Student and Teacher Perceptions of First Language Use in Secondary French Immersion Mathematics Classrooms

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This phenomenological study (Creswell, 2003, 2007; van Manen, 1997) explores student and teacher perceptions of first language use in French immersion mathematics classrooms at a large, urban high school in Canada. During individual interviews, participants discussed their perceptions and experiences of French immersion mathematics, language use, and, in particular, first language use. Interview data are analyzed through a sociocultural theory lens (e.g., Lantolf, 2000; Swain & Lapkin, 2000), drawing on key notions such as language interdependence and the use of language as a cognitive tool. While first language use in second language classrooms remains controversial, this article contributes to an open discussion on the potential role students' first language can play in determining effective language and content learning.

Cette étude phénoménologique (Creswell, 2003, 2007; van Manen, 1997) porte sur les perceptions des élèves et des enseignants sur l'emploi de la langue première pendant les cours de mathématiques dans un contexte d'immersion française d'une grande école secondaire en milieu urbain au Canada. Pendant les entrevues individuelles, les participants ont discuté de leurs perceptions et leurs expériences relatives aux cours de mathématiques en immersion et à l'emploi de langue, notamment la langue première. Les données d'entrevues ont été analysées dans l'optique de la théorie socioculturelle (p.ex., Lantolf, 2000; Swain & Lapkin, 2000), puisant dans des notions clés telles l'interdépendance des langues et l'emploi de langue comme outil cognitif. Alors que l'emploi de la première langue dans les classes d'immersion est controversé, cet article contribue à une discussion ouverte sur le rôle potentiel que peut jouer la langue première des élèves dans la détermination de l'apprentissage efficace de la langue et du contenu.

Historical Context of French Immersion in Canada

In Canada, French immersion (FI) is a voluntary program in which students whose first language is not French learn this target language through language classes and content courses. Historically, immersion programs are viewed as being among the most successful in regard to student achievement, not only when it comes to French language proficiency, particularly in terms of receptive skills (i.e., listening comprehension, reading), but also with respect to English language achievement. In Canada, a notable number of research studies have been conducted since FI's inception in order to investigate students' French and English language performance

(e.g., Cummins & Swain, 1986; Day & Shapson, 1996; Swain & Johnson, 1997); and these studies have also reported positive results when it comes to FI students' achievement in the content areas. With regard specifically to FI students' mathematics results, both small-scale and large-scale studies report positive results overall, with immersion students' achievement generally paralleling or exceeding that of their English-program peers (Bournot-Trites & Reeder, 2001; Cummins & Swain, 1986; Turnbull, Hart, & Lapkin, 2003; Turnbull, Lapkin, & Hart, 2001).

Despite FI's largely agreed-upon success as a language-learning program, there are controversies that have emerged over the years. One such controversy involves the use of students' first language (L1) in immersion classrooms by either the students themselves or the teacher. Historically, L1 use has been viewed mainly as a source of interference and even a hindrance to second language (L2) acquisition, both in the language arts classroom and the content courses (e.g., mathematics). At the same time, most educators and researchers acknowledged that the L1 is used in these classrooms, for example when students are working through complex subject matter and tasks. Recent research has maintained that it remains important to try to use the L2 as much as possible in order to maximize its learning. However, it has also begun suggesting that the L1 may prove useful in the teaching and learning of complex content, for example mathematics, as well as the L2.

In this article, I review some of the most recent and pertinent literature on L1 use in L2, foreign language and immersion classrooms, and additionally, studies based in FI and other L2 mathematics contexts. I also present my phenomenological study involving individual interviews with teachers and students of FI mathematics at the secondary level. Themes related to student and teacher L1 use emerged through this study. As a means of explaining these themes, I showcase them through examples of participant voices. I conclude with a discussion of my research findings and their theoretical and pedagogical implications.

First Language Use in the French Immersion Classroom

As Turnbull and Dailey-O'Cain (2009b) have explained, in most L2 and foreign language classrooms and certainly in immersion programs, "first language use is generally expected to be rare or nonexistent" (p. 1). For example, based on this longstanding tradition, the *Foundation for French Language Arts in French Immersion in Atlantic Canada* (New Brunswick Department of Education, Educational Programs & Services Branch, 2001) describes the underlying principles of the FI program under the heading "*All French All The Time*" (p. 35). The document suggests that "it is…essential that French be the only language of communication" in the FI classroom (p. 35). Similarly, the American Council on the Teaching of Foreign Languages (ACTFL) proposes "that language educators and their students use the target language as exclusively as possible (90% plus) at all levels of instruction during instructional time" (ACTFL, 2012, n.p.). The perception that L1 use in immersion classrooms should be forbidden has become taken for granted by many over the years. This stems from a number of longstanding cognitive and pedagogical arguments or beliefs. In some instances, L2, foreign language, and immersion educators believe that L2 learning can truly only occur when teachers and students use that target language exclusively, while some have simply internalized long-standing district or school policies on bans of L1 use. Others may view monolingual children's language acquisition as the most successful, or may regard the educated monolingual speaker as the standard to which all L2 speakers should be held. By extension, codeswitching[1] practices are seen as indicative of lower language proficiency. In a similar vein, some educators may view the

L1 as a source of interference to L2 development. Finally, L1 use may, for some educators, connote grammar-translation methods that have fallen by the wayside in favour of more communicative-based approaches. The notions of comprehensible input (Krashen, 1985) and output (Swain, 1985), and the "time-on-task" or "maximum exposure" hypotheses, Cummins (2007) contended, argue against an educational approach that includes both L1 and L2 use (p. 174). For a more in-depth discussion of this topic, see Turnbull and Dailey-O'Cain (2009b).

Despite the longstanding nature of these arguments, they have been explored, and challenged, by researchers in recent years who have taken a new look at existing theories and proposed new ideas and approaches (e.g., Cook, 2001; Cummins, 2000, 2001, 2007; Dailey-O'Cain & Liebscher, 2009; Macaro, 2009; Swain, 2000, 2012; Turnbull & Dailey-O'Cain, 2009b). Moreover, despite what has been, historically, policy that has banned the L1 from L2 classrooms, research has shown that teachers and students do use the L2 and L1 (e.g., Antón & DiCamilla, 1999; Behan, Turnbull, & Spek, 1997; Cummins, 2007; Dailey-O'Cain & Liebscher, 2009; Gutiérrez, 2007; Macaro, 2009; McMillan & Turnbull, 2009; Swain & Lapkin, 2000; Turnbull, 2001; Turnbull, Cormier, & Bourque, 2011). As Cook (2001) has suggested, "The L1 creeps back in, however many times you throw it out with a pitchfork" (p. 405).

