

THE IMPACT OF THE USE OF PRINTED INSTRUCTIONAL MATERIALS WITH  
NATIVE LANGUAGE SUPPORT ON IMMIGRANT STUDENTS' PERFORMANCE  
IN HIGH SCHOOL MATHEMATICS

by

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B.A., Irkutsk State Linguistic University, 1972

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AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Secondary Education  
College of Education

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Manhattan, Kansas

2006

## **Abstract**

This study explored the benefits of one instructional strategy on the development of English skills and on the achievement in academic school areas by linguistically different high school students. The specific strategy chosen was the use of printed instructional materials with native language support in subject matter areas. The academic performance of adolescent immigrant students having printed instructional materials with native language support in one subject area was compared to their academic performance in the same subject without using native language support. In addition, the study explored qualitatively the perceptions of the use of printed instructional materials with native language support in subject matter areas among learners, their parents, and ESL as well as subject area teachers.

The statistical analysis of linguistically different high school students' test performance in geometry showed that instructional materials with native language support contributed significantly to the improvement of students' performance. The comparison of ESL students' performance with the performance of non-ESL students demonstrated that, on average, ESL students who were lagging behind the non-ESL students before the treatment was applied, outperformed the non-ESL students when native language support was available and then closed the gap between ESL and non-ESL students on subsequent material without native language support..

The student survey demonstrated the ESL students' preference for having regular subject area textbooks in English containing page by page glossaries and explanations in their native language. Parents' responses to questionnaires showed that the instructional materials with native language support enabled parents to understand what their children study in school and to help their children with their school work. Both ESL and the majority of geometry teachers noticed the

positive changes in their ESL students when ESL students were provided with materials containing native language support.

All parties participating in the research supported the idea of providing adolescent immigrant students with printed instructional materials containing native language support in all academic subject areas, which would require a collective effort of educators in the fields of science, mathematics, social studies, language arts as well as special education teachers.

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... only attention and respect for those we call neighbors can hope to create conditions in which men can, with the minimum of wasted energy, bring into life the maximum of beauty, goodness and understanding.

(Chaliapin,1967, p. 31)

## **CHAPTER 1 - The Problem**

Educating linguistically different students has been a challenge for educators for years. For immigrant children it has meant a struggle to succeed or keep up with school work as well as adjust to a new social life. Transitioning between schools may be less difficult for children who speak the same language at home and at school. However, for children belonging to language minority groups, starting school means starting to learn a new language.

This is especially true for older children and adolescents whose needs to use language are higher in comparison to younger children (Piaget, 1973; Saville-Troike, 1984; Vygotsky, 1986; Salzinger, 1979). The years they have spent acquiring competence in their native language may seem wasted to them when they find their teachers, their textbooks, and their classmates using a different language. This language barrier may block their learning, discourage their efforts, and reduce their chances of success in the educational system (Spolsky, 1972). Learning in school depends on interactions between children and teachers, books, and classmates; all these interactions are mediated by language. Most of the teaching and learning takes place through language and most of the learning depends on a child's ability to understand what the teacher says and what is written in the books (Vygotsky, 1986). Without communication between teachers and students as well as between students and written and audio-lingual instructional materials, there is little chance for effective education.

Without oral and written English language skills, students are hard pressed to learn and demonstrate their knowledge of mathematical reasoning, science skills, social studies concepts, and so forth. Students who lack proficiency in English are at a decided disadvantage.

(Echevarria, Vogt, & Short, 2004, p. 11)



## **Immigrant Students in the U.S.**

### ***Changing Trends in Immigrant Student Populations***

The data published by the U.S. Census Bureau (2000) showed a continuation of the immigration trends that began in the previous decade. The number of immigrants rose 16 percent over the last five years (Lyman & Goodman, 2006). An estimated 32.5 million U.S. residents, or 11.5 percent of the US population, are foreign-born (Camarota, 2002). The number of school-aged children who speak a language other than English at home and who report some difficulty with English increased by 46 percent over the last decade and now comprises 6.6 percent of the entire school-age population—nearly 3.5 million out of 53 million school students (Crawford, 2002). The National Clearinghouse for English Language Acquisition (Friedman, 2002) gives even higher estimates: more than nine percent of students enrolled in U.S. public schools in 2000, that is almost five million students, were defined as Limited English Proficient (LEP).

The problem of educating immigrant children is no longer an inner-city issue. The population of LEP students is spreading from the West and East coasts to central states of the country. Increasing numbers of immigrants are settling in non-traditional urban and rural communities, particularly in the southern and mid-western states (Morse, 2001; Lyman & Goodman, 2006). In Garden City, Kansas, 25 percent of students are limited English proficient students (Associated Press, 2003), and in Dodge City, the same state, more than 30 percent of the children enrolled in public schools are the children of immigrants (Suárez-Orozco & Suárez-Orozco, 2001). Today, Kansas is the 25th immigrant-children receiving state in the country, with more than six percent of non-English-speaking students (Ruiz-de-Velasco & Fix, 2000). Unlike the traditional immigrant-receiving East and West coast states, the Southern and Mid-western states tend to have little experience or infrastructure with which to respond to the linguistic and cultural challenges posed by the new arrivals (Morse, 2001). This trend suggests a growing need for transitional services to assist recently arrived immigrants, with specific attention geared toward helping them in overcoming language difficulties.

### *Adolescents' Representation Within the School-Age Immigrant Population*

By definition, limited English proficient (LEP) students are students who come from a home where a language other than English is the primary language and who experience difficulty in understanding oral English or in speaking, reading, or writing the English language that may impair their success in school with English language instruction (Ruiz-de-Velasco & Fix, 2000). LEP students may be foreign-born immigrant children as well as children born in the U.S. into immigrant families. Ruiz-de-Velasco and Fix (2000) point out that foreign-born immigrant children represent a larger share of the total high school population (5.7 percent) than of the total elementary school population (3.5 percent). Immigrant children who have lived in the United States less than five years also represent a larger share of secondary than elementary school populations (2.7 versus 2.0 percent). Based on these data, Ruiz-de-Velasco and Fix state that financial allocations for language acquisition programs are distributed unevenly, with LEP students at the secondary school level receiving a significantly smaller share of any form of English instruction than in elementary school. The authors assume that children born outside the United States need more English language instruction than U.S.-born children, pointing to the fact that more than 15 percent of all LEP students coming to the U.S. have missed two or more years of school in their home countries. They write that the “secondary schools have benefited comparatively little” (p. 51) from resources provided by Emergency Immigrant Education Act and by Title I and Title VII (Bilingual Education Act) of the Elementary and Secondary Education Act. In the 1997-98 school year, for example, secondary schools accounted for one-third of all Title I eligible students, but received only 15 percent of Title I funds (Ruiz-de-Velasco & Fix, 2000). Seventy six percent of LEP students in elementary schools receive specialized language instruction compared with only 42 percent of LEP students in junior high school and 48 percent of high school LEP students (Ruiz-de-Velasco & Fix, 2000). Faltis and Wolfe (1999a) point to the lack of research on second language acquisition by adolescent immigrant students, stating that for every one research article that focuses on secondary education, there are hundreds of research articles related to elementary bilingual or ESL education. There is a large

disproportion, they say, between qualified bilingual/ESL teachers at the secondary and elementary school levels.

In examining Latino immigrants, the largest linguistic minority population in the U.S., it becomes apparent that immigrant students who enter American schools at or above the junior high school level face a particularly difficult challenge. In 2000, more than one third of Latino immigrants between the ages of 16 and 19 did not graduate from or were not enrolled in high school. Among Latinos of the same age group, 21 percent had dropped out, compared to 12 percent of blacks, 8 percent of whites, and 4 percent of Asians of the same age group (CNN.com Report, 2003). Only 10 percent of Hispanic Americans graduate from four-year colleges and universities (President's Advisory Commission on Educational Excellence for Hispanic Americans, 2003). Hispanics make up 56 percent of all immigrant children with 75 percent of them being LEP students, while the entire population of Asian students is 22 percent with 13 percent of them being LEP students (Ruiz-de-Velasco & Fix, 2000).

The Report Card issued by the Kansas State Department of Education (2004) for the year 2004 releasing the state test results in grades eight and eleven reflects the drastic problems immigrant students have in academic school subjects. Sixty seven percent of Kansas LEP students do not reach the proficient level in science and almost forty percent in mathematics.

### ***The Impact of Undereducated Youth on the Economics of the Country***

Researchers (August & Hakuta, 1997; Ruiz-de-Velasco & Fix, 2000; Camarota, 2002) point to the dramatic increase of poverty among the immigrant population compared to its general increase in the American population. The consequence of the increase in poverty is the segregation of immigrant students in predominantly minority schools. Many Hispanic students attend schools that are more than half minority (Ruiz-de-Velasco & Fix, 2000). Both poverty and segregation contribute to behaviors that increase the chances of dropping out, cutting classes, suspensions, early dating, and being older than classmates. Twenty five percent of female dropouts are pregnant (Ballantine, 1997). One of the possible explanations for this high drop out rate might be the lack of English proficiency. In 1998, the reading scores of California LEP students in grades 9-11 were lower than those of LEP students in grades 2-8

(Ruiz-de-Velasco & Fix, 2000). The high school graduation rates and college readiness for Hispanic youth is 52 and 16 percent respectively (Hardy, 2005).

The 30-nation Paris-based Organization for Economic Cooperation and Development in its yearly report stated that “a growing number of nations are doing a better job than the United States in getting young people through high school” (Associated Press, 2004). Among adults ages 25 to 34, according to the report, the U.S. is only the tenth among other industrialized nations in the share of the population with a high school degree. “If we are less competitive educationally, we will soon become less competitive economically” R. Paige, former Education Secretary, said (Associated Press, 2004). To improve the situation, the report says, “schools must show yearly progress for many historically disadvantaged groups, including minorities” (Associated Press, 2004). Without improving the English fluency of its population, the country will have an expanding number of undereducated workers and increasing demand for costly social services. The President’s Advisory Commission on Educational Excellence for Hispanic Americans (2003) admits that work should be done to reach out to children at risk by providing them with better learning opportunities.

### ***Being an Immigrant Student in School***

In recent years investigators have conducted qualitative research on second language learning practice in high school settings (Faltis & Wolfe, 1999a; Faltis & Wolfe, 1999b; Olsen, 1997; Harklau, 1994, 1999, 2000, 2002a, 2002b; Valdés, 1999, 2000, 2001). In the 1980s and at the beginning of the 1990s, some researchers claimed that the simple immersion in an English-speaking linguistic environment provides much support for second language acquisition (Bialystok & Hakuta, 1994; Genesee, 1987; Stern, 1983). The results of the qualitative research on English acquisition by immigrant adolescent-age students shed doubt on their claim. Here is an excerpt from the experiences of a second language learner illustrating the difficulties associated with immersion into the environment of the language of study.

