VOCABULARY SKILLS OF FRENCH IMMERSION STUDENTS IN THEIR SECOND LANGUAGE

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1. Introduction

Vocabulary knowledge is known to be crucial for reading comprehension and for dealing with academic content in a second language (e.g., Garcia, 1991; Hazenberg and Hulstijn, 1996; Laufer, 1992; Nation, 1993). In French immersion programs, where much of the school curriculum is taught in the second language, an important issue therefore concerns students' lexical development in French. With the current emphasis in schools on using educationally enriching, authentic French content in regular 'core' French programs as well, lexical development is of primary importance in this context too. Indeed, numerous recent publications addressed to language teachers and applied linguists concerned with learners in a wide variety of contexts (e.g., Coady and Huckin, 1997; Harley, 1995; Hatch and Brown, 1995; Nation, 1990; Huckin, Haynes, and Coady, 1993; Schmitt and McCarthy, 1997; Singleton, 1999) signal growing recognition of the key role of vocabulary knowledge in the development of second language proficiency.

This article first provides a summary account of vocabulary-oriented research conducted in recent years in French immersion classrooms, leading up to a new study examining a specific aspect of the lexical development of French immersion students vis-à-vis core French students: namely, their word analysis skills in the second language, French. The ability to analyse the internal structure of words is important because it can provide access to many new words and increase 'potential vocabulary' (Palmberg, 1987) in the second language. In immersion and core French programs in Canada, most French-as-asecond-language materials currently in use pay little or no attention to such skills. One aim of this study, therefore, is to determine what word analysis skills students at different grade levels in these programs now have in order to provide useful diagnostic information for teachers and a solid empirical basis for the development of relevant classroom materials.

2. Vocabulary Research in French Immersion

Researchers have studied second language vocabulary development in French immersion from both a teaching and a learning perspective. One of the first studies to focus on vocabulary from a teaching perspective was an observational study of instruction in early immersion classes in the Metropolitan Toronto area (Swain and Carroll, 1987). Observations in nine grade 3 classes and ten grade 6 classes of an early total immersion program[1] suggested that planned vocabulary teaching occupied a rather narrow place in the overall curriculum, occurring mainly during a period devoted to reading in French. As part of the reading lesson, teachers would typically call upon students to read aloud, question them on the content of the text, and ask for definitions or synonyms of specific words or expressions that were assumed to be unfamiliar to the learners but potentially interpretable in context. Some incidental teaching of vocabulary was also observed during subject matter lessons when teachers

provided students with needed vocabulary or corrected them as they encountered lexical difficulties in oral production. There was in general little emphasis on the internal structure of words as a clue to their meaning, although there were occasional references to derivational relationships between individual words and in one grade 6 class the teacher drew attention to the meaning of suffixes *-ée* and *-illon*. Swain and Carroll concluded that in light of the centrality of word knowledge for the development of proficiency in the second language, greater prominence needed to be given in the immersion curriculum to systematic vocabulary instruction.

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Alongside the observation study in grade 3 and 6 classrooms, other research in the late 1980s focused on the vocabulary knowledge of several classes of grade 6 early immersion students in another school board (Harley and King, 1989). In this study, the learners' use of French verb vocabulary in written compositions was analysed in relation to that of native French speakers of the same age who were given the same topics to write about. Based on various measures of lexical richness, the analysis showed that the immersion students made proportionally greater use of high-frequency verb vocabulary than the native speakers and less use of derived verbs (e.g., *affoler, encercler*) and of verbs that were in some way incongruent with English. For example, verbs such as *descendre, rentrer, sortir* were much less often used by the immersion students than by the native speakers. These French verbs combine motion and direction in the verb in contrast to English where direction tends instead to be expressed in a particle or prepositional phrase (e.g., *go down, come back (home), go out*). At the same time, there was evidence that the learners were able to benefit from lexical similarities with English, e.g., using some lower frequency verbs in French that have cognates in English and that fit in the same kinds of syntactic frames (e.g., *alarmer, masquer, respecter*). This study suggested a need for more vocabulary-focused learning materials in immersion classrooms that would take account of both problems and assets associated with transfer from English.

In order to examine patterns of second language development in immersion, another study (Harley, 1992) examined the oral use of French verb vocabulary by students at different grade levels. In this study, based on individual oral interviews in French, there were six groups of students with 12 students per group: three groups of early immersion students at grades 1, 4, and 10 respectively, a group of late immersion students in grade 10[2], and two comparison groups of native French-speaking students in Quebec at grades 1 and 10. This study showed that young students in early immersion quickly developed effective strategies for stretching their limited verb vocabulary to cover for situations where more specific verbs would be selected by native speaker peers. At higher grades in immersion there was greater use of more specific verbs. Both early and late immersion students in grade 10, however, were still demonstrating influence from English, e.g., by generally making little use of derived verbs and directional motion verbs in French, and typically assuming (sometimes incorrectly) that if verbs have equivalent meanings in English and French they will also fit into the same type of syntactic frame. Once again this study led to the suggestion that instruction in immersion programs might usefully place greater emphasis on the development of lexical proficiency in French.