As mentioned at the outset, long-held assumptions leading to a ban of L1 use in L2, foreign language, and immersion classrooms have been challenged over the years. As research has shown, L1 use occurs despite bans, while a number of cognitive and pedagogical counter-arguments proffer a different stance as to L1 use. Cummins' (2000, 2001) common underlying proficiency model and theories of language interdependence oppose a separation of languages. In general, Cummins (2007) challenged what he referred to as one of three "monolingual instructional assumptions", namely the "direct method assumption" which posits that "instruction should be carried out exclusively in the target language without recourse to the students' L1" (p. 222). There are now calls to view L2 students as developing bilinguals rather than poor imitators of an unattainable monolingual speaker-ideal (e.g., Cummins, 2007; Dailey-O'Cain & Liebscher, 2009; Macaro, 2009; Turnbull & Dailey-O'Cain, 2009b). Further arguments for a re-visioning of the place of L1 use are based on a sociocultural view of language as a cognitive tool. Researchers have approached this work from Vygotskian (1962, 1978) and neo-Vygotskian (e.g., Donato, 1994; Lantolf, 2000; Lantolf & Appel, 1994; Wertsch, 1985, 1993) viewpoints, which underscore the social roots of all individual higher mental functions. These studies are particularly important in terms of pedagogy and hold promise for furthering our understanding of teacher and student L1 use, by placing value on what occurs during interactions and dialogue situated in the classroom. Consequently, I examine some of these key studies in more detail here.

With regard to student L1 use in L2 and foreign language classrooms, researchers recognized that it can constitute a learning strategy that serves both cognitive and social functions. Studying the cognitive functions of student L1 use, Antón and DiCamilla (1999) noted that in an adult beginner Spanish class, use of the L1 (English) during collaborative dialogue allowed students to construct "collective scaffolding" (Donato, 1994), through which they mutually helped each other through a problem-solving task. The authors also found that use of the L1 allowed students to work through cognitively difficult tasks and served metalinguistic functions. Using microgenesis, an approach to data analysis that is informed by sociocultural theory and involves studying individuals' learning as it unfolds during interaction, Gutiérrez (2007) observed that learners working in triads engaged in collective scaffolding and were able to achieve together what had been previously unattainable by the individuals on their own. Furthermore, Gutiérrez

identified that the L1 was used in three ways to request assistance from the designated peer "expert" during problem-solving, collaborative tasks. Assistance consisted of either a straightforward reply (translation); a paraphrase followed by an L1 reply; or co-constructed assistance that followed an L1 request. An L1/L2 balance was struck as a result of students', or especially, the expert's desire for L2 learning and his or her insistence on its use being balanced by an awareness of the partner's needs. Work by Dailey-O'Cain and Liebscher (2009) examined how codeswitches in naturalistic bilingual settings also emerge in the L2 classroom, and found that students used the L1 as self-scaffolding, and that teachers also used the L1 as a scaffold for learners. Highlighting the social functions of student L1 use in second and foreign language classroom contexts, Antón and DiCamilla's (1999) research found that the L1 enabled beginning Spanish L2 students working collaboratively on problem-solving tasks to establish intersubjectivity, that is, "a shared perspective on the task" (p. 240). Dailey-O'Cain and Liebscher's (2009) work also concluded that students used the L1 to establish intersubjectivity.

A small number of important studies examining student L1 use have been situated within the Canadian core French and FI classroom contexts. Swain and Lapkin's (2000) work has focused on the FI language classroom. They conducted research in a Grade 8 early total FI language classroom examining student L1 (English) use during collaborative, task-based learning. The students had been enrolled in immersion since kindergarten, with instruction in the early years having been carried out entirely in French. There was a period of English language arts introduced at Grade 3, and by Grade 5 the instructional time was divided approximately equally between French and English. The authors found that students used the L1 for three main purposes: a) moving the task along in terms of understanding stories and task management, b) focusing attention with respect to vocabulary and grammar, and c) interpersonal interaction during off-task behaviour or disagreement. Swain and Lapkin cautioned that "use of the L1 should not be prohibited in immersion classrooms, but neither should it be actively encouraged as it may substitute for, rather than support, second language learning" (p. 268). Reflective of Vygotsky's theories, is these authors' conclusion that "to insist that no use be made of the L1 in carrying out tasks that are both linguistically and cognitively complex is to deny the use of an important cognitive tool" (Swain & Lapkin, 2000, p. 269).

Behan, Turnbull, and Spek's (1997) study focused on a social studies class situated within students' first year of a Grade 7 extended French program in which history, geography, drama, and art were instructed in French and students also received instruction in French language arts. Likewise these authors suggested that L1 use "can both support and enhance L2 development, functioning simultaneously as an effective tool for dealing with cognitively demanding content" (p. 41). The authors designed an experiment in which four groups of four students were monitored while working together to prepare an oral presentation. All four groups were encouraged to use as much French as possible during their collaborative work. Two of the groups were reminded to speak French by the teacher, whereas the other two groups, although addressed in French, were not reminded to speak French during the task. Through microgenetic analysis, the authors found that the groups who were left to converse in the language of their choice spoke more often, and exhibited more evidence of learning. When students used the L1, it was mainly for reasons related to vocabulary and task organization. While clear about not advocating unlimited L1 use in the L2 classroom, the authors go on to say that, in the content class in particular, "limited L1 use may benefit both L2 development and content mastery" (p. 42).

Also informed by key tenets of sociocultural theory, but with a focus on quantitative analysis,

Turnbull, Cormier, and Bourque (2011) explored FI students' L1 use in science classes. Participants were Grade 7 students, enrolled in their second year of a late FI program in which they received instruction in science and other subjects in French as well as instruction in French language arts. Prior to entering the immersion program in Grade 6, students had received instruction in French for 20 to 30 minutes a day beginning in Grade 1. Two groups of students were taught the same curriculum outcomes, using either the experimental literacy-based approach designed by the researchers or the standard approach as prescribed by the provincial curriculum document. The literacy-based approach involved a five-phase implementation strategy and was based heavily on concepts such as Lyster's (2007) counterbalanced approach, scaffolding, and various literature related to literacy and science instruction. Meanwhile the teaching approach in the control class involved three main teaching strategies: language simplification, demonstrations, and question-response-evaluation-type discussion. Students from each class participated in oral interviews, both before and after the teaching interventions, and a written task. A series of complex statistical analyses showed that, in general, the experimental group showed increased complexity in their final interview responses, but that these students required English in order to express the complex ideas. Furthermore, the English or codeswitched turns correlated positively to increased complexity and better results in both written French and science knowledge. Consequently, the authors suggested that "language acts as an important cognitive tool to help make sense of complex science content" (Turnbull, Cormier, & Bourque, 2011, p. 194). While it is encouraging that this study dealt with L1 use in science classes, and Behan, Turnbull, and Spek's (1997) work was based in a social studies class, studies exploring L1 use in FI mathematics classes are lacking, particularly when it comes to student L1 use.