I'd get so tired, my head would hurt. All day, I sit in classes and hear English, English, English, and try so hard to understand, but I do not understand. I was trying to figure out my science and my math. In the morning it was better. I'd think, today I will understand. But by lunch my head

was hurting, and I felt despair. By the last class in the day, I couldn't even listen anymore—it was so hard. I just sat there and nothing made sense. (Olsen, 1997, p. 93)

Many students spend long hours desperately trying to study English on their own. Some carry electronic dictionaries to look up unknown words (Olsen, 1997). In many cases these dictionaries only add to their frustration by providing only primary or outdated meanings. Although the meaning of a word is the smallest unit of thought and speech and the knowledge of words is one of the conditions for knowing a language (Spolsky, 1989), the meaning of a word is dynamic rather than static (Vygotsky, 1986). “The dictionary meaning of a word is no more than a stone in the edifice of sense, no more than a potentiality that finds diversified realization in speech” (Vygotsky, 1986, p. 245). The context in which the word is found is critical in determining the meaning of the word (Leontyev, 1978; Scherba, 1974; Vygotsky, 1986) since “in different contexts, it [meaning] changes its sense” (Vygotsky, p. 245). However, a dictionary cannot take the context into account. This leads to incomplete understanding or, sometimes, misunderstanding of the word or the context. Harmer (2001), who gives much practical advice to ESL teachers, is among very few authors showing how to make use of dictionaries. He points out that

a word in the L1 [mother tongue] may have six or seven equivalences in the L2 [second language]; if these equivalences are just offered as a list of words, they provide the student with no information about which one to choose – and when. Sometimes there are restrictions of the use of a word in L1 which do not apply in the L2. Unless these are given, the information is not complete (Harmer, 2001, p. 168).

Qualitative studies (Olsen 1997; Valdés, 2001) state that immigrant adolescents often retreat into social groups with other newcomers. This phenomenon is sometimes explained by their unwillingness to lose their cultural identity or by a lack of motivation to face the challenges of a linguistically different environment (Schumann, 1975). The subjects of Olsen's (1997) studies provided different explanations: "Mandy spoke about her wish to find an American friend" (p. 97). "How can we learn English if no one will speak it with us? No Americans speak with us" (p. 98). One of Olsen's

subjects "thought it would be a new world, [instead] it was a hell" (p. 119). Zamenova's (1995) Russian interviewee felt that he did not fit in with his classmates: "From the first day I was an outcast. Locked out of most activities by the language barrier, unfamiliar with basic games and customs, I quickly acquired a reputation of a dummy who doesn't even know how to play baseball" (p. 58).

Linguistically different immigrant students are forced into childish activities in the process of assimilation at school, which can make them outcasts: "beginning students were engaged primarily in coloring and copying from worksheets, and coloring was highly valued as an activity" (Valdés, 2001, p. 49). "The immigrant students understood little of what went on around them and they often became discouraged and uninterested" (Valdés, 2001, p. 35). Vocabulary enrichment consisted, in many cases, of occasional work on isolated words with little emphasis on reading and text comprehension (Valdés, 2001).

Students expressed the feeling that the ESL class was an easy class, with the same activities year after year, and emphasis on everyday spoken English that, according to students, could be picked up naturally in the course of living in an English-speaking society (Harklau, 2002a). A subject's complaint —"in this class [ESL], it's going very slow, and the language seems kind of like emergency things" (Harklau, 2002a, p. 145) — provides an example of discrepancies between the student's agenda and the existing curriculum.

Large numbers of immigrant students are barred from taking many of the subjects offered by their schools due to their lack of proficiency in English (Harklau, 1999). Mainstream teachers have been known to express anger, frustration, and unwillingness to deal with the new 'burden' placed on them by limited English proficiency (LEP) students in their classrooms (Penfield, 1987; Simons & Connelly, 2000). They find it impossible to teach literature or history to students with a poor command of English and have a hard time accepting and grading students' writing that contains an abundance of mechanical errors. Many teachers choose either to ignore errors completely or to correct them inconsistently (Harklau, 1999). So, whereas error analysis could help teachers to understand how students come to certain decisions and to see the styles and

strategies students employ in their learning (Piaget, 1973; Vygotsky, 1986), the importance of error analysis loses its value as a teaching tool in many ESL classrooms (Bialystok & Hakuta, 1994).

Valdés (2001) estimates that two thirds of LEP students at the secondary school level are not receiving the language assistance necessary to succeed academically and intellectually. Many immigrant students are referred to special education programs when they experience problems with academic content learning (Simons & Connelly, 2000). High-achieving immigrant students with high academic potential are often placed in low-track classes because their language proficiency is not sufficient to keep up with high-track courses (Harklau, 1994; Ruiz-de-Velasco & Fix, 2000). According to the studies (Oakes, 1985) there are significant differences in the expectations for curriculum, activities, participation structures, and independent work patterns of students in high- as opposed to low-tracks. Harklau (1994) points out that in low-track classes the teacher's usual feedback on assignments consists of 'checked', '+', the date, crossed off incorrect items, and the grade. Often there is no request to revise the work. Such grading patterns are widespread in low-tracks at secondary schools nationwide, which are attended by the overwhelming majority of immigrant students, and they naturally limit these students' access to future educational and occupational goals. Harklau (1994) admits that the existing tracking system presents a dilemma for teachers and school administrators. Placing ESL students in low-track classes deprives them of access to college-bound subjects. However, the strong emphasis high-track courses place on linguistic and academic skills may cause ESL students to lose confidence in their abilities. The counselors' typical advice to linguistically different students is not to run the risk of taking any challenging classes when there is doubt regarding whether they will succeed (Oakes, 1985; Wheelock, 1992). Simons and Connelly (2000) point out that tracking is a form of segregation that prevents ESL students from interacting with native speakers of English and from social integration.

Ruiz-de-Velasco and Fix (2000) point to “invisibility” (p. 67) of LEP immigrants in schools. Teachers, counselors, and principals turn out to have only limited awareness of services provided to immigrant students at their school. Many teachers make an effort not to see any problem for which “there appear no available solutions” (Ruiz-de Velasco & Fix, 2000, p. 68). Teachers usually do not get the little information about new immigrant students’ prior performance from the counseling office and, as a consequence, these students’ special needs are left unaddressed. Even students with good academic records often reach their senior year “without having consulted counselors or teachers about post-secondary options [and] as a result, they sometimes miss the opportunities to take the SAT or TOEFL and lack required course credits” (Ruiz-de-Velasco & Fix, 2000, p. 74).

Another problem is that a high percentage of immigrant children come from low-income families (Ruiz-de-Velasco & Fix, 2000), which means that these children can hardly rely on parental help concerning school matters. Limited English Proficient immigrant parents, who are newcomers in this country themselves and do not know how the school system works, cannot be eloquent advocates of their children in schools. Stern (1983) points to the research which found that children with parents in higher-status occupations receive greater parental support with learning experiences than children with parents in low-status occupations. Schools, however, do not involve immigrant parents in promoting and increasing their children’s success in school (August & Hakuta, 1997; Ruiz-de-Velasco & Fix, 2000). Thus, immigrant students are hampered “by their lack of English comprehension, the lack of English-speaking parents who can help them with homework, ... the lack of guidance counselors” (Nash, 1990), unwillingness or inability of subject area teachers to deal with their problems, and inadequate ESL curriculum.

### ***Adolescent Immigrants’ Dual Task at School***

Immigrant adolescents extricated from their native environment must confront a two-fold task: on the one hand, they have to master the intricate system of a new language and on the other hand, like all school students they must acquire knowledge and skills in different academic subject areas. Valdés (2000) points to the research which states that in order to participate in every day school life and to make



progress in learning academic subject matter, immigrant students must develop two skills in their second language: first, they must comprehend their teachers' explanations and, second, they must comprehend the language of the textbooks.

It is quite obvious that immigrant adolescents cannot effectively study an academic subject without adequate language skills. However, if they concentrate solely on improving language skills, their academic and cognitive development will stagnate. The intellectual development of an adolescent may be significantly hindered by not having the language skills to process everything that shapes his/her environment. Vygotsky (1986) writes that when children cannot name an object or phenomenon, they compensate by eradicating this object or phenomenon from their consideration, thus never incorporating it into their conception of reality. Stern (1983) writes that the size of the language learning task and the length of time required to reach language proficiency are very important issues for all language learners. Existing research suggests that linguistically different students need, on average, five to seven years to reach age-and grade-level norms of their native English-speaking peers (Collier, 1989; Cummins, 1981). For adolescent immigrants, this equates to a five to seven year stagnation in cognitive and social development, a period that may not be completed by the time they graduate from high school, precluding them from attending a university. Children who are brought to this country as adolescents do not have much time to develop age-appropriate abilities in English (August & Hakuta, 1997; Ruiz-de-Velasco & Fix, 2000; Valdés, 2001). Often, they do not have sufficient time to hone their English skills prior to graduation from high school, which places them at an obvious disadvantage for being accepted to and succeeding in a college or university. Moreover, adolescent immigrants who are placed into junior high or high school have little chance of competing academically with their native-born peers due to their lack of skills in English. In order to succeed, they must quickly master basic interpersonal language skills and academic terminology—both lofty goals against the backdrop of physical and cultural relocation.

In practical terms, adolescents must absorb and assimilate a linguistic ocean in a period of time short enough to evade interference with their development of formal operations. Typically, students need about 500 words to be able to start responding verbally (Kottler & Kottler, 2002). Everyday verbal

communication may be accomplished on an active vocabulary of a little over 2,000 words (Schonell, Meddleton, & Shaw, 1956). This number of words is usually indicated as the vocabulary goal in high school-level foreign language programs (e.g. the high school foreign language curriculum in Russia, see Simkin, 2000). However, an analysis of speech in a six-year-old child showed that the general active vocabulary at this age already contains 2,900 words (Kanesjan, 1976). Miller (1977), attempting to estimate the vocabulary of four-year-old children in New York, came to the astonishing finding that four-year-old children add words to their active and passive vocabulary at the rate of twenty words a day! In order to read at a beginner's level it is necessary to know roughly 5,000 words (Hirsh & Nation, 1992). For high school-level reading purposes, a knowledge of at least 10,000 words is required (Hasenberg & Hulstijan, 1996). The vocabulary requirements for achieving a competitive score on college entrance exams are even higher. The most conservative estimate of the vocabulary of high school graduates is 50,000 (Smith, 1984), with complex rules of application, multiple contextual meanings, and variable grammatical functions.

Echevarria, Vogt, and Short (2004) write that typical programs of two to three years are ineffective for immigrant students in catching up with their English-speaking peers. The only way, they say, is “to have well-implemented, cognitively challenging, not segregated, and sustained programs of five to six years duration” (p. 8). However, there are immigrant adolescents who do not have that much time left until the age of graduation from high school.

