

AN EMPIRICAL VALIDITY STUDY  
OF THE CANADA FRENCH INDIVIDUAL  
ACHIEVEMENT TEST

By

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B.A., The University of British Columbia, 1978  
P.D.P. Simon Fraser University, 1980.

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS OF THE DEGREE OF  
MASTER OF ARTS

in

Department of Educational Psychology  
and Special Education

We accept this thesis as conforming  
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

October 1988

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Date October 14, 1988.

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## CHAPTER I

### INTRODUCTION

#### BACKGROUND TO THE PROBLEM

From the origins of the first French immersion project, the St. Lambert experiment in Montreal (1962), a multitude of investigations have emerged as educators, parents and researchers seek to understand the ramifications of this approach to second language learning.

Cummins (1983), contends that, "the research has played a crucial role both in the spread of French immersion programs across Canada and in establishing the Canadian experiment as one of the most significant innovations in second language teaching in this century."

If Cummins' contention holds true, the research has had a tremendous effect in British Columbia where, as of September 1986, 101 of its elementary schools offered French immersion programs, educating 13,722 of British Columbia's elementary school population. (British Columbia Statistics, 1987).

Cummins (1983), has outlined the four central issues in French immersion research as the cognitive and academic effects of immersion, the effects of intensity of language two exposure on language one and

language two development, the relative advantages of early versus late immersion, and the suitability of immersion for all students particularly those with learning difficulties.

The present study focuses on academic achievement and French immersion.

The academic achievement of immersion students as opposed to their English "counterparts" is one of the earliest and most significant questions that researchers have investigated. The question of whether it is possible to produce linguistically competent students who are also academically competent needed an unambiguous answer before educators, parents, and administrators were willing to jump on the French immersion bandwagon.

Before examining some of the pertinent studies related to academic achievement in French immersion, it is crucial to review the methodological difficulties associated with cross-cultural/cross-lingual research. Included in the problems associated with this type of research are defining the variable bilingualism, controlling for socioeconomic status and IQ, comparing a pre-selected sample to the general school population, comparing two samples on the same outcome when the

curricula are not the same, and controlling for educational stimulation provided outside of school.

#### **ACHIEVEMENT TESTS USED FOR FRENCH IMMERSION RESEARCH**

One of the most limiting of methodological difficulties to this kind of research is the lack of appropriate instrumentation to conduct the research and thus provide valid findings in this approach to second language learning. For example, the majority of investigations that have occurred in Ontario and Quebec, (Barik & Swain 1976, Cummins 1983, Lambert & Peal 1962) have used the following instrumentation:

1. Test de Rendement en Francais; a standardized series of achievement tests normed on the native French speaking population of Montreal, (Andrew et al. 1980, Barik & Swain 1975, Bruck et al. 1973, Genesee 1976, Lapkin et al. 1971).
2. Test de lecture "California" (1967); a standardized reading comprehension test for native French speaking students.
3. Test de Mots a Trouver; an unstandardized cloze test, (Andrew et al. 1980, Carey & Cummins 1983, Lapkin et al. 1981, Swain & Lapkin 1977).



4. Translations of standardized measures of achievement, e.g. the Metropolitan Achievement Test.
5. American standardized cognitive test; Lorge-Thorndike Intelligence Tests, Otis Lennon Mental Ability Test, Peabody Picture Vocabulary Test, Wechsler Intelligence Scale for Children Revised, (Barik & Swain 1976, Cummins 1977, Lambert & Tucker 1972, Peal and Lambert 1962).
6. Canadian and American standardized achievement tests; The Canadian Test of Basic Skills, Metropolitan Achievement Test, (Andrew et al. 1980, Barik & Swain 1978, Barik et al. 1974, Crawford 1984, Genesee 1976).
7. Techniques such as taping children's interviews and storytelling, (Edwards & Casserly 1976, Genesee 1976, Genesee et al. 1977, Swain & Lapkin 1977, Tucker et al. 1976).
8. Analysis of composition written in French, (Crawford 1984, Bruck et al. 1975, Swain 1979).
9. Other measures developed at the Ontario Institute for Studies in Education by the Bilingual Education Project, such as: Test de Lecture, Test de Comprehension de L'Ecrit Marguerite Tourand.

None of the eastern research has demonstrated the use of an individually administered achievement test that has been normed for the particular population under investigation. In British Columbia's French immersion programs the most frequently used achievement instruments are:

1. Tests developed by the Ontario Institute for Studies in Education: Test de Lecture, Marguerite Tourand Test Diagnostique de Lecture.
2. English Achievement Measures such as the Canadian Test of Basic Skills.

Most school districts do not use any French measures of achievement and rely on the required English Achievement testing that occurs province wide e.g. Canadian Test of Basic Skills.

#### **STANDARDS AND REQUIREMENTS FOR EDUCATIONAL TESTS**

In the ninth edition of Mental Measures, O.K. Buros recommended that when groups are to be compared with regard to a variable it is inappropriate to use a nationally standardized group test, and that when individuals' performances are to be compared, it is desirable to use an instrument that has been locally standardized (1985).

Anastasi (1976) warns that because of the specificity of each criterion, test users are usually advised to check the validity of any chosen test against local criteria whenever possible. She claims that, "in the absence of additional interpretive data, a raw score on any psychological test is meaningless. Psychological test are most commonly interpreted by reference to norms ... the normals are thus empirically established by what a representative group of persons actually do on the test" (p.67). Tests used in French immersion achievement research do not have appropriate norms and are thus according to Anastasi meaningless.

Cronbach (1949) claims that, "tests must be selected for the purpose and situation for which they are to be used ... what tests are pertinent are to be used depends on the instructional plan" (p.151). The curricula or instructional plan of French immersion varies from the regular English program, the regular French program and American curricula. The available achievement tests used have either been created for the native French speaking population, the regular English program population or the American population, thus the tests used are not pertinent according to Cronbach.

