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Parent Conceptions of Language, Mathematics, and Support in a French Immersion Context

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Abstract

This study explores the perspectives of monolingual English-speaking parents whose children are enrolled in elementary (Grades 1–5) French immersion (FI) in New Brunswick, Canada, where FI students learn mathematics in French. Using poetic inquiry within a feminist postmodern framework, we analyzed interview data from three parents to examine how they conceptualize the relationship between language and mathematics, and how these conceptualizations shape the ways they support their children's mathematics learning. The resulting research poems reveal tensions in participants' views of mathematics and language. For example, mathematics was at times positioned as detachable from language, although language was simultaneously described as a potential barrier to mathematical success. In turn, parental involvement was characterized by support toward monitoring linguistic markers, relearning pedagogical methods, and rehearsing procedures. By centring parents' perspectives, this study contributes to research on multilingual mathematics education by illustrating how parental conceptualizations may play a role in shaping mathematics practices across home and school spaces. Methodologically, the study suggests that research poetry has analytic potential for surfacing tensions in parental sense-making that may remain overlooked in more conventional qualitative analyses. This study points to a need for resources and communication practices that support dialogue between schools and families about the relationship between language and mathematics in FI contexts.

Keywords: French immersion; mathematics education; parental involvement; poetic inquiry

1. Introduction

In our experiences as mathematics teachers in a second language context, we have had many conversations with parents about the mathematical hopes and concerns they have for their children. We have encountered 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 (perceived) mathematical deficiencies, and parents whose experiences were somewhere in between these two extremes. We have also encountered parents who wondered about the impact of learning mathematics in a second language, those who worried about it as something that might unintentionally make learning mathematics more difficult for their children, and those who voiced views of mathematics as something entirely separate from the language of instruction. As parents ourselves, we know what it is like to reflect on one's childhood and wonder how things might be different for your own children, for better or for worse. This article reports on findings from a larger study investigating the ways parents support their children's mathematics learning and schooling in a second language context. The study participants were six parents of

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elementary-aged students registered in the French immersion (FI) program in the province of New Brunswick, Canada. The broader study focused on disentangling the practices of parents as they relate to mathematics learning and mathematics schooling, especially within the second language context; exploring the different roles parents adopt to do this; and questioning how a parent's relationship with their child's school influences these practices. In this article, we focus on results related specifically to how parents of children learning mathematics in their second language (French) in an FI program conceptualize language and how these conceptualizations influence the ways in which they support their children's mathematics learning. We respond to our aim for this article by exploring the following research questions: (a) How do parents of elementary students learning mathematics in their second language (French) in an FI program conceptualize language? (b) How do these conceptualizations influence the ways in which parents support their children's mathematics learning?

1.1. Parental Involvement in Mathematics Education

In general, much of the mathematics education research exploring parental involvement has taken a school-centric approach that has 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 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). Often, a school-centric orientation to mathematics education tends to equate parental support with efforts to support school practices. When parental involvement is defined only by support for school-sanctioned learning activities, the view of the parent's role is limited. This, in turn, can, perhaps inadvertently, perpetuate an oppositional divide between home and school. For example, Harper et al. (2021) described how school-based initiatives "often overlook how parents are uniquely positioned to advocate for and support children's mathematical education across educational contexts" (p. 2). And de Abreu and Cline (2005) found that 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" (p. 719), it leads to the acceptance of binary assumptions of parents being able/unable to help children with learning at home. In a case like this, a school-centric orientation arguably positions parents as obstacles to student learning.

Mathematics education 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 school-centric orientations by centring the perspectives of parents and creating opportunities for researchers to help with potential misunderstandings between parents and schools. Some have done this from the perspective of critical studies, with an interest in rehumanizing or centring the human aspect of learning and doing mathematics. For example, these works 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) that 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-centred understanding of parental involvement in mathematics education (Jay et al., 2017). Other studies have offered

reconceptualizations of both how to conduct research in the field and which topics warrant closer scrutiny. For example, Vomvoridi-Ivanovic et al.'s (2025) collaborative autoethnography examined the affordances of motherhood in relation to mothers' responsibilities as mathematics teacher educators, noting the opportunity to serve as boundary brokers between fellow parents and schools. Similarly, Howker and Black (2025) described how a researcher with insider knowledge and experiences is well suited to doing research with parents. In their case, the primary researcher was the parent of children who attended the same school as the participants, which resulted in a set of shared experiences that enriched data collection. Both studies offered insight into how mathematics education researchers might draw from their experiences as parents, researchers, and mathematics specialists. Studies like these offer insights into how mathematics education research involving parents might be reoriented towards a less school-centric approach.