### **Adolescents as Described by Developmental Psychology**

It is reasonable for this study to tailor the issues of language acquisition to the stages of mental development of students. Thus, it is important to define the subjects, in this case adolescents who are attempting to acquire a second language, from the point of view of their psychological development. Webster's II New Riverside University dictionary (1984) defines adolescence as “the period of physical and psychological development from onset of puberty to maturity” (p. 79). In adolescents, “inner conflicts have reached a point of irrevocable entanglement but the outcome of turmoil is not predictable” (Blos, 1962, p. 98). In order to survive, they try to fit their developing human organism into the social

environment and attempt to transform a biological event into psychological experience (Blos, 1962). Adolescence is a crisis characterized by self-liquidating that, however, contributes to identity formation. Adolescents are eager to realize their actual roles, which promise them recognition through specific strengths emerging at high school age (Erikson, 1965). Erikson also warns that “we must remember the necessity for man to react (and to react most intensively in his youth) to the diversity of conditions” (p. 16) and that this reaction may be characterized either by devoted conformity or by extreme deviancy, and either by rededication or by rebellion. The re-evaluation of self in the light of new physical powers leads adolescents to compare themselves with their peers (Blos, 1962), which may result in negative psychological consequences for immigrant adolescents whose language is different from the majority of their peers. Harmer (2001) points out that besides their need for self-esteem and peer approval, adolescents are described as being disruptive and bringing problems into class from outside school. They “may push teachers to the limit” Harmer agrees, “but they are much happier if [their] challenge is met, if the teacher actually manages to control them, and if this is done in a supportive and constructive way” (p. 39). Simons and Connelly (2000) note that adolescent immigrant students are “doubly at risk” (p. 21) since economic problems in their families caused by either parental unemployment or parents’ employment as underpaid workers may negatively influence the social integration and academic achievement in school.

Describing factors affecting social survival, Millon (2004) states that radical shifts or significant changes of environments may result in the extinction of species.

The malleability of early potentials for diverse learning diminishes as maturation progresses.

Consequently, adaptive styles acquired in childhood and usually suitable for comparable later environments become increasingly immutable, resisting modification and relearning. Problems arise in new ecological settings when these deeply ingrained behavior patterns persist despite their lessened appropriateness.

Simply stated, what was learned and once adaptive, may no longer fit.

(Millon, 2004, p. 386)

Fortunately, Millon (2004) notes, humans exhibit adaptive pliancy by using the wide range of cognitive styles for survival in novel environmental circumstances.

### *Piaget and Vygotsky on Adolescence*

Both Piaget and Vygotsky, studying children's developmental stages, discussed the changes that take place in children's language development. In Piaget's (1973) theory, adolescence corresponds to the period of formal operations, the final period of human intellectual development. Adolescents have already completed the sensorimotor period (birth to 2 years), the first stage of development during which the child's "use of words is not representational in the sense of referring to absent objects, [but is instead] intimately related to child's ongoing actions" (Ginsburg & Opper, 1979, p. 78). They have also passed the second, pre-operational period (2 to 7 years), during which children display a significant amount of egocentric speech, which Vygotsky (1986) tends to call "an agent of realistic thinking" (p. 33), as well as the third, concrete-operational period, which starts shortly after age seven and is characterized by increasing proficiency in verbal communication. The concrete-operational child is able to appreciate certain basic identities and to perceive functional, albeit incomplete and semi-logical relations in his/her environment. Vygotsky (1997) characterizes this period that, according to him, ends with the onset of puberty, as "a boiling or freezing point, after which the new, qualitatively distinctive period of childhood begins" (p. 215) when children enter "into a new relationship with the environment" (p. 251).

The final, formal operations period in Piaget's theory of intellectual development begins roughly at age twelve – during junior high and high school in the United States school system – and is solidified and reinforced during adolescence. Besides many visible biological changes, the brain gains one third of its full weight during this period (Vygotsky, 1997). Vygotsky (1997) connects this period with "the ultimate formation of the individual's relation to the environment" (p. 216). The process of this formation is, however, accompanied by "internal and external shocks" (p. 215) and by "extraordinarily heightened sensitivity" (p. 215). Vygotsky (1997) notes that "love in the time of youth is the most natural and the most unavoidable form of sublimation of the sex instinct" (p. 74) and that adolescents' awakened sexual

desires cannot find an outlet and satisfaction and “are expressed in the stormy, troubled, anxiety-ridden state of the psyche” (p. 73).

Adolescents’ thoughts during this period, according to Piaget, are flexible and logical. Adolescents are able to deal efficiently with complex problems. They can imagine a variety of possibilities inherent in a situation and understand the outcomes of such possibilities, enabling themselves to assess hypothetical propositions and form decisions (Ginsburg & Opper, 1979). Vygotsky (1986) is more careful in describing this last period, which he calls also the period of concept formation. He writes that adolescents, even after having learned to produce concepts, do not abandon the more elementary forms. Vygotsky (1986) writes that his experiments showed the discrepancy between adolescents’ ability to form concepts and their ability to define them. Though adolescents form and use a concept correctly in a concrete situation, they may still experience difficulty in expressing that concept in words, especially if the concept is being formulated quite abstractly without reference to any concrete situation. This led Vygotsky (1986) to the conclusion that “developmentally late forms coexist in behavior with younger formations” (p. 140). Therefore, he characterizes this period as “less a period of completion than one of crisis and transition” (p. 141). Add to this crisis the fact that immigrant adolescents have to adjust to Western culture, with new social, economic, political, religious, historical, and educational traditions. This adjustment takes place at the time when social relations, according to Vygotsky (1997), become very important for youth. “In no other period of person’s life is there found anything like the friendship and companionship, profound affection and emotional bonds, that commonly bond youths together at this stage” (Vygotsky, 1997, p. 76). Thus, if adolescence is the adjustment to the new set of inner and outer conditions that confront the individual, immigrant adolescents also have an urgent necessity to cope with the novel language conditions.

### *Language in the Course of Children’s Developmental Stages*

Vygotsky (1986) distinguishes a word’s nominative function from its significative function. “The word is a sign, and as such it may be used in different ways depending on what kind of intellectual operation is involved” (p. 140). While nominative function is purely situational and tied to something

concrete, as it happens in a child's framework, the adult's significative framework is conceptual. For example, the nominative function of the word *springboard* is to name an object in the form of a board used as an aid in diving or gymnastics; the significative function of this word is 'aid' or 'starting point'. Comparing these structural and functional relations at the earliest, middle, and advanced stages of language development, Vygotsky (1986) found that in the beginning only the nominative function exists. Signification independent of naming and meaning independent of reference to an object appear later in children's life when this development is completed and children are able to formulate their own thoughts.

The research on children's developmental stages carried out by Jean Piaget (1973) and his colleagues at the Center of Epistemology, states that there is little indication that the formation of concepts about the surrounding world relies massively on language during the first two periods – the sensorimotor (birth through age two) and the pre-operational (age two to seven). Saville-Troike (1984) found that even eight-year old children are still able to “participate in a great deal of social activity ... with little or no language” (p. 207).

It is during the concrete operational period (age seven to eleven) and the period of formal operations (age eleven to fifteen) that logical thought, organization of knowledge, classification of objects and ideas, problem solving, realistic reasoning, and dealing with abstractions develop and become closely connected to speech and verbal communication. Piaget (1973) asserted that “it is difficult to see how they [formal operations] develop or rather how they complete their development without language” (p. 119). Salzinger (1979) also noticed an age-related difference in the use of language: children tend to generalize words related in sound to the conditional stimulus while adults tend to generalize words related in meaning.

Neurological research also supports the existence of differences between language properties in children and adults. Simons and Connelly (2000) point to the brain research, which indicates that prepubescent bilingual children use the same area for both L1 and L2 language processes while older learners of a second language develop a different area in the brain for new language processes. The documented cases on humans who had suffered a language-impairing brain lesion demonstrated that

adults were unable to recapture fully their language abilities while children with the same condition completely restored their language function. These findings caused neurologists to hypothesize that children have not yet completed the formation of neuronal connections and that the formation of new, previously non-existent neural connections for language building enabled them to recover from the brain lesions (Penfield & Roberts, 1959; Curtiss, 1989). Yet another kind of brain injury resulting in aphasia (a condition of partial or total loss of the ability to speak or comprehend speech) and the consequent recovery led scientists to the assumption of a special localization in the human brain of areas responsible for languages. Fabbro (2002) describes some bilingual and polyglot patients who, after an injury of a certain brain area, recovered their second language, but not their mother tongue. The researcher assumes that this phenomenon may be due to differences in the process of language acquisition that could influence the localization of language storage in brain. Dewaele (2002), based also on neurobiological research, sees one of the causes for individual differences in fluency of oral L2 production in capacity of short-term memory and working memory. He notes that “heavy reliance on declarative knowledge requires an important amount of short-term capacity” (p. 240) and, thus may result in its overloading.

These findings may signify that, first, because of their developing ability to reason abstractly adolescents are more dependent on language than prepubescent children. Second, the psychological, and possibly, biological pre-dispositions toward acquiring a second language are quite different in children and adults. Penfield & Roberts’ (1959) research and Curtiss’ (1989) case description suggest that the natural, genetic, or innate, ability of humans to learn languages exists only until the pre-pubescent age. By this age and having lived in one linguistic community, “children with very different experiences arrive at comparable grammars, indeed almost identical ones” (Chomsky, 1977, p. 98). Some language teachers ignore Chomsky’s stipulation on his hypothesis on the innate ability of language acquisition, forgetting that “when the moment of maturation is passed ... it is no longer possible to learn a language [naturally]... We speak a foreign language which we have learned late in life with an accent. Without these biological constraints, foreign accent [as well as grammar mistakes] would be inexplicable” (Chomsky, 1977, p. 98). As Bialystok and Hakuta (1994) note, it appears that “children’s brains are

designed to learn languages in a way that adult brains can no longer replicate” (p. 52). Third, because of the mental and biological developmental changes that have taken place since their birth, adolescents may have passed the age before which it is possible to acquire a language naturally.

### ***The Role of Language at the Adolescent Age***

It is a widely accepted truth that language is fundamental in defining human identity (Spolsky, 1972). It acts not only as a socializing and uniting force, but is also the most potent single known factor for the growth of individuality (Sapir, 1966). Potebnya considered language “a device for human self-understanding” (cited from Vygotsky, 1986, p. 133). Larsen-Freeman (2003) calls it an instrument of power and a medium that enables one to learn other things. The “capacity of representing absent objects and events by mental images, ... or by language, is essential to thought; without it we would not progress beyond the practical intelligence of apes and infants” (Inhelder & Chipman, 1976, p. 210). Vygotsky (1986) writes that it is as though the child were not able to see things when he/she does not know their names. Likewise, Sapir (1966) states that without language, reality may fail because human beings do not live in the objective world alone and that they depend very much on the particular language which has become the medium of expression for their society. Along with memory, attention, and abstraction, speech and thinking are the most powerful tools in the cultural development of the human psyche. They are also major components in the development of the individual (Luria & Vygotsky, 1992). In his general theory of genetic roots of thinking and speech, Vygotsky (1986) writes that word meaning is a generalization and that generalization is a verbal act of thought. We use words to describe concepts and bring thoughts into existence. Therefore, word meaning is not only a unity of thinking, but also a unity of social interaction and communication. Language is “the fundamental mechanism of human survival” (Hayakawa, 1990, p. 12) that makes communication and cooperation possible. “Human fitness to survive requires the ability to talk, write, listen, and read in ways that increase the chances for you and fellow members of the species to survive together” (Hayakawa, p. 12). Vygotsky’s (1986) theory of socio-cultural activity is central to cognitive development. It says that the transformation of basic processes into higher psychological functions occurs within the child’s social interactions and through the use of



culturally determined tools and symbols. Learning is the result of social interactions and it precedes maturation. The basic idea of this theory that must not be overlooked by educators of language minority students, is that the development of the processes that lead to the formation of concepts takes place in the earliest stages of childhood, whereas the mental basis and the intellectual functions of concept formation are constituted and developed during adolescence (Vygotsky, 1986). Thus, it is very important not to allow the cognitive development of adolescents placed into a second language environment to stagnate.