The focus of several more recent studies has been on the enhancement of vocabulary instruction. Lapkin and Swain (1996), for instance, carried out a descriptive case study of one teacher's approach to vocabulary instruction during a science lesson focused on the 'greenhouse effect'. This teacher had been found to be particularly effective in promoting a high level of French proficiency among his grade 8 students. Based on a videotaped record of the lesson, which lasted for about 40 minutes over two consecutive days, Lapkin and Swain observed that the teacher systematically addressed a range of aspects of vocabulary knowledge - phonological, morphological, syntactic, discoursal, and sociolinguistic - and that as part of his science teaching he was adept at recycling lexical items in different linguistic contexts and at 'pushing' students in class discussion to use specific relevant vocabulary precisely and accurately. As one teaching technique, he regularly drew attention to derivational relationships between new words and ones that were more familiar (e.g., *soleil/solaire*). In short, his instructional approach consisted of a carefully orchestrated integration of vocabulary and content instruction that appeared to benefit the second language development of his students.

Another study of vocabulary instruction involved younger French immersion students in grade 4 (Wright, 1996). Building on the earlier learning-oriented vocabulary research, the aim of this experimental study was to see if focused vocabulary instruction could fill the previously observed gap in students' knowledge of directional motion verbs in French. The researcher in this case was the teacher of the grade 4 class in which the experiment took place. In a three-week unit of study, she introduced a series of children's books in French featuring a number of motion verbs in telling the adventures of a young boy and his cat. Reading of the stories in class was followed by discussion of the relevant verbs and how they differed from English, along with a variety of exercises designed to practise use of these verbs, a physical education activity involving relevant actions, and production by the students in small groups of 'big books' in which the motion verbs were used. Based on pretests given before the instruction began, immediate posttests, and delayed posttests given five weeks later, Wright found lasting improvement in her students' use of directional motion verbs relative to a comparison class that did not receive the unit of study. Like the study by Lapkin and Swain (1996), this study thus supported the view that deliberate vocabulary instruction embedded in activities designed to be of interest and educational significance for learners at the relevant age level is beneficial for immersion students' lexical development.

This view was further supported by a study conducted in secondary school by Harley, Howard, and Roberge (1996). This research, conducted collaboratively with two French-as-a-second-language teachers, involved the introduction of vocabulary learning activities integrated with a language arts theme that both teachers were featuring with their classes. One teacher had a class of early French immersion students who had reached the grade 11 level, and the other was teaching a class of extended French[3] students in grade 9. Several types of vocabulary-oriented activities were designed for use with selected readings on the theme of science fiction in each class. The readings and the lexical content of activities (and tests) differed in accordance with the different proficiency levels of the two groups of students, but the types of activities were similar. These included the production of semantic maps, or networks, graphically linking a central concept to a surrounding network of semantically

related words, as well as a more formal type of activity designed to develop students' skill in deriving new words from stimulus words in particular 'word families'. Test results indicated a significant increase in vocabulary knowledge in both classes over the three to four weeks of the study, but students in both classes had trouble with the formal word families activities. The test findings were complemented by comments made in the teachers' journals and in student interviews: semantic mapping was regarded as useful and interesting, but the word families type of activity was seen as difficult. In a questionnaire focussed on vocabulary learning strategies that the students filled out at the beginning of the study (Harley and Hart, in press), there was evidence that in both classes the strongest preference on encountering an unfamiliar word in French was for inferring the meaning of the new word from context. Whereas the more experienced grade 11 immersion students saw themselves as equally likely to often try and think of an English word that was similar and to look for clues to meaning in the word itself, in the grade 9 extended French class, these two intraword strategies were less strongly favoured, suggesting an overreliance by these less experienced students on top-down processing strategies (see Haastrup, 1991). A question remaining was whether a stronger focus specifically on teaching word analysis skills to immersion and extended French students would accelerate their lexical development. The new study described below represents a first step in tackling this question, designed to take a closer look at the word analysis skills of students at different grade levels.

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3. STUDY OF WORD ANALYSIS SKILLS

Research on the acquisition of derivational morphology in English as a first language (e.g, Nagy, Diakidoy and Anderson, 1993; Tyler and Nagy, 1989, 1990) shows that there are developmental aspects to word analysis skills. Whereas children in grade 4 already have some knowledge of the internal structure of morphologically complex words in their mother tongue and can make use of this knowledge in interpreting new words, there is continuing development in word analysis skills into the high school grades. Most important from an educational point of view, knowledge of what suffixes contribute to the meanings of derived words correlates with reading ability in high school (Tyler and Nagy, 1990). For second language learners whose first language shares cognates with the second, as is the case for English-speaking learners of French, there are also benefits to be gained from awareness of morphological correspondences between the two languages (e.g, Hancin-Bhatt and Nagy, 1994; Nagy, Garcia, Durgunoglu and Hancin, 1993; Tréville, 1993).

