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*Report of Current Research on the Effects of Second
Language Learning
on First Language Literacy Skills*

by: Monique Bournot-Trites, Ph.D. and Ulrike Tellowitz, M.A.

A Report Commissioned by the Atlantic Provinces Educational Foundation

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EXECUTIVE SUMMARY

Report of Current Research on the Effects of Second Language Learning on First Language Literacy Skills

By Monique Bournot-Trites, Ph.D. and Ulrike Tallowitz, M.A.

Introduction

The relationship between second language learning and cognitive ability continues to divide opinions. As French immersion is increasingly popular in Canada and other countries, parents, researchers and professionals are asking whether second language learning enhances cognitive development and what are the effects of second language learning on first language literacy skills. In this paper, we present and discuss the results of recent research on the effects of second language learning on first language skills as well as on achievement in non-language domains.

Various contexts of second language learning

Research on the effects of second language learning has been carried out in two main educational contexts: in submersion and transitional bilingual programmes, as for example in the United States, and in immersion programmes, as in Canada. We will concentrate here on the Canadian context. Immersion programmes and Core French programmes in Canada are bilingual programmes where the first language of the students is generally the majority language in the community. In immersion, all or some of the subjects are taught in the second language. In all cases, the L1 (English) is further developed at school, in the family and in other situations outside the school.

Cummins' hypotheses

Most research on the relationship between L1 and L2 learning makes reference to two hypotheses developed by Cummins. **Cummins (1976)** explains his "threshold hypothesis" as follows: The level of L1 and L2 competence of a student determines if he or she will experience cognitive deficits or benefits from schooling in the second language. **Cummins (1979)** defines the "developmental interdependence hypothesis," saying that when the use of the L1 is promoted by the child's linguistic environment outside the school, then a high level of L2 achievement is also likely to occur at no cost of L1 competence. L1 and L2 literacy skills are seen to be interdependent, i.e., they are manifestations of a "common underlying proficiency." High levels of L1 proficiency help L2 acquisition, and conversely, high proficiency in L2 has a positive effect on L1 development.

Effects of learning a second language on first language skills

The question of how second language learning can influence first language literacy skills has been addressed especially in studies on immersion education; a few examples of which are cited here.

Lambert and Tucker (1972) investigated an early French immersion programme in

Montreal (St. Lambert experiment). The goal was to provide English-speaking children with functional competence in both written and spoken French, while at the same time promoting and maintaining normal levels of English development. In grade 1 the immersion students scored significantly lower in English literacy skills. However, this lag had disappeared by the end of grade 2 when English instruction had set in. In oral English skills the immersion students did not fall behind at all at any level.

Genesee and Stanley (1976) found no significant differences in English composition between immersion students and English programme students. **Genesee (1979)** reports high correlations between L1 and L2 reading skills, and concludes that this proficiency is most likely transferred from one language to the other.

Swain and Lapkin (1982) carried out immersion studies in Toronto and Ottawa. The results of their longitudinal study showed that whereas the immersion students seemed to have lower literacy skills than the unilingual students in the first two years, these differences disappeared as soon as English Language Arts were officially introduced into the curriculum in grade 3. In grade 5, the immersion students even outperformed the English-only programme students in some aspects of English language skills. These results were confirmed by **Harley, Hart, and Lapkin (1986)**.

In a more recent study, **Reeder, Buntain, and Takakuwa (1999)** examined the effect of increased use of French instruction in an early immersion programme in Vancouver, and found that the higher amount of instruction in French did not lead to significant differences in English writing skills.

In a report to the Ontario Education Quality and Accountability Office (EQAO), **Turnbull, Hart and Lapkin (2000)** conducted an evaluation of French immersion education with respect to its effect on English literacy and mathematics. The results showed that grade 3 immersion students performed at a comparable level with English programme students in both reading and writing. By grade 6, immersion students clearly outperformed the regular programme students in all skill areas.

In other parts of the world, the relationship of students' L2 and L1 have been investigated as well. **Verhoeven (1994)** observed Turkish children living in the Netherlands and found that reading abilities showed a strong positive transfer from L1 to L2. In Hong Kong, **Marsh et al. (2000)** compared students who were instructed in Chinese with students who received instruction in English, and found that the achievement in the first language (Chinese) and second language (English) were enhanced through instruction in English. The intensive instruction in a second language did not hinder in any way the development of the first language; on the contrary, it promoted its development.

In conclusion, one can say that the studies generally confirm Cummins' hypotheses. Students in immersion and enrichment programmes reach a "functional bilinguality" in their second language, with no loss in their L1. In fact, L1 competencies are usually enriched when compared to control groups who have been schooled in English only.

Effects of learning a second language on non-language domains

Swain and Lapkin (1982) used standardised tests in mathematics and science, and compared the performance of immersion students with that of students in English-only

programmes. Early immersion students consistently showed results comparable to the unilingual students.