### **Educational Programs Aimed at the Needs of Linguistically Different Students**

August and Hakuta (1997) who head The Committee on Developing a Research Agenda on the Education of Limited-English-Proficient and Bilingual Students, state that there is still not sufficient knowledge about the education of English language learners. There is a wide variation in programs, the choice of which is determined by the mix of students' linguistic backgrounds, availability of certified teachers, bilingual staff, resources, and the perception of educating linguistically different students by school, state, and federal administrations. The two most typical programs that serve immigrant students are the ESL Pullout program and bilingual education (transitional, maintenance, and two-way). The less used approaches are sheltered instruction, and content-based ESL.

#### ***ESL Pullout Programs***

Among all programs that have been created for linguistically different students, the ESL Pullout program is the most widely used approach to provide help to ESL learners (Richard-Amato, 1995). This is especially true in the Midwest, where the growing immigrant population is still not as dense as on either coast. Students in this program attend a class aimed at improving their English for one or two class periods each day, while spending the rest of the school day immersed in regular classes.

Harklau (2002a), comparing ESL classes to mainstream classes, is opposed to the early immersion and mainstreaming of linguistically different students. She claims that ESL classes

provide instruction that is tailored to meet the special needs of ESL students. Her reasoning is that ESL students are not provided support in mainstream classes and that the support the mainstream teachers attempt to provide is often incomprehensible to ESL learners, leading them to frustration. Mainstream classes rarely give ESL students a chance to speak or to get feedback on the dynamics of English grammar. Commonly, subject area teachers are unsure about what to do with the LEP students in their classes (Wall, 2000). They often lack a sense of responsibility for the performance of ESL students, displacing it onto the ESL teacher to deal with them (Johnson, 1987; Penfield, 1987; Simons & Connelly, 2000). Admittedly, it is difficult to expect a subject teacher to make specialized sheltered materials for ESL students, even in cooperation with the ESL teacher. The workload of either teacher is arguably prohibitive in accomplishing these tasks. Moreover, their cooperation may not guarantee the creation of instructional materials based on and supported by scientific research. School district office administrators are usually unable to provide much help with the latest research or to give advice about potentially useful existing commercial materials (Wall, 2000).

In pullout ESL programs, the ESL teacher may be in charge of ten or more ESL learners with different native language backgrounds (L1), both beginners as well as those who have spent several years in the U.S. For economic reasons, all of these students are pulled out at the same time for one or two periods each day. In addition, these students take a wide range of high school subjects: from the lowest math level to trigonometry and calculus, from remedial reading to humanities and American literature, from college chemistry to marine science to auto mechanics. These conditions make the task of the ESL teachers extremely difficult if they want to incorporate the activities of the regular classroom into the ESL curriculum. It might take the ESL teacher several generations of secondary level students to establish an appropriate curriculum in accordance with methods that lead to higher linguistic and academic outcomes and to prepare sheltered content-based materials in all subjects the ESL students might take (Short, 1993).

In many schools ESL teachers are the only people responsible for linguistically different

students. Penfield's (1987) research survey about the expectations regular teachers have for the ESL teachers showed that the ESL teacher is expected to be simultaneously a language/reading teacher, a subject-matter teacher (which in the high school setting extends to mathematics, social studies, physics, chemistry, etc.), a counselor, a cross-cultural interpreter, and a consultant to the regular teacher. The survey also revealed the regular teachers' assumption that ESL teachers spoke the native language of each ESL student! After receiving this list of seemingly non-feasible expectations, Penfield concludes by recommending that "ESL teachers MUST [our capitalization] provide direct help to regular teachers on how to teach the LEP student. ESL teachers MUST develop strategies for increasing cooperation and collaboration with regular classroom teachers. They MUST devote more professional time to advising and consulting with these teachers" (Penfield, 1987, p. 36). Penfield is not alone with such recommendations:

Coordination [between ESL and regular teachers] demands more than a one-day workshop on teaching LEP students. It requires strong administrative support for recognizing and including language minority students' perspectives. ESL teachers at high school level need to be informed about curricula in subject areas if they are to support content-area learning while developing language skills. (Harklau, 1999, p. 56).

Kottler and Kottler (2002) suggest that ESL teachers can prepare English language learners by introducing needed concepts and vocabulary before the regular teacher presents new material. If the regular teachers notice mistakes in grammar or pronunciation, they can "communicate them to the ESL teacher who can work with the student individually" (p. 54).

No one provides explanations or guidelines for *how* an ESL teacher, who must be in a classroom for five or six periods each day, can fulfill these recommendations. Tyson (1997) notes that American teachers have less time to prepare than their counterparts elsewhere. Taking into consideration the number of different classes each ESL student takes, it may be necessary for an ESL teacher to cooperate with more than ten regular teachers. Feasibly, such cooperation could entail developing guidelines for how to work with ESL students. Such guidelines already

exist (Wall, 2000), but do not provide much help in the regular nor the ESL classroom. Adequate instructional materials would be of help. But two or three hours after a full day of classroom work is hardly enough time for one teacher to accomplish the task of creating quality instructional materials for ESL students at different English proficiency levels enrolled in different subjects at their high school. Currently, ESL teachers follow their own philosophy in working with immigrant students: one being to help them succeed in academic-subject areas and consequently give them the opportunity to study at a college, and another to help ESL students learn how to be comfortable in this country with their limited language (Harklau, 2002a).

The ESL Pullout program fails to serve adequately linguistically different minority students for several reasons. First, ESL students spend only a small fraction of their school day with ESL teachers, while regular classroom teachers, who generally have no training in ESL, cannot integrate ESL students into regular classroom activities (Penfield, 1987; Harklau, 1999). Almost half of all public school teachers have had an ESL student in their classes, but only a very small fraction have taken courses in order to learn how to teach linguistically different students (O'Malley & Waggoner, 1984). Moreover, some research found that instruction focused on immigrant children “was provided almost entirely by teacher aides” (Johnson, 1987, p. 437) who had little training and as a result more time was spent on nonproductive tasks and less time spent on rich learning experiences that lead to the success in the higher levels of schooling (Heath & Branscombe, 1985). It is commonly believed that teachers with a knowledge of LEP students' needs are better able to serve LEP students (Johnson, 1983; Waggoner & O'Malley, 1985).

Another objection to the ESL Pullout program, even to its Half-or Full-day version, is its failure to provide high school immigrant students with adequate instruction in academic content. It is virtually impossible for the ESL teacher to be competent in all secondary level subject areas, especially if ESL students choose to take advanced classes, such as chemistry, physics, or genetics. One should not forget that ESL students are in school not only to master their English, but also to get knowledge and skills in academic subjects (Olsen, 1997). In this

sense, prolonging the time ESL students spent out of mainstream classes jeopardizes their academic development.

### ***Bilingual Educational Programs***

The definition of bilingual education used by the U.S. Office of Education is:

Bilingual education is the use of two languages, one of which is English, as mediums of instruction for the same pupil population in a well-organized program which encompasses part or all of the curriculum and includes the study of the history and culture associated with the mother tongue. (Paulston, 1980, p. 15)

Nieto (1996) defines bilingual education as any “educational program that involves the use of two languages of instruction at some time in a student’s school career” (p. 156).

One of the models in bilingual education programs is maintenance bilingual education, in which the language spoken in the home is used as the medium of instruction and English is taught as a second language (August & Hakuta, 1997). This approach agrees with UNESCO Report (Brisk, 2001) stating that the home language is the best initial medium of instruction because it facilitates literacy development as well as mastery of different subjects and promotes understanding between home and school. In the transitional bilingual education model, the native language is used for a short period of time as a transition bridge to the second language. (Brisk, 1998). (See Brisk, 1998, for detailed description of other bilingual programs.)

Bilingual education can pursue a variety of goals. In countries with two or more national languages, bilingual education aims at the development of bilingualism in children, i.e. their ability to use two languages equally well (Brisk, 2001). In the United States, civil rights activists want bilingual education to guarantee equal opportunities for linguistically different minority groups while sustaining the development of cultural diversity and fostering a sense of ethnic identity (Crystal, 1987). The most contentious issues concerning bilingual education are whether states and governments should provide special funds to teach minority children in their

native language and whether teaching in the native language will help or disadvantage minority children (Ballantine, 1997).

Bilingual education was implemented, in part, as a consequence of the Supreme Court's *Lau v. Nichols* (Mora, 2004) decision to remedy instructional programs for language minority students who did not understand English by offering them special help. Without special help, the Supreme Court concluded, linguistically different students were excluded from any meaningful education. The Lau Remedies prescribed transitional bilingual programs for the elementary schools, while the ESL Pullout approach was deemed appropriate for the secondary school level (Olsen, 1997).

Some conservative politicians, backed by a substantial portion of the population, see bilingual education as a threat to national unity. The liberals postulate that bilingual education poses the risk of trapping immigrants within the confines of their mother tongue, precluding them from learning the language of the majority of the population. This, in turn, reduces their access to prosperity (Crystal, 1987). Debates regarding bilingual education are still going on and have led some states to ban bilingual education altogether. One well-known example of this is Proposition 227 (Black, 1999) in California that banned the use of bilingual education in classrooms. Some members of Kansas State Board of Education tried to cease state support of bilingual programs in support of total-immersion classes (Associated Press, 2003). In many cases, Paulston (1980) states, bilingual education is “clearly a legal-political process rather than the pragmatic-educational policy” (p. 14) with “ideological rather than pedagogical” (p. 15) issues.

In describing bilingual education models, Lambert (1975) introduced the terms additive and subtractive bilingualism. Additive bilingualism considers learning another language advantageous (e.g. Canadian language policy). In subtractive bilingualism, there is no recognition of the native language. Additive programs use native-language instruction for all or a major part of the school day. Subtractive models are early-exit transitional bilingual programs that use English as the language of instruction with ‘buddy translators’ who are fluent enough in

English to help the newer students with translation or immigrant teacher-aides with low English proficiency because there is an acute shortage of qualified bilingual teachers in most parts of the country (Simons & Connelly, 2000).