Standards for Educational and Psychological tests, (1974) advises that the primary responsibility for the improvement of testing continues to rest on the shoulder of the test user (p.6). The current test users have chosen to use the aforementioned measures which lack the standards essential to appropriate test use.

Holmes (1981) and Wormeli (1983) found that the major source of error is the use of tests for which the validity is unknown when applied to British Columbia's students, and that the use of American standardized tests are inappropriate for British Columbia's students.

As stated earlier (Cummins 1983), much of the spread of immersion is due to the current research in French immersion, thus it is essential that the soundness of the research be adequate. Adequate and sound research is obtained by gathering data based on the administration of appropriate measurement instruments. The instrumentation used to investigate the effects of French immersion on achievement has not met the standards described by O.K. Buros (1985), Anastasi (1976), Cronbach (1949), Standards for

Educational and Psychological Tests, Wormeli (1984), and Holmes (1981).

#### **THE CANADA FRENCH INDIVIDUAL ACHIEVEMENT TEST**

In response to the obvious need for appropriate assessment instrumentation of British Columbia's French immersion population, Wormeli and Ardanaz (1987) have developed the Canada French Individual Achievement Test, (F.I.A.T.).

The F.I.A.T. is an individual screening instrument that has been based on curricula and materials in general use in French immersion programs across Canada. It is normed on a nationwide sample of elementary school children.

The F.I.A.T. contains four subtests; Spelling, Word Identification, Passage Comprehension and Arithmetic to screen students enrolled in French immersion elementary programs. The purpose of the F.I.A.T. is to allow the test user:

1. to compare the French immersion pupils' performance to that of other pupils in the same grade placement.
2. to identify those French immersion students whose scores deviate sufficiently from the average of his or her peers to be regarded as abnormal.

3. to determine a pupil's performance by observing test performance and by testing the limits of response made by the pupil.

Wormeli and Ardanaz created the test as an individualized screening test and as an informal diagnostic tool. Investigating the validity of the test is the primary objective of this study.

To test the validity of this test, this investigation will determine the power of the F.I.A.T. to differentiate low achieving French immersion students from average or high achieving French immersion students by administering the F.I.A.T. to a sample of French immersion students receiving remedial instruction or those considered eligible for remedial instruction and a sample not receiving remedial instruction.

#### **DEFINITION OF TERMS**

French immersion students are defined as those students who have been enrolled in total French immersion in an elementary school in British Columbia since Kindergarten or grade one and whose mother tongue is English. Remedial French immersion students fulfill the previously described stipulation, but are receiving remedial instruction in Reading, or Spelling or are

considered by their teacher to be eligible for remedial instruction.

#### **ASSUMPTIONS OF THE STUDY**

The present study assumes that conditions existing at the start of the time sequence will exist again after the study is completed. It assumes that the sample is truly representative of the population for which later inferences will be drawn. The sample is pre-selected as all French immersion populations are. It does not include any mentally handicapped or learning disabled population. The remedial sample is selected from a population defined by teacher selection and nonstandardized tests.

Chapter Two of the thesis will review the research related to the history of research in French immersion, achievement tests used in French immersion research, the methodological problems associated with French immersion research and recommendations for appropriate test use.

Chapter Three will describe the sample, the methodology, including the consent forms, the test administrators, the test administration and the empirical validity of the test.

Chapter Four will present and interpret the results of the data analysis.

Chapter Five will summarize the findings, offer conclusions, suggest the practical implications and provide suggestions for future research.



## CHAPTER II

### REVIEW OF THE LITERATURE

The plethora of research put forth on the different effects of French immersion education on Canadian students is vast, yet contradictory. The literature can be divided historically; the literature published between the years 1920-1960 and the literature published between 1960-present.

The early research, is distinct from the current research; pioneers of investigations into the effects of bilingualism consistently reported the detrimental effects of bilingualism (Saer 1923, Smith 1923, Seidl 1937, Pintner & Keller 1922, Darcy 1953) e.g. mental confusion, some even went so far as to conclude that bilingualism led to split personalities (Diehold 1965). Research that occurred during this period focused on what Lambert (1975) refers to as "subtractive bilingualism, where the mother tongue is a minority language and is not deemed 'desirable' or an 'upwardly mobile' language such as Irish, Welsh or Spanish. Additionally there are obvious distinctions in the populations studied during the two time periods; i.e. the geographical settings, the language of the populations, the historical periods of time and

different types of measurement instruments available. Lambert and Peal (1962) contend that these (the early studies) exhibit an obvious paucity of significant controls for socioeconomic status, I.Q., age, educational background, degree of bilingualism and types of instrumentation used.

Recent research, from 1960-present has been conducted primarily in Ontario and Quebec, (Barik & Swain 1977, Lambert & Peal 1962, Casserly and Edwards 1976, Cummins 1983, Trites 1976, Carey 1983). The rapid growth of French immersion in the West has spurred British Columbian researchers to do some of their own investigations, (Shapson & Day 1982, Holmes 1981, Trites 1986, Wilton 1974, Wormeli and Ardanaz 1987).

The commonality of the current research is that the findings consistently report favourable effects of bilingual education on the students enrolled in Canadian French immersion programs, e.g. it may have positive effects on cognitive functioning, (Lambert & Tucker 1972), it causes no impairment of academic achievement (Genesee 1978, Lambert 1969), it does not hinder attainment of equivalence in English language skills if measured soon after English language arts is

introduced into the curriculum (Shapson & Day 1982), it develops higher levels of second language skills at no cost to first language skills (Lambert & Tucker 1972), it may benefit children with language disabilities (Bruck 1978).

Another similarity of the current Canadian research is that it deals with 'additive' bilingualism, that is majority language individuals (English) are acquiring a second language (French) that is socially relevant to their first, an already socially relevant language.

The current Canadian research has centered on four issues outlined by Cummins (1983):

1. the cognitive and academic effects of immersion,
2. the effects of intensity of language two exposure on language one and language two development,
3. the relative advantages of early versus late immersion,
4. the suitability of immersion for all students, particularly those with learning difficulties.