Codeswitching in Immersion and Second Language Mathematics Classrooms

In terms of teacher L1 use, McMillan and Turnbull (2009) conducted individual interviews with, and observations of, two late FI teachers in order to explore their perceptions and beliefs surrounding their use of the L1 and how these beliefs were enacted in their classrooms. Both teachers taught a variety of content courses (mathematics, science, social studies, and health) in Grade 7 late FI, the students' first year of the program. One teacher, Frank, used little to no L1 with his students, while the other teacher, Pierre, used the L1 much more frequently, but in a judicious manner, particularly at the beginning of the school year. Even though Frank used very little L1 and saw its use as practically unavoidable at times (especially in the early months of the program) feelings of guilt were associated with L1 use. Both Pierre and Frank felt that, due to the many French-English cognates and its use of numbers and symbols, mathematics was one subject that could be more easily taught exclusively in the L2 from the outset. However, Frank noted that the need for some L1 use actually seemed to increase with time, as the mathematical concepts and word problems became more challenging and complex. This links to Behan, Turnbull, and Spek's (1997) and Turnbull, Cormier, and Bourque's (2011) findings which underscored that students' L1 was used to negotiate cognitively complex content in the L2, especially in the early phases of their program when proficiency was limited.

There is some research investigating teacher L1 use in English-medium mathematics classrooms in South Africa. While the South African context differs from Canadian FI, these studies can offer understandings of L1 use in a highly multilingual mathematical setting. Researchers (Adler, 1998, 1999; Adler & Setati, 2000; Setati, 1998; Setati, Adler, Reed, & Bapoo,

2002) have described L1 use in the English-medium mathematics classroom as both a controversial and necessary practice. Setati, Adler, Reed, and Bapoo (2002) noted that L1 use is most prevalent at the secondary level, and that mathematics and science teachers switched more often than language teachers. This may be due to teachers' perceptions that there exists a heavier content load at the secondary level, and in these subjects in particular, which required an increased support of L1 use.

Moschkovich (2005) provided perspective on student L1 use in an L2 mathematics context through an analysis of L1 use in a conversation between two Grade 9 students solving a mathematics problem. The students were both L1 Spanish speakers, but had been enrolled in mainstream English mathematics classes in the US for a number of years. Moschkovich noted that the bilingual students' codeswitching served a variety of purposes. The codeswitches reflected a level of communicative competence and also reflected community norms; they provided stylistic switches in the conversation (to add colour, emphasis, etc.); they related to memory and to routines; and they were a resource for elaborating ideas. While based in a non-immersion bilingual context, her findings constitute an important and useful starting point for immersion mathematics research based in a Canadian FI context.

Research Questions

This article explores one emergent theme from a larger phenomenological study situated in a large, urban high school in Canada—the purpose of which was to describe the essence, and make meaning, of the experiences of FI students who are deciding whether or not to remain in FI mathematics at the secondary level, and of their experiences in the course (Culligan, 2010). Teacher data were collected in order to enhance, and in some ways, triangulate, the student data. During data analysis, teacher data were used to support, deepen, and offer an additional perspective on the themes emerging from the student data. For the purposes of this paper, which focuses on L1 use, I address the following research questions taken from the larger study:

1. What are students' experiences (perceptions, feelings, opinions) of FI mathematics in Grade 11?

2. What are teachers' experiences teaching Grade 11 FI mathematics?

Grade 11 (students in this grade are generally 16-17 years old) was chosen as a target for exploration since, at this particular school, it was a pivotal year for FI students. FI students at this grade level had a choice of whether to take mathematics in French, whereas in the previous grades mathematics in French was mandatory for all FI students. While neither of the research questions specifically targeted L1 use as a topic of exploration, students and teachers focused at considerable length on the topic and it proved to be one of the key emergent themes in the data.

Methodology

The theoretical framework underpinning the approach to this research can be described as subjectivist and interpretivist (Crotty, 1998). In particular, van Manen's (1997) hermeneutic phenomenological approach provided the guiding methodology for the exploration of the research questions. As van Manen explained, "Phenomenology describes how one orients to lived experience, hermeneutics describes how one interprets the 'texts' of life" (p. 4). In this sense, "phenomenology is not only a description, but it is also seen as an interpretive process in

which the researcher makes an interpretation" (Creswell, 2007, p. 59). In this study, data collection marked the very beginning of the interpretive process, while the data analysis phase allowed a reiteration of initial interpretations and a more explicit thematic analysis of themes. These processes will be described in more detail in the Data Analysis section. Phenomenology provided a methodological approach for this study, whereby "the researcher identifies the 'essence' of human experiences concerning a phenomenon, as described by participants in the study" (Creswell, 2003, p. 15). In keeping with this approach, the participants in this research were instrumental in determining the type and quality of data collected.

Participants

The participants include 10 students who were enrolled in FI mathematics in Grade 11, as well as four FI mathematics teachers. The FI students (who were all in Grade 12 at the time of the interviews) represented both the early and late immersion programs (EFI and LFI), meaning some had entered the program in Grade 1 (5-6 year olds, six students) and others had entered the program in Grade 6 (10-11 year olds, four students). Four males and six females were interviewed, and student achievement in mathematics ranged from below-average to above-average. For all students, the L1 was English and henceforth the two terms, L1 and English, will be used interchangeably. Similarly, French was the L2 for all students, and will refer to French hereafter in this paper. The four teacher participants, two females with over 15 years' experience teaching FI mathematics, and two males with fewer than 15 years' experience, all taught secondary FI mathematics at the time of the study.