Although a rethinking of the role of parents is becoming more common in mathematics educational research, dominant discourses in schools may 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 some teachers still see it as primarily a responsibility of teachers (Wilder, 2017). This tension is especially evident in studies that occurred in the context of emergency at-home learning during the COVID-19 pandemic (e.g., 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.

Informed by the research exploring parental involvement in their children's mathematics education more broadly, we next review pertinent literature related to the specific context of the current study. This literature provides the necessary background knowledge related to the geographical, sociolinguistic, and educational landscape of the study.

1.2. Bilingual Education in French Immersion

The region known today as the province of New Brunswick is located on the traditional lands of the Wolastoqey, Mi'gmaw, and Peskotomuhktai peoples. As Canada's only officially bilingual province, New Brunswick recognizes English and French as official languages and guarantees citizens the right to receive public services, including education, in the language of their choice. The government of New Brunswick currently oversees two separate public school systems, Anglophone and Francophone. French immersion (FI) is an optional second-language education program offered to students within the Anglophone school system. In the elementary grades (Grades 1–5, students aged approximately 6 to 11 years), students in FI spend at least 80% of instructional time learning in French (Government of New Brunswick, 2018). Mathematics is one of the subject areas that is taught in French in FI in New Brunswick. Most research involving parents in FI contexts has focused on enrollment and withdrawal decisions (Masson et al., 2021), and less is known about parents' conceptualizations of language as it relates to mathematics schooling.

1.3. Learning Mathematics in a Second Language in Immersion and Other Contexts

There are any number of classroom contexts in Canada and globally in which students are learning mathematics through a second (or additional) language. French immersion, the context of this study, is one such example. Unlike other French second language teaching methods, in FI "classroom language communication aims to be meaningful, authentic and relevant to the child's needs, not contrived, tightly controlled or repetitive . . . Learning a second language in early immersion becomes incidental and subconscious, similar to

the way a first language is acquired" (Wright & Baker, 2025, p. 258). From its inception in the 1960s, reading, writing, and mathematics were taught exclusively in French to elementary FI students. In the early decades of the FI program in Canada, several studies explored whether FI students would be disadvantaged in their mathematics achievement if mathematics was offered in French, since achievement was a key concern. These studies concluded that, in general and in the long term (with the exception of some mixed results in partial immersion and late-entry models), FI students learning mathematics in French as a second language are not disadvantaged and, in some cases, outperform their immersion and non-immersion peers learning mathematics in English (Bournot-Trites & Reeder, 2001; Cummins & Swain, 1986; Day & Shapson, 1996; Swain & Lapkin, 1982; Turnbull et al., 2001, 2003). It is important to note that the reasons behind these results are not straightforward, and some of these studies have acknowledged that many factors might be at play, for example, cohort composition (Turnbull et al., 2003) or increased effort on the part of students due to perceived increased difficulty (Bournot-Trites & Reeder, 2001). These findings are generally reflected in results from other language immersion and content and language integrated learning (CLIL) mathematics contexts worldwide (e.g., De Courcy & Burston, 2000; Jäppinen, 2005; Marsh et al., 2000). Nonetheless, in the Canadian context, parents have continued to express concerns that their child might be "handicapped" by learning mathematics in French in FI (Bournot-Trites & Reeder, 2016).