Recent research is more methodologically sound than the earlier research, e.g., bilingualism as a variable is accurately defined, socioeconomic status and I.Q. are controlled for, however, Willig (1987)

contends that there are still methodological difficulties that haunt Canadian French immersion research, such as;

1. the differences between types of programs being compared are not controlled for,
2. the language of criterion instruments is not consistent,
3. the academic domain of the criterion instruments vary,
4. the random versus non-random assignment of students to immersion programs.

Swain contends (1979) that the demographic characteristics of communities being compared vary.

Lambert & Peal (1962) warn that the educational background of students is not controlled for, that there is an absence of the use of tests that have been constructed and standardized on a population similar to the one being tested, that there is use of tests that have been translated from one language to another without appropriate standardization, and that there is lack of consistency in language used for test administration.

Carey (1984) advises that systematic evaluation of French immersion programs should be occurring during

all phases of implementation. He warns of the methodological problems woven into the research, "Many of the major evaluation studies have compared the progress of students in immersion programs with that of similar students in the English program which usually include core French. ... that parents and teachers have determined which program (English or French immersion) a student follows ... thus the most fundamental assumption of doing experimental research has been obviated since subject selection factors are given free rein" (p.249-250).

He includes on his list of obviated confounding variables:

1. the socioeconomic status of the parents of French immersion students is significantly higher than those of students in the regular program.
2. parents who enrolled their children in immersion are more interested in speaking French than those parents of children in the English program.
3. teacher differences are highly influential in language acquisition and academic achievement.

He concludes by stating that "parental sociocultural and ethnolinguistic values and aspirations are important variables influencing linguistic and academic

achievement" (p.252).

Beyond these seemingly inherent methodological difficulties that are extremely difficult to eradicate, there are those that can be eliminated or at the very least reduced, by the selection of appropriate instrumentation.

Results from studies examining the academic achievement of French immersion students compared to those in the regular English program, may or may not suffer from all of the aforementioned methodological programs. However, they consistently conclude that French immersion students achieve academically equally to students in the English program based on the data acquired using the following instrumentation, (Swain 1977);

1. Test de Rendement en Francais; a set of achievement tests standardized on the native French speakers of Montreal.
2. Tests of reading standardized on native French speaking students in Belgium.
3. Unstandardized cloze tests.
4. Test de Rendement en Mathematique; an arithmetic achievement test standardized on the native French speaking population of Montreal.

5. Translated version of the Peabody Picture Vocabulary Test Revised, Spilka (1974).

There are other claims as to the level of achievement of French immersion students based on the use of inappropriate instrumentation findings. Shapson and Day (1982), claim that "researchers have demonstrated that children experience no harmful effects to their cognitive development or ... achievement in school subjects ... immersion children at all grades have shown similar levels of achievement as children in the regular English program in Mathematics" (p.2). They conclude that "their level of achievement in French language arts appears to be similar to those reported for some of the immersion programs in more bilingual regions of Canada, e.g. Ottawa, Stern et al., (1976) and Montreal, Genesee (1978).

The measures used to acquire the data to make these claims were:

1. Test de Rendement en Francais to assess French language arts.
2. Test de Rendement en Mathematiques.

Both measures were created to assess the level of achievement of native French speakers in Montreal.

Bruck (1978) in her investigation of the suitability of early French immersion for the language disabled child administered the Metropolitan Achievement Test and the WRAT. She also used teachers' ratings of student achievement in reading, writing, math, expressive language and receptive language. She concluded on the basis of her data that children with language learning problems who attend French immersion can "develop linguistic, cognitive and academic skills at a rate similar to that at which they would develop were they placed in an all English classroom". The tests used to make these conclusions are American standardized achievement tests that are administered to the subjects in English.

Swain (1974), explains that most of the evaluations of achievement in French immersion programs have examined student performance in the area of mathematics and that the tests commonly used are the Cooperative Mathematics Test and the Metropolitan Achievement Test. Again, both tests are American standardized tests that are administered to the subjects in English.

Singh (1986), points out that "teaching and testing in immersion programs is still largely



restricted to linguistic competence" (p.561).

Can statements or conclusions be made or drawn comparing French immersion students' achievement when testing occurred in English rather than the language of instruction used in their program, when the measures used were not designed for use with these populations, nor was the item content drawn from the curricula in general use? Sattler advises that, "achievement tests, such as reading and mathematical tests are heavily dependent on formal learning experiences that are acquired in the home or at school. They appear to be more culture bound and sample more specific skills than do intelligence tests ... achievement tests stress mastery of factual information" (p.59).

Standards for psychometric adequacy are provided by a joint committee of the American Psychological Association, the American Educational Research Association and the National Council on Measurement in Education. They describe the measurement instrument as "an operational definition of a specified domain of skill or knowledge, or of a trait of interest to the developer or user ... the essential problem is to reach some conclusion about how scores on the test are related to some other performance, and is it

appropriate to speak to the closeness of the relationship" (p.25).

They recommend as an essential standard of measurement use that, "a test user should examine the differences between characteristics of a person tested and those of the population on whom the test was developed or norms developed. His responsibility includes deciding whether the differences are so great that the test should not be used for that person" (p.71).

Of the instruments used in measuring the achievement of French immersion students, none of the characteristics of the population used to standardize the test match or resemble those of the Canadian French immersion population.

Can we really assume that we have measured academic achievement of students in French immersion if we are testing the students in their mother tongue when their language of instruction has been French? The question of the role of language in cognition (which when measured is highly correlated with achievement) has not been answered. Whorf (1956) suggested that perception of the environment and its mental representation depend essentially on language. Vgotsky

(1962) studied the relationship between language and cognition and interpreted languages as playing a leading role in the development of cognition.

Most of the research investigated language and cognition has been directed towards determining the favorable effects of bilingualism on cognition development. Very little research has been done to investigate whether a child actually performs differently in one language as opposed to another. Does individual academic performance vary from one language to another? Can we assume that we have measured academic achievement when researchers have overlooked the most essential of psychometric standards in test selection by using translations of standardized test without re-standardizing, tested French immersion students' achievement in English, used achievement tests that have been normed on native French speakers, and used unstandardized measures, such as teacher evaluations and cloze procedures?