In examining the word analysis skills of classroom learners of French, we would expect to find a within-program pattern of increasing scores at higher grade levels, but also some effect of the amount of exposure to French experienced in different programs. For example, when grade level is held constant, we would expect early immersion students to have an advantage over late immersion students, and the latter to perform better than core French students. Given the positive association between word analysis skills and reading comprehension, as well as the previously noted relationship between reading comprehension and vocabulary knowledge in general, we can also expect to find a relationship between students' skills in this area and their receptive knowledge of vocabulary in French.

3.1 Participants

A total of 246 students enrolled in three different French-as-a-second-language programs provided the sample for this study. All the students were attending schools in the same school board in southern Ontario. Three groups of students at grades 6, 8, and 10, respectively, were in an early immersion program that had begun in kindergarten. Following 100% immersion in French at the early primary level, these students' school curriculum was being delivered half in French and half in English by the grade 6 level, and by grade 10 the French portion of their curriculum consisted of one or two subjects in French in addition to French language arts. Two further groups of students were in a late immersion program at grades 8 and 10, respectively. This program involves 50% immersion in French in grades 7 and 8[4] following a regular forty-minute-per-day core French program starting in grade 4. Across the secondary school grades, the late immersion students' curriculum in French involves slightly fewer subject credits than the early immersion students (i.e., seven versus ten subjects taught in French). A sixth, and final, group of students was attending a core French program in grade 10 that had begun for most of them with 40 minutes per day in grade 4. This selection of participants was designed to permit comparison of vocabulary skills both within and across programs and grade levels. Each of the six groups of students participating in the study was drawn from at least two different classes designated by school board personnel as representative of the program concerned. In some cases, not all students in a class were included in the sample owing to complicating factors in their language background. For example, students attending core French who had been in an immersion program for one or more years were eliminated from the core French sample, and students in a late immersion class who had previously also been in early immersion were eliminated from the late immersion sample. Students who used French at home most or all of the time were also excluded from the study, but included in the sample were other students who had exposure to a language other than English or French at home.

3.2 Instruments

Two pencil-and-paper tests were developed for the study. The first is a French Vocabulary Skills Test, designed to probe several aspects of students' word analysis skills in French. The second is a French Vocabulary Recognition Test, providing a measure of vocabulary knowledge in French.

French Vocabulary Skills Test. This test has four parts, each with English instructions and with items simple in format designed to make the test accessible both to younger immersion students in grade 6 and to grade 10 core French students who have had less second language exposure than any of the immersion groups. Part 1 of the test investigates students' understanding of the meaning of a number of affixes in French. It contains multiple choice items of the following kind:

criminalité ____ D'une façon criminelle
criminellement ____ Étude des crimes

criminologie ____ Personne qui étudie les crimes
criminologue

The students' task here is to match three of the words on the left with their corresponding meanings. There are six such items in this part of the test, for a maximum score of 18 points. In order to answer correctly, the learners need only pay attention to the suffix (and in some cases also a prefix). Part 2 of the test assesses students' ability to provide other words in the same word family as a given word. Test items in Part 2 consist of a series of five pictures of trees where one branch is filled in with a derived stimulus word (e.g., *fortifier*). Students have to fill in other branches with three derivationally related words. Words that a student could use to fill in other branches of the *fortifier* tree, e.g., might consist of *fort, fortement, forteresse, coffre-fort.* The total score for this part of the test is 15, with one point given for each appropriate word produced up to a maximum of three points for each tree. Note that the student can pick out the embedded root of the stimulus as one of the words supplied (i.e., *fort* in this example). Part 3 of the test is concerned with the syntactic aspect of word analysis skills; only one of four related words provided as choices in each of 12 multiple choice items fits grammatically in the given sentence. In the following example, for instance, only *mugissement* is syntactically appropriate and thus the correct response:

Entends-tu le_____de cet animal?
mugissement
mugissant
mugit
mugir

The total score for Part 3 of the test is 12. Finally, Part 4 investigates students' skill in converting English words into their cognate forms in French in instances where reliable 'interlexical correspondence rules' exist for the suffixes involved (Tréville, 1993). Students are instructed to create French equivalents for rare English words that will resemble the English word in some way but look and sound French. For a given English word such as 'cataleptic', e.g., students should produce the cognate French *cataleptique.* To obtain the maximum 12 points on this part of the test, students have to correctly render the cognate suffixes in French, but a mistake in spelling of the root is disregarded. It is important to note that for many of the items in this test, students are not expected to be familiar with the words; to ensure that they do not become discouraged, they are reminded of this several times in the instructions. Knowing the words is not necessary for accurate performance on Parts 1, 3, and 4; in fact it is even counterindicated since the purpose of these test items is to find out what students can do with the information provided by suffixes and prefixes alone.

French Vocabulary Recognition Test. This test is a revised version of a more general vocabulary test used in earlier research with immersion and extended French students at the secondary school level (Harley, Howard and Roberge, 1996). The revisions are designed to make the test somewhat easier. Based on research originally carried out by Meara (1994), this self-report test consists of a list of 100 possible words in French, some of which (about 35%)

are not real words. The real words are selected from different frequency levels in French and include a representative number of cognates with English (about 25% of the real words). The students' task is to cross out any words on the list that they do not know well enough to say what they mean. Scoring is designed to correct for guessing (i.e., when students indicate that they know a pseudoword). Apart from differences in the words used in the test, two further features of this revised test distinguish it from Meara's original work: a) in order to discourage guessing and prevent students from giving up on the test, they are told in the instructions that some of the words are not real words; and b) in accordance with the school board's policy for French-as-a-second language instruction, nouns (and pseudonouns) in the list are accompanied by an appropriate article.