As for the use of native-language instruction, Simons and Connelly (2000) found that immigrant students' parents do not always support native-language instruction and in some cases refuse to permit their children to participate in primary-language instruction. They cite one mother saying: "I want my child to walk like you, talk like you, and be able to compete with you and your children for jobs – good paying jobs – and they can only do that if they speak perfect English. I can't teach them at home, so it must be English in school" (Simons & Connelly, 2000, p. 74). A study of the educational aspirations and attainment of eighth and ninth grade immigrant students showed that three-fourths of the sample from a wide variety of immigrant groups preferred speaking English, the exception being Mexicans living near the Mexican/U.S. border (Rumbaut, 1997). Valdés (2000) notes that "English is the language of prestige in all Mexican American communities [and] is considered important, and every child is expected to become an English speaker" (p. 125). This coincides strongly with Maslow's (1968) philosophy and psychology of healthy and normal individuals' motivation that is oriented toward compensation for something lacking or for improvement in something.

Simons and Connelly (2000) point out another factor against native-language instruction – that students in primary-language programs isolate themselves socially and develop close friendships only with peers with whom they share L1. Also, they state that there is little evidence that programs with content instruction that occurs in the native language produce statistically higher levels of academic achievement than other educational programs.

Encouraging research on bilingual education of elementary school children was carried out in Dade County, Florida, in Cuban refugee communities (Mackey & Beebe, 1977) and in Canada, a country striving for bilingualism (Lambert & Tucker, 1972). However, some researchers point out that both populations, children of the Cuban elite and children of the

educated Canadian Anglophones, were in many respects different from the majority of poor immigrant students in the United States (August & Hakuta, 1997). Nevertheless bilingual education attracted researchers who believed that children taught in bilingual programs have more chances to make progress in English and, consequently, in other academic areas (Bialystok, 1978; Collier, 1987; Cummins, 1981).

The U.S. Department of Education undertook a longitudinal study to determine the effectiveness of bilingual programs for elementary school children. The study involved three types of bilingual programs:

- immersion programs with only informal first language support,
- early-exit bilingual programs with thirty to sixty minutes of language instruction a day and the rest of the school time students spent in mainstream classes; children stayed in this program less than three years,
- late-exit programs with about forty percent of instruction in L1 and students could remain in the program even after developing proficiency in English.

This study showed that students participating in late-exit programs showed better results in academic as well as English language proficiency compared to the other two programs (Ramirez, Yuen, Ramey, & Pasta, 1991).

At the secondary level, bilingual programs are still the most unexamined and otherwise overlooked areas of education in the United States. Practically no research on secondary school programs for linguistically different students was conducted prior to 1990 (Faltis, 1999). Most of the research conducted in this area during the last decade is qualitative and concludes that "secondary education in the United States is in need of far-reaching structural change if it is to adequately meet its mandate to educate [linguistically different students] on an equal basis" (Faltis & Wolfe, 1999a, p. vii).

Currently, bilingual programs are established in areas where the number of ESL students is high enough to form bilingual classes, limiting such programs to large cities. Also, the



Federal Department of Health, Education, and Welfare proscribed bilingual programs only for elementary schools (Olsen, 1997). Thus, bilingual education serves only a small fraction of ESL learners. In 1991 less than 13 percent (250,000) of LEP students were enrolled in bilingual programs and the majority of those enrolled were elementary school children (Cisneros & Leone, 1995). In California, before the passage of Proposition 227 (Black, 1999), only 409,874 out of a total of 1,406,166 ESL students were enrolled in bilingual education programs (Valdés, 2001). The number of students participating in bilingual programs is falling rather than growing, due mostly to political struggles in states where the immigrant population is especially high. Moreover, it is unrealistic to expect that it is possible to find bilingual teachers in the many languages represented by multilingual immigrant students (Olsen, 1997), especially teachers who are able to teach academic subject matter bilingually.

### ***Sheltered Instruction Method***

Sheltered instruction is designed to take into account the teaching of content, such as social studies, mathematics, and science. The National Clearinghouse of Bilingual Education (NCBE) gives the following definition of sheltered instruction:

Sheltered English instruction is an instructional approach used to make academic instruction in English understandable to LEP students. Students in these classes are “sheltered” in that they do not compete academically with native English speakers since the class includes only LEP students. In the sheltered English classroom teachers use physical activities, visual aids, and the environment to teach important new words for concept development in mathematics, science, history, and other subjects.

(NCBE, 1987).

Valdés (1999) defines sheltered instruction and sheltered content courses as “classes in which teachers, who may or may not speak the non-English language(s) spoken by their students, present subject-matter instruction using special strategies. They modify their use of English and provide numerous illustrations of the concepts they are presenting” (p. 174). Presently, sheltered

instruction is widely advocated as an effective instructional strategy for language minority students (Chamot & O'Malley, 1987b; Crandall, 1993; Brinton, Snow & Wesche, 1989; Echevarria, Vogt, & Short, 2004) though there is little agreement among practitioners as to what constitutes effective sheltered lessons (Short, 1999).

After many years of research Echevarria, Vogt, and Short (2004) created Sheltered Instruction Observation Protocol (SIOP), a model for lesson planning that “provides English learners with access to grade-level content standards” (p. xi). The analysis of sheltered instruction research reveals that sheltered instructional materials require a thorough preparation by a team of specialists, something that would be difficult to accomplish in a real school setting due to the already heavy workload of all participating parties.

Short (1993) states that the sheltered instruction units developed by her research team were field-tested in middle school classroom settings with only English language learners as well as in mainstream classes that included LEP students, but admits that at the middle-school level teachers have the flexibility to spend more time on certain lessons and adjust the number of topics covered in a course. The high-school setting, with stricter syllabi and established requirements for graduation, does not allow such flexibility (Short, 1993). This potential drawback of sheltered instruction is exemplified in the results of the research on sheltered instruction conducted in California, which found that sheltered instruction provides very sparse coverage of subject-area content in comparison with mainstream classes (Minucci & Olsen, 1992). Interviews with teachers revealed that they spent hours preparing visuals to accompany presentations in order to communicate only one or two main concepts to their students (Valdés, 2001).

### ***Content-Based Language Instruction***

Content-based instruction (CBI) and sustained-content language teaching (SCLT) are programs designed to take into account two goals: first, to keep immigrant students in mainstream classes without segregating them from the rest of the students (though some researchers say that immigrant students who come with zero knowledge of English need a short initial segregated

period for learning basic English (Ruiz-de-Velasco & Fix, 2000) and, second, to provide them with comprehensible, authentic instruction in academic areas. First attempts in creating such model were done in Great Britain in the 1960s (Levine, 1990). The innovators assumed that the pupils would progressively gain facility in spoken and written expression and develop reading skills through the practice they got by handling the content of lessons – many school activities have systematic features, and their recurrences would provide the regularity of practice in sentence and discourse patterning. (Levine, 1990, p. 23).

To support learning, instructional materials were constructed that correlated with mainstream curriculum and contained techniques and practices of second-language teaching. Levine (1990) admits that at that time the program was being created without taking into account any theory. It was an action research project conducted by practitioners who saw the need for change and who were happy to see children in normal, not segregated classes.

At the end of the last century a team (Bunch, Abram, Lotan, & Valdés, 2001) working in California, undertook the project in SCLT taking as a foundation for their study Cummins' (2000) model focusing on the meaning, use, and nature of forms of language expected for specific purposes. The researchers decided to go beyond sheltered instruction by intending, as the British educators did, to move ELLs out of sheltered instruction classes, where they were isolated from their mainstream classmates, and to place them in regular classes with authentic content though, as previously discussed, the linguistic and content demands of high school courses are often beyond the skills of ELLs.

In their research report, Bunch et al. (2001) note that for SCLT strategies to be effective, teachers require necessary preparation and administrative support . Language teachers often lack the knowledge of subject content and subject teachers, in turn, lack the necessary experience in working with language matter. Bunch et al. conclude that "contrary to the claims of several political movements in the United States, these issues [second language acquisition

problems] do not disappear simply by placing ELLs in mainstream classes" (Bunch et al., 2001, p. 29).

Schleppegrell, Achugar, and Oteiza (2004) focused their study on the grammar of history texts for enhancing content-based instruction (CBI). They believe that greater focus on language itself, focus on the form with emphasis on function, can help students cope with the complexity of grade-level concepts and thus achieve grade-level standards. They came to the conclusion that to identify key events and understand organizational features of texts, one needs first of all grammatical knowledge, then lexical access, and at last, semantic proposition formulation. With CBI, the authors say, there is no need to integrate language into curriculum. Language and content are already integrated. What is needed, is a means of helping students see how language construes meaning, i.e. functional grammatical analysis.

Students at middle school and above are interested in engaging with complex concepts and subject matter; we need to help them develop the linguistic repertoire that will make reading and writing this subject matter possible. (Schleppegrell, Achugar, & Oteiza, 2004, p. 90)

### **Description of the Study**

The Committee on Developing a Research Agenda on the Education of Limited-English-Proficient and Bilingual Students (August & Hakuta, 1997) outlined principles of overall priorities for research. The priorities, it states, should be given to insufficiently researched topics for which, however, theories exist. The topics named by the committee include investigation of specific populations, research questions that are of strong interest to the public, and methods designed to serve English language learners. This study attempts to follow the principles identified for the research in the field of second language acquisition by linguistically different immigrant students.

### ***Problem Statement***

According to the Supreme Court's decision in *Lau vs. Nichols* of 1974 and to the *Castañeda v. Pickard* Equal Educational Opportunities Act of 1981 (Mora, 2004), districts have a

dual obligation to teach English and to provide access to academic-content instruction. Thirty years later there is still abundant documentation that educational programs have been weak or negligent in meeting the needs of the school population that is experiencing a substantial growth (Simons & Connelly, 2000). Research states that learning problems of many immigrant students are the consequence of inadequate instruction (Olsen, 1997; Simons and Connelly, 2000; Valdés, 2001).

Efforts were made to fulfill the first obligation outlined by the *Castañeda v. Pickard* Equal Educational Opportunities Act when a score of ESL teacher positions were created and filled. However, untrained regular classroom teachers were not able to help ESL students avoid "irreparable deficits in subject-matter learning" (Valdés, 2001, p. 13). A 1999-2000 survey reported that 41 percent of teachers taught ESL students, but only 12.5 percent of them had received eight or more hours of professional training, which means that immigrant students are still served by unprepared teachers who share little of their cultural and linguistic experience (National Center for Education Statistics, 2002). Few, if any, teacher preparation programs include ESL strategies in the curriculum of regular K-12 classroom teachers (Simons & Connelly, 2000). As a result, regular classroom teachers feel overwhelmed and unable to meet the needs of linguistically different minority students (Penfield, 1987; Simons & Connelly, 2000). More than half of the secondary teacher respondents in Simons and Connelly's qualitative research said that their job was to teach a particular academic-content area and that teaching English was "incompatible with achieving the goals and objectives of their courses and curricula" (p. 170). Half of the teachers responded that ESL students should not be in regular classrooms until they master English.

