
How Long? A Synthesis of Research on Academic Achievement in a Second Language

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To expand the current theoretical base in second language acquisition, this article proposes nine generalizations on optimal age, L1 cognitive development, and L2 academic achievement. These generalizations summarize the author's and others' research on second language acquisition for schooling purposes. In this synthesis, relationships among the following variables are considered: first language acquisition, second language acquisition, student age at the time of exposure to a second language, academic achievement (as measured by standardized tests in all subject areas), membership in a language majority or language minority community, and language(s) of instruction in school. The five new generalizations presented at the end of the article, which are based on research on academic achievement in a second language, merit additional research to validate and refine them.

How long does it take to master a second language for schooling? Is it easier to acquire that language when one is younger or older? What level of proficiency in first and second languages is needed to succeed academically in a second language? How long does it take to reach the level of average performance by native speakers in all academic subjects in the second language? This research synthesis addresses these questions.

For many years, educators have focused on the acquisition of English as the primary goal of special programs for limited English proficient (LEP) students. We have assumed that the development of English proficiency would result in our students' eventual attainment of the academic skills needed to succeed in school in a second language, at levels comparable to native English speakers. Yet we have conducted very little basic research that addresses variables that might influence this process, such as the length of time and the level of L2 proficiency required to achieve academic success in a second language.

Hakuta and Snow (1986) distinguish between basic research, which analyzes the linguistic, psychological, sociological, and cultural processes in human development, and evaluation research, which typically compares educational program models or teaching methods to examine their effectiveness. This synthesis of research includes studies from both basic research and evaluation research that explore how long it takes students studying in a second language to reach the level of average academic achievement by native speakers on standardized tests of reading, language arts, mathematics, science, and social studies. The synthesis includes an analysis of the influence of several important variables on academic achievement, such as first and second language acquisition, student age at the time of initial exposure to a second language, membership in a language majority or language minority community, and the language(s) of instruction in school.

AGE OF INITIAL SECOND LANGUAGE ACQUISITION

It is widely believed that young children are the fastest, most efficient acquirers of a second language. Language researchers dispute this common assumption but continue to debate the optimal age for beginning second language acquisition. However, increasing research evidence indicates that the age question cannot be separated from another key variable in second language acquisition: cognitive development and proficiency in the first language.

First language acquisition is not a quick and easy process; it takes a minimum of 12 years (McLaughlin, 1984; de Villiers & de Villiers, 1978). From birth through age 5, children acquire enormous amounts of L1 phonology, vocabulary, grammar, semantics, and pragmatics, but the process is not at all complete by the time children reach school age. From ages 6 to 12, children still have to develop in the first language the complex skills of reading and writing, in addition to continuing acquisition of more complex rules of morphology and syntax, elaboration of speech acts, expansion of vocabulary (which continues throughout a person's lifetime), semantic development, and even some aspects of phonological development (McLaughlin, 1984; de Villiers & de Villiers, 1978). For school purposes, language acquisition also must include the vocabulary and special uses of language for each subject area, such as metalinguistic analysis of language in language arts classes and many other learning strategies associated with the use of language in each content area (Chamot & O'Malley, 1987; Heath, 1986).

Second language acquisition research has found that this process of L1 development has a significant influence on the development

of L2 proficiency. One important finding is that the lack of continuing L1 cognitive development during second language acquisition may lead to lowered proficiency levels in the second language and in cognitive academic growth. Lambert (1984) refers to this as subtractive bilingualism; Cummins (1981b) describes this in terms of a lower threshold level in the first language, or limited bilingualism, with which negative cognitive effects are associated. Several research reviews have identified groups of students experiencing some negative cognitive effects of subtractive or limited bilingualism (e.g., Cummins, 1981b, 1984; Dulay & Burt, 1980; Duncan & De Avila, 1979; Skutnabb-Kangas, 1981).

When the debate about the optimal age for beginning acquisition of a second language for schooling purposes takes this important intervening variable—L1 cognitive development—into account, the arguments can be resolved fairly conclusively. Before puberty, it does not matter when one begins exposure to (or instruction in) a second language, as long as cognitive development in the first language continues up through age 12 (the age by which first language acquisition is largely completed). Cummins (1981b) refers to a common underlying proficiency, or interdependence, existing between a bilingual's two languages (even given widely varying surface features), with development of one language strongly aiding development of the second one. To see how this interdependence works, let us now examine research on the age question that addresses preschool children and school-age children.