One study indicates negative effects of instruction in English (second language) on mathematics achievement and other non-language subjects (History, Geography, and Science is the Hong Kong study by **Marsh et al. (2000)** mentioned. The authors argue that the programme “was a failure in terms of providing academic benefits for Hong Kong students, as well as supporting predictions based on previous immersion research and Cummins's theory” (p. 339). However, the results of this study, even though significant and important, could not be expected to yield results generalisable to the Canadian context, which is quite different. First, this study concerned late immersion starting at the high school level where the threshold of L2 competency needed to achieve benefits from immersion might be much higher than the threshold needed in early immersion (Cummins, 1979). Second, the language achievement level of immersion students relative to that of other students was measured with only written tests and there was no indication of the students' oral fluency (listening or speaking). Third, as the programme was near-universal, with little ESL ‘bridging’ instruction available to students entering from Chinese language programmes, it is possible that both low initial student proficiency in English and lack of L2 support compromised students’ content learning. Finally, the authors indicate that the teachers of nonlanguage subjects may not all have been highly fluent in English. None of the Core French of immersion programmes in Canada have such negative characteristics. Clearly this study does not change the fact that learning a second language in the Canadian context has positive consequences.

Bournot-Trites and Reeder (2001) addressed parents’ concerns about whether their children’s achievement in mathematics would not suffer when taught in French instead of in English. When assessed on their math achievement with English tests, the group with high intensity French obtained higher results than the comparison groups. **Turnbull et al. (2000)** and **de Courcy & Burston (2000)** in Australia showed very similar findings.

Conclusion

The effect of learning a second language (e.g. French) on first language skills has been virtually positive in all studies. Although most studies on the effect of second language learning on first language literacy have been done in the area of French immersion education, one can also apply the findings to Core French and intensive French programmes.

The loss of instructional time in English in favour of the second language has never been shown to have negative effects on the achievement of the first language. Cummins' interdependence hypothesis, which maintains that language skills are being transferred from one language to the other, can be assumed to be true for the core French situation as well. One can confidently assume that cognitive abilities acquired in the learning of one language can be put to use in the acquisition and proficiency of the other language. In many studies first language skills were shown to be enhanced, even if instruction time in L1 was reduced in favour of L2 instruction.

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Introduction

The relationship between second language learning and cognitive ability continues to divide opinions. Some researchers argue that second language learning enhances cognitive ability (the ability to think or general mental abilities) others that second language learning hinders it (for a review see Darcy, 1953 and Trites, 1986). As French immersion is increasingly popular in Canada and other countries, parents, researchers and professionals are again asking whether second language learning enhances cognitive development (the development of the brain and of mental functions). In particular they want to know what are the effects of second language learning on first language literacy skills. The purpose of this literature review is to present the current research on this question. First, we will describe different contexts of second language learning, then we will present Cummins' threshold and interdependence hypotheses, which relate directly to the question. Thirdly, we will present and discuss the results of recent research on the effect of second language on first language skills. Finally, we will also discuss research pertaining to supplementary effects, such as brain development and achievement in non-language domains, resulting from learning to speak, read, and write in a second language. In this report, we will use the terms second language learning and bilingualism interchangeably. Second language learning eventually results in a certain level of

bilingualism: being proficient in more than one language. Of course, there is an infinite range of proficiency levels as there is an infinite range of levels and types of bilingualism.

Various contexts of second language learning / bilingual education

The effects of second language learning on first language literacy skills cannot be discussed independently of the context of learning a second language. The social and political context of second language learning is an important variable in the study of its effects on first language skills. Therefore, it is important to describe the various contexts in which studies are conducted and link their results to these contexts. Two main contexts of second language learning can be found: submersion and transitional bilingual programmes as for example in the United States, and French immersion programmes or Core French as in Canada. These programmes lead to subtractive and additive bilingualism respectively. Both concepts will be explained in the following paragraphs.

Subtractive bilingualism: Submersion bilingual programmes in the United States

The terms “subtractive” and “additive” bilingualism were coined by Lambert (1964). The important factor dividing the two types of bilingualism is social in nature. Subtractive bilingualism develops in the case of minority children who are forced to assimilate quickly into the mainstream culture, Mexican children in the USA for example. These children are schooled from the beginning in their new second language (English). Their first language (Spanish) is slowly replaced. Their bilinguality is characterised by a growing disuse of the ethnic home language and its cultural accompaniments; the first language (L1) is being “subtracted out” (Lambert, 1992, p. 213). When they start

schooling in the second language (L2), their L1 system has not been fully developed yet, they do not develop it further outside the family, and this often leads to a deficiency in both languages, “semi-lingualism” as Skutnabb-Kangas and Toukomaa (1976) called it.

In order to remedy this situation, the question of bilingual education has been an urgent political issue in the United States. Since submersion seems to have such negative effects on the development of minority children, by eliminating their first language, weakening their cultural identity and putting them at risk in academic achievement, so-called “transitional” programmes have been introduced. In these programmes, instruction in reading and writing is carried out in the first language of the children during the first school years. At the same time, they receive intensive instruction in the English language (L2). The programmes thus provide a time of transition between schooling in the first language and the time when L2 has been learned to a sufficient degree in order to use it as the language of instruction. They try to foster self-confidence in immigrant children as well as a positive attitude towards their own culture.

Willig (1985) compared submersion and transitional bilingual programmes in the United States and found that students who were taught in their first language while receiving intensive instruction in English performed better in school than students taught only in L2. This was true for language subjects (L1 and English) as well as for social sciences. The students in the transitional programmes also had more positive attitudes toward self and school, a factor that helped their scholastic success. These findings were supported by other research. Cummins (1996) concluded “that strong promotion of minority students’ L1 throughout elementary school contributes significantly to academic success” (p. 121). But even these transitional programmes lead to monolinguality in

English by the end of elementary school, since they are conceptualised only as a pedagogical support, not meant to foster the use of the first language throughout the school career. Despite the efforts made, transitional programmes still lead to subtractive bilingualism.