By the time students in FI in Canada reach the secondary grades (Grades 9–12, students aged approximately 14 to 18), the option to take mathematics in French in the FI program may or may not be available. For example, courses may not be offered due to continued doubts about whether mathematics should be offered in students' second language, or sometimes the lack of available qualified teachers limits mathematics offerings in French. Culligan (2010) explored this phenomenon via a small-scale qualitative study and found that when the option of taking mathematics courses in French in FI does exist, as students get older, they begin to take on more agency in these program-related decisions, whereas in their earlier years of schooling, parents may have a bigger role in program decision-making. The study found that for its participants, who were students at the secondary level (approximately aged 15–16 years), the decision-making processes revolved around three key elements, in order of prominence. The first element was the degree of importance allotted to the FI program itself and/or finishing the program; those who placed greater value on these things tended to remain in the program and saw French mathematics courses as a way to meet both the language and mathematics course requirements of secondary school. Second, students who chose to stay in FI tended to worry more about the potential short-term difficulties that might come with a transfer to secondary school mathematics in English after many years in French. Finally, the group who remained in FI mathematics reported needing less decision-making support and felt more like the decision was their own, whereas those who chose to leave described needing more support from others in their decision-making, and, for both groups, parents were the ones to whom the students turned the most.

These findings suggest that parents' ideas surrounding their children learning mathematics in a language other than their mother tongue, even in a scaffolded, optional language learning program like immersion, involve more than just achievement data. These ideas may be influenced by the tensions that Barwell (2009a, 2009b, 2010) has described as inherent in any bilingual mathematics classroom, which would include FI. These tensions are between language and mathematics, formal and informal language used to discuss mathematics, students' home languages and the official language of schooling, mathematical understanding and the social value of a second language, and policy goals and classroom practice. With regard to the specific context of FI, for instance, parents may have different

views on the connection between language and mathematics or the role of language in the teaching and learning of mathematics. They may experience a disconnect between the formal and informal language they and/or their children might use to discuss mathematics, both in the context of schoolwork and "real life". Parents may doubt the benefits or even the advisability of learning mathematics in French (students' second language) and yet simultaneously highly value the acquisition of this second language and its use as the primary medium of teaching and learning.

2. Materials and Methods

2.1. Theoretical Framework: Feminist Postmodernism

Feminist postmodern thinking troubles the assumption of objective, unquestionable truth and rejects the notion of epistemological or methodological certainty (Collins, 2000; Gannon & Davies, 2011). We adopted a feminist postmodern approach to this study as a way to recognize the constitutive relationship between the self and everything around it (Gannon & Davies, 2011). Every self is constituted in historically specific and socially regulated ways, ways that can be questioned or challenged, accepted or revised. 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. A feminist postmodern framing created space for valuing emotions such as sympathy, empathy, sensitivity, and responsiveness (Langford, 2019), which influenced how we listened to participants, analyzed their words, and made decisions about data representation.

We view our positionality as integrated within the theoretical framework of this research; to do research within a feminist postmodern frame is to be attentive to the relationship between the researchers, participants, and context. This study took place in a specific context (i.e., New Brunswick, Canada) and explores the perspectives and practices of parents of FI students. Both authors were born in this province, attended FI programs as students, taught in the FI program as public school teachers, teach FI methods courses to Bachelor of Education students, and have children registered in FI. This is the province where we live, work, and play, and it is the context within which we began asking questions about the role of language when learning mathematics in FI. We understand these perspectives and practices as dynamic, just as people are dynamic, unfinished, and incomplete. This relates to the notion of all people being "subjects-in-process" (Gannon & Davies, 2011), a never-ending state of becoming. We also understand these perspectives and practices in relation to each other. That is, we understand our participant perspectives and practices in relation to other participants as well as to ourselves. With these ideas in mind, we adopted poetic inquiry as a suitable methodology that attends to relationality, context, and emotion.

2.2. Poetic Inquiry

Poetic inquiry 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 (Cahnmann, 2003; James, 2017; Vincent, 2022). Poetic inquirers do this through dialogue, relationships, and an ethic of caring that invites expressiveness, emotion, and empathy (Owton, 2017). 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. We have adopted *research poems* to describe the poetry from this poetic inquiry, and we will use that term throughout when describing

poetic representations of interview data. In this approach, 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. Just as postmodern thinking recognizes a constitutive relationship between the self and everything around it (Gannon & Davies, 2011), so too does poetic inquiry draw attention to the relationship between researcher, participant, and audience. Together, poetic inquiry in a postmodern feminist framework invited us to experiment with representation through the composition of research poems.