Data Collection

Consistent with phenomenological inquiry, the main source of data collection for this study was the interview (Creswell, 2007, McMillan, 2008). Interviews were semi-structured and open-ended, to allow participants to freely discuss their experiences and perceptions, of utmost importance in a qualitative phenomenological approach. Simultaneously, the format of the semi-structured interviews provided some direction for the participants, in that the questions and prompts focused specifically on their experiences in FI mathematics (Creswell, 2007). As van Manen (1997) cautioned, "It is important to realize that the interview process needs to be disciplined by the fundamental question that prompted the need for the interview in the first place" (p. 66). Consequently, an interview guide was used (Seidman, 2006), which constituted the main guiding questions for the student and teacher interviews. Moreover, the guide was designed to elicit the experiences of students and teachers enrolled in FI mathematics or involved in its instruction. Probes and follow-up questions were employed to explore meanings (Warren, 2002). Probing questions included open-ended prompts such as: "Give me an example of... Tell me more about that..." and "What was it like for you when..." (Merriam, 2009, p. 99). Student interviews lasted between 17 and 34 minutes and teacher interviews took between 40 and 90 minutes. All interviews were audio recorded and transcribed. As the primary researcher, I completed and complied the transcriptions. These steps marked the beginning of the data analysis. Through a journaling process, I maintained a "research diary" (Holly & Altrichter, 2011) in which initial ideas and thoughts about the data were recorded. Undertaking this research provided a place for me to "bracket" my experiences and approach my work with a fresh perspective—a process that can be particularly important in phenomenological research

(Creswell, 2007, p. 59). Although true bracketing may not be possible in interpretive, hermeneutical phenomenological research (Creswell, 2007; van Manen, 1997), researchers such as myself, may, at minimum, succeed in "suspending our understandings in a reflective move that cultivates curiosity" (LeVasseur, cited in Creswell, 2007, p. 62).

Data Analysis

The data analysis process combined what Creswell (2003, 2007, 2008) has described as the general steps of data analysis for qualitative research, with some of the more prescribed steps of phenomenological research. According to Creswell (2007), this combination of generic steps and those more specific to the particular methodology used, often produces most effective data analysis. In this research, data analysis began with the organization and preparation of the data (i.e., transcription, filing, and sorting). Next, an overall read-through of the data provided a general sense of the information. A memoing technique (Creswell, 2007; Merriam, 2009) was used in which ideas were recorded in the margins of the text. The coding process marked the next step in data analysis. Significant statements were highlighted and labeled with preliminary codes. Codes were then reduced to address overlaps and redundancy, leading to the emergence of "meaning units" (Creswell, 2007, p. 159) or themes. The themes allowed a general description of the phenomenon to develop. The results of the data analysis were organized and presented thematically, using participants' voices to illuminate the various themes and subthemes. Presenting the data in this way allowed the essence of the phenomenon to shine through. Finally, data were interpreted, and in this process of meaning-making there emerged "lessons learned" (Creswell, 2003, p. 194), reflections, and fodder for further questions. For this paper, a reiteration of data analysis, looking at the initial overarching theme of L1 use with renewed focus and through a fresh lens, allowed me to elucidate and refine additional subthemes of which I will discuss in the section below.

Results

The following are the themes and subthemes relating to L1 use that emerged in response to the two research questions:
1. Student Language Use
    a. Student Use of the L2
    b. Student Use of the L1
2. Teacher Language Use
    a. Teacher Use of the L2
    b. Teacher Use of the L1

The themes that emerged from student and teacher data overlapped, therefore both student and teacher quotes will serve to illustrate theme meanings.

Student Language Use

Both student and teacher participants spoke about students' use of the L2 and the L1 during FI mathematics classes. In keeping with the usual thinking on what is appropriate for the FI

classroom, all of the teachers in this study held the belief (to varying degrees) that students in FI should be speaking French at all times, and both groups discussed how the FI mathematics classroom importantly afforded students an opportunity to not only listen to but also speak French. Nonetheless, students and teachers acknowledged that English was used to some extent and for various purposes within the classroom.

Student use of the second language. Three students felt more "natural" about speaking French than English and that French was more the rule than the exception. The fact that the context was a mathematics classroom, rather than a language classroom, did not seem to deter students from seizing the opportunity to use their L2:

> Any opportunity to go in a French classroom and it be a French environment where you have to talk to your friends in French and everything, it gives you that chance to speak French. So I mean, that it's math, it's not a whole lot different from any other French courses. (Susan, LFI student)

One student viewed his experience in the FI mathematics classroom as an indirect form of language learning: "It's still communication skills, I guess … It's almost you don't realize it but you are [learning French] … you're focused on doing your math so you're just learning it subconsciously" (Andrew, EFI student).

Two students mentioned that, although they felt like they had not spoken French as much as they should have, and that speaking French was not an organic part of the classroom environment, they wished they, and their classmates and teacher, had taken more advantage of the opportunity to do so. Paul (EFI student) explained,

> In French math, not everybody spoke French all the time, which is probably, like, a problem. If they did speak French all the time, I'm 100% sure they would do a lot better and I know I would do a lot better.

Here, Paul showed that he seems to have internalized the belief that it is problematic to use the L1 in the immersion classroom. The question of students communicating in English, their L1, is explored next. Since teachers did not speak about students' use of French in an isolated way, and talked about student use of the L2 and L1 in a more integrated fashion, teacher quotes will be presented in the next section (Student use of the first language), along with student quotes related to that theme.

Student use of the first language. The three students who felt that using their L2 in FI mathematics was natural and that they did so fairly often, also acknowledged that they spoke the L2 more often with teachers and when using technical mathematical terms (which were only known in French). These students, as well as three others, explained that the L1 was more likely to be used when conversing with peers, particularly about non-mathematics related subjects: "It's so frustrating sometimes because when you're like, trying to convey sarcasm or something, but you can't, really, because your French isn't good enough" (Grace, LFI student). That said, at times students expressed difficulty using their L2 even when discussing on-task, mathematical subject matter. Although students were clear that they almost never used mathematical terms in English because these were largely unknown to them, difficulties arose when trying to explain a concept, or formulate a question. Under these circumstances, when the cognitive load is heavy, students might use the L1, particularly, although not always, if they were conversing with a peer at the time, rather than a teacher. As Grace (LFI student) explained:

> In math you know how to get it across because you're taught all these terms, but if you're trying to tell someone something it's just kind of hard to, like, figure out how to say what you want to say and so it's just, like, easy to get tempted to try and, like, explain it to them in English.

Ann (EFI student) alluded to a perceived additional challenge posed by the requirement to speak the L2 while learning through content such as mathematics: "It takes probably twice as much work … you compose a question in French, about a math question." This was a factor that, at times, led her to use her L1. Students' explanations in this section regarding their own codeswitching suggests that there are reasons for L1 use that go beyond the need to simply fill a vocabulary gap in the L2. Students found themselves reverting to the L1 when having difficulty working through certain mathematics problems, trying to explain a concept, or when asking a question about a mathematics problem.

Additionally, one student also believed that switching to L1 occurred due to the strangeness of speaking French with an Anglophone friend:

> Not a lot of students are just like, "Ah oui," like, it just doesn't happen, you know what I mean? And it just seems kind of awkward. For two students who speak English everywhere else except for this one place to be like, "Et oui, on parle français ici, moi et toi." (Paul, EFI student)

Here, Paul described how his L1 is part of his socially constructed identity, and how the language choices and practices that exist outside the classroom also manifest inside it.