Preschool Children

Many studies have examined simultaneous development of two languages in children from birth. (For syntheses or collections of these studies, see Hakuta, 1986; Hatch, 1978; McLaughlin, 1984.) All of these studies reveal that children go through a process similar to L1 acquisition, with initial mixing of the two languages followed by a fairly rapid sorting out of the two linguistic systems, between ages 3 and 5. When cognitive development takes place in each language, it is frequently stimulated by parents who work hard to raise the children bilingually. Preschool children who begin second language acquisition any time between ages 3 and 5 (successive bilinguals) are not at any disadvantage as long as they continue to develop their first language at the same time that they are acquiring the second language.

If simultaneous and successive bilinguals continue cognitive development in both languages throughout the elementary-school years, they frequently outperform monolinguals on measures of

cognitive flexibility, linguistic and metalinguistic abilities, concept formation, divergent thinking skills, creativity, and diversity (see, for example, De Avila & Duncan, 1980; Díaz, 1983; Hakuta, 1986).

School-Age Children

The language needed for school is unique and very complex. In the past, school personnel have frequently oversimplified the language acquisition process, assuming that a child who carries on a conversation, sounding just like a native speaker, is completely proficient in the second language. We now know that the type of language needed for school includes not only all the domains of language (phonetics, phonology, inflectional morphology, syntax, vocabulary, discourse, pragmatics, and paralinguistics—including both structure and semantics), with all four language skills (listening, speaking, reading, and writing) to be mastered in each domain, but also use of all of these domains and skills within each subject area to be mastered (language arts, mathematics, science, social studies; see Collier, 1989).

Language in school becomes increasingly complex and less connected to contextual clues as students move from one grade level to the next. Language becomes the focus of every content-area task, with all meaning and all demonstration of knowledge expressed through the oral and written forms of language. Cummins and Swain (1986) describe context-reduced, cognitively demanding school language as especially difficult to master. Yet by fourth grade, most uses of language in school fall into this category. This review addresses, first, the acquisition of basic L2 skills and, second, the acquisition by nonnatives of the more cognitively complex school language.

Basic second language skills (survival language). The earliest studies addressing age differences focused on pronunciation, a cognitively undemanding task. The findings of these studies are very consistent: After 3 to 5 years of exposure to a second language, the large majority of subjects who begin second language acquisition after puberty retain a foreign accent, whereas children initiating second language acquisition before puberty retain little or no foreign accent (e.g., Asher & García, 1969; Fathman, 1975; Oyama, 1976; Seliger, Krashen, & Ladefoged, 1975; Tahta, Wood, & Loewenthal, 1981; Williams, 1979).

Lenneberg (1967) believes that older acquirers' difficulty in achieving a native-like pronunciation is due to loss of cerebral plasticity by puberty. In an extensive synthesis of studies on this

topic, Long (1988) confirms the existence of maturational constraints on second language acquisition but asserts that much more research needs to be conducted in this area. Although the reasons for older acquirers' difficulty with acquisition of L2 pronunciation are debated by language researchers, the phenomenon clearly exists and is often cited as a rationale for beginning second language acquisition prior to puberty, if at all possible.

With regard to the role of age in the acquisition of other oral skills needed for basic communication, studies have found that in the initial stages, older children and adults proceed through syntactic and morphological development faster than younger children. However, after 2 to 3 years, children beginning second language acquisition before puberty achieve higher proficiency levels than individuals beginning as adolescents or adults (see Krashen, Scarcella, & Long, 1982, for a synthesis of these studies). Thus, in the long run, prepubertal children are the best acquirers of the basic L2 skills needed for interpersonal communication.

This phenomenon of older children and adults being more efficient L2 acquirers in the early stages confuses most people. A common assumption is that "young children pick up a second language so fast." What is not often taken into account by the layperson is the vast difference in the level of language complexity expected for each age. Children's second language acquisition *appears* superior largely because the structures and vocabulary they need for adequate communication are so much simpler than those required of adults. In addition, children at age 6 have not yet begun to complete full cognitive development in their first language. Young children can be outperformed by older subjects on similar tasks in the second language because of the latter group's greater cognitive maturity and the knowledge or life experience that transfers from the first to the second language. This is even more clearly demonstrated in the following summary of studies focusing on acquisition of context-reduced, cognitively demanding aspects of oral and written school language.

Context-reduced and cognitively demanding school language. A number of researchers have compared the performance of subjects of different ages on language tasks associated with school skills. The short-term studies once again show initial advantages among the older subjects, but a new phenomenon emerges here. When examining optimum age for beginning second language acquisition, most studies of both short-term and long-term gains have found that students initiating second language acquisition between the ages of 8 and 12 are faster in early acquisition of L2 skills; in addition, over

several years' time, they maintain a greater cognitive advantage over younger children initiating second language acquisition at 4 to 7 years of age.