2.3. Participants

The larger study involved six parent participants: two mothers and four fathers. For the narrower scope of this article, we selected poems from three participants who discussed language and mathematics in tension: one mother (Sally) and two fathers (Roderick and George). All names are pseudonyms. These three participants had one or more children registered in elementary FI and were attached to four different schools in New Brunswick, including one Grade 3–5 elementary school, one Grade K-5 elementary school, and two Grade 6–8 middle schools (which typically comprise students aged approximately 11 to 14). These schools ranged in size from 200 to 700 students and were located in two different municipalities: one rural and one urban.

2.4. Data Collection

Data included three individual in-depth interviews (transcribed verbatim) per participant, participant journaling, and researcher field notes. This article reports on interview data from three participants, as these data were found to be especially salient in exploring the research questions. In this study, we used a combination of semi-structured and unstructured approaches to individual in-depth interviews with participants. Rather than composing a prescribed checklist of questions to ask, interviews were organized using general themes and open-ended questions to explore. In line with our postmodern theoretical framework, this conception of a dual role of listener/participant reflects 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" (pp. 46–47).

The first of the three interviews focused on connecting with each participant 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. The second interview explored the different roles that parents adopt when supporting their children in mathematics. The third and final interview centred around the relationships that parents develop with their child's school. Interviews took place over a period of five months, beginning in June 2024 and concluding in November 2024. Each interview lasted on average 1 h and 24 min, with a range of 45 min to 2 h and 6 min. Therefore, for each participant, we collected approximately 4 h of interview data. All interviews were conducted by the first author, the principal researcher of this project.

2.5. Data Analysis

Data analysis and the composition of research poems involved a four-step process, drawing from Miller et al.'s (2015) approach to poetic analysis. The first step was immersion, which involved cycling back and forth between audio recordings and written transcriptions of interviews. Over time, certain segments began to stand out for their aesthetic power

or critical insight (Prendergast, 2015), informed by our identities as second language mathematics teachers, educators, and parents. The second step was the arrangement of these segments into early draft poems. Table 1 shows how segments from an interview transcript were identified and then arranged into a poem.

Table 1. From Immersion to Arrangement.

Original Text from Immersion	Arrangement into a Draft Poem
Yeah no I I think that would be fantastic because I think now like even the sheets I see whether the kids bring them home or me in the classroom a lot of times that they look like sheets that we would have done like they look the same but the technique that the kids are using are not the same. Yeah and so again it's not black and white to just bring that sheet home and the parent knows the techniques they're using to get there because it just it still just looks like a basic math sheet that you would think yeah you do this and it's not it. So I find it's not as if math itself in pen to paper does not look different like when you're just looking at the equation I guess it doesn't look any different but it's the ways they're getting there and the solutions they're using to get there that is different.	Even sheets I see The kids bring them home They look like sheets that we would have done They look the same but *not the same* *not black and white* a basic math sheet but *it's not it* Looking at the equation but *the ways* *the solutions* are different.

The third step attended to technical considerations, including phonological decisions (i.e., how word choice influences the way a poem sounds) and graphological decisions (i.e., how the visual presentation impacts how the poem is read). Poets attend to these and other stylistic devices to help readers with interpreting a poem (Sharma, 2019). The final step was to edit the poem for length, quality, and clarity. Though each poem is composed using participants' words, these words were sometimes selected, rearranged, and revised to strengthen the poem. For instance, in Table 1, not every word in the poem appears in the same order as it appeared in the transcript; rather, key phrases were selected and arranged to convey the participant's meaning in a condensed form. Each research poem presents participants' words as interpreted through the researcher's lens, thus representing a blending of participant voice and researcher analysis. Once this step was finished, each participant received a compilation of poems composed from their interview data and was asked for consent to use the poems as data. No participant requested revisions or modifications to the poems. Their feedback was overwhelmingly positive, with several participants describing having emotional responses to the poems. This period of member-checking ensured that each poem represented what participants intended to communicate.

3. Results

This section is organized by participant and begins with an orienting vignette followed by two research poems. We present two research poems per participant: one attending primarily to RQ1, and one attending primarily to RQ2.