Additive bilingualism: Immersion programmes in Canada

The situation is different in bilingual programmes where the first language is the majority language. This is the case with English speaking students entering a French immersion or a core French programme in Canada. The second language (French) is introduced either in form of core French with approximately 30 minutes a day of French language instruction, or as an immersion programme. There is “early immersion” (starting in kindergarten or grade 1), “mid-immersion” (starting in grade 4) or “late immersion” (starting in grade 6 or 7). In immersion, all or some of the subjects are taught in the second language. For example, mathematics or science are taught in French. Programmes in Canada can be identified as either partial (only a few subjects in L2, usually about 50%) or total immersion (all instruction is in L2). Finally, there are “enriched second language programmes” where only one subject and language arts are taught in the second language. Usually, all the subjects are taught in French from kindergarten to grade 3. Starting in grade 4, 50% of the subjects are taught in French and 50% in English. However, variations of this model are found throughout Canada. In all these cases, the L1 (English) is further developed at school, in the family and other situations outside the school. The resulting type of bilingualism is called “additive”

bilingualism (Lambert, 1964; 1975; 1990) because the L2 is an addition to the L1 competence, with no loss of L1 knowledge. Both languages have social value and respect especially because of the two languages being official in Canada; in some cases, the first language has a higher status than the second language. Under these circumstances, schooling in the second language shows positive effects on general cognitive abilities, in particular on first language literacy skills (English). These findings are discussed in more detail below.

The difference between the two types of situational contexts, submersion bilingual education or immersion education, which in turn either lead to subtractive or additive bilingualism, is important because it leads to different results in studies on the effect of second language learning. We will come back to these concepts when describing such studies. Cummins, a well-known scholar in second language learning, explains these differential results with two hypotheses, the threshold hypothesis and the interdependence hypothesis. We will first describe these hypotheses because research about the effects of second language learning on first language skills and other domains often use Cummins' hypotheses to explain their results.

Cummins' hypotheses in relation to the effects of second language learning

Cummins' threshold hypothesis

Cummins compared the positive effects of second language learning in immersion situations and the negative effects in submersion situations and tried to account for the

seemingly contradictory results of both groups. He looked at the linguistic, social and school programme factors and postulated his “threshold hypothesis”. This hypothesis states that the level of L1 competence already reached by a student determines if he or she will experience cognitive¹ deficits or benefits from schooling in the second language (Cummins, 1976; 1978a). This means that there has to be a certain “threshold” in first language competence before the benefits of studying a second language can develop. This threshold level has usually not been reached in the case of minority students who start schooling in the second language while their L1 is not fully developed. It is not a problem for the child speaking the language of the majority.

In 1979, Cummins developed his threshold hypothesis further, and claimed that there is a threshold for L2 as well, which must be attained in order to “allow the potentially beneficial aspects of second language learning to influence a student’s cognitive and academic functioning” (Cummins, 1979, p. 222). He differentiates between two thresholds. The attainment of a lower level of bilingual competence is thought to be sufficient to avoid any negative cognitive effects, effects on intelligence for example. This lower level is defined as the level where the student can follow instructions in L2 and participate in basic social communication. The attainment of a second, higher, level of bilingual competence is hypothesised to lead to accelerated cognitive growth (p. 230). Cummins cites as support of this hypothesis a study by Barik and Swain (1976) who report that high French achievers in immersion programmes showed a significant growth in IQ scores, as compared to low French achievers whose IQ remained the same over a three-year period (p. 231).

¹ cognitive = related to intelligence; functions of the brain

Cummins also reports on comparisons between total and *partial* immersion programmes in order to support his threshold hypothesis. Students in total immersion programmes have a more intense exposure to French and attain a level of functional competence faster than students in partial immersion. Swain (1978) shows that they also perform at a significantly higher level in English as compared to regular programme control groups. No such trends were seen for the partial immersion group. Cummins (1979, p. 232) concludes that the higher level of French made it possible for the total immersion students to enhance their academic skills in the first language as well.

Cummins' developmental interdependence hypothesis

Cummins then combines his concept of the threshold hypothesis with his “developmental interdependence hypothesis.” This hypothesis is relevant especially for immersion contexts. Cummins explains development of L2 competence as a function of the type of competence developed in L1 at the time when intensive exposure to L2 begins (Cummins, 1979, p. 222). When the usage of language functions, vocabulary and concepts of the L1 is promoted by the child’s linguistic environment outside the school, then a high level of L2 achievement is also likely to occur, at no cost of L1 competence. Conversely, when the L1 is not sufficiently developed at the start of the bilingual education, this will lead to low levels of L2. In short, the hypothesis proposes that there is “an interaction between the language of instruction and the type of competence a child has developed in his L1 prior to school” (p. 233). In 1984, Cummins described the interdependence hypothesis as follows:

“To the extent that instruction in Lx is effective in promoting proficiency in Lx, transfer of this proficiency to Ly will occur provided there is adequate exposure to Ly (either in school or environment) and adequate motivation to learn Ly.”² (Cummins, 1984, p. 41).