3.3 Procedures

With the help of board personnel, several schools were identified that offer one or more of the relevant French second language programs. Agreement to participate in the study was then obtained from school principals, teachers, parents, and the students themselves.

As a first step in the research, preliminary versions of the tests were piloted in two classes that did not participate in the main study: a grade 6 immersion class of 16 students and a grade 10 core French class of 24. A major purpose of the piloting was to find out whether the tests were appropriate for such students, namely for those who would be the youngest to be tested (grade 6 immersion students) and for those with the fewest accumulated hours of French instruction (grade 10 core French students). In order to field-test as many items as possible for the French Vocabulary Skills Test, two forms of this test, A and B, were administered with some shared items as well as items that were unique to each form. A preliminary version of the French Vocabulary Recognition Test was also given. Both classes were able to complete the tests without undue difficulty, and statistical analysis indicated equally good reliability (alphas of .77) for the two pilot versions of the vocabulary skills test. Since the reliability of Part 3 of Test A was low, version B was chosen as the basis for a single final version of the skills test, with the addition of one new item and some replacements from version A in those instances where easier items appeared to be needed. A few minor adjustments to test instructions were also made to maximize clarity. The other test administered in the pilot phase, the French Vocabulary Recognition Test, appeared to work well and was therefore left unchanged for the main study. The piloting also established the necessary time allotment for test administration: 35 minutes for the vocabulary skills test and just five minutes for the self-report vocabulary recognition test, including time for the tester to take the class orally through the instructions and examples of items in order to ensure full understanding of the requirements. Following the pilot phase and finalizing of the Vocabulary Skills Test, testing for the main study took place at the convenience of classroom teachers between late March and May, 1999.

3.4 Findings

Since the French Vocabulary Skills Test was newly developed for this study, it was important first of all to examine its reliability as a testing instrument for the range of students involved. An item analysis indicated satisfactory reliability for all four parts of the test, with alphas of

.82 for Part 1, .75 for Part 2, .73 for Part 3, and .70 for Part 4. As shown in Table 1, the four parts of the vocabulary skills test also correlate moderately strongly with one another, indicating that students who performed well on one aspect of word analysis skills were likely also to be doing well on the other aspects measured. In what follows, therefore, group results on this test are presented not only for the individual parts but for the test as a whole. Differences among the groups are assessed using analysis of variance and t-tests, with alpha set at .05. In light of the number of statistical comparisons made, the Bonferroni adjustment for multiple comparisons is used to guard against any potentially spurious findings of statistical significance.

Table 1: Pearson Correlations of Parts 1-4 of the Vocabulary Skills

	Vocabulary Skills		
Vocabulary Skills	Part 1	Part 2	Part 3
Part 2	.590**		
Part 3	.691**	.538**	
Part 4	.635**	.587**	.627**

Legend: ** p<=.01

Tables 2 to 5 present the mean scores of each group of students on the four parts of the vocabulary skills test, and Table 6 presents their total test scores. Based on the mean scores in Tables 2 to 5, seen in relation to the maximum possible scores on each part of the test, it appears that within each of the six program groups, the highest scores are consistently on Part 1 designed to assess understanding of French affixes, and the lowest scores are consistently on Part 4 which calls for the production of cognates in French. A general tendency is also evident in Tables 2 to 6 for the main increase on all parts of the test to occur in early immersion between grades 6 and 8, and for this increase to be closely matched by the rise in late immersion scores from grade 8 to 10. Also apparent from these tables is that on all four parts of the vocabulary skills test, the scores of both early and late immersion students by grade 10 are roughly twice as high as those of grade 10 core French students who have had much less exposure to French.

Table 2: Vocabulary Skills Test, Part 1 (Max.=18)

Program	Early Immersion			Late Immersion			Core French		
Grade Level	mean	s.d.	n	mean	s.d.	n	mean	s.d.	n
Grade 6	10.8	3.3	28						
Grade 8	13.6	2.8	33	9.4	3.4	66			
Grade 10	15.2	2.4	41	13.7	3.5	38	6.8	2.8	40

Table 3: Vocabulary Skills Test, Part 2 (Max.=15)

Program	Early Immersion			Late Immersion			Core French		
Grade Level	mean	s.d.	n	mean	s.d.	n	mean	s.d.	n
Grade 6	6.0	2.1	28						
Grade 8	8.2	1.7	32	6.0	2.2	66			
Grade 10	9.3	2.6	41	9.6	2.6	38	5.1	1.9	40

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Table 4: Vocabulary Skills Test, Part 3 (Max.=12)

Program	Early Immersion			Late Immersion			Core French		
Grade Level	mean	s.d.	n	mean	s.d.	n	mean	s.d.	n
Grade 6	6.0	2.5	28						
Grade 8	8.4	2.0	33	6.0	2.4	66			
Grade 10	9.2	1.5	41	8.1	2.2	38	4.3	1.6	40