3.1. George

George was the first father who expressed interest in joining this study. George has three children, the eldest in Grade 2 FI, the middle child in Kindergarten, and the youngest not yet in school. George works from home and is the primary parent after school, while his wife works outside of the home. The interviews took place in the evenings using MS Teams with cameras on. George enjoyed learning mathematics as a student. He is originally from Ontario, Canada and remembers moving to New Brunswick in Grade 4 when everyone was learning multiplication while he already knew how to do it. George's wife was in FI until Grade 10 or 11, when she switched out of FI and joined George in his English-language advanced mathematics class. George is confident that he can help his children with any challenges they might experience with mathematics, even though they are learning mathematics in French. Many of the mathematics activities that he described doing at home were similar to the sort of school mathematics that he remembers from childhood, such as teaching the formula for finding the area of a triangle. These activities were largely calculation-focused, such as counting time or memorizing multiplication facts.

Poem: Kind of mathematics

Math is kind of funny with French immersion.
My daughter is pretty smart
Grade 1 French immersion was really easy
just learning how to count to 100 in
French.

Math is kind of separate from language, right?
Duolingo for the last couple of years
getting up there in my understanding
it hasn't covered the lingo for math but
I could look it up pretty quick.

Math is kind of its own language.
At my level of French I would translate.
And then do it.
I think in English.
French would make me slow.

(I could probably teach her in French if I really tried)

Poem: 70

She can probably count to 100 in French
To *cinquante* or higher
Maybe she would get stuck at *soixante-dix*
Is it still called *soixante-dix*?

3.2. Roderick

Roderick has lived in New Brunswick his entire life. He has been living in the same small city since childhood and knows many people in the community. He is a stay-at-home father of three children registered in FI: the eldest is in Grade 7, the middle is in Grade 5, and the youngest is in Grade 2. The interviews were held over coffee on his front porch during the summer months while his children were home. He describes mathematics as something that did not come easily to him, despite his father being a mathematics teacher. 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. His wife was in FI in New Brunswick but left the program in secondary school when there were few options to study science and mathematics in French. He describes himself as fortunate that his children love school.

Poem: I wouldn't want to learn math in French
I didn't take French immersion.
my parents didn't put me in even though they were teachers
people didn't think about it the same way
my parents were from [the village]
neither spoke French
didn't put me in French

My wife was in French immersion until Grade 11.
when we were in school, you needed to do science and math to become anything
you got to focus on this
you got to have good marks on that
she could have done them all in French but
she needed high marks

I always thought learning math would be hard in French but
it's no different than anything
it's knowing the vocabulary
If someone struggles in math they could struggle in any language.
middle school thinking *I wouldn't want to learn math in French*
Of course not!
It would be really hard to learn both of those things at the same time.

Poem: Relearning
Math is taught different now
They do grouping and different methods
I've had to learn how the kids learn to count

The eldest is going into Grade 7
How they teach multiplication and all those things are taught
Differently
I feel like I'm relearning
I get her to explain to me sometimes

I ask what their teachers tell them
We are fortunate
Our kids get it most of the time
Our kids listen to their teachers
Our kids teach me almost as much as I teach them because they get it
Math was/is not my best subject

Often I don't understand
I sit down and [re]learn what they're doing
It's Grade 6 or Grade 7 math.
I can figure it out
It's going to get worse as they get older
Probably end up learning things I didn't pick up in school

3.3. Sally

Sally was the first participant who joined the study. She lives in a small town in New Brunswick with her husband and three children. Sally is originally from Ontario, Canada but has lived in New Brunswick since before her children began school. The interviews took place in a busy coffee shop, where Sally 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. Sally was a stay-at-home mom up until recently. She is a substitute teacher now that all three of her children are in 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 Sally and her husband removed him from FI in Grade 4. Neither Sally nor her husband speak French. Sally is involved in several parent committees and volunteers frequently at the elementary school.

Poem: Doubles + 2
Even sheets I see
The kids bring them home
They look like sheets that we would have done
They look the same but *not the same*
not black and white
a basic math sheet but *it's not it*

Looking at the equation but *the ways*
the solutions

are 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.

Poem: Flash Cards
Multiplication facts are the be all end all of math
I know random multiplication facts but
I never ever memorized them.
The big push coming from teachers--
especially grade four year--
multiplication
facts.
Multiplication is the center of it all.