The perception that students want to, and do use the L2, but that the L1 is used under different circumstances for a variety of reasons, were also discussed among teachers. Students' personal motivation to speak French was also a point raised by two of the teachers. As M. Parker (teacher) stated:

> I think that students that have made the choice to be in, to stay in, the French immersion program in Grade 11 have maybe … made the decision that becoming bilingual to them is important … But then … there's still students who, even though they've decided to stay in French immersion, possibly because if they stay that extra year they get the certificate [of program completion] … and because their parents won't let them change to English, some students just still don't want to be speaking French in the classroom.

M. Ryan (teacher) explained student motivation issues in a succinct way: "It's not cool to speak French." Because of this, he felt that students needed extrinsic motivation, provided by the teacher, to encourage them to speak French. This is where, for M. Ryan, the "French only" policy comes into play: "I really honestly think that, secretly, they're proud. And they're, they're happy to do it [speak French]. And when you enforce them and make them do it, it's like, 'Oh good … it's him making me.'"

For all four teachers, the perception was that, when it comes to students conversing with the teacher, French is used the vast majority of the time. While the teachers valued this capability on the part of their students, and recognized this as an achievement, they expressed anxiety when it came to students speaking the L1 during group work. The situation appeared to be complicated by the desire, on the part of teachers, to provide group work and thus opportunity for mathematics discussion. Since these discussions tended to involve student use of the L1 to a greater or lesser extent, this conflicted with teachers' sense of responsibility to enforce a French-

only policy. Mme Taylor (teacher), for example, expressed her reluctance to allow students to work in groups for fear of English use, and she went on to express her uncertainty about whether she should allow that fear to guide her pedagogical practice. However, Mme Taylor's fear of students' use of English went beyond a blind following of a French only policy—she had internalized the belief that enforcing French use was of most benefit to the students:

> They speak to me in French, but it's when you get them and they're working together and you're conscious of the fact that, "Okay, I'm supposed to have a French immersion classroom here" and then they divert into the English … It's quite wonderful to think that they're able to explain things in French and speak to you in French, and they do that, but I guess it's just that sense of what's going on in-between, or when they're working together … And maybe I shouldn't let it bother me. I don't know. But on the other hand, they don't get a lot of opportunity to speak French, really.

Mme Taylor's word choice, "*divert* into the English," suggests her perception that students' use of English, their L1, signifies their going off-track. That is, a diversion to off-task activities. However, as illustrated in previous comments from students, while this is sometimes the case, it is not always so.

Overall, students and teachers expressed a desire for, and saw the benefits of, students using their L2 to communicate in FI mathematics. In spite of this, both groups of participants also perceived a certain level of L1 use among students. A final theme emerged in addition to the theme of student language use—teacher language use and, as a subtheme, their use of the L1. Students spoke less about this particular theme than teachers did, but both groups discussed experiences and perceptions of this phenomenon.

Teacher Language Use

Teacher use of the second language. Most students (eight out of 10) mentioned that they believed that the teacher's use of the L2 to instruct mathematics did not affect their learning to a great degree. For example, Paul (EFI student) suggested, "whether you learn math in English or French … it's kind of universal either way … it's a lot of, you know, numbers and diagrams and things like that." Moreover, Andrew (EFI student) differentiated between his language comprehension and his mathematics comprehension when he said, "It wasn't the language, it was the math that I didn't get right off the bat." Similarly, all four teachers made some statement about how they felt that (in the case of struggling students in particular) language was not the key issue or, at least, not the only issue. In other words, they felt that presenting the mathematics content in students' L2 was not the main factor when it came to comprehension. "For the most part [hesitation], the language isn't the issue. For some it might be, but I think that's a small portion … often the problem is difficulty with the math concepts" (M. Parker, teacher). Interestingly, these kinds of statements on the part of students and teachers point toward an underlying perception of mathematics and language as being truly separate entities. The perception that mathematics is "numbers and diagrams", and that students can understand the language but not the mathematics, or vice versa, suggests a separation between mathematics and language.

In sum, many of the participants stated that it made no difference when the mathematics teacher used the L2 versus the L1. However, staying true to the complex nature of human experience, a number of these same participants also went on to explain that perhaps there is

some sort of difference or even challenge faced by students when the teacher presents mathematics content in the L2. Despite being an EFI student enrolled in the program since Grade 1, Paul described the following experience:

> At least in English, if you're just kind of drifting off, you still hear the words and you don't have to, in your mind, translate, but in French, if you're just kind of head in the clouds, your brain isn't paying attention at all … you don't pick up on anything … you really had to, in French courses especially, be on the ball and be, like, alert, and watching.

Teachers also seemed cognizant of some kind of real or perceived challenge associated with students learning mathematics in an L2. For example, M. Parker (teacher) shared the following: "For some students … I know it is an extra thing you have to, to keep working on, on top of a subject that possibly some of them truly believe they can't have success with." Another teacher, Mme Sands, explained:

> I really think it adds a, an extra level of difficulty, I really do … when you're doing something like statistics, for example, and talking about the mean of the means … it is tough to explain. It's a tough concept, and then they've got the language issue as well … I really like the immersion program … and I think it's great, but, I also don't want their math to suffer.

Both groups of participants maintained that it was important for the FI mathematics teacher to use the L2 as much as possible, but, as will be discussed in the following section, they also discussed when, how, and if the teacher should use the L1.

Teacher use of the first language. Three students spoke about how they believed that some use of English on the part of the FI mathematics teacher could be beneficial. This mostly involved quick translations of mathematics terminology: "Sometimes there's a little vocabulary and you just need to hear the word in English and it makes sense" (Susan, LFI student). These quick vocabulary translations were also seen as a way for immersion students to connect with their peers in the English program: "It makes it easier to kind of, like, help out other people who are in the English program" (Grace, LFI student). On the other hand, one student found that having to make her own vocabulary connections was a more effective way for her to learn:

> A lot of time they don't just give the English word. They like to explain it in French so that we can picture it in our mind … I find it better because you can remember it easier if it's explained to you and you have to figure it out using your own brain, rather than just having it told to you. (Melanie, EFI student)

And so, perhaps not surprisingly, students expressed some differing opinions about how they feel they learn best in the classroom, in this case with regard to teacher L1 use. Teachers elaborated more on this theme and also expressed uncertainty as to how to approach this particular issue.