To what end does the development of the F.I.A.T. resolve these inadequacies? The F.I.A.T. has been standardized on Canada's French immersion population and its item content has been selected from curricula in general use in French immersion programs in Canada.

How will the development of the F.I.A.T. assist French immersion in general?

Anastasi (1976) claims that appropriate achievement measures, "constitute an important feature of remedial teaching programs ... they are useful in the identification of pupils with special educational disabilities". She further contends that appropriate achievement instrumentation can lend itself to providing the adequacy with which essential content and skills are actually being taught. Thus the development of an appropriate achievement instrument for French immersion students will assist in evaluating the effectiveness of the program rather than measuring only linguistic competence.

Cummins (1983) claims that many administrators assume that immersion is only appropriate for 'brighter' students and that children with potential academic problems should be screened out. Genesee (1976) claims that we should be seeking to allow all types of children to participate in this type of second language learning, but prior to doing so we need to understand more about individual differences and processes. With increased understanding of individual achievement and differences we can begin to speculate

as to the worthiness of immersion for all students and we can adapt programs to suit the needs of students of all potential.

The purpose of the F.I.A.T. is to allow investigators to compare a French immersion student's performance to that of other Canadian students in the same grade placement. The F.I.A.T. is intended to identify those French immersion students whose scores deviate sufficiently from the average of his or her peers to be regarded as abnormal and to determine a student's performance by testing the limits of response make by the student.

The primary function of the F.I.A.T. is to discriminate between French immersion students who require remediation and those who do not. The present study will investigate the validity of the F.I.A.T. to make this discrimination.

### **CHAPTER III**

#### **METHODOLOGY**

The test constructors intended that the F.I.A.T.'s primary function is as an individualized screening device to indicate the relative abilities of French immersion elementary pupils in Reading, Spelling and Arithmetic. Students in need of remedial assistance should obtain scores significantly lower than those not in need of remedial assistance. To test this hypothesis, the F.I.A.T. will be administered to a sample of French immersion students receiving remedial instruction and a sample not receiving remedial instruction to determine the ability of the instrument to differentiate between these two groups. Children at two grade levels will participate in the validation phase.

#### **THE SAMPLE**

Permission to collect data was obtained from the Coquitlam School Board and the Delta School Board, 1987 (See Appendix A for letter of permission). The sample was drawn from 5 lower mainland elementary schools that offered early French immersion and remedial services for French immersion students. French immersion teachers of each of the grade levels 2 and 5 were asked

to identify all students who receive remedial instruction for Language Arts and whose first language is not French. Parental consent forms (see Appendix A) requesting permission for identified remedial students were sent home and returned indicating permission to participate. Teachers were asked to place a check beside the names of all students who would not be considered "at all eligible for any kind of remedial instruction, average or better pupils and whose mother tongue is not French." (see instructions for Teachers, Appendix A) Parent consent forms were sent home and returned to the teacher indicating whether or not permission had been granted. F.I.A.T. examiners then randomly selected students to be tested at each of the grades.

#### **TEST ADMINISTRATORS**

Teachers of Delta and Coquitlam who are native speakers of French and who have been trained in the administration of the F.I.A.T. administered the test in the participating schools during school hours between April 1 and April 15, 1987.

#### **EMPIRICAL VALIDITY**

The purpose of this validation study is to examine the empirical validity of the F.I.A.T. Means and

standard deviations were computed for each group, remedial and non-remedial, at each grade level. Individual reliabilities between individual subtests were calculated for each remedial and non-remedial group.

The remedial and non-remedial groups were compared at each grade level in the analysis. All four subtests were entered simultaneously to determine the best linear combination of subtests that differentiate the remedial from the non-remedial groups. The significance level will be set at .01 for this analysis for entry and deletion. At the grade 5 level, each subtest was entered independently to determine the ability of individual subtests to distinguish between the remedial and non-remedial group. These analyses are computed using the discriminant function analysis subprogram in the Statistical Package for the Social Sciences (SPSSX) (Nie 1975) at the Educational Research Computing Centre (ERSC) at the University of British Columbia (U.B.C.).

#### **GRADE TWO VALIDATION**

Means, standard deviations, between individual subtests and internal consistency reliabilities for Spelling, Arithmetic, Word Identification and Passage



Comprehension are reported in Table 4 for the remedial group and non-remedial group. The results of the F-test conducted as part of the discriminant analysis for each subtest show whether the differences between pairs of subtest means are significant. The ability of all of the four subtests to differentiate between the groups as well as the possibility of a combination of subtests of producing different results are presented in Table 7 and Table 8.

#### **GRADE FIVE VALIDATION**

Means, standard deviations, correlations and reliabilities for Spelling, Arithmetic, Word Identification and Passage Comprehension for the remedial group and the non-remedial group are presented in Table 9. The results of F-tests shown in Table 13 will show whether the remedial group scored significantly lower than the non-remedial group.

The ability of the four subtests to discriminate between the groups as well as the possibility of a combination of subtests producing a superior result will be shown in Tables 14 through 22.

#### **CODING**

After the F.I.A.T. was administered, test protocols were scored by hand and verified by the

author. Protocols were coded by hand for grade, identification number, sex and group classification. A number of subtests were excluded from the analysis (see Table 3) because of basal and ceiling errors. At grade 2, 0 of the subtests were eliminated. At grade 5, 10 of the Spelling subtests, 9 of the Arithmetic subtests and 11 of the Passage comprehension subtests were not included in the analysis. When all 4 subtests at the grade 5 level were entered simultaneously, 23 cases were eliminated for missing discriminating variables.

## CHAPTER IV

### RESULTS

This chapter describes the final obtained sample and presents the results of the data analysis.

