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LINKING SECOND LANGUAGES RESEARCH AND PRACTICE SERIES

In this Issue:

Pente or Slope? Using Student Voices to Explore Program Choice and Experiences in Secondary French Immersion Mathematics

Research study by Karla Culligan*

An Examination of student decision making regarding the option of continuing to study math in French or switching to studying math in English

(*) Culligan, K. (2010). Pente or slope? Using student voices to explore program choice and experiences in secondary French immersion mathematics. *Canadian Modern Language Review*, 66(3), 421–444.

Reflect — What experiences do I bring to reading the research?

1. What background experiences do my students bring to the French immersion mathematics classroom? What motivates them to continue the French immersion program and French immersion mathematics at the high school level?
2. What do French immersion students perceive and experience as they aim to learn, in their second language, the complex mathematical concepts required at the high school level?
3. What are the differences, if any, between learning mathematics in a second language and learning mathematics in the first language? How do high school students perceive and experience these differences?
4. What role, if any, does (or should) the first language play in my teaching and in students' learning of mathematics in French immersion at the high school level?
5. How can I best tackle the complex task of supporting my high school students' learning of not only the mathematical concepts but also the French language in the French immersion mathematics classroom?

What experiences does the researcher bring to conducting the research?

Introducing Karla Culligan

As a high school French immersion mathematics teacher, Karla has always striven to know more about how best to teach and learn mathematics in the French immersion context. While teaching at the high school level, Karla earned her M.Ed. at the University of New Brunswick. She later returned to the University of New Brunswick and is currently a full-time Ph.D. student in education, focusing on second language and mathematics. She is also the current Associate/Managing Editor of the *Canadian Journal of Applied Linguistics*.

A conversation with Karla Culligan, author of *Pente or Slope? Using Student Voices to Explore Program Choice and Experiences in Secondary French Immersion Mathematics*

Where did you conduct your research? With whom?

I conducted my research at a large, urban high school in New Brunswick. I targeted Grade 11 students as participants because, in this particular school, French immersion students at this grade level were able to choose, for the first time in their French immersion program, whether or not they wanted to continue to pursue mathematics in French. Prior to Grade 11, all French immersion students were required to take mathematics in French. At the time of the study, all of the student participants had moved on to Grade 12 and were thus reflecting on their Grade 11 experiences.

What were you trying to find out?

I wanted to find out about high school students' decision-making process as they were considering whether to remain in French immersion mathematics or not. I also wanted to know about students' experiences both in French immersion mathematics and after transferring to an English mathematics course.

How did you gather your information?

I conducted individual interviews with sixteen students who had been in French immersion until at least Grade 10. Of these sixteen students, ten had decided to continue in French immersion mathematics in Grade 11 while six had decided to transfer to an English mathematics course at that point. I asked open-ended interview questions about the students' decision-making processes while choosing their mathematics course and about their experiences in their course of choice. Each interview lasted approximately 20 minutes and was audio recorded.

What did you do with the data?

I began by transcribing each audio recording. Once I had these transcripts and started reading them, I noted, in the margins, anything interesting or anything that jumped out at me. I underlined interesting sentences or passages. I began to take note of recurring topics or themes that were common to several interviews. This is how the

broad themes began to emerge from the interview data. As I read through the transcripts multiple times, subthemes also began to emerge. Because the interview style encouraged participants to discuss freely their responses to broad questions, participant statements sometimes touched on more than one theme, creating an interwoven story of the experiences. When I wrote about the results of my data analysis, I used quotations from the students to support and illustrate each theme and subtheme.

How would you summarize what you found?

The interview data suggested that high school French immersion students choose to continue studying mathematics in French for reasons such as the need to satisfy both mathematics and French course credit obligations, a desire to remain in their "comfort zone," and, to a lesser extent, due to the encouragement of parents, peers, or teachers. For students who chose to abandon French immersion mathematics, reasons included course scheduling conflicts, feeling satisfied with their current French speaking ability, and the view that doing so would better prepare them for mathematics courses at English universities.