Two measures are frequently used in reporting findings on second language acquisition by immigrants. Age on arrival (AOA) refers to the age at which an individual entered the country in which the second language is spoken. It also marks the age at which the immigrant's exposure to the second language began, as well as the age that schooling in the second language for part or all of each school day began. Length of residence (LOR) is defined as number of months or years of L2 exposure, both inside and outside the formal classroom.

Among the short-term studies, Ekstrand (1976) tested 2,189 immigrants to Sweden with a LOR of 2 years and an AOA of 6 to 14, using measures of listening comprehension, pronunciation, free oral production, reading comprehension, dictation, and free written production. He found that older students performed better than younger students on all measures. Ervin-Tripp (1974) tested English speakers' acquisition of French in Switzerland during their first 9 months of exposure. On measures of comprehension, imitation, taped natural conversation, diary writing, and translation, the 7- to 9-year-olds were superior in syntax, morphology, and pronunciation to the 4- to 6-year-olds. Examining foreign language learning in an elementary school in Japan, Grinder, Otomo, and Toyota (1962) found that in comparison with second graders, fourth graders excelled in vocabulary development, listening comprehension, and, in some instances, pronunciation after 1 year of study.

Snow and Hoefnagel-Höhle (1978) examined English speakers representing a wide range of ages who were acquiring Dutch in Holland. They grouped subjects into five age groups: 3- to 5-year-olds, 6 to 7, 8 to 10, 12 to 15, and adults. Subjects were tested during their first 6 months of exposure to Dutch, at 10 months, and at 14 to 15 months. Testing was limited to oral measures of language, including pronunciation, auditory discrimination, morphology, sentence repetition, sentence translation, sentence judgment, story comprehension, and the Peabody Picture Vocabulary Test. At the first testing (LOR of 6 months), the adults and the 12- to 15-year-olds performed better on all measures. By the third test (LOR of 14 to 15 months), the adults' progress had slowed considerably, and the 8- to 10-year-old and 12- to 15-year-old groups had surpassed all others. The 3- to 5-year-olds were consistently the worst performers on all measures, thus confirming findings of other short-term studies that older students outperform younger students. (It should be noted, however, that measures used in the study were the same

across all ages. When age-appropriate measures are used, the results are different, as is seen in the studies reviewed in the section on adolescents in the second half of this article.)

Among the long-term studies, Burstall (1975), who examined foreign language learning in the elementary school, found that 16-year-old speakers of English introduced to French at age 8 were only slightly ahead of 16-year-old students who had started studying French at age 11 when both groups were tested on measures of listening, speaking, reading, and writing.

Similarly, Lapkin, Swain, Kamin, and Hanna (1980) discovered (much to their surprise) that 10th-grade students from late French immersion programs, who had accumulated 1,400 hours of instruction in French, achieved scores on tests in oral and written skills in French roughly equivalent to 10th-grade students from early immersion programs, who had accumulated 4,000 hours of French instruction. The group with 1,400 hours of French had had 20 to 40 minutes per day of French as a second language instruction in elementary school and immersion in academic instruction in French in 7th and 8th grades. The group with 4,000 hours of French had had their French immersion experience in kindergarten and 1st grade, with academic instruction in English beginning in Grade 3 and academic course work in both English and French throughout the rest of their schooling.

Other studies of late immersion have found that only those students who have had sufficient preparation in French in Grades K through 6 are able to achieve in the second language on a par with the early immersion students (Cummins & Swain, 1986). Genesee (1978) concludes that older students are efficient L2 learners in late French immersion programs because their ability to abstract, classify, and generalize in the first language may aid in second language acquisition for academic purposes.

After seeing this consistent, emerging pattern among almost all the studies on age variation in second language acquisition for school purposes, Cummins (1981a) chose to reexamine the data from one study (Ramsey & Wright, 1974) that seemed to contradict the findings of other studies. Ramsey and Wright had concluded that students with an AOA of 6 to 7 were more advantaged in L2 development than older learners. Cummins undertook this reanalysis because LOR was not included as a variable in the Ramsey and Wright study.

Cummins (1981a) found that LOR was a significant variable on all tests of oral and written skills. Students being schooled only in the second language who were tested in the fifth, seventh, and ninth grades were found to require a LOR of 5 to 7 years to reach the

grade mean for native speakers in language skills needed for school. In comparing the number of correct answers on a given set of test items across various ages of subjects, Cummins found, as had previous researchers, that older students performed better than younger learners because they were more cognitively mature. This difference was lessened, however, when younger and older students were compared using norms appropriate to their age and grade. In addition, Cummins found that the effects of LOR and AOA variables seem to diminish with time, especially after a LOR of 5 years.