Table 5: Vocabulary Skills Test, Part 4 (Max.=12)

Program	Early Immersion			Late Immersion			Core French		
Grade Level	mean	s.d.	n	mean	s.d.	n	mean	s.d.	n
Grade 6	3.5	2.7	28						
Grade 8	5.9	2.1	33	4.5	2.2	66			
Grade 10	7.3	2.4	41	6.9	2.4	38	3.3	1.9	40

Table 6: Vocabulary Skills Test, Total Score (Max.=57)

Program	Early Immersion			Late Immersion			Core French		
Grade Level	mean	s.d.	n	mean	s.d.	n	mean	s.d.	n
Grade 6	26.3	8.0	28						
Grade 8	36.2	6.3	32	25.8	8.0	66			
Grade 10	41.1	6.1	41	38.3	8.4	38	19.5	5.3	40

Within-program comparisons. Within both early and late immersion there are signs, as

expected, of progress across grades in vocabulary skills. Table 7 presents statistical comparisons of mean scores from grade to grade within each immersion program. It shows that in early immersion, the mean scores of the grade 8 students are significantly higher than those of the grade 6 students on all four parts of the test, but between grades 8 and 10 the differences in means, though they tend to favour the grade 10 students, are not statistically significant. Within the late immersion program, the grade 10 students' mean scores on the four parts of the test are significantly higher than those of the grade 8 students. On the vocabulary skills test as a whole, the same general pattern of findings within each program applies.

Table 7: Differences in Vocabulary Skills by Grade within Early Immersion (EI) and Late Immersion (LI) Programs

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI gr8 minus EI gr6			
Part 1	2.86	0.79	.005
Part 2	2.15	0.57	.003
Part 3	2.39	0.59	.000
Part 4	2.48	0.58	.000
Total	9.90	1.87	.000
EI gr10 minus EI gr8			
Part 1	1.64	0.72	.353
Part 2	1.13	0.52	.472
Part 3	0.80	0.42	1.000
Part 4	1.35	0.53	.171
Total	4.89	1.47	.064
LI gr10 minus LI gr8			
Part 1	4.31	0.63	.000
Part 2	3.63	0.45	.000
Part 3	2.12	0.47	.000
Part 4	2.44	0.46	.000
Total	12.49	1.68	.000

[1] Analysis of variance showed statistically significant differences over the three grades in Early Immersion for all parts of the vocabulary skills test ($p<=.001$).

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons

span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Within-grade comparisons. Comparisons across programs with grade level held constant provide one indication of the effects of different amounts of classroom exposure to French on the development of vocabulary skills. Table 8 shows that the mean scores of the grade 8 early immersion students on all parts of the vocabulary skills test and on the test as a whole are statistically significantly higher than those of the grade 8 late immersion students with less overall exposure to French. At grade 10, the mean scores of early immersion, late immersion, and core French students can all be compared. These comparisons presented in Table 9 show that grade 10 early and late immersion students' mean scores on the four parts of the test and the test as a whole are no longer significantly different from one another despite the greater prior exposure to French of the early immersion students. However, grade 10 core French students, with much less past exposure to French, score significantly lower than both grade 10 immersion groups.

Table 8: Program Differences in Vocabulary Skills at Grade 8: Early Immersion versus Late Immersion

	Difference of means (EI minus LI)	Std. error of difference	Adjusted sig.[1]
Part 1	4.23	0.66	.000
Part 2	2.19	0.48	.000
Part 3	2.44	0.46	.000
Part 4	1.46	0.48	.044
Total	10.34	1.48	.000

[1] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI)

Table 9: Program Differences in Vocabulary Skills at Grade 10: Early Immersion (EI) , Late Immersion (LI) and Core French (CF)

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI minus LI			

Part 1	1.56	0.70	.377
Part 2	-0.32	0.50	1.000
Part 3	1.11	0.47	.292
Part 4	0.37	0.51	1.000
Total	2.73	1.67	1.000
LI minus CF			
Part 1	6.88	0.70	.000
Part 2	4.56	0.50	.000
Part 3	3.83	0.48	.000
Part 4	3.62	0.51	.000
Total	18.89	1.60	.000

[1] Analysis of variance showed statistically significant differences over the three program groups for all parts of the vocabulary skills test ($p<=.001$).

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF)

Cross-program/cross-grade comparisons. The role of prior exposure to French in the development of the students' vocabulary skills can also be assessed by comparing groups across programs and grade levels. For example, when grade 10 core French students' scores and those of immersion students at lower grades are compared on each part of the vocabulary skills test and the test as a whole (see Tables 10 to 14), the core French students with considerably less overall exposure to French remain generally at a disadvantage, scoring on average significantly lower than both early and late immersion students in grade 8 on most comparisons and lower than the younger grade 6 early immersion students on Parts 1 and 3 as well as on total test scores (see Tables 10, 12 and 14). However, on Part 2 calling for production of words derivationally related to stimulus words in French and on Part 4 calling for production of French cognates, the grade 10 core French students' mean scores are not significantly different from those of the grade 6 early immersion or grade 8 late immersion students (see Tables 11 and 13).