#### THE SAMPLE

121 students conformed to the criteria specified in Chapter Three and completed the F.I.A.T. as participants of this study. At the grade 2 level, 27 remedial French immersion students and 35 non-remedial French immersion students (see Tables 1 and 2) who had been enrolled in French immersion since kindergarten, whose mother tongue was English and for whom parental consent had been obtained participated in the study. 0 subtests at the grade 2 level were eliminated from the analysis due to basal or ceiling errors.

At the grade 5 level 20 remedial French immersion students and 39 non-remedial French immersion students who met the criteria specified in Chapter Three participated in the study (see Tables 1 and 3). A number of subtests were eliminated from the analysis at the grade 5 level due to basal and ceiling errors: 10 Spelling subtests, 9 Arithmetic subtests, 1 Word Identification subtest and 11 Passage Comprehension subtests were eliminated from the analysis (see Table 3).

TABLE 1

## OBTAINED AND DESIRED SAMPLE SIZE FOR GRADES 2 AND 5

	Obtained Non- Remedial	Desired Non- Remedial	Obtained Remedial	Desired Remedial	Obtained Total	Desired Total
Grade 2	35	30	27	30	62	60
Grade 5	<u>39</u>	<u>30</u>	<u>20</u>	<u>30</u>	<u>59</u>	<u>60</u>
Total	74	60	47	60	121	120

TABLE 2

**GRADE 2 NON-REMEDIAL AND REMEDIAL  
SAMPLE SIZE PROCESSED FOR EACH VARIABLE**

Variable	Non-Remedial N Processed	Remedial N Processed	Number Eliminated	Total
Spelling	35	27	0	62
Arithmetic	35	27	0	62
Word Identification	35	27	0	62
Passage Comprehension	35	27	0	62
Entering 4 Variables	35	27	0	62

TABLE 3

**GRADE 5 NON-REMEDIAL AND REMEDIAL  
CASES PROCESSED FOR EACH VARIABLE**

Variable	Non-Remedial N Processed	Remedial N Processed	Number Eliminated	Total
Spelling	37	12	10	49
Arithmetic	31	19	9	50
Word Identification	38	20	1	58
Passage Comprehension	38	10	11	48
Entering 4 Variables	29	7	23	36

## **DATA ANALYSIS**

Remedial and Non-remedial groups were compared for spelling, arithmetic, word identification and passage comprehension at each grade level using the Discriminant Function subprogram of the statistical Package for the Social Sciences (S.P.S.S.X) (Nie, et al., 1975) at the Education Research Service Centre at the University of British Columbia (E.R.S.C., U.B.C.).

In the first analysis means, standard deviations, between individual subtests and reliabilities for Spelling, Arithmetic, Word Identification and Passage Comprehension were computed. Reliability estimates were computed by split-halves, then inflated manually using the Spearman-Brown Formula.

In the second analysis, subtests were entered simultaneously to determine the most powerful identifier or best linear combination of subjects of remedial and non-remedial groups. Because of different sample sizes, at the grade 5 level, the four subtests were entered independently to determine individual subtest's power to accurately classify.

## **GRADE TWO RESULTS**

Means, standard deviations between individual subtests and internal consistency reliabilities are

**TABLE 4**  
**GRADE 2**  
**MEANS, STANDARD DEVIATIONS, CORRELATIONS<sup>1</sup>**  
**AND RELIABILITIES<sup>2</sup> FOR REMEDIAL**  
**AND NON-REMEDIAL STUDENTS**

		Spelling	Arithmetic	Word Identification	Passage Comprehension
$\bar{X}$	Non-Remedial	9.3	17.4	33.0	4.6
	Remedial	7.5	17.1	24.4	4.0
SD	Non-Remedial	4.1	4.6	13.2	2.1
	Remedial	3.2	5.2	10.5	1.7
C O R R E L A T I O N S	Spelling	<b>.81</b>	.50	.59	.48
	Arithmetic	.56	<b>.81</b>	.36	.48
	Word ID	.53	.21	<b>.96</b>	.46
	Passage Comp.	.49	.46	.49	<b>.58</b>

<sup>1</sup>Correlations in the upper triangle are for non-remedial students; correlations in the lower left triangle are for remedial students.

<sup>2</sup>Reliabilities estimates (computed by split-halves, inflated by the Spearman-Brown formula) are listed diagonally from upper left to lower right in bold face print.



reported in Table 4 for the Remedial and non-remedial group. The means for remedial and non-remedial groups indicate that Word Identification produced the greatest difference between group means, followed by Spelling, Passage Comprehension and Arithmetic.

Pearson Correlations indicate that Word Identification is most highly correlated with Spelling for both Remedial and non-remedial groups and Arithmetic and Word Identification are the least correlated for both groups.

Internal consistency reliabilities (see Tables 5 and 6) calculated for Remedial and Non-Remedial groups combined were above .80 for all subtests Excepting Passage Comprehension which was low .58. Internal consistency reliabilities calculated for the remedial group were above .80 for all subtests excepting Passage Comprehension.

Reliabilities for the Non-remedial group were lower, .75 for Spelling and Arithmetic, .59 for Passage Comprehension and .94 for Word Identification.

At the grade 2 level basal and ceiling errors did not occur resulting in equal sample sizes for all subtests (see Table 2). By entering the 4 subtests simultaneously, only Word Identification was included

TABLE 5  
GRADE 2  
INTERNAL CONSISTENCY RELIABILITIES\*  
FOR REMEDIAL GROUP

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Spelling	.87
Arithmetic	.87
Word Identification	.96
Passage Comprehension	.56

---

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\*Reliability estimates computed by split-halves and inflated by Spearman-Brown Formula.

TABLE 6  
GRADE 2  
INTERNAL CONSISTENCY RELIABILITIES\*  
FOR NON-REMEDIAL GROUP

---

Spelling	.75
Arithmetic	.75
Word Identification	.94
Passage Comprehension	.59

---

---

\*Reliability estimates computed by split-halves and inflated by Spearman-Brown Formula.

in the analysis at step 1. Results of F-tests indicate that the Spelling, Arithmetic and Passage Comprehension subtests did not discriminate between group means (see Table 7). Word Identification emerged as the most powerful discriminator between grade 2 remedial and non-remedial students, correctly identifying 74.1% of the remedial students as remedial and 57.1% of the non-remedial students as non-remedial with an overall correct classification rate of 64.52% (see Table 8). The direction of the error was in favour of identifying non-remedial students as remedial (42.9% of the non-remedial students were classified as remedial).