Compliance with the second obligation of the *Castañeda v. Pickard* Equal Educational Opportunities Act, namely to provide linguistically different students' access to academic-content instruction, is still unresolved. The researchers agree that "deep proficiency in a second language takes far longer to attain than surface fluency" (Northwest Regional Educational Laboratory, 2001, p. 2). The

instruction should equip the learners not only with survival skills “necessary for ordering Big Mac” (Northwest Regional Educational Laboratory), but with complex cognitive skills critical to their school success and enabling them to analyze, synthesize, and evaluate while reading or writing in a target language (Northwest Regional Educational Laboratory, 2001).

### ***Purpose of the Study***

The purpose of this study was to explore the benefits of one instructional strategy on immigrant students’ achievement in academic areas. The specific strategy chosen was the use of printed instructional materials with native language support in a subject matter area for adolescent immigrant students who are in the process of acquiring English language skills. In this study, the academic performance of adolescent immigrant students having printed instructional materials with native language support in one subject area was compared to their academic performance in the same subject without using printed support materials. In addition, the study explored qualitatively the perceptions of the use of printed instructional materials with native language support in subject matter areas among learners, parents, and ESL as well as subject area teachers.

### ***Research Questions.***

The central question addressed in this research was:

- Do printed instructional materials with native language support afford a significant increase in adolescent immigrant school students’ achievement in high school geometry as measured by chapter tests?

The related questions were:

- How does the second-language learners’ use of proposed instructional materials with native language support compare to their self-reported use of other resources?
- What is the perception of second language learners toward the usefulness of printed instructional materials with native language support?

- What is the perception of the parents of second-language learners toward the usefulness of instructional materials with native language support in being more involved with their child's learning and assisting their child's learning?
- What is the perception of academic subject-area teachers regarding how instructional materials with native language support affected the classroom environment, involvement of second-language learners, and success of second language learners?
- What are the perceptions of ESL teachers regarding the usefulness of instructional materials with native language support in defining the language material to be taught and in explaining word meaning and sentence structure?
- What is the impact of availability of instructional materials with native language support on teachers' and linguistically different students' classroom behavior as measured by classroom observation?

### ***Research Design***

A quasi-experimental design supported by qualitative analysis of surveys and interviews gathered from students, their parents, ESL teachers, and subject matter teachers was the basis for the study. The sample was an in-tact school population of tenth and eleven graders taking geometry as their mathematics course. In this subject students were provided with printed instructional materials containing the support in the ESL students' native language. These materials were to be used in the mainstream classroom, at home, and in the ESL classroom. Instructional materials were prepared based on a unit from the textbook that was used in the mainstream class. Vocabulary and grammar/structure reinforcement materials used in ESL classroom were made based on texts from the same unit of the textbook. Students' achievements in geometry when they study the subject without and with bilingual support were compared.

### ***Limitations of the Study***

1. The use of an in-tact sample limits the generalizability of the findings to other populations.

2. The use of a population with the same native language limits the generalizability of the findings to students with other native languages.
3. The selection of subject areas may limit the generalizability of the findings to subjects other than geometry.
4. A limiting factor might be the fact that immigrant students will not be isolated in completely controlled laboratory conditions and thus might be positively influenced by the availability of teaching resources other than the school provides.
5. The short duration of the intervention could, on the one hand, result in a positive effect because of the novelty of the strategy. On the other hand, the short treatment might not lead to drastic outcomes since the achievements in learning are the result of a gradual and sometimes long process.

#### ***Definition of Terms***

*ESL (English as a Second Language).* Programs designed for students learning English as a second language.

*Immigrant Students.* Limited English proficient foreign-born students.

*Instructional materials with native language support.* Instructional materials in English that use students' primary language to help them derive meaning from the instruction in English language.

*LEP students.* Limited English proficient students who have difficulty in understanding oral English or in speaking, reading, or writing in English, which may impair the students' success in classrooms where the language of instruction is English.

*Students' involvement into the learning and teaching process.* Students' participation in the class activities, their interest in subject, the quality of home assignments, and the overall progress in a certain subject.

#### **Summary**

As the immigrant population continues to increase in number nationwide and as many traditionally non-immigrant states receive more culturally and linguistically different newcomers, educational institutions are faced with finding the best ways of teaching adolescent immigrant students.



This population of students has little time to master content knowledge and language skills. Adolescents are hardly able to acquire a second language naturally. Thus, the process of acquiring English as a second language should be facilitated for these students and the progression of their cognitive development ensured as much as possible, despite their lack of language skills in English. Finally, as their ability to enter and succeed in an institution of higher learning depends wholly on the progress they make in junior high and high school, opportunities for expeditious learning should be made available to motivated students.

Most adolescent children, except those from war-ridden countries, come to the U.S. able to read in their native language (Echevarria, Vogt, & Short, 2004). Despite some evidence supporting the positive outcomes of bilingual education (Ramirez, Yuen, Ramey, & Pasta, 1991), where the native language of students occupies an important place in learning, knowledge in and of native language is most often ignored. Because of a large shortage of qualified bilingual teachers, especially those able to teach academic content at secondary school level, lack of knowledge about what constitutes the best approaches to bilingual education, and political reasons, bilingual education currently serves only a small fraction of children, most at the elementary school level (Faltis & Wolfe, 1999a; Olsen, 1997; Valdés, 2001). Instruction in the most typical ESL Pullout program is usually not based on the learners' L1. Sheltered and content-based instruction cannot be widely implemented due to the lack of availability of appropriate grade-level and academic subject matter printed materials.

The purpose of this study was to investigate the effectiveness of using printed instructional materials with native language support for adolescent immigrants in subject areas, without requiring teachers to know the native languages of the immigrant students they teach. The issue was to explore this approach in terms of its impact on the development of immigrant adolescents' English language proficiency and on their achievement in subject matter areas. Also, the aim of the study was to evaluate the perceptions of English learners, their parents, as well as ESL and subject matter teachers on the use of the instructional materials with native language support.

## CHAPTER 2 - Literature Review

Today, research on the subject of second language acquisition makes use of theories and methodologies from a variety of academic fields, such as general and developmental psychology, psycholinguistics, sociolinguistics, neurolinguistics, and educational psychology with its principles of teaching and learning. The literature regarding the subjects' psycholinguistic features, the role of language in their cognitive development, and existing educational programs for linguistically different students was reviewed in Chapter 1. This chapter will review the relevant literature with the specific focus on approaches, theories, and methods of second language acquisition taking into account differences in regard to the age of learners. It will also discuss the views of researchers and practitioners on the role of the native language in the process of second language acquisition. Then, this chapter will present an analysis of why some major educational programs aimed at immigrant adolescent students fail to serve qualitatively this population and, finally, the present situation with instructional materials for immigrant adolescent students will be summarized.

### **The Decline of Behaviorism and its Aftermath**

A large portion of the twentieth century language teaching pedagogy in the U.S. was influenced by behaviorism. Behaviorists' desire was to free psychology from its mentalistic, mystical, magical, and extra-natural characteristics. They wanted psychology to become a true science, more materialistic, mechanistic, and more objective (Millon, 2004). Millon (2004) explains the long triumph of behaviorism over other approaches in America by the culture's receptiveness to everything pragmatic, concrete, simple, tangible, and having common sense. Also, he attributes the dominance of behaviorism to American heartland intellectuals' "aversion to the cosmopolitan and liberated thoughts of foreign nations" (p. 332) so that scientists who "would dare write about topics such as the mind and the conscious were viewed with great suspicion, as fuzzy-minded radicals inclined to mystical thought" (p. 332). Until the 1960s "behaviorists held all the dominant positions of power, wrote all the textbooks, received all the honors, and controlled all the money in psychology departments" (p. 387).

After the fall of the audio-lingual method of language instruction, with its behaviorist principles of stimulus-response connections, second language educators turned to two diametrically opposed approaches, the natural and the cognitive. Much of the decline of behaviorism-based methods of second language teaching was attributed to Chomsky's (1972) proposition of language acquisition as the result of natural, intrinsic, human ability. While structural behaviorists carefully worked out the taxonomy of presumably all possible sentence structures, treating language as a static entity or finished product consisting of a collection of habits learned by imitation, memorization, and mechanical drill, Chomsky's approach reflected the generative and creative nature of language. Because of their emphasis on formal aspects, structural linguists were accused of neglecting the creative aspects of language (Stern, 1983).

### *Natural Approaches to Second Language Acquisition*

In response to Chomsky's (1972) claim that language structures are not derived from experience but are innate, some language educators propagated natural language teaching, a method that did not involve the use of grammar, translation, or audio-visual drill. They justified shunning these widely used methods by referring to Chomsky's claim that the ability to learn languages was innate to humans and asserted that "second language acquisition can ... take place unconsciously in natural context, [as] incidental learning, ... by exposure to models ... and without overt explanation" (Gee, 1988, p. 217). Languages, they claimed are not "bodies of conscious knowledge, they are not products of conscious learning. Language teachers, if they actually observe themselves and their students, can come to know as much as or more than research can currently tell them" (Gee, 1988, p. 217). They further suggested that intentional learning leads to meta-linguistic skills and meta-knowledge that have nothing to do with knowing a language. Teachers, they argued, should not equate teaching a second language to teaching subject matters like physics or history (Gee, 1988). However, unlike the naturalists, Chomsky (1964) did not believe that knowledge of formal statements of grammar would hinder language acquisition. He believed that structuralist grammars, which were concerned with surface structures, were possibly useful as 'practical' or 'teaching' grammars, saying that "the advantage of practical grammars lies in the fact that they provide a straight-forward representation of 'surface structure'" (p. 149) and that "the current

change of emphasis in grammatical studies affects everyone who is concerned with the study of language, in whatever capacity” (p. 152).

Larsen-Freeman (2003) admits that there are successful language learners who have picked up a second language without formal training but immersed in an L2 environment. But there is much evidence, she says, of learners “who have failed to acquire even rudimentary morphology” (p. 19) being surrounded by the target language.

Krashen and Terrell (1983), following the innate character of language learning, proposed five hypotheses of second language acquisition: *acquisition versus learning hypothesis, natural order hypothesis, monitor hypothesis, input hypothesis, and affective filter hypothesis*. The *acquisition versus learning hypothesis* claims that formal learning cannot lead to natural fluent communication. What brings the positive results is the acquisition that occurs in a manner similar to the acquisition of L1 without explicit attention to form and following the natural order of acquisition of grammar rules (*natural order hypothesis*). The acquisition versus learning hypothesis provoked much disagreement among educators (see for example Ioup, 1984; Faltis, 1984; Hakuta, 2003) because they thought it is almost impossible to distinguish between learning and acquisition. Also, not all language experts supported the natural order hypothesis. Larsen-Freeman (2003) believes that the order of acquisition of grammar rules does not play any significant role and suggests using a checklist of grammatical structures tied to reading passages rather than teaching grammar in a strict linear order.