In this same study, Cummins found that immigrants took approximately 2 to 3 years to reach proficiency in basic communicative skills in English, or context-embedded, cognitively undemanding aspects of language. School personnel frequently assume that proficiency in this type of language is all that is needed to succeed in school. Yet proficiency in basic L2 skills does not correlate highly with the type of language needed for context-reduced, cognitively demanding language tasks, as measured on standardized tests; nor does proficiency in basic skills correlate highly with informal measures designed to test the thinking skills and more abstract thought required in the upper elementary grades and secondary school (Collier, 1987; Collier & Thomas, 1988; Gottlieb, 1985; Saville-Troike, 1984). In contrast to the 2 to 3 years needed to reach proficiency in basic L2 skills, Cummins found that a period of 5 to 7 years of study in the second language is required to reach native-speaker levels in school language.

In another study, Cummins et al. (1984) examined age differences and the influence of L1 development on L2 school language development. Japanese students in Canada in Grades 2, 3, 5, and 6, as well as Vietnamese students aged 9 to 17, were tested on measures of English vocabulary, reading, prepositional usage, and sentence repetition and were given oral interviews. On measures of L2 school skills, older students performed significantly better, whereas younger students outperformed older students on context-embedded measures, or basic skills in English. Multiple regression analyses of both Japanese and Vietnamese students' scores revealed that development of L1 school language accounted for a highly significant proportion of the variance in L2 school language.

In his theoretical framework, Cummins (1978) explains that older students' better L2 performance in academic settings is strongly related to the development of L1 school skills. His interdependence hypothesis predicts that the development of L2 school language is partially dependent upon the prior level of development of L1 school language. Cummins asserts that there is a common

underlying proficiency that makes possible the transfer of school skills across a student's two languages.

Generalizations on the Optimal Age for Acquisition of a Second Language

At this point, we can make the following generalizations about the relationships among first language acquisition, second language acquisition, and student age at the time of initial exposure to a second language:

1. Before puberty, it does not matter for overall long-term academic achievement when one is initially exposed to (or first receives instruction in) the second language, as long as L1 cognitive development is continued through age 12 (the age by which first language acquisition is largely completed).
2. When children's L1 development is discontinued before it is completed, they may experience negative cognitive effects in L2 development; conversely, children who have reached full cognitive development in two languages enjoy cognitive advantages over monolinguals.
3. At the beginning stages of second language acquisition, adults and adolescents with solid L1 development master basic interpersonal communicative skills faster than children. After 2 to 3 years of L2 exposure, however, children achieve higher L2 proficiency in basic interpersonal communicative skills, with adults and adolescents typically retaining an accent.
4. Older children (ages 8 to 12) who have had several years of L1 schooling are the most efficient acquirers of L2 school language. Adolescents with solid L1 schooling are equally efficient acquirers of L2 school language, except for pronunciation.

ACADEMIC ACHIEVEMENT AND SCHOOL LANGUAGE

Up to this point, this synthesis of research has focused on the development of L2 proficiency, as influenced by age and L1 proficiency. Now let us consider the key question of academic achievement in a second language.

Academic achievement may be measured in a variety of ways: by teacher-made tests in each subject area studied; by grade point average in all subjects; by student performance on tests designed by a school district to measure attainment of the objectives of the local curriculum; or by standardized tests designed to compare the performance of one group of students with that of all students in the

United States. To make direct comparisons from one study to another, we must use standardized test scores, since they are the only measure providing a normative standard. However, it must be kept in mind that standardized tests are extremely limited measures of language proficiency, in that they measure only one language skill, reading, and do not test the student's ability to use the language for any spoken or written communicative function. Nevertheless, standardized tests can provide a measure of students' abilities to think in the language and to demonstrate content knowledge.

Basic Research on Academic Achievement in a Second Language

Very few basic research studies have addressed the question of the length of time required for L2 students to reach the level of average academic achievement by native speakers. Cummins (1981a) examined the length of time needed for immigrants to acquire school language when schooled exclusively in the second language after arrival. His study examined the achievement of 1,200 Canadian immigrants in Grades 5, 7, and 9. Measures did not include all the content areas but focused on school language as measured through standardized tests. Cummins found that it took LEP students 5 to 7 years to reach native-speaker norms at the 50th percentile or 50th normal curve equivalent (NCE). Number of years of L1 schooling was not included as a variable.