#### **GRADE FIVE RESULTS**

Means, standard deviations, correlations and internal consistency reliabilities are presented in Tables 9, 10, 11 and 12 for the remedial and non-remedial groups. The difference between means of non-remedial and remedial groups is significant for all subtests excepting Passage Comprehension.

Pearson Correlations indicate that Word Identification and Spelling are the most highly correlated subtests for the remedial group and Spelling and Passage Comprehension are the most highly

**TABLE 7**  
**GRADE 2**  
**DISCRIMINANT ANALYSIS**

At Step 1 Word Identification was included in the analysis.

Word Identification		Degrees of Freedom		Significance
Wilks' Lambda	0.88793	1	60	
Equivalent F	7.57312	1	60	0.0078

Variables Not in the Analysis After Step 1

Variable	F to enter
Spelling	0.92570E-01
Arithmetic	0.28874
Passage Comprehension	0.49523E-02

**TABLE 8**  
**GRADE 2**  
**CLASSIFICATION RESULTS**

Spelling    Arithmetic    Word Identification    Pass. Comp.

---

Actual Group	No. of Cases	<u>Predicted Group Membership</u>	
		Non-Remedial	Remedial
Non-Remedial	35	20	15
		57.1%	42.9%
Remedial	27	7	20
		25.9%	74.1%

---

Percent of "Grouped" Cases Correctly Classified    64.52%

**TABLE 9**  
**GRADE 5**  
**MEANS, STANDARD DEVIATIONS, CORRELATIONS**  
**AND RELIABILITIES FOR**  
**REMEDIAL AND NON-REMEDIAL STUDENTS**

		Spelling	Arithmetic	Word Identification	Passage Comprehension
$\bar{X}$	Remedial	14.4	37.7	46.8	13.0
	Non-Remedial	23.8	41.8	58.5	16.5
SD	Remedial	6.1	3.9	11.3	4.5
	Non-Remedial	5.7	5.1	8.9	5.6
C O R R E L A T I O N S	Spelling	<b>.91</b>	.27	.31	.42
	Arithmetic	.16	<b>.86</b>	-.01	.55
	Word ID	.69	.16	<b>.92</b>	-.01
	Passage Comp.	-.15	-.38	.07	<b>.92</b>

Correlations in the upper triangle are for non-remedial pupils; correlations in the lower left are for remedial pupils.

Reliability estimates (computed by split-halves, inflated by the Spearman Brown formula) are listed diagonally from upperleft to lower right in boldface print.

**TABLE 10**  
**GRADE 5**  
**MEANS AND STANDARD DEVIATIONS CALCULATED**  
**INDEPENDENTLY FOR EACH SUBTEST**

		Spelling	Arithmetic	Word Identification	Passage Comprehension
$\bar{X}$	Remedial	16.9	37.00	49.45	11.7
	Non-Remedial	23.8	41.77	58.63	16.3
SD	Remedial	6.1	3.85	9.51	4.7
	Non-Remedial	5.3	4.96	9.44	5.4



TABLE 11  
GRADE 5  
INTERNAL CONSISTENCY RELIABILITIES  
FOR REMEDIAL GROUP

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Spelling	.89
Arithmetic	.93
Word Identification	.96
Passage Comprehension	.89

---

**TABLE 12**  
**GRADE 5**  
**INTERNAL CONSISTENCY RELIABILITIES**  
**FOR NON-REMEDIAL GROUP**

---

Spelling	.89
Arithmetic	.70
Word Identification	.89
Passage Comprehension	.91

---

correlated for the non-remedial group. The Arithmetic and Passage Comprehension subtests had the lowest correlation for the remedial group, and the Word Identification and Passage Comprehension subtest had the lowest correlation for the non-remedial group.

Internal consistency reliabilities computed for combined remedial and non-remedial groups and for individual groups and subtests indicated reliability estimates above .80 for all subtests except for the Arithmetic subtest computed for non-remedial group, which has a reliability estimate of .70.

#### **GRADE FIVE SPELLING**

Results of F-tests (see Table 13) indicate that the ability of the spelling subtest to discriminate between groups was significant at .01. Classification results (see Table 14) demonstrate that the spelling subtest correctly identified 66.7% of the remedial students as remedial, and 75.7% of the non-remedial students as non-remedial. The direction of error was towards identifying 33.4% of the remedial students as non-remedial. The overall correct classification rate was 73.47%.

TABLE 13

GRADE 5  
WILKS' LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO  
WITH 1 AND 47 DEGREES OF FREEDOM

Variable	Wilks' Lambda	F	Significance
Spelling	.76789	14.21	0.0005

TABLE 14  
SPELLING GRADE 5  
CLASSIFICATION RESULTS

Actual Group	No. of Cases	<u>Predicted Group Membership</u>	
		Non-Remedial	Remedial
Non-Remedial	37	28 75.4%	9 24.3%
Remedial	12	4 33.3%	8 66.7%

Percent of cases correctly classified: 73.47%

**GRADE FIVE ARITHMETIC**

Results of F-tests (Table 15) indicate that the ability of the Arithmetic subtest to discriminate between groups is significant at .01.

Table 16 presents the Discriminant Analysis results for the Arithmetic subtest. 20 of the 31 (64.5%) non-remedial students were correctly classified and 13 of the 19 (68.4%) remedial students were correctly classified. Using the Arithmetic subtest alone 66% of grouped cases were correctly classified. Subtest error identified 31.6% of the remedial students as non-remedial and 35.5% of the non-remedial students as remedial.