Three out of four teachers discussed their experiences with their own use of the L1 in FI mathematics. Unlike the students, for whom two somewhat distinct subthemes emerged (relating to their use of the L2 on one hand, and the L1 on the other hand), teachers' discussions of their own L1 and L2 use were very much intertwined and difficult to separate. For two out of the three, using the L1 was something that they did on occasion, but only during extra help sessions (e.g., during students' lunch break or after school) and outside of formal classroom

instructional time. Teachers expressed that using students' L1 was not something that they were "supposed" to do and therefore they struggled with this aspect of their teaching:

> I know I'm not supposed to, but I do always offer them to come in, anytime, and we will, you know, go over it in English … I was told [by the French department] that I was really a language teacher first, and a math teacher second. But my math department would disagree and, of course, say that I'm a math teacher first and a French teacher second and I, I do agree with that. I think I teach math, in French … But I close my door because I know that I'm not supposed to be offering extra help to my French immersion students, in English. (Mme Sands, teacher)

All three teachers pondered the dual role of mathematics teacher and French teacher, to which Mme Sands alludes in her commentary. Teachers struggled to strike a balance between what they felt was their responsibility to teach French, specifically by providing a classroom environment in which French is the only medium of communication, and their responsibility, and desire, as mathematics teachers, to ensure that mathematical content was delivered and understood. As M. Parker (teacher) explained, "The math content can't suffer, from my opinion … because I'm a *math* teacher … So you need to cover the same material, but cover it in a way that allows students the opportunity to practice their French."

While teachers' desire for students to comprehend the mathematics content was strong, only one teacher admitted to using students' L1 within the formal instructional time of the classroom:

> I do [use English], on occasion … I'm not saying English does the trick. I'm saying, if I had a Smart Board up there, it's a different medium, right? … It's just another tool, right? And so, I use that tool. I'm not supposed to use that tool, but I use it sometimes. (Mme Sands, teacher)

Mme Sands' comments on the notion of the L1 as a "tool" are ones that link to recent sociocultural views regarding student use of the L1. This notion, as well as other key ideas brought out by student and teacher participants, will be explored in more depth in the following section.

Discussion and Conclusion

When student and teacher participants in this study were asked to talk about their experiences in FI mathematics at the secondary level, a main emergent theme was language use and, in particular, L1 use. Upon first reflection, most students and teachers felt that a teacher delivering mathematics lessons in an L2 had no perceivable effect on student achievement or comprehension. However, despite this perception on the part of many participants, a number went on to describe a certain level of challenge or difference associated with FI mathematics.

With regard to student language use, some students acknowledged their desire to communicate primarily in the L2 in the FI mathematics classroom, but they also stated that they used their L1 in a variety of situations. This finding connects to other research which has found students' languages, and their L1 use, can be seen as an important part of students' identity outside and inside the classroom (Myers-Scotton, 1983, 2002; Prasad, 2014). As well, L1 use can be considered as a cognitive tool and resource, rather than a deficiency, that serves a variety of purposes during the learning of both content and an L2 (Antón & DiCamilla, 1999; Gutiérrez, 2007; Moschkovich, 2005; Swain & Lapkin, 2000; Turnbull, Cormier, & Bourque, 2011). Beyond the need for simply filling L2 vocabulary gaps, students in this study perceived their L1

use as occurring and being useful across diverse mathematical situations. This finding links to Moschkovich's (2005) suggestion that multilingual mathematics students use their L1 to "explain a concept, justify an answer, describe mathematical situations or elaborate, expand and provide additional information" (p. 138). Research based in other immersion content classes (e.g., Turnbull, Cormier, & Bourque, 2011) and in L2 mathematics contexts (e.g., Moschkovich, 2005) has found that this may be particularly the case when it comes to students learning complex content. An insistence on exclusive L1 use may result in an overuse of teacher-led lessons, limiting students' collaborative learning and L2 speaking opportunities (Macaro, cited in Turnbull & Dailey-O'Cain, 2009b). To this end, teachers in this study expressed frustration in trying to "enforce" a French-only policy, and felt that students used the L1 especially when working together collaboratively. Furthermore, "what emerges is an increasing possibility that banning the first language from the communicative second language classroom may in fact be reducing the cognitive and metacognitive opportunities available to learners" (Macaro, 2009, p. 49). I suggest that in the content classroom, and in this case, mathematics, this point bears special consideration. Nonetheless, student motivation, long recognized as a pedagogical concern in the L2 literature and in immersion classrooms (e.g., Dörnyei, 2003; MacIntyre, Baker, Clément, & Donovan, 2003) was also on the minds of the teachers in this study. The teachers' belief in the importance of maximizing students' opportunity to speak the target language in order to facilitate learning meant that teachers believed they sometimes had to "enforce" an L2-only policy when students' intrinsic motivation was lacking.

When it comes to teachers' use of the L1, one teacher felt justified in her own L1 use as a "tool" for students, which echoes research based in sociocultural theory. However, she and other teachers also expressed feelings of guilt, and having to hide the fact that they were using some L1 in their instruction. This feeling of teacher guilt is cited often in the literature based in L2 and foreign language classes (e.g., Macaro, 2009; Swain, Kirkpatrick, & Cummins, 2011; Turnbull & Dailey-O'Cain, 2009a) as well as immersion and L2 mathematics classes (e.g., Adler, 1998; McMillan & Turnbull, 2009). Teachers struggled with what they perceived as their dual role of language teacher and mathematics teacher. The complexity and delicate nature of the dual role of the immersion content teacher has also been acknowledged in the literature (Swain, 1996). Students and teachers in this study seem to view language and mathematics as distinct. Like Barwell (2010), one might ask: "Is the issue here one of language or of mathematics? Or both?" (para. 2). In his work, Barwell also recognizes other tensions that are inherent when teaching mathematics through an L2, such as a tension between formal and informal language, home and school languages, mathematical understanding and the social value of an L2, and policy goals and classroom practice. More research is needed to explore in detail how these tensions are lived in FI mathematics.

Findings in this small phenomenological study are in keeping with what most researchers and some educators are beginning to acknowledge—that some teachers and certainly students continue to use the L1 in the immersion classroom despite being banned from doing so at a policy level. In encouraging a re-visioning of L1 use in the L2 or foreign language classroom, and perhaps especially in the immersion classroom, most proponents of L1 use to support L2 learning are careful to note that L1 use must be approached in some systematic way and, in past debates on the issue, scholars have cautioned against an overreliance on L1 use (e.g., Cook, 2001; Turnbull, 2001). Terms such as "principled use/code choice" (Levine, 2011), "judicious use" (Cummins, 2000; McMillan & Turnbull, 2009; Swain & Lapkin, 2000; Swain, Kirkpatrick, & Cummins, 2011), and "optimal use" (Macaro, 2009; Turnbull & Dailey-O'Cain, 2009a), for

example, point towards L1 use that is just that—principled, judicious, and optimal. The difficulty, of course, lies in defining what principled, judicious, or optimal might mean; and, if we arrive at a definition, how can this definition be enacted in the L2 classroom?