Collier (1987) and Collier and Thomas (1988) conducted two studies analyzing the length of time required for 2,014 immigrants, whose schooling was exclusively in English after arrival in the United States, to reach native-speaker norms on standardized achievement tests in reading, language arts, mathematics, science, and social studies. AOA ranged from 4 to 16 years and LOR from 2 to 6 years. Over 75 different languages were represented in the sample, which included 65% Asians and 20% Hispanics. To control the important variables of L1 schooling and socioeconomic status, only those students who were at grade level in the first language when they entered the United States and who were from a middle- or upper middle-class background were included. The studies were also limited to those students with no previous exposure to the English language prior to their arrival in the United States.

Results of the studies showed that those students below age 12 who had had at least 2 years of formal schooling in their first language before arriving in the United States reached the 50th percentile or 50th NCE on the reading, language arts, science, and social studies tests in 5 to 7 years. Clear evidence of transfer of content

knowledge in mathematics from first to second language was demonstrated by students' high achievement on math scores, reaching the 64th to 73rd NCE (or 75th to 86th percentile) after only 2 years of study in English (2 years' LOR).

In contrast, young students who had arrived between the ages of 4 and 6 and had had little or no schooling in their first language had not reached the 50th percentile or 50th NCE within the first 6 years of LOR and were projected to reach it in 7 to 10 years at their demonstrated rate of progress. Those students who arrived at ages 12 to 16 also scored dramatically lower than students with an AOA of 8 to 11. After 6 years of schooling all in the second language, they had reached the 50th percentile or 50th NCE only on the standardized test in mathematics. On the 11th-grade test, the older students, after 6 years' LOR, had reached only the 31st NCE (18th percentile) in reading, the 42nd NCE (35th percentile) in language arts, the 38th NCE (28th percentile) in social studies, and the 37th NCE (27th percentile) in science. At this rate of progress, they would be unable to score at the 50th percentile or 50th NCE before graduating from high school.

From this point on, NCEs are reported rather than percentiles because they represent a conversion of percentiles into equal-interval data and thus a more appropriate measure for analysis. Unlike percentiles, NCEs are preferred for statistical analysis because arithmetical operations can be performed only on equal-interval scales.

Young children. Collier's (1987) and Collier and Thomas's (1988) findings on young children with little or no L1 schooling provide more research evidence for the interdependence of the two languages and for the importance of continuing cognitive development in the first language, including L1 literacy, for more efficient acquisition of the second language. When schooled exclusively in the second language, children who arrive at ages 4 to 7 may need 1 to 5 more years to reach the same levels of academic achievement as older LEP children who have had some L1 schooling.

Collier's (1987) and Collier and Thomas's (1988) findings, along with those of Cummins (1981a), provide evidence that L2 proficiency and academic achievement do not occur quickly; rather, they involve a developmental process that takes a much longer time than school personnel have previously assumed. All three studies found that when schooled exclusively in the second language, students require a minimum of 5 years to reach the 50th NCE on standardized tests; this is true even for the most advantaged students, that is, those who have a strong educational background and who come from a middle- or upper middle-class background.

Adolescents. The findings on adolescents past puberty in the Collier (1987) and Collier and Thomas (1988) studies were the biggest surprise. Adolescents with good cognitive development in the first language, such as the adolescents in these studies, reach high levels of proficiency in basic L2 skills in 2 to 3 years, with the possible exception of native-like pronunciation. However, during this period of acquisition of the second language, these students received no assistance with continuing content-area achievement, except for sitting in mainstream classes in which they could not understand the language of instruction. As a result, their academic achievement lagged behind that of native English-speaking peers. It appears that secondary students cannot afford the loss of 2 to 3 years of academic instruction while they are mastering basic L2 skills, if their expectations are to compete successfully with native speakers who plan to pursue a university degree.

Herein lies the fallacy in the assumption by educators that once adolescents have acquired basic L2 skills, they will be able to do well in school. In secondary school, the level of cognitive complexity and sequential content knowledge needed for each subject is extremely dependent on prior knowledge. If academic work in the first language is not continued at home or at school while secondary students are acquiring the second language, there may not be enough time left in high school to make up the lost years of academic instruction.

Three studies examining adolescents' second language acquisition, cited earlier in this article, found these older L2 acquirers to be the fastest in comparison with younger children. However, two of the studies (Ekstrand, 1976; Snow & Hoefnagel-Höhle, 1978) were short-term, measuring basic L2 skills during the first 2 years of L2 study, and focused on measuring absolute gains in the second language, with approximately the same language measures given to all ages. Yet adolescents and older children typically show faster absolute gains in the early stages. In contrast, Collier (1987) and Collier and Thomas (1988) examined students' long-term L2 and content-area achievement using standardized measures that varied for each age and grade level, increasing appropriately in cognitive complexity with each age group. Early gains seen in 8th-grade scores were not evident by 11th grade, with adolescents needing as many years (7 to 10) as the youngest children who had had no L1 schooling.