**GRADE FIVE WORD IDENTIFICATION**

The results of F-test (see Table 17) indicate that the ability of the Word Identification subtest to discriminate between remedial and non-remedial groups is significant. Use of the Word Identification subtest (see Table 18) alone correctly classified 27 of the 38 (71.1%) non-remedial students and 13 of the 20 (65%) of the remedial students. The overall correct classification rate was 68.97%. The direction of the error favoured identifying 35% of the remedial students as non-remedial and 28.9% of the non-remedial as remedial.

TABLE 15

GRADE 5  
ARITHMETIC 13  
WILKS' LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO

Variable	Wilks' Lambda	F	Significance
Arithmetic	.78956	12.79	.0008

**TABLE 16**  
**GRADE 5**  
**ARITHMETIC CLASSIFICATION RESULTS**

Actual Group	No. of Cases	Predicted Group Membership	
		Non-Remedial	Remedial
Non-Remedial	31	20 64.5%	11 35.5%
Remedial	19	6 31.6%	13 68.4%

Percent of "Grouped" cases correctly classified 66.00%



TABLE 17

GRADE 5  
WORD IDENTIFICATION  
WILKS' LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO  
WITH 1 AND 56 DEGREES OF FREEDOM

Variable	Wilks' Lambda	F	Significance
Word ID.	.81975	12.31	.0009

**TABLE 18**  
**CLASSIFICATION RESULTS**

Actual Group	No. of Cases	<u>Predicted Group Membership</u>	
		Non-Remedial	Remedial
Non-Remedial	38	27 71.1%	11 28.9%
Remedial	20	7 25%	13 65.0%

Percent of Groups correctly classified 68.97%

**GRADE FIVE PASSAGE COMPREHENSION**

The results of the F-tests (Table 19) indicate that the ability of the Passage Comprehension subtest to discriminate between remedial and non-remedial groups is not significant.

By entering the four subtests simultaneously, only Spelling was included in the analysis at step one (see Table 21).

Classification Results (see Table 22) indicate that 50.0% of the remedial students were identified as remedial and 80.1% of the non-remedial students were identified as non-remedial. The overall correct classification rate was 73.47%. The direction of the error favoured classifying 50% of the remedial students as non-remedial.

**EMPIRICAL VALIDATION**

By administering the F.I.A.T. at the grade 2 level, an overall correct classification rate of 64.52% emerged. This rate of classification is due to the Word Identification subtest which displayed the strongest test attributes. With reliability estimates of above .90 and a difference between means that was significant, the subtest classified 74.1% of the

TABLE 19

GRADE 5  
WILKS' LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO  
WITH 1 AND 46 DEGREES OF FREEDOM

Variable	Wilks' Lambda	F	Significance
Passage Comprehension	.88534	5.958	0.0186

TABLE 20

GRADE 5  
WILKS' LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO  
WITH 1 AND 34 DEGREES OF FREEDOM

Variable	Wilks' Lambda	F	Significance
Spelling	.69679	14.80	0.005
Arithmetic	.89311	4.069	0.0516
Word ID	.79829	8.591	0.0060
Passage Comp.	.93270	2.453	0.1265

**TABLE 21**  
**GRADE 5**  
**DISCRIMINANT ANALYSIS**

At Step 1 Spelling was included in the analysis.

		Degrees of Freedom		Significance
Wilks' Lambda	0.69679	1	34	
Equivalent F	14.7954	1	34	0.0005

Variables not in the analysis after step 1

Variable	F to enter	Wilks' Lambda
Arithmetic	0.48562	0.68668
Word ID	1.9914	0.65718
Passage Comp.	0.16811E-03	0.69678

TABLE 22

GRADE 5  
 SPELLING, ARITHMETIC, WORD IDENTIFICATION,  
 PASSAGE COMPREHENSION

Actual Group	No. of Cases	Predicted Group Membership	
		Non-Remedial	Remedial
Non-Remedial	37	30 81.1%	7 18.9%
Remedial	12	6 50.0%	6 50.0%

Percent of "Grouped" cases correctly classified: 73.47%

remedial students as remedial. The direction of error was in over-identifying non-remedial students as remedial. If error is to occur, this type is more desirable as the purpose of the test is to serve as an initial screening device in the identification of French immersion students requiring remediation. The Spelling subtest was not a powerful discriminator between groups; differences between means was not significant at .01. Reliability estimates were above .80 when computed for groups combined and the remedial group, but dropped to .75 for the non-remedial group. (Error was 40% in either direction)

The weakest discriminators between groups were the Arithmetic and Passage Comprehension subtests.

Neither subtests revealed any distinction between group means. Reliability estimates for the Arithmetic subtest were above .80 when computed for all groups except the non-remedial group which had a reliability estimate of .75. Passage Comprehension emerged as the weakest discriminator between groups. With reliability estimates below .60 and no difference between group means, the subtest appears to render little assistance in attempting to identify remedial from non-remedial students.



By administering the F.I.A.T. at the grade 5 level, 73.47% of the students were correctly classified with the weight of the correctly identified students being non-remedial (81.1%); 50% of the remedial students were correctly identified as remedial.

The F.I.A.T. emerged as a more powerful discriminator between groups at the grade 5 level than the grade 2 level. The Spelling subtest is the most powerful discriminator between groups with an overall correct classification rate of 75.51%, reliability estimates over .80, and a difference between means that is significant at .0005. However, as the purpose of the F.I.A.T. is to identify remedial students who are in need of remediation, and this subtest correctly identified 58.3% of remedial students as remedial, other subtests prove more powerful when entered into the analysis independently.

The Arithmetic subtest showed differences between means that were significant, reliability estimates above .80 except for the non-remedial group (.70) and had a correct overall classification rate of 66%, correctly identifying 68.4% of the remedial students as remedial.

Word Identification correctly identified 65.0% of the remedial students as remedial and 71.1% of the non-remedial students as non-remedial. Reliability estimates are above .80.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### SUMMARY

The purpose of this study was to examine the ability of the French Individual achievement test to discriminate between remedial and non-remedial French immersion students at grades 2 and 5.