In general, the L1 is optimally used when it enhances or supports L2 learning, which, after all, is the main goal of an L2, foreign language or immersion classroom. However, scholars envision this idea in different ways. Some (e.g., Levine, 2011) have argued for a systematic, deliberate approach to creating a bilingual L2 or foreign language classroom, in which codeswitching is introduced to students through a series of curricular constructs, discussed explicitly, and analysed critically. Others (e.g, Dailey-O'Cain & Liebscher, 2009) suggest that the process of creating a bilingual classroom take on a more organic approach, and that requiring instructors to effectively and explicitly model codeswitching is an unrealistic burden. Furthermore, some have suggested that L1 use might prove most useful among beginning learners with limited proficiency and/or when the cognitive load is particularly heavy and complex (e.g., Turnbull & Dailey-O'Cain, 2009b). Ideally, as learners' proficiency increases, they should deal increasingly with classroom material in the L2 in order to practice using and learning the language. Knowing when and how to foster a bilingual environment that welcomes L1 and L2 use, without letting the L1 become overused and while ensuring that, when possible, the L2 is used and that its learning is the main goal, is sure to create a challenge. Turnbull and Dailey-O'Cain (2009a) have offered the following as their best definition of optimal use:

> Optimal first language use in communicative and immersion second and foreign language classrooms recognizes the benefits of the learner's first language as a cognitive and meta-cognitive tool, as a strategic organizer, and as a scaffold for language development. In addition, the first language helps learners navigate a bilingual identity and thereby learn to function as a bilingual. Neither the classroom teacher nor the second or foreign language learner becomes so dependent on the first language that neither can function without the first language. Optimal codeswitching practices will ultimately lead to enhanced language learning and the development of bilingual communicative practices. (p. 183)

Having an open discussion about the place of L1 use in FI programs may be the initial and biggest barrier. While L1 use has been debated and discussed with more success recently with regard to second and foreign language classrooms, policy makers and educators in FI contexts have largely ignored it as an issue. In light of recent studies suggesting that the L1 is an important cognitive tool for both L2 and content learning, and that teachers and students use the L1 despite the policies prohibiting its use, further investigation of the issue is important. Certainly, having teachers experience guilt induced by their own, and especially their students', L1 use seems counterproductive, particularly when such guilt constrains teachers and causes them to deny students opportunities for collaborative learning. In opening the dialogue about L1 use in the immersion classroom, we can hopefully continue to refine our definition of optimal use and define ways in which the L1 can be used appropriately as a cognitive tool, with the goal of successful L2, and also, equally important, content, learning. Investigating these issues in FI content classrooms will surely move the dialogue forward.

References

Adler, J. (1998). A language of teaching dilemmas: Unlocking the complex multilingual secondary mathematics classroom. *For the Learning of Mathematics, 18*(1), 24-33.

Adler, J. (1999). The dilemma of transparency: Seeing and seeing through talk in the mathematics classroom. *Journal for Research in Mathematics Education, 30*(1), 47-64.

Adler, J., & Setati, M. (2000). Between languages and discourses: Language practices in primary multilingual mathematics classrooms in South Africa. *Educational Studies in Mathematics, 43*(3), 243-269.

American Council on the Teaching of Foreign Languages (2012). *Use of the target language in the classroom.* Retrieved from http://www.actfl.org/news/position-statements/use-the-target-language-the-classroom

Antón, M., & DiCamilla, F. (1999). Socio-cognitive functions of L1 collaborative interaction in the L2 classroom. *The Modern Language Journal, 83*(ii), 233-247.

Barwell, R. (2010). Tensions in teaching mathematics through a second language. *The ACIE Newsletter, 13*(3). Retrieved from http://www.carla.umn.edu/immersion/acie/vol13/no3/may2010_rr.html

Behan, L., Turnbull, M., & Spek, J. (1997). The proficiency gap in late immersion (extended French): Language use in collaborative tasks. *Le journal de l'immersion, 20*(2), 41-42.

Bournot-Trites, M., & Reeder, K. (2001). Interdependence revisited: Mathematics achievement in an intensified French immersion program. *The Canadian Modern Language Review, 58*(1), 27-43.

Cook, V. (2001). Using the first language in the classroom. *The Canadian Modern Language Review, 57*(3), 402-423.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2008). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River, NJ: Pearson Education.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process.* London, United Kingdom: Sage.

Culligan, K. (2010). Pente or slope? Using student voices to explore program choice and experiences in secondary French immersion mathematics. *The Canadian Modern Language Review, 66*(3), 421-444. doi:10.3138/cmlr.66.3.421

Cummins, J. (2000). *Language, power, and pedagogy: Bilingual children in the crossfire.* Clevedon, United Kingdom: Multilingual Matters.

Cummins, J. (2001). *Negotiating identities: Education for empowerment in a diverse society* (2nd ed.). Los Angeles, CA: California Association for Bilingual Education.

Cummins, J. (2007). Rethinking monolingual instructional strategies in multilingual classrooms. *The Canadian Journal of Applied Linguistics, 10*(2), 221-239.

Cummins, J., & Swain, M. (1986). *Bilingualism in education.* London, United Kingdom: Longman Group.

Dailey-O'Cain, J., & Liebscher, G. (2009). Teacher and student use of the first language in foreign language classroom interaction: Functions and applications. In M. Turnbull & J. Dailey-O'Cain (Eds.), *First language use in second and foreign language learning* (pp. 131-144). Bristol, United Kingdom: Multilingual Matters.

Day, E. M., & Shapson, S. M. (1996). *Studies in immersion education.* Clevedon, United Kingdom: Multilingual Matters.

Donato, R. (1994). Collective scaffolding in second language learning. In J. P. Lantolf & G. Appel (Eds.), *Vygotskian approaches to second language research* (pp. 33-56). Westport, CT: Ablex Publishing.

Dörnyei, Z. (2003). Attitudes, orientations, and motivations in language learning: Advances in theory,

research, and applications. *Language Learning, 53*(1), 3-32.

Gutiérrez, A. G. (2007). Microgenesis, method and object: A study of collaborative activity in a Spanish as a foreign language classroom. *Applied Linguistics*, 1-29. doi:10.1093/applin/amm032

Holly, M. L., & Altrichter, H. (2011). Research diaries. In B. Somekh & C. Lewin (Eds.), *Theory and methods in social research* (2nd ed.). London, United Kingdom: Sage.