Every kid could work on their multiplication but
Does the world revolve around being able to do
four times five

you see the sheets come home
get the flash cards out

4. Discussion

The findings offer insights into these parents' conceptualizations of language and their approaches to supporting their elementary-aged FI students in mathematics. Consistent with a feminist postmodern interest in opening lines of flight towards new ways of knowing (Gannon & Davies, 2011), this discussion explores how the unique perspectives of each participant contribute to an expanded understanding of language, mathematics, and parental support. To do this, we organize the discussion around the study's research questions, tracing how parents conceptualize language in FI mathematics and how these conceptualizations materialize in particular forms of support. By foregrounding parents' accounts in the format of research poems, this study contributes a nuanced understanding of how non-expert conceptualizations of language shape everyday mathematics practices in FI contexts.

4.1. Conceptualizations of Language in French Immersion Mathematics

All three participants share the characteristics of being monolingual English-speaking parents of children learning mathematics in a second language, French, in FI. Across all three participants, learning mathematics in FI was conceptualized primarily as learning the French words for "doing mathematics". In other words, learning and doing mathematics in French instead of in English mainly involves memorizing the necessary terms. We interpret this conceptualization as seemingly positioning mathematics as language neutral, with the language of instruction functioning as lexical overlay, thereby reducing attention to context and mathematical meaning-making.

However, this shared conceptualization is not stable. Read together, for example, although George and Roderick's poems suggest a shared view of mathematics as conceptually independent from language, they also point to the participants' niggling anxiety that language proficiency nevertheless interferes with mathematical legitimacy. In George's poem "Kind of mathematics," for example, he conceptualizes mathematics in paradoxical relation to language, at once separate from language, viewed as its own language, and mediated by language. The poem begins with a description of language as something apart from mathematics, where learning mathematics in Grade 1 FI is "really easy" because it is primarily a vocabulary exercise. In contrast, George describes his current level of French language competency as a barrier to doing mathematics in French, which suggests a conceptualization of language and mathematics in tension. This conceptualization of language may shape what is identified as mathematics and what is recognized as mathematical competence. From this perspective, learning numbers in French is not viewed as mathematics because it is understood as a vocabulary exercise. There is no space for something to be both a mathematics and a language exercise. At the same time, George questions whether mathematics is a language or part of a language and ponders whether mathematics becomes something different when it is taught in a second language, illustrating nuanced, complex, and even paradoxical findings.

Roderick voiced a similar, seemingly contradictory idea about language and mathematics in "I wouldn't want to learn math in French," namely that learning mathematics while learning French would be especially challenging since it would involve learning both a new language (i.e., French) and new content (i.e., mathematics) simultaneously. In this poem, Roderick expresses a belief that better grades in mathematics are likely in English-medium classes. The final stanza captures a lingering dissonance between the statement that learning mathematics in French would be no more difficult than learning it in a different language and that learning a language and learning mathematics at the same time would be especially challenging.

Researchers have discussed the nature of mathematics as a universal language or a tool at the service of language (e.g., Barton, 2008; Noren, 2015), and "non-experts" also have important experiences and interpretations of the relationship between language and mathematics to contribute to the conversation. For parents of FI students in this study, language is both foregrounded (i.e., learning French vocabulary) and invisible (i.e., the language used to describe mathematical thinking and understanding). Both George and Roderick report viewing learning mathematics in a second language as being about learning vocabulary, rather than focusing on the communicative function of language as it relates to learning and doing mathematics. George's statement that "[doing mathematics in] French would make me slow" suggests a threshold when the language of mathematics no longer affects someone's calculation speed. In the literature, the use of more than one language in mathematics contexts is increasingly recognized as helpful to student learning (Barwell, 2018). In this study, Roderick and George frame language use mainly as a matter of choice, where someone is doing mathematics in French or doing mathematics in English.

Moreover, by prioritizing speed and accuracy as expressions of mathematical competency, parents may unintentionally devalue deep, careful thinking in the mathematical process (Boaler et al., 2015). While some previous research (e.g., Culligan, 2010) has suggested that FI students report that overall, they do not experience mathematics as "easier" in English-medium contexts, we view the issue as not straightforward. Parents in this study frame language choice as something they think about in relation to student success.