Students in French immersion mathematics felt that there was not a great difference between learning mathematics in French and learning mathematics in English. They spoke a lot about the use of French versus English in the classroom. Overall, students expressed a desire to speak French in the French immersion mathematics classroom. However, perceived challenges to this included vocabulary issues, the use of English when working in groups, and struggling to express mathematical content.

Once students had experienced learning mathematics in English in Grade 11 or 12, most identified some level of challenge associated with having previously studied mathematics in French. For many the challenge was the mathematics vocabulary ("I was always using *pente* instead of *slope*"). For others, there was a perceived increase in ease of comprehension, ability to focus, and overall comfort level once they began studying mathematics in English.

What practical messages come from this study?

1. French immersion mathematics can be a viable option at the high school level.

The majority of students in this study chose to continue French immersion mathematics after Grade 10. However, with program attrition being most acute at the high school level, we need to find ways of encouraging and enabling more students to pursue the French immersion program through the end of their school years. Being able to offer quality course programming that appeals to students could be one way of doing so. Recruiting and then supporting teachers who are trained specialists in both a content area, such as mathematics, and French second language education is key.

2. We must determine the best practices in French immersion mathematics for simultaneously teaching not only the mathematical content, but also the French language.

Finding ways to be not only an effective mathematics teacher but also an effective language teacher can be challenging, particularly at the high school level when mathematical content becomes increasingly complex and abstract. Students in this study identified some added elements related to language in French immersion mathematics. In French immersion and English programs alike, in both language and content courses, literacy support is essential for struggling students, and helps all students. French

immersion mathematics teachers must be given the tools, resources, and support necessary to integrate language and content teaching.

3. We must be willing to dialogue about the role of students' first language in French immersion mathematics and other French immersion courses.

Student use of English in the French immersion classroom has long been strongly discouraged. There are many reasons for this; however, teachers and researchers have acknowledged that students nonetheless do use their first language in the French immersion classroom. Students in this study sometimes used English in order to express themselves when trying to work through mathematics. Indeed, some recent studies have argued that a student's first language acts as a valuable tool that can be used when trying to work through complex language and content tasks. A professional dialogue and more research about this subject could lead to new understandings of how students best learn language and content.

4. Student voices can be a valuable source of understanding.

This study enabled me to sit down with students and listen to them speak freely about their experiences in French immersion mathematics. As a teacher and researcher, the interviews proved to be rewarding and interesting. Given the time and opportunity, our students can tell us a lot about their learning experiences and thus how they learn.

Additional research articles

- 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.

This study compared the math skills of two groups of immersion students — one group who studied math in their first language (English) and the other in French. The students studying math in French matched or outperformed their peers who studied math in English as demonstrated by standardized math tests.

- Jappinen, A.-K. (2005). Thinking and content learning of mathematics and science as cognitive development in content and language integrated learning (CLIL): Teaching through a foreign language in Finland. *Language and Education*, 19(2), 148–169.

Jappinen compared the cognitive development in math and science classes of two groups of adolescent learners — one group who studied in their first language and the other in their second language. The researcher found that the cognitive development of those students studying in a second language resembled that of those who studied in their first language.

- Turnbull, M., Cormier, M., & Bourque, J. (2012). The first language in science class: A quasi-experimental study in late French immersion. *The Modern Language Journal*, 95, 182–198.

This study examines the use of English in two Grade 7 French immersion science classrooms. The researchers found that students relied on English in particular with complex ideas. This scaffolding allowed students to communicate more difficult concepts and was correlated to an increase in written French results and science knowledge.

- Wannagat, U. (2007). Learning through L2-content and language integrated learning and English as a medium of instruction. *International Journal of Bilingual Education and Bilingualism*, 10(5), 663–682.

This study explores two late English immersion history classes — one in Hong Kong and one in Germany — by means of video and audio recordings. Wannagat discovered that the classes in Hong Kong were more teacher-dominated and used more first language than those in Germany. First language use for 50% of the time reduced second language use, risk taking, and hypothesizing.