Research evidence of the influence of L1 abilities on L2 achievement can be found, for example, in Skutnabb-Tangas and Toukoma (1976) who report that L1 and L2 reading scores are very highly correlated. Cummins explains this result by saying that the ability to extract meaning from a text can be transferred easily from one language to another. These findings explained the success of immersion programmes since here the children usually enter school with a good foundation in their L1 (the language that is spoken in the community, on TV, radio, etc.), and this language is further developed in the home and in school. With this essential basis, they are better equipped to follow L2 instructions, and transfer their conceptual vocabulary and grammatical knowledge to the second language. Children in these programmes bring a strong linguistic basis to the programme. The usually high language ability of children who attend immersion programmes and the intensive instruction in the second language in these programmes interact positively to create high proficiency levels in both L1 and L2.

Cummins draws the conclusion that L1 and L2 literacy skills are interdependent, i.e., they are manifestations of a “common underlying proficiency” (Cummins, 1983, p. 116). High levels of L1 proficiency help L2 acquisition, and inversely, high proficiency in L2 has a positive effect on L1 development. This is shown in the fact that L1 development does not suffer from amount of instructional time dedicated to L2 instruction (and taken away from L1 instruction).

² Can be read with English for Lx and French for Ly, and vice versa

Effects of learning a second language on first language skills in context

There has been a great amount of research about the influence of the first language on the second (see for example Harley, Cummins, Swain, & Allen, 1990), with the general result that the mother tongue is indeed a significant factor in second language development (p. 23). But what about the influence that second language learning has on first language literacy skills? This question has been addressed especially in studies on immersion education.

Critics of immersion programmes at the time of their first conception had predicted that the students' L1 abilities as well as their overall academic development would suffer as a result of instruction of content subjects in French (Macnamara, 1966). But the results of a decade of empirical research, carried out by the Bilingual Education Project at the Ontario Institute for Studies in Education, showed no evidence of a lag in development of English proficiency in early immersion programmes (Swain & Lapkin, 1982). Although immersion students lag behind their monolingual peers in some aspects of English literacy skills, these differences disappear when instruction in English is introduced into the curriculum (anywhere from grade 2 to grade 4). Studies show that the bilingual students often even outperform the unilinguals (Cummins, 1980). This is true especially for English grammatical usage, punctuation, and vocabulary (Swain & Lapkin, 1982). The reduced amount of instructional time in English does not seem to have a negative effect on English literacy skills. In the following, we will describe the main studies done on this question since the beginning of the immersion programmes in Canada until today.

The general results are invariably positive.

Lambert and Tucker (1972) investigated an early French immersion programme in Montreal. A concerned group of English-speaking parents in the suburban community of St. Lambert, outside of Montreal, had started the first French immersion programme in 1965. The goal of the so-called St. Lambert experiment was to provide English-speaking children with functional competence in both written and spoken French, while at the same time promoting and maintaining normal levels of English development. All instruction was in French during kindergarten and grade 1. English language arts instruction was introduced in grade 2. Lambert and Tucker compared an immersion student group and an English control group after grade 1, 2, 3, and 4. Before the English instruction began, i.e., in grade 1, the immersion students scored significantly lower in English literacy skills, such as reading comprehension, spelling, and written vocabulary (Lambert & Tucker, 1972, p. 43). However, this lag was made up by the end of grade 2 (p. 103), with the exception of spelling, which caught up by grade 4.

In oral English skills, such as listening comprehension, oral production or oral vocabulary skills, the immersion students did not fall behind at all (Lambert & Tucker, 1972, p. 43). Lambert and Tucker examined the speaking skills of grade 1 and grade 2 students by asking them to create a story based on a comic strip. The stories were tape-recorded and analysed for number of adjectives, nouns, verbs and grammatical errors. The stories of the immersion students were equivalent to those of the English students in all these aspects. Furthermore, their listening comprehension was equivalent to the English control group. They had to listen to a short story and answer multiple-choice questions. These findings are not surprising as the immersion students used their first language,

English, outside of school and developed oral skills there.

Lambert and Tucker explained the positive results for the immersion group by their early development of a linguistic “detective” capacity (p. 208). They suggested that the French immersion experience encourages students to engage in a kind of “contrastive linguistics” by comparing similarities and differences in both languages. This has positive effects on their skills in English, and helps them both “to build vocabulary and to comprehend complex linguistic functions” (p. 208). They also introduced the idea of a “transfer of skills” from one language to the other, or the development of some higher order cognitive skill, which is developed in one language, and can be used for the proficiency in the other language. This idea is comparable to Cummins' interdependence hypothesis explained above.

As far as specific literacy skills are concerned, Genesee and Stanley (1976) examined the English writing skills of grade 4 and 6 early immersion students in Montreal, comparing them to an English programme control group. The students had to write a composition based on one of three topics provided by the testers. Experienced grade 4 and 6 teachers who did not know about the students' participating in a study then evaluated the compositions written by the students; they also did not know which programme the students belonged to. The teachers graded each text according to spelling, vocabulary, punctuation, sentence accuracy, sentence complexity and variety, organization and originality. Except for spelling and originality in grade 4, there were no significant differences between the immersion students and the English programme students (reported in Genesee, 1987, p. 36). Swain (1975) corroborates these findings in a study on the writing skills of immersion students in Ontario.

There seems to be gains in general communicative ability as well. Genesee, Tucker and Lambert (1975) carried out a study in which they found out that early total immersion students and partial immersion students performed better on an interpersonal communication task than students in regular English schools. When asked to describe how to play a game to a child who could not see the game because he/she was blindfolded, the immersion students were better able to take the listener's handicap into account. They described the materials that made up the game before describing the rules of the game. Genesee (1987) attributes the sensitivity demonstrated by the immersion students to their greater awareness of the necessities of interpersonal communication (p. 35).

