster presentation]. International Group for the Psychology of Mathematics Education (IGPME), Auckland, New Zealand.

Wagner, D., DeWolfe, S. & Gerbrandt, J. (2024, July 18). *Storylines experienced by Indigenous and newly migrated mathematics students* [Paper presentation].

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Gerbrandt, J. (2024, June 15). *The invisible role of parents and caregivers: A critical discourse analysis of the canceled New Brunswick innovative immersion program* [Paper presentation]. Canadian Association for the Sociology of Education (CASE), Montreal, Canada.

Gerbrandt, J. & Culligan, K. (2024, June 13). *Storying family practices that support elementary French immersion students in mathematics* [Paper presentation]. Canadian Association of Applied Linguistics (ACLA), Montreal, Canada.

Gerbrandt, J. (2024, June 2). *Untangling threads of care: Exploring family practices that support elementary French immersion students in mathematics* [Poster presentation]. Canadian Mathematics Education Study Working Group, Quebec City, Canada.

Gerbrandt, J. (2024, May 25). *Parents, schools, and learning mathematics in French immersion.* [Paper presentation]. Atlantic Education Graduate Student Conference, Fredericton, Canada.

Culligan, K., Kristmanson, P., Le Bouthillier, J., Garrett, M., Gerbrandt, J. & Krist, J. (2024, April 25). *A synopsis of major research projects undertaken by the Second Language Research Institute of Canada (L2RIC) over the past three years* [Poster presentation]. New Brunswick Education Research Symposium (NBERS), University of New Brunswick, Fredericton, Canada.

Gerbrandt, J. (2023, December 1). *Navigating the Weeds: Thinking through Theory* [Invited presentation]. Canadian Association of Applied Linguistics Student Symposium.

Gerbrandt, J. (2023, October 4). *Navigating the Weeds: Thinking through Theory* [Invited presentation]. UNB's Research Showcase Week, Fredericton, New Brunswick, Canada.

Gerbrandt, J. (2023, September 21). *Learning mathematics in French immersion: Not for everyone?* [Paper presentation]. Mid-Term International Conference of the Research Network 10 (Sociology of Education) of the European Sociological Association, Warsaw, Poland.

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Gerbrandt, J. (2023, June 10). *Research with or research on: Exploring tensions between ethics, values, and respect.* [Paper presentation]. Atlantic Education Graduate Student Conference, Fredericton, Canada.

Gerbrandt, J. (2023, May 29). *A practitioner's guide to navigating educational theory: My journey through the weeds* [Roundtable presentation]. Canadian Society for the Study of Education, Toronto, Canada.

Gerbrandt, J. & Culligan, K. (2023, May 27). *Bringing Bourdieu into French immersion: Beyond the concept of cultural capital* [Paper presentation]. Canadian Association of Applied Linguistics. Toronto, Canada.

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Gerbrandt, J. (2023, March 24). *Bringing Bourdieu into mathematics education research* [Paper presentation]. University of New Brunswick Graduate Research Conference, Fredericton, Canada.

Gerbrandt, J. (2023, March 4). *Mathematical competence and French immersion in New Brunswick: Exploring gatekeepers to official language bilingualism* [Paper presentation]. Jean-Paul Dionne Symposium, Ottawa, Canada.

Wagner, D. & Gerbrandt, J. (2022, November 8-10). *Conflict, hope, and action in mathematics education storylines in Indigenous and immigration contexts* [Paper presentation]. Mathematics in Indigenous and Migrational Contexts Conference, Alta, Norway.

Gerbrandt, J. (2022, June 24). *Confronting despair: A study at the intersection of immersion, mathematics, and critical research.* [Paper presentation]. Psychology of Language Learning Conference, Sydney, Canada.

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Gerbrandt, J. (2022, May 6). *Exploring mathematical competence as manifestations of cultural capital within the context of French immersion* [Paper presentation]. University of New Brunswick Graduate Research Conference, Fredericton, New Brunswick, Canada.

Gerbrandt, J. (2022, March 5). *Investigating systemic barriers to French immersion through school mathematics* [Roundtable presentation]. University of Manitoba Graduate Student Research Symposium.

Academic Awards:

SSHRC Canada Graduate Scholarship (CGS-D) (2022–2025)

L2RIC Doctoral Scholarship (2021–2024)

Sherman Fellowship in Early Childhood Education (2022–2024)

O'Brien Foundation Fellowship (2023)

Webster Fellowship in Early Childhood Education (2021)

New Brunswick Innovation Foundation STEM & Social Innovation Award (2021)