Additional evidence that amount of exposure to French is not the only factor influencing test scores is provided by cross-grade comparisons between early and late immersion group means on the vocabulary skills test. These comparisons, also displayed in Tables 10 to 14, show no significant advantage for early immersion students in grade 8 over late immersion students in grade 10, or for younger early immersion students in grade 6 over late immersion students in grade 8, although both early immersion groups have had more prior exposure to French than the older late immersion groups. At grade 10, in fact, the older grade 10 late immersion

students score significantly higher than the grade 6 early immersion students on all four parts of the test.

Table 10: Cross Program/Grade Differences in Vocabulary Skills, Part 1

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus CF(gr10)	6.81	0.72	.000
EI(gr6) minus CF(gr10)	3.95	0.76	.000
LI(gr8) minus CF(gr10)	2.58	0.62	.000
EI(gr8) minus LI(gr10)	-0.78	0.73	1.000
EI(gr6) minus LI(gr8)	1.37	0.69	.736
EI(gr6) minus LI(gr10)	-2.93	0.77	.002

[1] Analysis of variance showed statistically significant differences over program/grade groups (including within program and across grade) for all parts of the vocabulary skills test (p<=.001).

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Table 11: Cross Program/Grade Differences in Vocabulary Skills, Part 2

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus CF(gr10)	3.11	0.52	.000
EI(gr6) minus CF(gr10)	0.96	0.55	1.000
LI(gr8) minus CF(gr10)	0.93	0.44	.570
EI(gr8) minus LI(gr10)	-1.44	0.53	.105
EI(gr6) minus LI(gr8)	0.04	0.50	1.000
EI(gr6) minus LI(gr10)	-3.60	0.55	.000

[1] Analysis of variance showed statistically significant differences over program/ grade groups (including within program and across grade) for all parts of the vocabulary skills test (p<=.001).

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Table 12: Cross Program/Grade Differences in Vocabulary Skills, Part 3

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus CF(gr10)	4.15	0.43	.000
EI(gr6) minus CF(gr10)	1.76	0.54	.012
EI(gr8) minus LI(gr10)	0.32	0.50	1.00
EI(gr6) minus LI(gr8)	0.05	0.57	1.000
EI(gr6) minus LI(gr10)	-2.07	0.60	.002
LI(gr8) minus CF(gr10)	1.71	0.40	.001

[1] Analysis of variance showed statistically significant differences over program/ grade groups (including within program and across grade) for all parts of the vocabulary skills test (p<=.001).

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Table 13: Cross Program/Grade Differences in Vocabulary Skills, Part 4

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus CF(gr10)	2.64	0.53	.000
EI(gr6) minus CF(gr10)	0.16	0.56	1.000
LI(gr8) minus CF(gr10)	1.18	0.46	.147
EI(gr8) minus LI(gr10)	-0.98	0.54	1.000
EI(gr6) minus LI(gr8)	-1.02	0.51	.711
EI(gr6) minus LI(gr10)	-3.46	0.57	.000

[1] Analysis of variance showed statistically significant differences over program/ grade groups (including within program and across grade) for all parts of the vocabulary skills test (p<=.001).

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Table 14: Cross Program/Grade Differences in Vocabulary Skills Total Mean Scores

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus CF(gr10)	16.74	1.39	.000
EI(gr6) minus CF(gr10)	6.84	1.72	.002
LI(gr8) minus CF(gr10)	6.40	1.29	.000
EI(gr8) minus LI(gr10)	-2.15	1.76	1.000
EI(gr6) minus LI(gr8)	0.44	1.80	1.000
EI(gr6) minus LI(gr10)	-12.06	2.03	.000

[1] Analysis of variance showed statistically significant differences over program/ grade groups (including within program and across grade) for the vocabulary skills test total scores (p<=.001).

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

[3] Not assuming equal variances. Note: Results of significance testing are very similar whether or not equal variances are assumed.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Correlational analysis. A further approach to examining the relationship between students' classroom exposure to French and their word analysis skills in French is to rank-order the six groups of students in terms of their exposure to French and to correlate these ranks with their scores on the various parts of the vocabulary skills test. As can be seen in Table 15, scores on each part of this test as well as the test as a whole correlate positively with the rank order of exposure, indicating a general tendency for those with more exposure to French to have higher test scores. With respect to vocabulary skills, the highest correlation with exposure (.619, p<.01) occurs for Part 1 of the vocabulary skills test and the lowest (.395, p<.01) with Part 4.

Table 15: Pearson Correlations of Vocabulary Skills and Vocabulary Recognition Measures with Exposure to Instruction in French [1]

Vocabulary Skills	Exposure
Part 1	.619**
Part 2	.490**

Part 3	.554**
Part 4	.395**
Total score	.612**
Vocabulary recognition	.807**

[1] Exposure is represented by the reverse rank order of a student's program: EI gr10=6, EI gr 8=5, EI gr6=4, LI gr10=3, LI gr8=2, CF gr10=1. The rank order is reversed so that associations between higher exposure and higher test scores will be indicated by positive correlations.