To ensure the correct usage, Krashen and Terrell (1983) offered the *monitor hypothesis*, which does not deny the knowledge of rules but recommends their acquisition with the focus on communication and not rote learning. There was no disagreement among grammar teaching supporters regarding this hypothesis that takes into account practice of language material (Leki, 1992). Also, there were no objections among language teaching experts concerning the *input hypothesis*. The concept of comprehensible introduction of new material is not a new phenomenon proposed by Krashen and Terrell. Dewey (1947), a philosopher and an avid supporter of scientifically tested teaching methods, was also against haphazard learning. He stressed that each student’s experience should be a step to further ones.

The Swiss educator Pestalozzi (1916) suggested that students should understand each step or principle in a lesson before more complex material is presented. Krashen and Terrell's comprehensible input can be understood to mean a certain point in the series of experiences.

To explain the differences in second language acquisition by older learners and "the changes that take place at puberty" (p. 47), Krashen and Terrell (1983) rely on affective factors (*affective filter hypothesis*). They hypothesize that the adolescents' affective filter increases in strength as compared to that of a younger child, but that "there is no fundamental change in language acquisition process at puberty. The ability to acquire does not disappear at puberty nor is it seriously damaged; rather the necessary input is often blocked and therefore is less available for acquisition" (Krashen & Terrell, 1983, p. 47). Krashen and Terrell affirm that adults, like children, are able to reach native-like levels of proficiency in a second language provided that language acquirers (in line with their theory of natural acquisition of language, Krashen and Terrell refer to them as language 'acquirers' and not language learners), possess a low affective filter and are provided with sufficient amounts of comprehensible input. On the one hand, Krashen and Terrell are against explicit teaching and conscious learning. On the other hand, their primary concern is whether the students *understand* the transmitted messages. *Understanding*, however, implies arriving at awareness by a conscious process. Thus, in advocating natural approaches, Krashen and Terrell make use of students' purposeful adaptations to their surroundings. They even admit that "adults would not be happy with an approach, which depends entirely on unconscious process ... and they may feel more comfortable if they can read a good succinct explanation of the forms and structures the instructor is using in the input they are receiving" (Krashen & Terrell, 1983, p. 91). In Natural Approach courses for secondary schools and universities, Krashen and Terrell allow "students to have a grammar handbook" and go so far as to admit that "such materials are of great help to them" (Krashen & Terrell, 1983, p. 92). See also Krashen, Scarcella, & Long, 1982. This asserts that there is hardly any purely natural approach, as proposed by natural approach supporters to second language acquisition, by adolescents and adults and that adults and adolescents can hardly acquire a second language 'naturally'.

The physiologist Pavlov (1928) whose studies of conditioned reflexes inspired so many behaviorists, differentiated between the first and second signaling systems. The functions of the first, consisting of responses to surrounding world, are, according to Pavlov, similar in the human brain and in that of an animal. The second signaling system Pavlov related purely to human beings because of their ability to process the speech and words, i.e. secondary signals. Psychological reflexes do constitute foundations of behavior, but scientific psychology cannot ignore the facts of consciousness (Vygotsky, 1997).

Comparing the learning of a second language with the learning of a mother tongue, the philosopher Wittgenstein (1969) noticed that the first language may be learned only by practice while the second involves the study of the rules, because we already have a language base on which we can plan our strategies. Similarly, in describing the relationship between the development of the native and the learning of a foreign language, Vygotsky (1986) noted that native language is learned subconsciously whereas foreign language acquisition is conscious and deliberate.

Consciousness is reflected in a word as the sun in a drop of water. A word relates to consciousness as a living cell relates to a whole organism, as an atom relates to the universe. A word is a microcosm of human consciousness.

(Vygotsky, 1986, p. 256)

### ***Cognitive Approach to Second Language Learning***

Simultaneously with the natural approach a rationalist, or cognitive, theory was emerging. The cognitive theory with its phenomena of consciousness, mind, and intelligence was critical in the rapid development of information theory that, in turn, drew the attention of different scientific fields, such as mathematics, logic, neurology, engineering, philosophy, and psychology, to the intricacies of higher mental processes. The scientists were highly interested in the processes of human reasoning with an intention to extend the possibilities of creating new forms of computer communication.

Cognitivists, according to Millon (2004), have three common features. First, they focus their efforts on thought. Second, they deal with conscious attitudes and expectations. And third, they believe

that individuals' conscious approaches to problems may lead to a more constructive outlook on life. Thus, individuals may become masters of themselves. Millon (2004) notes that cognitive approaches "appear best suited for relatively stable and moderately intelligent adults" (p. 405).

Cognitive psychology views learning as a constructive, not a receptive process. Learning is the product of the interaction among what learners already know, the information they encounter, and what they do as they learn (Bruning, Schraw, & Ronning, 1999). At the time when cognitive psychology was not wide-spread in the American education system, Dewey expressed cognitivist ideas:

Experience is an interaction between the self and some aspect of environment. Purposeful, intelligent action is the means by which this interaction is rendered significant. In the course of such action, objects acquire meaning and the self becomes aware of its own powers, since by intelligent control of the environment, it directs and consolidates its own capacities. Purposeful action is thus the goal of all that is truly educative and it is the means by which the goal is reached and its content remade. Such activity is the necessity of growth and growing.

(Dewey, 1947, p. 3)

Cognitive psychology emphasizes self-awareness and self-regulation of cognition that leads from learning to learners themselves. When students progress, they become, first, more aware of their ability to remember, learn, and solve problems and, second, more strategic in their learning (Bruning et al., 1999). "Mind is the quintessential hypothetical construction in our search for the self. [It] controls what we do, governs what we think, regulates what we feel. Of all that we possess, it is mind that bears the ultimate responsibility for who we are" (Bialystok & Hakuta, 1994). And it is the work of the mind that brings learners to literacy, which in turn leads to the change of the patterns of logical thought (Luria, 1976).

Under the influence of psychologists such as Piaget (1973) and especially Vygotsky (1986) whose first English translation of *Thought and Speech* appeared in 1962 (almost thirty years after his death), the role of language was viewed as a central factor in determining the cognitive and affective states of the individual. There are some differences in Vygotsky's views on learning and development in

children in comparison to those of Piaget, who looked upon learning and mental development as independent processes. In Vygotsky's (1986) view, learners may progress and expand their cognitive abilities under adult guidance or in collaboration with more capable peers. Defending Piagetian ideas, Tudge and Rogoff (1989) suggest that it is important to differentiate between learning skills and adopting new perspectives. They admit that adults may be better able than peers to help children learn skills and knowledge. But free verbal interchange in peer interaction, the researchers assume, may be influential in the change of perspectives. There is a good reason, Tudge and Rogoff say, to believe that language development should be viewed as a biological process rather than as the result of social learning. However, one should keep in mind the metaphor that a seed has the potential to become a plant, but actually becoming that plant depends on lots of environmental conditions. The idea that children can reach higher developmental levels under guidance is supported by Vygotsky's (1986) finding that "the development of scientific concepts runs ahead of the development of spontaneous concepts" (p. 190) in children's minds.

Cognitive theory in application to language learning is simultaneously a modified up-to-date grammar-translation theory (Carroll, 1971) and a modified up-to-date direct method approach (Diller, 1978). "It lays emphasis on the conscious acquisition of language as a meaningful system and it seeks a basis in cognitive psychology and in transformational grammar" (Stern, 1983, p. 469). McLaughlin (1978) pointed out that the language acquisition process takes into account both the linguistic knowledge and the behavior of the child. The language acquisition process, McLaughlin (1978) repeats after Piaget (1973) and Vygotsky (1986), is dynamic, reflects the child's changing experiences with linguistic and non-linguistic environment, is gradual, reflects the child's cognitive growth, and includes in addition to phonological and syntactic development, the acquisition of communicative skills through interaction with the social environment. Diller (1978) gives the following principles of language cognition: a living language is characterized by rule-governing creativity; the rules of grammar are psychologically real; man is specifically equipped to learn languages; a living language is a language in which we can think.



The cognitive approach does not assume that first language acquisition and second language learning are identical or even similar processes. But even though different, second language (L2) is bound to be related to first language (L1). “Native language growth provides a standard against which to conceptualize second language learning” (Stern, 1983, p. 303). The cognitive theory of learning places an emphasis on meaningful learning as a clearly articulated and precisely differentiated conscious experience.

### ***Categories of Cognitive Learning***

Stern (1983) differentiates among the following sets of categories of cognitive learning. *Social context* (socio-linguistics, socio-cultural, and socio-economic factors) is directly connected to *learner’s characteristics* (age, cognitive, affective, and personality characteristics) *and learning conditions* (educational treatment, objectives, content, procedures, materials, evaluation, exposure to target language). The learner’s characteristics and learning conditions, in turn, are directly connected to *the learning process* (strategies, techniques, and mental operations) that leads to learning outcomes (Stern, 1983). Bialystok and Hakuta (1994) include five elements into the “ecology of language learning” (p. 4): language (understanding the parts and the whole of language body), brain (knowledge of psycho-neurology of language acquisition), mind (relation between mental and linguistic categories, i.e. between ideas and words), self (personality factors, such as aptitude, intelligence, attitude and motivation), and culture (critical role of language in constructing a new culture).

### ***The Pedagogic Grammar***

Second language acquisition researchers make a distinction between linguistic and communicative competence, i.e. distinction between form and social function. Linguistic competence is the learner’s knowledge of the language system or grammar of the language (Paulston, 1980). Language teachers and laymen alike are familiar with the term grammar, which is simultaneously the most productive and the most controversial area in language teaching. Grammar is that branch of the description of language that accounts for the way in which words combine to form sentences (Lyons, 1981). Larsen-Freeman (2003) suggests that “grammar is a flexible, incredibly rich system that enables

proficient speakers to express meaning in a way appropriate to the context [and] to how they wish to present themselves” (p. 66).

Until the end of the 1960s, the main method of teaching foreign languages in the United States was the audio-lingual method based on structural approaches to language and on teaching definite sentence patterns. With the decline of behaviorism, second language educational researchers attempted to consider both the structuralist and the descriptive approaches to language teaching. Spolsky (1970) proposed a dual relationship between linguistics and language teaching: applications (data provided by linguistics for the creation of instructional materials) and implications (new discussions in linguistics, offering new insight into language teaching). Stern (1983), supporting Spolsky and trying to reconcile pure linguistics with the needs of language teachers, suggested differentiating between scientific, i.e. descriptive, grammar on the one hand, and pedagogic grammar on the other hand. Textbooks used by teachers and students would contain pedagogic grammar tailored to the language learning process and derived from the scientific grammar. “Theoretical linguistics ... can provide us with concepts, models, and ideas on language and it offers a protection against oversimplification. [It can] help to think critically and constructively about language” (Stern, 1983, p. 185). Pedagogic grammar based on the communicative functions that learners need in their acquisition of a second or a foreign language, has gathered wide support (Lyons, 1981; Palmer, 1971; Harmer, 2001; Larsen-Freeman, 2003). Thus, while scientific, or descriptive grammar attempts to describe all linguistic phenomena, the pedagogic grammar is “designed specifically to be of help to teachers and students of the language who need, as far as possible, clear and easily-digestible summaries of what is and what is not correct” (Harmer, 2001, p. 15). In pedagogic grammar Larsen-Freeman (2003) makes focus on “the big three”: consciousness-raising (helping to raise students’ awareness about grammatical features), practice, and feedback. Schleppegrell, Achugar, and Orteiza (2004) call grammar structure a signaling mechanism. For L2 readers, they say, linguistic awareness is the foundation of fluent reading. It helps derive the cues of what is happening, of participants, and of their relationships. Teachers interviewed by Ruiz-de-Velasco & Fix (2000) stated that

students “who can identify the functions of an adjective, subject, or verb in a sentence, are well positioned to make successful transitions to English language literacy” (p. 46).