Krashen, S. (1985). *The input hypothesis: Issues and implications*. London, United Kingdom: Longman.

Lantolf, J. (2000). Introducing sociocultural theory. In J. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 1-26). Oxford, United Kingdom: Oxford University Press.

Lantolf, J., & Appel, G. (Eds.). (1994). *Vygotskian approaches to second language research*. Westport, CT: Ablex Publishing.

Levine, G. (2011). *Code choice in the language classroom*. Bristol, United Kingdom: Multilingual Matters.

Lyster, R. (2007). *Learning and teaching languages through content: A counterbalanced approach*. Philadelphia, PA: John Benjamins Publishing Company.

Macaro, E. (2009). Teacher use of codeswitching in the second language classroom: Exploring 'optimal' use. In M. Turnbull & J. Dailey-O'Cain (Eds.), *First language use in second and foreign language learning* (pp. 35-49). Bristol, United Kingdom: Multilingual Matters.

MacIntyre, P. D., Baker, S. C., Clément, R., & Donovan, L. A. (2003). Sex and age effects on willingness to communicate, anxiety, perceived competence, and L2 motivation among junior high school French immersion students. *Language Learning, 53*(1), 137-165.

McMillan, J. H. (2008). *Educational research: Fundamentals for the consumer* (5th ed.). Boston, MA: Pearson Education.

McMillan, B., & Turnbull, M. (2009). Teachers' use of the first language in French immersion: Revisiting a core principle. In M. Turnbull & J. Dailey-O'Cain (Eds.), *First language use in second and foreign language learning* (pp. 15-34). Bristol, United Kingdom: Multilingual Matters.

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

Moschkovich, J. (2005). Using two languages when learning mathematics. *Educational Studies in Mathematics, 64*(2), 121-144.

Myers-Scotton, C. (1983). The negotiation of identities in conversation: A theory of markedness and code choice. *Journal of the Sociology of Language, 44*, 115-136.

Myers-Scotton, C. (2002). Frequency and intentionality in (un)marked choices in codeswitching: 'This is a 24-hour country'. *The International Journal of Bilingualism, 6*(2), 205-219.

New Brunswick Department of Education, Educational Programs & Services Branch. (2001). *Foundation for French language arts in French immersion in Atlantic Canada*. Retrieved from http://www.gnb.ca/0000/publications/curric/imeng.pdf

Prasad, G. L. (2014). Portraits of plurilingualism in a French international school in Toronto: Exploring the role of visual methods to access students' representations of their linguistically diverse identities. *The Canadian Journal of Applied Linguistics, 17*(1), 51-77.

Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences* (3rd ed.). New York, NY: Teachers College Press.

Setati, M. (1998). Code-switching in a senior primary class of second-language mathematical learners. *For the Learning of Mathematics, 18*(1), 34-40.

Setati, M., Adler, J., Reed, Y., & Bapoo, A. (2002). Incomplete journeys: Code-switching and other language practices in mathematics, science, and English language classrooms in South Africa. *Language and Education, 16*(2), 128-169.

Swain, M. (1985). Communicative competence: Some roles of comprehensible input and comprehensible output in its development. In S. Gass & C. Madden (Eds.), *Input and second language acquisition* (pp. 235-254). Rowley, MA: Newbury House.

Swain, M. (1996). Integrating language and content in immersion classrooms: Research perspectives. *The*

Canadian Modern Language Review, 52(4), 529-548.

Swain, M. (2000). The output hypothesis and beyond: Mediating acquisition through collaborative dialogue. In J. Lantolf (Ed.), *Sociocultural approaches to second language research* (pp. 97-115). Oxford, United Kingdom: Oxford University Press.

Swain, M. (2012). A *Vygotskian sociocultural perspective on immersion education: The L1/L2 debate.* Keynote address presented at the Fourth International Conference on Language Immersion Education, St. Paul, MN.

Swain, M., & Johnson, R. K. (1997). Immersion education: A category within bilingual education. In R. K. Johnson & M. Swain (Eds.), *Immersion education: International perspectives* (pp. 1-16). Cambridge, United Kingdom: Cambridge University Press.

Swain, M., Kirkpatrick, A., & Cummins, J. (2011). *How to have a guilt-free life using Cantonese in the English class: A handbook for the English language teacher in Hong Kong*. Tai Po, New Territories, Hong Kong: Research Centre into Language Acquisition and Education in Multilingual Societies, Hong Kong Institute of Education.

Swain, M., & Lapkin, S. (2000). Task-based second language learning: The uses of the first language. *Language Teaching Research, 4*(3), 251-274.

Turnbull, M. (2001). There is a role for the L1 in second and foreign language teaching, but… *The Canadian Modern Language Review, 57*(4), 531-540.

Turnbull, M., Cormier, M., & Bourque, J. (2011). The first language in science class: A quasi-experimental study in late French immersion. *The Modern Language Journal, 95*, 182-198. doi:10.111/j.1540-4781.2011.01275.x

Turnbull, M., & Dailey-O'Cain, J. (2009a). Concluding reflections: Moving forward. In M. Turnbull & J. Dailey-O'Cain (Eds.), *First language use in second and foreign language learning* (pp. 182-186). Bristol, United Kingdom: Multilingual Matters.

Turnbull, M., & Dailey-O'Cain, J. (Eds.). (2009b). *First language use in second and foreign language learning*. Bristol, United Kingdom: Multilingual Matters.

Turnbull, M., Hart, D., & Lapkin, S. (2003). Grade 6 French immersion students' performance on large-scale reading, writing, and mathematics tests: Building explanations. *Alberta Journal of Educational Research, 49*(1), 1-21.

Turnbull, M., Lapkin, S., & Hart, D. (2001). Grade 3 immersion students' performance in literacy and mathematics: Province-wide results from Ontario (1998-99). *The Canadian Modern Language Review, 58*(1), 9-26.

van Manen, M. (1997). *Researching lived experience: Human science for an action sensitive pedagogy*. London, Canada: The Althouse Press.

Vygotsky, L. (1962). *Thought and language*. Cambridge, MA: The Massachusetts Institute of Technology.

Vygotsky, L. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

Warren, C. A. B. (2002). Qualitative interviewing. In J. F. Gubrium & J. A. Holstein (Eds.), *Handbook of interview research: Context & method* (pp. 83-102). Thousand Oaks, CA: Sage.

Wertsch, J. (1985). *Vygotsky and the social formation of mind*. Cambridge, MA: Harvard University Press.

Wertsch, J. (1993). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

Note

1 For the purposes of this article, I define codeswitching as "the systematic use of linguistic material from two or more languages in the same sentence or conversation" (Levine, 2011, p. 50).

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