A review of the literature on achievement testing in French immersion and of the current research in French immersion indicated that instruments most commonly used to assess the academic achievement of Canadian French immersion students were: standardized achievement tests normed on the native French speaking population of Montreal, standardized reading tests normed on Native French speakers, translations of standardized measures of achievement, and English achievement tests.

Cronbach (1949) advanced that, "tests must be selected for the purpose and situation for which they are to be used .... What tests are pertinent to be used depends on the instructional plan" (p.151).

In response to the need for a reliable and valid French immersion achievement measure, Wormeli and Ardanaz (1987) developed the F.I.A.T.

This study addresses the empirical validity of the instrument or the ability of the test to discriminate between remedial and non-remedial groups at grades 2 and 5.

At the grade 2 level only the Word Identification subtest of the F.I.A.T. discriminated between the remedial and non-remedial groups at a significance level of .01.

Although reliability estimates were above .80 for all subtests excepting for the Arithmetic subtest (.75 when calculated for the non-remedial group) and Passage Comprehension subtest (below .60 when computed for both groups individually and combined), the Spelling, Arithmetic and Passage Comprehension subtests were unable to discriminate between groups at a significance level of .01. Analysis of the Arithmetic and Passage Comprehension subtests indicated that the remedial and non-remedial groups obtained equal means. This finding suggests that the F.I.A.T. is not an accurate screening instrument at the grade 2 level.

At the grade 5 level, when subtests were analysed independently all subtests except Passage Comprehension discriminated between the two groups at a significance level of .01.

When subtests were entered simultaneously only Spelling emerged as a significant discriminator between groups with a correct classification rate of 75.51%.

Internal consistency reliabilities for both remedial and non-remedial groups were above .80 except for the non-remedial Arithmetic group.

Several caveats should be considered regarding the weakness of the F.I.A.T. at the grade 2 level.

The selection process of grade 2 students in need of remediation is done by teacher observation and nonstandardized testing. This factor may have created a sample that is not reflective of students in need of remediation. A second factor to be considered in explaining for the similar means between remedial and non-remedial groups for Spelling and Passage Comprehension may be that the French immersion curriculum guidelines from which test items were selected may be too difficult at the grade 2 level for the skills assessed by Spelling, Arithmetic and Passage Comprehension subtests, or that at the grade 2 level it is too early to screen for remediation.

In spite of the weakness of the F.I.A.T. to discriminate between remedial and non-remedial groups at the grade 2 level, the development of this

instrument is a major breakthrough in French immersion research.

French immersion research has been fraught with ambiguities since the inception of its first program in 1965. With an experimental base, a history and development based on nonstandardized measures and/or translated instruments, the curriculum, goals and research in French immersion have indeed been vulnerable.

The development of the F.I.A.T. is a statement of confidence in the future of French immersion. It is acknowledgement from the academic community that French immersion can and will be taken seriously in educational research; that with appropriate psychometric instrumentation emerges the possibility of French immersion programs with well-defined goals and the opportunity for all children to enter the French immersion innovation fearlessly.

#### **LIMITATIONS OF THE STUDY**

The study has several weaknesses that detract from its definitiveness. The sample size is small, particularly for the remedial groups. This limitation is difficult to overcome because of the lack of availability of students receiving remediation in

French immersion.

The composition of French immersion samples is always a limitation in French immersion research because of the select population enrolling in French immersion. Sample limitations are compounded in this study because remedial students assigned for remedial services are done so by teacher observation and informal assessment procedure. In addition, the predominant number of remedial students were receiving remediation for language arts rather than Arithmetic. The latter limitation reduces the discussion and inferences to be drawn as the effectiveness of the Arithmetic subtest in discriminating between remedial and non-remedial French immersion students.

#### **DIRECTIONS FOR FUTURE RESEARCH**

Opportunities for future research in French immersion are abundant, the ones mentioned in this publication are those that emerged as the most of desperate need of addressing and as those that would most readily offer French immersion research credibility and growth.

1. Further empirical validity studies with the F.I.A.T. using remedial and non-remedial students at different grade levels.

2. Correlational studies comparing performance on the F.I.A.T. with the British Columbia Quick Individual Achievement Test or other English Language Achievement tests.
3. Research into the process of second language learning and reading readiness and the development of standardized achievement measures for the primary French immersion population.
4. The development of a screening instrument that identifies students who would be eligible for French immersion programs to eliminate the population of students who are identified at grade 3 as unable to function in French immersion and who are then faced with entry to the regular English program having had only a half year exposure to English Language Arts.



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**APPENDIX A**

THE UNIVERSITY OF BRITISH COLUMBIA  
FACULTY OF EDUCATION  
EDUCATION CLINIC  
2125 MAIN MALL  
VANCOUVER, B.C. V6T 1Z5

1987.02.19

Dear Parent:

\_\_\_\_\_ school has agreed to participate in the development of an individualized achievement test for elementary school children enrolled in French immersion programs. This project requires the cooperation of children enrolled in grades 1-7. Their participation will provide information which will be used to complete the development of a new test (the Canadian French Immersion Achievement Test).

This project is being undertaken because of concern over the need for valid and reliable tests for French immersion pupils. It is endorsed by the Superintendent of your school district and by the Principal of your school. The final version of the test will evaluate reading, spelling and arithmetic. It will assist educators and psychologists in making decisions about the educational needs of specific children.

Your child's name was randomly drawn as a possible participant in this project. If you and your child agree to participate, \_\_\_\_\_ will be asked to take part in a testing session approximately forty minutes long. Your child will be informed by the examiner before testing begins that participation is voluntary and that testing will be stopped if your child wishes. Testing will be performed by a trained examiner at your child's school during school hours in March 1987.

The results of testing will be strictly confidential; your child's name will not appear on the test forms. No individual test results will be released. The

CANADA F.I.A.T.

PARENT CONSENT FORM

I give permission for my son/daughter to be tested for the French Immersion Achievement Test.

\_\_\_\_\_  
Signature of parent/guardian

I am unwilling to have my son/daughter involved in the testing

\_\_\_\_\_  
Signature of parent/guardian