The third study that found adolescents to be among the best L2 acquirers (Lapkin et al., 1980) measured long-term academic achievement among students whose academic instruction was never

interrupted. These adolescents had actually begun L2 study during their elementary-school years, prior to puberty. While they were acquiring basic skills in French (L2) during their elementary-school years, they received all academic instruction in English (L1), keeping up to grade level. By the time they began academic immersion in the second language in seventh grade, they had developed sufficient L2 proficiency to continue uninterrupted academic development.

From an examination of these few studies in basic research, it is apparent that an important key to successful second language acquisition *and* academic achievement by adolescents may be uninterrupted academic instruction during the acquisition of basic L2 skills. To examine this question further, let us turn to some evaluation research that examines long-term academic achievement in a second language.

Evaluation Research on Academic Achievement in a Second Language

Other studies that report on the L2 development and content-area achievement of L2 acquirers can be classified as program evaluations. Hundreds of evaluations of U.S. programs have been conducted, although results are relatively inaccessible to the public. This review is limited to published longitudinal evaluations from around the world that have reported findings in sufficient detail to allow for comparisons of student achievement.

These evaluation findings typically report results on two types of standardized measures of the second language—reading and language arts tests. For the purposes of this synthesis, reading scores are considered to be a more valid predictor of L2 thinking skills than language arts scores. A standardized language arts test typically measures the easily taught aspects of language: punctuation, capitalization, spelling, and simple grammar points. In contrast, a reading test usually measures, through reading comprehension passages and vocabulary analysis, the ability to think in the language. Most of the school districts investigated report that students reach the 50th NCE on a standardized language arts test 2 to 4 years earlier than they reach the 50th NCE on the reading test. For this reason, a reading test is a better predictor of students' academic performance in the second language at the secondary and postsecondary levels.

Schooling in two languages for language minority students. Each of the evaluations reviewed in this section used a comparison group being schooled only in the second language; in each case, the

experimental group was being schooled bilingually. Each found that the comparison group typically performed better in the first (and sometimes second) year of schooling when both groups were tested in the second language and that subsequently the two groups performed roughly equally. Then, in the fourth or fifth (or sometimes sixth) year, the students in the bilingual program made dramatic gains, whereas the comparison group remained significantly below grade level. L1 instruction throughout the elementary school years, coupled with gradual introduction of the second language, seems to produce a consistent pattern of greater academic achievement in the second language at the end of 4 to 7 years of schooling, even though the total number of hours of instruction in the second language may be dramatically smaller when compared with schooling in the second language only.

Gale, McClay, Christie, and Harris (1981) reported the results of a longitudinal evaluation of an Australian bilingual program. Aboriginal students taught in their native language and in English for all grades performed significantly better on 10 different oral and written measures of English after 7 years of schooling than did aboriginal students schooled only in English. Although students in the bilingual program had not yet reached national norms in the seventh year, L1 cognitive development appeared to aid their academic achievement significantly.

In another study, Malherbe (1978) found that students in South Africa being schooled in Afrikaans and in English experienced an initial lag in mastery of academic subjects when English was introduced. However, this lag disappeared by the end of Grade 6, when students reached grade-level norms on all tests in English.

Skutnabb-Kangas (1979) found that Finnish 9- to 11-year-old arrivals to Sweden, with several years of L1 schooling, achieved at significantly higher levels than Finnish students with an AOA of 6 to 8 years who had had little or no L1 schooling. In another study reported by Skutnabb-Kangas, Finnish children being schooled in a bilingual program in Sweden that permitted L1 cognitive academic development through Grade 6 were able to achieve at grade level when tested in Swedish in the sixth grade.

In the United States, McConnell and Kendall (1987) found that by Grade 5, immigrants to the state of Washington participating in a bilingual program were scoring at or above the 50th NCE in mathematics, vocabulary, and English reading. Plante (1977) reported that Hispanic students from low-income families who were participating in a Connecticut bilingual program were at or above national norms in English and mathematics by the end of

Grade 3, whereas a comparison group receiving instruction only in English performed significantly less well than the students in the bilingual program.

Tempes et al. (1984) reported that Hispanic students in several bilingual programs in California had reached national norms in English reading by fifth or sixth grade and in mathematics by third or fourth grade. In general, these programs began literacy and content-area instruction in the first language; literacy instruction in the second language was introduced in third grade, and content-area instruction in both languages continued throughout the elementary-school years.