In a 1979 article reviewing findings about the reading skills in first and second language, Genesee reports high correlations between L1 and L2 reading skills, and concludes that this proficiency is most likely transferred from one language to the other (Genesee, 1979, p. 77). Here again, we see the correspondence of this explanation and Cummins' hypotheses.

Swain and Lapkin (1982) carried out immersion studies in Toronto and Ottawa, Ontario. They were interested to see whether students' first language (English) skills were affected by participating in a programme using the second language (French) as a medium of instruction, as well as whether there is a relationship between cognitive development and academic success in the French immersion programme (see also Lapkin & Swain, 1984, p. 49). In their longitudinal study, they tested immersion students and English control groups on an annual basis near the end of each school year, and then a follow-up group of students entering the programme in a subsequent year. The results of these tests

showed that whereas the immersion students seemed to have lower literacy skills than the unilingual students in the first two years, these differences disappeared as soon as English Language Arts were officially introduced into the curriculum in grade 3 (or sometimes grade 4). In grade 5, the immersion students even outperformed the English-only programme students in some aspects of English language skills, for example vocabulary and grammatical usage (Swain & Lapkin, 1982, p. 37; Lapkin & Swain, 1984, p. 50;). Lapkin and Swain conclude that when literacy skills are well established in one language, they easily transfer to the other language.

In the same study, no differences were found in English language achievement between early partial immersion and early total immersion in grades 3 and 4. That is, the amount of instruction in English (50 % in the case of partial immersion, 100 % in the case of total immersion) did not influence their achievement level.

Lapkin and Swain concede that it is not always easy to identify and measure differences of motivation between groups. The immersion students usually come from middle class families with high educational goals and high motivation to learn French.

Harley, Hart, and Lapkin (1986) examined the effect which early immersion education has on the students' English skills over time. In a longitudinal study, carried out in Ottawa and Toronto, they compared students in an early French immersion program to a regular English programme group. The immersion students had received all their schooling in French from kindergarten to grade 2, when English instruction set in. English instruction then slowly increased to 50% in grade 6. Students were tested during a six-year period, and while there were lags in English development up to grade 3, in grades 4 to 6 the immersion students scored higher on standardised tests (MAT and

CTBS)³ on reading, grammatical usage, punctuation, vocabulary, and especially the use of reference materials. There was little difference between the groups in their composition-writing skills (p. 306). The authors found their analysis of the relationship between L1 and L2 proficiency gives support for the evidence of an interdependence of L1 and L2 (p. 317). Reeder cautions, however, that these studies have limited generalisability due to size and makeup of the sample (Reeder, Buntain, & Takakuwa, 1999, p. 53).

Considering a number of studies carried out in Canada and the United States (Cummins, 1984; Genesee, 1979; Geva & Ryan, 1987; Hakuta & Diaz, 1985), Cummins concluded that considerable evidence shows that cognitively demanding skills in L1 and L2 are at least partially interdependent. Considerable transfer of skills from one language to another is possible, given sufficient exposure (instruction) and motivation to learn (Cummins, 1991, p. 84).

In a more recent study, Reeder, Buntain, and Takakuwa (1999) examined the effect of increased use of French instruction in an early immersion program, in order to find out whether this higher intensity of instruction in French would have an effect on French (L2) and English (L1) proficiency. In their quasi-experimental longitudinal study, they compared two groups. Both groups had 100% of their instructional time in French from kindergarten to grade 3. Then, starting in grade 4, one group continued with 50% of their instructional time in French and 50 % in English. This was the comparison group. The other group received 80% of instruction in French, and 20 % of instruction in English from grade 4 to grade 7. This was the treatment group. The latter group had only English language arts in English, whereas the comparison group had also mathematics in English.

³ Metropolitan Achievement Test and Canadian Test of Basic Skills

The results after three years of testing these groups showed no significant differences between the two groups in French reading comprehension and French narrative writing, but the 80 % group was better in French descriptive writing. As far as English literacy skills were concerned, both groups showed no significant differences in English narrative or descriptive writing, but the 50 % group was somewhat stronger in English reading comprehension. This was attributed to the possible gain in English reading skills of expository texts in their mathematics classes, which were in English. Overall however, both groups tested favourably above average in all measures compared to the Canadian mean scores. This shows that intensive instruction in French does not diminish English literacy skills to any significant degree, and improves French literacy skills.

In a report to the Ontario Education Quality and Accountability Office (EQAO), Turnbull, Hart and Lapkin (2000) conducted an evaluation of French immersion education with respect to its effect on English literacy and mathematics. They analysed the EQAO test results of French immersion students, regular English programme students as well as students in enrichment programmes during the period 1998-1999, from a total of 62 school districts. These tests are now curriculum-based and include a greater variety of test types than did the tests in the 1970s and 1980s. The earlier tests were standardised ones.

The results of these provincial exams showed that grade 3 immersion students performed at a comparable level with English programme students in both reading and writing. The only exception were the students in total early immersion who had only started with formal English instruction in grade 4. For this group, the test results were below the ones of the non-immersion students. The authors explain this by the lag

immersion students show in the early years of the program (Turnbull et al., 2000, p. 13).