While George's and Roderick's poems largely show a view of language as separate from mathematics, Sally's poem "Doubles + 2" suggests a view of mathematical language as more embedded in context by foregrounding language as historically and pedagogically situated. Sally's research poem explores ideas related to language as something that shifts over time to reflect the values, beliefs, and meanings of speakers. Similarly, the language used in a mathematics classroom also evolves to reflect changes in values and beliefs about how mathematics should be taught. As is typical of many parents of children in FI, the parent participants in this study generally do not have a high degree of French language proficiency and therefore do not have extensive French language skills to draw from when trying to make sense of mathematics homework explanations written in French. Parents in this study perceived that their unfamiliarity with the French language may have limited their ability to talk to their children about what they are learning in school; in these parents' view, not only are their children learning mathematics in a different language, but they are also learning the language of "new mathematics."

These issues blend several of the tensions in teaching mathematics through a second language as described by Barwell (2010): a tension between language and mathematics, a tension between formal and informal language to talk about mathematics, and a tension between home and school languages. Mathematics education vocabulary has expanded to include words, symbols, and meanings that reflect a movement towards conceptual understanding. In contrast, the mathematics language that Sally reported experiencing as a student reflected a greater emphasis on an instrumental understanding of mathematics. From these findings, we propose that when parents ask FI students to describe what they are learning in school, the children may not have the French language competence to translate what they are doing into a language their parents understand. And when the teacher sends home instructions in the language spoken at home, there is a new set of mathematics vocabulary that parents may not have previously encountered. Taken together, the poems illustrate how these parents' conceptualizations of language in FI mathematics are shaped by intersecting tensions between language and content, home and school discourses, and past and present pedagogies. In this study, this complex intersection appeared to relate to some uncertainties about how they can meaningfully participate in their children's mathematical learning.

4.2. From Conceptualizations to Practice: Supporting Mathematics Learning

In this study, the parent participants often conceptualized language as detachable from mathematics. They also reported that their support often oriented toward procedural features (i.e., counting, calculating), and was less likely to foreground conceptual meaning-making. Though participants seemed to share an overarching conceptualization of mathematics as largely independent from the language of instruction, they reported a variety of approaches to supporting the mathematics learning of their children. Rather than mapping individual parental practices, this analysis attends to how shared conceptualizations of language may play a role in the forms of support that become available to parents.

The first form of support orients toward monitoring surface indicators of mathematical competence. In "70," George wonders about his daughter's acquisition of the necessary

French vocabulary for counting to 100. George recognizes a potential language-related hurdle, where the language of communication becomes visible in how to express the value of 70. In English, seventy is read as seven groups of 10, or 7×10; whereas in French, *soixante-dix* is sixty-ten, or $60 + 10$. In this moment, we suggest that George is less focused on mathematical meaning-making in French and more focused on supporting his child by monitoring their progress with learning French words for mathematics. Evidence suggests that students in FI can achieve favourable mathematical outcomes (Turnbull et al., 2003). Meanwhile, the findings of this study reveal that some parents continue to orient their support toward monitoring language-specific features. Combined with a conceptualization of language as detachable from mathematics rather than as a resource for conceptual understanding, parental support may become oriented toward checking linguistic milestones rather than engaging in shared mathematical thinking.

Another form of parental support manifests as relearning. Roderick's poem "Relearning" illustrates this form of support that involves navigating changing pedagogies while leaving the language of instruction largely unexamined. Like Sally, Roderick has noticed changes in how mathematics is taught, and he has asked his children to explain their teachers' methods. We suggest that this form of support positions the parent as learner, the child as a mediator, and the teacher as mathematical authority. Language remains largely backgrounded, suggesting that for this participant, successful mathematics learning depends on pedagogical alignment rather than language mediation. This backgrounding of language seems to reflect a conceptualization of mathematics learning as pedagogical rather than linguistic work, where understanding the new method matters more than negotiating meaning through language.

The third form of support relates to at-home reinforcement of in-school learning. For example, Sally's poem "Flash Cards" highlights how dominant school discourses around fluency and memorization may have shaped the parental support she provided. Sally expressed ambivalence, indicating she may not agree that memorizing multiplication facts is the most important skill for children to learn, but she defaults to rehearsal anyway. Thus, even when this parent questions dominant practices, the available forms of support remain procedural. Though Sally conceptualizes language as evolving to reflect changing pedagogies, her support practices remain anchored in procedural reinforcement. For Sally, this seems to suggest that there are limited forms of mathematical support available to parents outside the classroom.