Krashen and Biber (1988) present additional data on bilingual programs in four other California school districts that report similar findings. On standardized tests, Hispanic students from low-income families were able to reach the 50th NCE by sixth grade in reading in English and by third grade in mathematics when tested in English. Two school districts whose Hispanic students traditionally scored extremely low were able, with the addition of L1 cognitive academic development materials to the curriculum, to bring their scores in English up to the 44th and 48th NCEs in reading and mathematics, respectively, by fifth grade.

Troiike (1978) reported that students in a French-English bilingual program in Minnesota were at or above national norms in all content areas by the end of 5 years of schooling in both languages and that Hispanic students in a bilingual program in New Mexico reached national norms in mathematics by the end of fourth grade and in English reading by the end of fifth grade. Medina and Valenzuela de la Garza (1987) reported that Mexican American students in four bilingual elementary schools in Arizona were scoring above national norms on the California Achievement Test at the end of third grade on all subject-area tests.

Vorih and Rosier (1978), in an investigation of Navajo students in Arizona, found that those in a bilingual program reached national norms by sixth grade but that those being schooled only in English (L2) performed substantially below the experimental group. In a longitudinal study, Medina, Saldade, and Mishra (1985) reported that Hispanic students who had attended a maintenance bilingual program at the elementary-school level in Arizona were still achieving at or above national norms in mathematics and in English reading in the 12th grade.

The research findings reported in this section support the view that it takes 4 to 7 years of dual-language cognitive academic development for academic gains to be clearly seen but that once those gains are achieved, students being schooled in both languages are

much more academically successful than their peers being schooled only in the second language. However, very little research has been conducted on the academic achievement of students from dual-language programs at the secondary level.

ESL programs for language minority students. Very few ESL program evaluations have been reported. A few studies of short-term gains have been summarized by Long (1983), who found that special L2 instruction does improve, to some degree, students' performance on L2 tests, compared with that of students who have "natural" exposure to the language without special L2 instruction. However, there is a strong need for further research in this area.

Collier (1987) and Collier and Thomas (1988) have reported on the L2 academic achievement of ESL students over a 6-year period, but in these studies there were no comparison groups receiving only natural L2 exposure or bilingual instruction. The Collier and Thomas studies did not evaluate the ESL program, since complete data were not available on the exact length of time that each student remained in ESL classes. Most students received 1 to 2 hours of ESL instruction daily for 1 to 2 years and were immersed in the mainstream for the rest of their classes. Thus, these studies provide an analysis of how students perform when they are immersed in the second language in school with a small amount of ESL pullout instruction. In this situation, it took the 8- to 11-year-old arrivals 5 to 7 years to reach the 50th NCE on all the standardized tests combined, and it was projected that the 4- to 7-year-old and adolescent arrivals would take 7 to 10 years to reach the 50th NCE.

Saville-Troike (1984) followed 19 children, ages 7 to 12, through their first year of English (L2) acquisition, examining their achievement on many measures of oral and written English and academic performance in all subject areas. She found that the two major factors that correlated significantly with their L2 academic achievement were development of English vocabulary and opportunity for continuing cognitive development in the native language with peers and adults.

Gersten and Woodward (1985) summarized two evaluations of structured ESL immersion programs. In this type of program model, which provides instruction only in English, materials are designed for student mastery of minute structures, taught on a sequential, step-by-step basis. In one program, Hispanic students were taught all in English using highly structured DISTAR materials for language and mathematics lessons in Grades K through 3. After 4 years in this program, students scored slightly above national norms on language arts, at the 47th NCE on mathematics, and at the

39th NCE on reading. In the second structured immersion program, 16 Asian students placed in a special class reached the 58th NCE in reading and mathematics 5 years after entry into the program, but this was not a sufficient number of students for the findings to be generalizable.

In summary, there is a great need for more studies on the long-term achievement of students being schooled entirely in the second language. It may take as long as 7 to 10 years for nonnative speakers to reach the average level of performance by native speakers on standardized tests, as found in the Collier (1987) and Collier and Thomas (1988) studies. In the bilingual program evaluations, comparison groups of students being schooled exclusively in the second language typically never reach the 50th NCE.

Schooling in two languages for language majority students. Other school evaluations that provide additional insights into the question of how long it takes to master a second language for schooling are evaluations of Canadian immersion programs. From these evaluations, extensive published data are available on the academic achievement of language majority students in kindergarten through Grade 12. Reviews of this research can be found in Cummins and Swain (1986), Genesee (1987), Larter and Cheng (1984), and Swain and Lapkin (1981).