The tests for grade 6 showed somewhat different results. By now, immersion students were receiving between 30 to 50 % of their instruction in English (accumulated 1000 to 2800 hours of English instruction). Included was also the group of middle immersion students, with 4000 or more accumulated hours of English instruction. All the grade 6 immersion students clearly outperformed the regular programme students in all skill areas (p. 17). The differences were found to be greatest for reading. Here, the performance of the immersion students was close to that of the students in enrichment programs, which is a highly selected group of good students. In writing, immersion students performed better than regular students, but not quite as well as the students in the enrichment programmes. In conclusion one can say that these results confirm the earlier findings of, e.g., Lambert and Tucker (1972) and Swain and Lapkin (1982). The authors confirm that there is no threat to English literacy through the intensive teaching of a second language.

In other parts of the world, the relationship of students' L2 and L1 have been investigated as well. Verhoeven (1994) compared 98 6-year-old Turkish children living in the Netherlands. Their L1 was Turkish, and Dutch became their L2 through playmates and daycare. Verhoeven looked at the development of literacy in both languages. He found that lexical and morpho-syntactic skills developed more or less autonomously (p. 408), and there was a moderate interdependence in phonological skills. Pragmatic skills (the use of language in situations), however, showed a strong positive transfer from L1 to L2; the same was true for reading abilities. In schools where L2 reading was taught first, there was a strong influence of that skill on later L1 reading abilities. Reading skills seem to be highly interdependent across languages.

In Hong Kong, Marsh et al. (2000) carried out a large-scale longitudinal study in order to find out whether immersion education (with Chinese as L1 and English as L2) would have an effect on the achievement of students in Chinese and subjects other than English. Hong Kong is using a late immersion model starting in grade 7 (high school). The researchers were especially interested in how students would do in subjects like Chinese (L1), English (L2), mathematics, science, geography, and history. Comparing students who were instructed in these subjects in Chinese (except for the English language classes) with students who received instruction in English (except in the Chinese language classes), they found out that the achievement in the first language (Chinese) and second language (English) were enhanced through instruction in English. The intensive instruction in a second language, which has a high prestige in Hong Kong, did not hinder in any way the development of the first language; on the contrary, it promoted its development. This finding can be seen as support for Cummins' interdependence hypothesis: when both languages are developed to a high degree, L2 abilities are transferred to L1.

In conclusion, one can say that students in immersion and enrichment programs reach a “functional bilinguality” in their second language (usually French; but also Ukrainian, Hebrew, Spanish, or German in some areas in Canada), with no loss in their L1. Furthermore, L1 competencies are usually enriched when compared to control groups who have been schooled in English only. That is, although there is less schooling in the L1, development in this language does not suffer. One can conclude from these findings that a transfer from L2 to L1 takes place. Thinking and language abilities are developed in

one language and transferred to the other one. There is a “mutually beneficial interplay between L2 (the language of instruction) and L1 (the basic language of thought and expression for the children at the start of the experience)” (Lambert, 1990, p. 217).

In an elaboration of his interdependence hypothesis, Cummins (1980) introduced the terms “cognitive academic language proficiency” (CALP) and “basic interpersonal communication skills” (BICS). The higher level cognitive skills, such as problem-solving skills and literacy skills (CALP) are transferable, since they represent general cognitive skills, whereas the BICS (including surface aspects such as orthography or fluency) rely more on the context and on the specific language. Reading academic texts would be an example of CALP, and thus be transferable from French to English (see also the study for Hebrew-English immersion by Geva & Ryan, 1993). Communicating in situations, on the other hand, would depend more on specific skills in one language. Harley et al. (1990) found convincing evidence of a significant relation of academic language skills across languages (p. 24).

Cummins' theory is still a controversial issue in the research community because it cannot be supported experimentally since there is no definition to the "threshold level necessary". Some researchers such as Geva and Ryan (1993) suggest that other variables may be at play in addition to interdependence to explain the results found. They say that in addition to transfer of cognitive abilities there might be basic individual differences in intelligence and memory span that are also responsible for the observed relationship between L1 and L2 performance in reading (p. 37). McLaughlin (1990) and Skehan (1986) argue in the same direction .

Supplementary effects from learning to speak, read, and write in a second language

Intelligence

Since the 1960s, studies have reported a positive association between second language learning, and cognitive and academic development (Cummins, 1978b; Peal & Lambert, 1962). This positive relationship has been observed for example with respect to creative thinking abilities (Cummins & Gulutsan, 1974). Cummins explains this by citing Vygotsky who argues that being able to express the same thought in different languages will enable the child to see his/her language as one particular system among many, to view its phenomena under more general categories, and thus to become aware of his or her linguistic operations (Vygotsky, 1962, p. 110).

In a paper, which sums up three decades of research on bilingualism, Lambert (1990) attributes a strong positive influence of second language learning on the cognitive and social development of a student. The limiting condition is that “the two languages involved in the bilingualism have enough social value and worth and that both can be permitted to flourish as languages of thought and expression” (p. 210). This is in accordance with Cummins’ threshold hypothesis, which states that if both languages pass some minimum threshold of competence, one can realise the benefits of being bilingual (Cummins, 1978b; 1979). Lambert had himself carried out studies comparing English-French bilinguals and monolingual ten-year-olds in non-verbal tests and language competencies (Peal & Lambert, 1962). The bilingual children in Montreal scored significantly higher in both tests. They also showed a “more diversified structure of

intelligence and more flexibility in thought” (p. 211). Studies in other parts of the world have since supported these findings (Ben-Zeev, 1977; Cummins & Gulutsan, 1974; Scott, 1973). Lambert sees these studies (all in early immersion) as evidence against the common-sense notion that becoming bilingual (having two linguistic systems within one’s brain) divides a person’s cognitive resources and reduces efficiency of thought. The contrary seems to be the case.