Legend: ** p<=.01

Vocabulary knowledge.Turning now to the French Vocabulary Recognition Test that the six groups of students also completed, the group means on this test are shown in Table 16. As reflected in a high correlation of .807 (p<.01) between rank order of exposure and vocabulary recognition scores (see Table 15), the table of means indicates a general pattern within each immersion program of increasing scores at higher grades. Table 17 shows that these within-program differences across grades are in each case statistically significant. When grade level is held constant, Table 18 also shows that the early immersion students with more exposure to French perform better on the vocabulary recognition test than their peers in late immersion in grades 8 and 10, and that the grade 10 late immersion students in turn perform better than core French students at the same grade level. Across programs and grades (see Table 19) we find the early immersion groups in grades 6 and 8, and the late immersion students in grade 8, all performing significantly better on this test than the core French students in grade 10. Grade 6 early immersion students also demonstrate significantly higher mean scores than grade 8 late immersion students. By grade 8, however, early immersion students' scores are not superior to those of late immersion students who are two years senior to them in grade 10. And as was the case for the vocabulary skills test, the vocabulary recognition scores of the grade 10 late immersion students are significantly higher than those of the younger grade 6 early immersion students. Finally, concerning the relationship between French vocabulary knowledge and word analysis skills, Table 20 shows that scores on the two tests are strongly correlated.

Table 16: Vocabulary Recognition Test (Max.=1.0)

Program	Early Immersion			Late Immersion			Core French		
Grade Level	mean	s.d.	n	mean	s.d.	n	mean	s.d.	n
Grade 6	.44	.12	28						
Grade 8	.64	.08	33	.34	.11	66			
Grade 10	.74	.128	41	.61	.11	38	.19	.07	40

Table 17: Differences in Vocabulary Recognition Mean Scores by Grade within Early Immersion (EI) and Late Immersion (LI) Programs

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus EI(gr6)	.20	.02	.000
EI(gr10) minus EI(gr8)	.11	.02	.000
LI(gr10) minus LI(gr8)	27	.02	.000

[1] Analysis of variance showed statistically significant differences over the three grades in Early Immersion (p<=.001). Note: differences of means shown here may depart slightly from a subtraction of group mean shown in earlier tables due to rounding.

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Table 18: Differences in Vocabulary Recognition Mean Scores Across Programs within Grades

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus LI(gr8)	.29	.02	.000
EI(gr10) minus LI(gr10)	.13	.02	.000
LI(gr10) minus CF(gr10)	.43	.02	.000

[1] Analysis of variance showed statistically significant differences over program/ grade groups (including within program and across grade) for the vocabulary recognition test (p<=.001). Note: differences of means shown here may depart slightly from a subtraction of group mean shown in earlier tables due to rounding.

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Table 19: Cross Program/Grade Differences in Vocabulary Recognition Mean Scores

	Difference of means[1]	Std. error of difference	Adjusted sig.[2]
EI(gr8) minus CF(gr10)	.45	.02	.000
EI(gr6) minus CF(gr10)	.25	.03	.000
LI(gr8) minus CF(gr10)	.16	.02	.000
EI(gr8) minus LI(gr10)	.03	.02	1.000
EI(gr6) minus LI(gr8)	.10	.03	.001
EI(gr6) minus LI(gr10)	-.17	.03	.000

[1] Analysis of variance showed statistically significant differences over program/ grade groups (including within program and across grade) for the vocabulary recognition test (p<=.001). Note: differences of means shown here may depart slightly from a subtraction of group mean shown in earlier tables due to rounding.

[2] Bonferroni adjustment for multiple comparisons based on t-tests for each subtest. Relevant comparisons span several tables shown here.

Legend: Early Immersion (EI) , Late Immersion (LI), Core French (CF), Grade 6 (gr6), Grade 8 (gr8), Grade 10 (gr10)

Table 20: Pearson Correlations of Vocabulary Skills and Vocabulary Recognition Measures

Vocabulary Skills	Vocabulary Recognition
Part 1	.751**
Part 2	.639**
Part 3	.699**
Part 4	.588**
Total	.888**

Legend: ** p<=.01

4. Discussion

The findings of this study indicate that amount of classroom exposure to the second language certainly has a bearing on the development of word analysis skills in that language, but that the relationship is not straightforward. In general, we find the grade 10 core French students lagging behind the immersion groups in their French vocabulary skills, as would be expected given the much greater prior exposure of the immersion students to the second language. The fact that the grade 10 core French students are nonetheless at par with grade 6 immersion students on Parts 2 and 4 of the vocabulary skills test (i.e., on the parts measuring the ability

to produce words derivationally related to a given stimulus and the ability to apply appropriate interlexical conversion rules in producing cognate words in French) is an important indication that relative maturity counts in the core French students' favour with respect to such skills, overriding to some extent the disadvantage of much less overall exposure. An advantage for relative cognitive maturity is also indicated in a number of the comparisons between early and late immersion students. Despite their greater overall exposure to French, e.g., the grade 6 early immersion students are outperformed by the grade 10 late immersion students on all parts of the vocabulary skills test. Moreover, by grade 10 the late immersion students appear to have substantially caught up with the grade 10 early immersion group, indicating more rapid progress in word analysis skills for the later learners even though their intensive exposure to French began much more recently in grade 7. Earlier research had led to the conclusion that their later start for immersion may in general promote a more analytic approach to second language learning than among early immersion students who tend to rely more on memory (Harley and Hart, 1997). Perhaps the finding in the present study that grade 10 early immersion students demonstrate recognition knowledge of a larger number of French words than grade 10 late immersion students on the vocabulary recognition test, but not greater word analysis skills on the vocabulary skills test, is a further indication of a less analytic, more memory-oriented approach to second language learning in early immersion.