Taken together, these forms of support illustrate how parents' conceptualizations of language in FI mathematics may play a role in shaping not only what they do at home, but also what they perceive as possible. In particular, as noted by other participants, when language is understood as detachable from mathematics, support often orients more toward monitoring, relearning, and rehearsing and less toward engagement with mathematical meaning-making (de Abreu & Cline, 2005; Barwell, 2010). In this study, parental support appears to reflect both individual beliefs and broader structural constraints shaping home-school mathematics practices.

4.3. Implications

The implications of this study follow directly from the two research questions guiding the inquiry. First, parents in this study often conceptualize language as largely detachable from mathematics, which we argue may play a role in shaping the kinds of support they perceive as possible. Second, these conceptualizations may also play a role in influencing how parents enact support at home, practices which in this study often involved orienting toward procedural monitoring and rehearsal rather than mathematical meaning-making. This opens potential opportunities to improve home and school dialogue by developing

parent-facing resources and supporting FI teachers as content and language specialists. Such resources could explicitly challenge the view of mathematics as language-neutral by illustrating how mathematical reasoning is mediated through language. Attending to parents' conceptualizations of language in this way may expand the forms of support they feel able to offer.

The findings contribute to theorizing language and mathematics in multilingual education by illustrating how these parent participants conceptualize mathematics as simultaneously detached from and influenced by language. This paradox complicates dominant binaries that position mathematics as either language-neutral or linguistically embedded. Rather than resolving this tension, we suggest that the parents' perspectives reveal how these conceptualizations coexist and actively shape participation in mathematics. By foregrounding parents' perspectives and voices, this study aims to extend sociocultural and language-as-resource perspectives in mathematics education to include parental sense-making as a consequential site of theorizing. Parents' conceptualizations involve beliefs and organizing orientations and may play a role in the types of mathematical support that parents recognize as legitimate or possible.

This study explores parental conceptualizations of language and mathematics as dynamic and generative, rather than as static beliefs to be measured, corrected, or overcome. Future research might examine how these conceptualizations shift over time, differ across multilingual contexts, or interact with institutional discourses circulating across schools and homes. Methodologically, the use of research poetry suggests that arts-based and post-qualitative approaches have the potential to surface tensions, ambiguities, and affective dimensions of parental sense-making that may remain overlooked in more conventional analytic forms. Future research might further examine how poetic inquiry can function not only as representation, but also as a mode of analysis for studying relationships between language, learning, and participation across home and school spaces.

5. Conclusions

This study contributes to research on parent involvement in children's mathematics learning in a second language by moving away from a school-centric orientation and instead centring parents' perspectives. Through research poems, the study examines how parents of children in FI conceptualize the relationship between language and mathematics, a relationship that can exhibit various tensions. For these parents, mathematics is frequently positioned as detachable from language, while language is simultaneously understood as a potential barrier to mathematical success.

By examining these conceptualizations along with parents' reported support practices, this study extends existing work by showing how parents' conceptualizations of language may mediate mathematics practices. This study's findings suggest that parents' views of language may shape the forms of support they perceive as available or legitimate. The parents featured in this study orient their support practices toward attending to linguistic markers, relearning pedagogical methods, and rehearsing procedures more often than toward engaging in shared mathematical meaning-making. The findings contribute to a deeper understanding of parental beliefs and experiences and how these co-exist with their involvement in multilingual mathematics contexts.

Methodologically, this study suggests there is analytic potential in research poetry as a way to explore parents' conceptualizations of language and mathematics. This kind of methodological approach offered a way to surface tensions that may remain obscured in more conventional analytic forms. Guided by a feminist postmodern orientation, we were committed to listening differently, creating space for the composition of research poems that attended to parents' perspectives in a novel way. Taken together, the findings

suggest several possible ways forward, including targeted supports for teachers who often communicate the relationship between language and mathematics to parents, as well as resources that invite parents into conversations about learning mathematics in an additional language.

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Parent Conceptions of Language, Mathematics, and Support in a French Immersion Context

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