In the same vein, Hakuta & Diaz (1985) present convincing arguments in favour of the positive impact of bilingualism on intelligence. They carried out a longitudinal study in order to find out whether the degree of bilingualism is related to cognitive flexibility, and to assess whether bilingualism is really the cause of heightened cognitive ability, or whether it is rather the other way round, i.e., cognitively strong children will become good and balanced bilinguals. Rather than comparing bilinguals to monolinguals, they observed and tested bilingual students over a period of time, in order to find out the relative effect of growing bilingualism on cognitive ability. Hakuta and Diaz looked at students in a transitional bilingual program in New Haven, Connecticut. These students were primarily from Puerto Rican families, and had lived in the United States for a mean of 2 years. The groups were also controlled for socio-economic status (SES). Both their Spanish (L1) and their English (L2) linguistic ability were measured with the Peabody Picture Vocabulary Test, a receptive vocabulary test (with an adapted form in the case of Spanish), in order to establish linguistic ability in both languages. An intelligence test was administered to establish their general cognitive abilities, and to correlate these with their abilities in the two languages. All these tests were administered twice, at two different times, six months apart. The results showed a significant relationship between degree of

bilingualism and non-verbal intelligence (Hakuta & Diaz, 1985, p. 337). This positive relationship was observed in both time intervals, which at first left unanswered the question whether cognitive ability or degree of bilingualism is the causal factor. In various statistical analyses of the data, however, the researchers were able to show that it is indeed bilingualism that effects non-verbal intelligence, rather than intelligence being a predictor for successful bilingualism.

In their discussion, the authors try to find answers to the question of how bilingualism effects cognitive abilities and suggest that bilingualism fosters the use of language in the processing of information, i.e., the children are better able to verbalize and become aware of their actions, and this could explain the improved cognitive performance. These positive effects are expected especially in cases of balanced and additive bilingualism where the second language is an addition to the first, and the first language is not threatened. Furthermore, in accordance with Cummins' threshold hypothesis, the positive effects of bilingualism are observable only when a certain level of proficiency in both L1 and L2 is attained.

Lambert (1990) reports that bilinguals can remember twice as many items on a list of words if they are presented in English and in French. He believes that the stored translation equivalents in the brain have a stronger basis in terms of imaginary representation, and are thus remembered better (p. 208).

Achievement in non-language domains

Swain and Lapkin (Lapkin & Swain, 1984; Swain & Lapkin, 1982) report that in their studies (see above) immersion students were able to keep up in academic achievement with students taught in their first language. They used standardised tests in mathematics and science, and compared the performance of immersion students with that of students in English-only programmes. Early immersion students consistently showed results comparable to the unilingual students (Swain & Lapkin, 1982, p. 65). Late immersion students usually lagged behind in the first and second year of introducing the programme. This was especially the case if they only had very little core French prior to entering the late immersion programme (p. 68). The authors suggest that this was probably due to the fact that their proficiency in the second language was not high enough yet to understand relatively complex subject matters in French.

When early total immersion students were tested for their proficiency in mathematics and science, they performed as well as their unilingual, English-instructed peers on these tests whereas early partial immersion students often did not (Swain, 1996, p. 92). Again the explanation is that the level of French attained by the partial immersion students was not adequate to deal with the more sophisticated level of mathematical and scientific concepts being presented to them in French. There is a gap in L2 proficiency that needs to be bridged when students move from learning a language as a subject to using it as medium of content learning (Johnson & Swain, 1994). This finding is consistent with Cummins' threshold hypothesis. Only when a certain threshold is reached in the L2 can

content teaching in this language be successful.

One study, however, shows negative effects of content teaching in the second language. The Hong Kong study mentioned above in connection with the positive effects of instruction in the second language on achievement in the first language (Marsh, 2000) also looked at the effect, which English instruction had on other academic subjects. They found a strong negative effect of immersion education. This was true especially for science, geography, and history. It is important to note in this case that these programmes are late immersion programmes, i.e., they do not begin instruction in the second language until grade 7. Marsh et al. interpreted the negative results in the content subjects in the following way: since the students in grade 7 did not have enough proficiency in English yet, they did not understand enough of the content in the subjects like science, history or geography. These subjects rely to a large degree on understanding concepts, and if the language of instruction has not been developed enough, the students do not understand the new concepts enough to follow the course successfully. This negative effect is especially clear in a programme starting in grade 7, since the content of the courses are more abstract and difficult than in the primary grades. In early immersion programmes (starting in kindergarten or grade 1), the instruction relies more on visuals, simple concepts etc., that is, the language demands are not so great, and students can follow even if the instruction is in the L2 (see positive results of early immersion studies reported in Lambert, 1990; 1992). The authors argue that the programme “was a failure in terms of providing academic benefits for Hong Kong students, as well as supporting predictions based on previous immersion research and Cummins's theory” (p. 339). However, the

results of this study, even though significant and important, could not be expected to yield results generalisable to the Canadian context, which is quite different. First, this study concerned late immersion starting at the high school level where the threshold of L2 competency needed to achieve benefits from immersion might be much higher than the threshold needed in early immersion (Cummins, 1979). Second, the language achievement level of immersion students relative to that of other students was measured with only written tests and there was no indication of the students' fluency. Third, as the programme was near-universal, with little ESL 'bridging' instruction available to students entering from Chinese language programmes, it is possible that both low initial student proficiency in English and lack of L2 support compromised students' content learning. Finally, the authors indicate that the teachers of nonlanguage subjects may not all have been highly fluent in English. None of the Core French or immersion programmes in Canada have such negative characteristics. Clearly this study does not change the fact that learning a second language in the Canadian context has positive consequences.