The findings overriding the anticipated effect of amount of exposure to the second language on French vocabulary skills are also in line with the argument based on earlier first and second language research that the development of morphological awareness is positively associated with the maturity of the learner (Hancin-Bhatt and Nagy, 1994; Nagy, Diakidoy and Anderson, 1993; Tyler and Nagy, 1989, 1990). Given the relationship of this type of awareness to academic progress in the second language, we need to ask whether more focused instruction designed to enhance word analysis skills would be useful, and if so, when it should be introduced.

By grade 8 in early immersion and grade 10 in late immersion, students are achieving average scores equivalent to 75% of the maximum on Part 1 of the vocabulary skills test. The skill assessed in this part of the test (understanding of the meaning of various affixes) no doubt serves them well in their reading of texts in French. The fact, however, that early immersion students' progress in word analysis skills appears to slow down between grades 8 and 10, without reaching a ceiling on any part of vocabulary skills test, and allowing late immersion students to catch up to a large extent, suggests that there may be a useful role for focused instruction on all aspects of vocabulary skills around the grade 8 level (see also Lapkin and Swain, 1996). In particular, the value of an emphasis on morphological correspondences between English and French needs to be assessed. As shown in Tables 2 to 5, Part 4 of the French Vocabulary Skills Test assessing students' ability to make use of systematic relationships between English and French suffixes produced the lowest scores in each program group relative to scores on other parts of the test. Even the highest mean score of 7.3 out of 12 achieved by grade 10 early immersion students suggests weakness in this area. This is perhaps surprising in view of earlier research results indicating that cognate relationships are an aid to second language performance (Ard and Homburg, 1983; Hancin-Bhatt and Nagy, 1994; Meara, Lightbown and Halter, 1994; Nagy, Garcia, Durgunoglu and Hancin, 1993). On

one vocabulary recognition test similar to that used in the present study, Meara, Lightbown, and Halter (1994), for example, found that the inclusion of an unusually high proportion of French-English cognates on a test of English improved the scores of French-speaking learners.

In a detailed analysis of the core French students' performance on the French Vocabulary Recognition Test used in the present study, Jean (1999) also found that the (mostly monomorphemic) words cognate with English were more readily recognized than non-cognate words. What the results on Part 4 of the vocabulary skills test in this study seem to indicate is that awareness of cognate relationships between suffixes in the first and second language is a more sophisticated aspect of second language knowledge than recognition of words with cognate roots (cf. Tyler and Nagy, 1989) and that it cannot be taken for granted. Raising awareness of these relationships between English and French suffixes in classroom instruction could therefore be helpful in promoting both comprehension and production of French, especially of written French where similarities in spelling make such correspondences more transparent. Given that such cognate suffixes in English tend to be associated with more academic words that are more familiar to grade 8 and 10 students than to grade 6 students, the age at which such awareness instruction is introduced will need to take account of students' maturity level with respect to vocabulary knowledge in English. It suggests, for instance, that beginning such instruction at grade 8 may be more appropriate than at grade 6 in the immersion context. In light of Tréville's (1993) research showing that instruction in morphological correspondences between cognates in English and French was useful for beginning adult learners, it is likely that core French students at grades 8 to 10 would also have sufficient knowledge of French to benefit from such instruction.

In sum, the findings of this study lead to the conclusion that the merits of introducing focused instruction on word analysis skills in French should be investigated in all three types of programs sampled here. As Jean (1999, p. 76) points out, this instruction would need to be meaningfully integrated with substantive content rather than restricted to isolated exercises if students are to grasp the value of such skills for reading comprehension and vocabulary acquisition and use.

Notes

1. In an early total immersion program, students are first instructed in French for half a day in kindergarten followed by a full day of immersion in French in the early elementary grades. English instruction is gradually introduced so that by grade 6 the students are receiving half their curriculum in French and half in English. Back.

2. These late immersion students had begun their immersion program in grade 7 following a core French program that had begun in grade 1. In grades 7 and 8, 80% of the school day was in French, and in grade 9 the proportion of the day in French was about 50%. Back.

3. In this program, students had since grade 7 been taking one subject in French as well as French language arts each year, following a regular core French program that had begun in grade 4. Back.

4. In the school board concerned, this program was not called late immersion, but 'extended French'. The label 'late immersion' is preferred here to conform to a definition of immersion as involving at least 50% of curriculum in the second language for at least one year of the program (see Johnson and Swain, 1997). Back.

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