Among the variations in immersion models, early total immersion is the most widely implemented. This model typically provides all instruction in the second language (the minority language) for the first 2 years of schooling (kindergarten and first grade). Beginning in second or third grade, students receive one hour of L1 language arts instruction; generally by fourth grade, 50% of the curriculum is taught in the first language and 50% in the second language. At the secondary level, 60% of the instruction is in the first language and 40% in the second language.

Evaluations of early total immersion programs have typically found that by the end of Grade 5, students reach national norms in tests in both languages in all subject areas and that they continue to achieve above national norms throughout the rest of their schooling. Once the first language is introduced into the curriculum, students reach national norms within a year on L1 standardized mathematics and reading tests (Swain & Lapkin, 1981).

In early partial immersion, in which balanced instruction in both languages is provided for kindergarten through Grade 12, students' achievement sometimes lags behind that of early total immersion students, although the differences disappear by sixth or seventh grade. One explanation for this is that the introduction of literacy

training simultaneously in two languages causes confusion for students, and it takes them longer to sort out the two language systems (Cummins & Swain, 1986).

Late immersion students begin their immersion experience in Grades 7 or 8. Those who have had L2 instruction for 20 to 40 minutes daily from kindergarten through Grade 6 are sufficiently proficient in the second language so that their academic achievement does not suffer when they are totally immersed in L2 instruction. However, those who have had only 1 or 2 years of prior L2 instruction lag somewhat in their academic achievement while they are taught only through the second language. Students who undergo only 1 year of late immersion appear to do well at first but do not sustain their L2 achievement as they continue through high school. As noted earlier, late immersion students who have had sufficient L2 preparation prior to the immersion experience perform as well as early total immersion students in measures of L2 proficiency, even though they have had approximately one fourth the number of hours of L2 instruction. Overall, however, early total immersion students generally outperform students in all other types of immersion programs on attitudinal measures and on measures of academic achievement throughout their schooling (Genesee, 1987).

Generalizations on Academic Achievement in a Second Language

The research reviewed in the second half of this article, on the length of time that it takes to become proficient in a second language for schooling purposes and to reach native-speaker norms in academic achievement, leads to additional generalizations on the relationships among the following variables: first language acquisition, second language acquisition, student age at the time of exposure to a second language, academic achievement (as measured by standardized tests in all subject areas), membership in a language majority or language minority community, and languages of instruction in school.

1. When students are schooled in two languages, with solid cognitive academic instruction provided in both the first and second languages, both language minority and language majority students generally take from 4 to 7 years to reach national norms on standardized tests in reading, social studies, and science (measures of thinking skills), whereas their performance may reach national norms in as little as 2 years in L1 and L2 tests in mathematics and language arts (the latter testing spelling, punctuation, and simple grammar points). Social class background

does not appear to make a significant difference in academic achievement in a dual-language program.

2. Immigrants arriving at ages 8 to 12, with at least 2 years of L1 schooling in their home country, take 5 to 7 years to reach the level of average performance by native speakers on L2 standardized tests in reading, social studies, and science when they are schooled exclusively in the second language after arrival in the host country. Their performance may reach national norms in as little as 2 years in mathematics and language arts.
3. Young arrivals with no schooling in their first language in either their home country or the host country may take even longer to reach the level of average performance by native speakers on L2 standardized tests: possibly as long as 7 to 10 years in reading, social studies, and science, or indeed, never. Very little longitudinal research has been conducted in this area, however.
4. Adolescent arrivals who have had no L2 exposure and who are not able to continue academic work in their first language while they are acquiring their second language do not have enough time left in high school to make up the lost years of academic instruction. Without special assistance, these students may never reach the 50th NCE or may drop out before completing high school. This is true both for adolescents with a good academic background and for those whose schooling has been limited or interrupted.
5. Consistent, uninterrupted cognitive academic development in all subjects throughout students' schooling is more important than the number of hours of L2 instruction for successful academic achievement in a second language.

These generalizations represent new syntheses of common patterns in research findings on academic achievement in a second language. Researchers are encouraged to conduct additional studies to validate and further refine these generalizations.

In both basic and evaluation research, many more studies need to be conducted that examine all ages of students acquiring a second language for schooling. Evaluation studies reported in this synthesis represent those that were published and gave sufficient information on method in order to provide some valid measures for purposes of cross-study comparisons. To date, most comparisons of student achievement in schools are given using national norms of standardized tests. These tests are not the best measures of second language proficiency, and in the future, it is hoped that researchers may find other measures for comparisons of academic achievement

in a second language. Much still remains to be done to understand the variables that influence academic achievement in a second language.



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