In a study carried out in *early partial* immersion in Australia, de Courcy & Burston (2000) compared the children's ability in mathematics after having been taught this subject in their second language, French. At the Australian schools, 45% of instruction time is in French, and 55% in English. As in the Canadian immersion programmes, this programme aims at fostering "additive" bilingualism (Lambert, 1975). The researchers' hypothesis, in accordance with Cummins interdependence hypothesis, was that the cognitive processes developed in French math instruction could be transferred to the first language, and make testing in English possible. When tested with the multiple-choice

Progressive Achievement Test – Maths, the results of the immersion students were above average when compared to Australian norms (p. 81). A difference between the groups that were tested in English compared to the group that had been tested in French could also be seen: the English tests were better than the French ones. On the whole, the transfer of mathematical abilities from the L2 to the L1 was made successfully, “there is no question that the children have developed a sound foundation of mathematical concepts, which can be transferred to their first language from their second, and vice versa. This adds support to the theory that children can transfer knowledge and skills acquired in one language to their second language” (p. 93).

In the Ontario study mentioned above, Turnbull et al. (2000) also looked into the performance of the immersion students in mathematics. The results of this study corroborated earlier studies and found that at grade 3 (where the math test is taken in a French translation), achievement is similar for French immersion and non-immersion students. In grade 6 (where most schools choose the English test), immersion students outperformed students in the regular program in mathematics even in comparison to students in enrichment sections in the regular programme (p. 18).

Bournot-Trites and Reeder (2001) carried out a quasi-experimental study in a Vancouver French immersion school, and tried to find out whether students’ proficiency in mathematics would change when it was no longer taught in English (L1), but in French (L2). This study is part of the more comprehensive Vancouver study mentioned above (Reeder et al., 1999).

Bournot-Trites and Reeder's longitudinal study addresses parents' concerns about whether their children's achievement in mathematics would not suffer when it is taught in French instead of in English. Particularly, the parents were concerned about mathematics tests, which are usually carried out in English in provincial exams. Would the students be able to cope with those tests, although their instruction had been in French? Therefore, the researchers used English tests to assess the math achievement of the two groups. As presented above in the context of the Reeder et al. study (1999), the first group had had mathematics in French in the intermediate years (grades 4-7), altogether 80% of instruction in French. The comparison group had continued with their normal programme of mathematics in English (altogether 50% of instruction in French). The test was administered at the end of grade 6 to both groups, using the Stanford Diagnostic Mathematics Test⁴.

The following areas were tested: Number System and Numeration, Computation, and Applications. In all three areas, the treatment group, with high intensity French, obtained higher results than the comparison groups (p. 12). These results provide further evidence for Cummins' threshold and interdependence hypotheses as described earlier. The increased time of instruction in French increased the French academic proficiency level. This higher level may have been beneficial to the treatment group to have a good understanding of mathematical concepts taught in French. Bournot-Trites and Reeder (2001) also see evidence of transfer in these results:

"... the students who had acquired their mathematical knowledge in French were able to retrieve it in English. Concepts learned in one language could be expressed in the second language without any cost" (p. 13).

⁴ (Beatty, Gardner, Madden, & Karlsen, 1984)

Conclusion

Although most studies about the effect of the second language on first language literacy have been done in the area of French immersion education, one can apply the findings to core French learning. The results also apply to intensive French programmes. Although intensive English programmes in Quebec have been studied, there are no published results on the effects of intensive English on French skills. However, immersion programmes represent the most possible risks to first language skills since students spend more time studying in the second language than in any of the other second language programmes. If studies in French immersion show positive effects of French learning on English language skills, a fortiori the results would be positive for any other second language programme be it Core French or intensive French. The effect of learning a second language (French) on first language (English) skills has been positive in all studies done. Furthermore, the loss of instructional time in English (first language) in favour of the second language has never been shown to have negative effects on the achievement of the first language. Cummins' interdependence hypothesis, which maintains that language skills are being transferred from one language to the other, can be assumed to be true for the core French situation as well. One can confidently assume that cognitive abilities acquired in the learning of one language can be put to use in the acquisition and proficiency of the other language. Numerous studies about the relationship of second language learning to first language skills support this claim. In these studies the first language skills did not suffer. On the contrary, in many studies first

language skills were shown to be enhanced, even if instruction time in L1 was reduced in favour of L2 instruction.

The literature gives us thus very positive evidence about the value of learning a second language. These advantages have been shown in the above studies to be in the cognitive area; but another important educational factor is the positive attitude and understanding it creates for other cultures. Lapkin and Swain (1984, p. 52) report on a study of compositions that grade 5 and 6 students had to write, about “Why I like being Canadian.” The immersion students gave on average two to three times as many reasons than did the English comparison groups. They commented especially on the rich and varied cultural and linguistic composition of Canada. This was seen to be a very positive and encouraging consequence of learning a second language.

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