Larsen-Freeman (2003) suggests looking at grammar as an integrated and inseparable part of three dimensions: form (phonology, graphology, morphology, syntax), meaning (semantics), and use (pragmatics). Also, she recommends that teachers give reasons for the grammar rules based on use, and encourage students’ curiosity about the logic in the language they are learning. After all, Larsen-Freeman says, grammar might be attractive for the language learners because of their own security. This statement is supported by Harklau’s (2000) subjects, immigrant adolescents who, after four to five years of American high school, voluntarily signed up for an ESL class when they entered a college because they felt they needed more knowledge of English grammar in order to feel more secure about the language they use. Larsen-Freeman mentions a language learner who felt cheated after the exposure to a teaching approach that did not consider any explicit grammar presentation.

The cognitive approach to second language acquisition led to a rehabilitation of grammar and especially of pedagogic or educational grammar. However, practitioners are still deciding the place of grammar in the teaching/learning process. At one of her lectures Larsen-Freeman (2003) conducted a short survey among ESL teachers concerning the associations they make to grammar and communication. Grammar was associated with such words as *rules, parts of speech, verb paradigms, memorizing, drills, and boring*. Communication is linked with *dynamic, understanding, meaning, accomplishing some purpose, and fun* as if understanding, meaning, and purpose are not direct consequences of knowledge and skills in grammar. This small investigation leads one to assume that grammar and communication are not only segregated in textbook pages (Larsen-Freeman, 2003) but also not related either in the curriculum or in teachers’ minds.

## **Native Language and the Age-Related Ability to Second Language Acquisition**

Native language commonly refers to either the language of early-childhood acquisition or to the language of preferred use (Stern, 1983). Such duality in the definition is explained by the fact that the language of early-childhood may remain undeveloped if the child loses the exposure to it, for example, by being placed into a different linguistic environment.

The questions usually asked in regard to second language acquisition are whether the second language is acquired through the same mechanisms as the native, i.e. the first language (L1), and under what circumstances it is possible to reach the native-like language proficiency in a second language (L2). Singleton (2003) points out that until the 1950s, the ideas about language learning were based on “impressionistic observation” (p. 4). It was commonly assumed that prepubescent children acquired a second language quickly and without much effort. In the second half of the twentieth century, neuroscientists supported the age-related, or biological, differences in language development. Thus, Lenneberg (1967), studying children with Down’s syndrome who develop language, although at a slower rate than normal children, noticed that these children stop their linguistic progress when they reach puberty. Based on this finding, Lenneberg proposed the critical period hypothesis in language acquisition suggesting that language acquisition is constrained by a critical period ending around puberty. Lenneberg borrowed the concept of critical period from neurological research on animals concerning time-bounded learning, which showed that animals are best able to learn up to a certain age (Lorenz, 1965; Hubel, 1988). Lenneberg conducted his research on L1 acquisition. However, he noted that adults, in general, were able to learn a foreign language because their cerebral organization for language learning had taken place in childhood, which meant that they possessed the rules of universal grammar.

The fact that adults can learn a second language and that some of them even manage to reach native-like proficiency, made some researchers use the term *sensitive* period for language learning instead of critical period (Birdsong, 1999; Eubank & Gregg, 1999). Still other researchers refuse to recognize the critical period hypothesis in language learning altogether (Bialystok & Hakuta, 1999; Marinova-Todd, Marshall, & Snow, 2000; Singleton, 2003).

Singleton admits that there is no disagreement among researchers over the proposition that earlier exposure to L2 leads to a better language proficiency in the long run. Scovel (1988) says that because younger children are cognitively immature, they acquire speech skills quite automatically. Older learners, on the other hand, commonly analyze what they are learning. They are faster and more efficient language learners because of their cognitive maturity, ability to generalize, and their social experience. The advantage of children, however, is not in their learning rate, but in their ultimate attainment (Scovel, 1988). Thus, both research and empirical evidence show that differences in second language learning by younger children and adults do exist (Hurford & Kirby, 1999; Johnson & Newport, 1989; Oyama, 1976; Weber-Fox & Neville, 1999).

Given these differences, is there a sensitive, or critical, age for maximal second language acquisition? A study done by Johnson and Newport (1989), shows that prepubescent children have a marked advantage in second language acquisition. The researchers tested subjects who arrived in the U.S. between ages 3 and 39 and had lived in the U.S. between 3 and 26 years by the time of testing. The test included a wide variety of structures of English grammar, using a grammaticality judgment task. If exposed to a new language before the age of seven or eight, children's second language abilities become indistinguishable from native speakers. Johnson & Newport note that there is a decreased language performance if children are exposed to a second language as early as age 8-10 as compared to the youngest group. The scatterplot reflecting their findings shows a rapid decline in native-like language performance by individuals exposed to a second language after the age 8 (see scatterplots of test scores in relation to age of arrival for subjects arriving in United States before vs. after puberty, in Johnson & Newport, 1989, p. 80). In a close examination of Johnson and Newport's scattergram, Bialystok and Hakuta (1994) noticed two rapid declines in English proficiency, one after age seven and the other just before twenty and suggested that the critical period of second language acquisition ends before age twenty, not at puberty as previously believed. To explain the decline of language proficiency after twenty, Bialystok and Hakuta (1994) assert that children who arrive before this critical age have greater opportunities for formal study of English grammar and receive special instruction in English as a Second

Language (ESL) courses. However, qualitative research on classroom practice described in Chapter 1 of this thesis does not support this assertion (Olsen, 1997; Valdés, 2001).

Researchers who described cases where adults reached native-like, or very close to native-like proficiency in a second or foreign language, are unconvinced that age alone may be the real cause of differences in adult and children second language acquisition. Bialystok and Hakuta's (1999) research on factors contributing to better language learning based on the data from the 1990 U.S. population census revealed that late language learners are able to achieve close to native-like perfection in an L2. The researchers admit that a serious limitation of their study was the fact that the English proficiency was based on self-evaluation of subjects. Also, they do not give the percentage of late language learners who achieved a high English proficiency. But the fact that some adults can be good language learners allowed them to suggest that some linguistic and cognitive factors, and not solely age, are responsible for language learning. Bialystok and Hakuta (1999) compared Johnson and Newport's (1991) replication study with Johnson and Newport's (1989) earlier research. In the replication study, older subjects' English proficiency was evaluated not orally but with a printed format. With printed-format testing, subjects exposed to English at an older age demonstrated higher English proficiency in comparison to the oral way of testing. Based on this comparison, Bialystok and Hakuta (1999) concluded that the differences in performance were attributable to testing methods. The differences in older learners' performance with the application of different testing formats may signify the greater role of cognitive influences in adults as compared to younger children. Singleton (2003) believes that the various age-related phenomena, such as environmental factors, motivation, and language dominance, as well as decreasing cerebral plasticity and other changes in the brain cause the differences in language acquisition. Birdsong (1999) and Marinova-Todd (2003) oppose the critical period hypothesis based on the fact that some adults do reach a very high level of proficiency in second or foreign languages.

To understand the pro- and anti-critical period hypothesis, let us have a further look at specific areas in Johnson and Newport's (1989) scatterplots reflecting subjects' judgment about the grammatical correctness of English sentences after the oral presentation of these sentences. The areas of interest will

be the score distribution of children exposed to English before age eight, between eight and eleven (upper grades of primary school), and between twelve and eighteen (junior high and high school students). Such an approach reveals an interesting pattern. The mean scores of native English speakers and subjects who arrived in the U.S. before age eight are 268.6 and 269.3 respectively, with standard deviations of 2.9 and 2.8. The range of scores in this age group is only 8 points (the highest score being 272 and the lowest 264) and the correlation between age and score is very low. The data for those between the ages 8 and 11 are as follows: range is about 20 (the highest 264 and the lowest 243). The largest range, 88 points (the highest score being 251 and the lowest 163), occurs for subjects of the last group, those between the ages of 12 and 18. Not a single student in this group reached the native-like English proficiency.

Another graph in Johnson and Newport's (1989) study (see *Mean percentage of errors on 12 types of English rules*, p. 87) reveals that subjects who arrived to the U.S. at high school age made many errors on determiners (*a, the, any, several, etc.*), plurals, past tenses, and particles.

The analysis of language errors made by adults and adolescents reflects that this age group has difficulties with the transformation of semantic language structures, which are quite abstract, into surface structures, which have logical form and phonetic representation. The question that may arise in every educator's mind is whether it is possible to teach/learn/acquire the rules of transformation of semantic structures into syntactic structures.

To answer this question, researchers (Marinova-Todd, 2003; Birdsong, 1999; Bongaerts, 1999) decided to find subjects who acquired native-like or close to native-like proficiency in a second language in spite of the fact that they started learning it at after-pubescent age. The researchers' aim was "to gain insight into the factors that have contributed to their ultimate success in the L2" (Marinova-Todd, 2003, p. 65). They found that older learners who have the more sophisticated knowledge of their L1 tend to perform transformations between semantic and surface structures successfully (Marinova-Todd, 2003). Older learners benefit from some formal instruction of grammatical rules to accelerate the learning (Bongaerts, 1999; Marinova-Todd, 2003; Singleton, 2003). Except high motivation, other important factors of successful L2 learning, according to Bongaerts, are access to massive L2 input and intensive

training in the perception and production of L2 speech. Marinova-Todd states that “under the right circumstances and with excellent instruction, the chances of achieving native-like competence in an L2 are similarly increased for both younger and older learners” (p. 70).

To summarize, biological or age restrictions cannot be ignored and easily overturned. After all, Johnson and Newport’s subjects exposed to L2 before prepubescent age did not receive any special treatment, rigorous instruction, and probably did not realize whether they were motivated to acquire English. It is quite possible to assume that they have learned English, their second language, naturally. On the other hand, older learners are able to reach high level of proficiency in an L2 as well. However, their success and chances to succeed depend on many factors, such as individual characteristics of the learner and social environment. School in this study is considered an important component of language learners’ social environment.

Carroll (1961) states that the results of language learning are generally highly correlated with the quality of instruction, the learner’s ability for languages, and the learner’s effort. Learning without good instruction may rob a student of all the motivation needed to learn a subject. Very few independent learners are able to reach the functional proficiency levels that can be achieved more easily by formal guided teaching. As Vygotsky (1986) points out, the range of skills that can be developed with guidance exceeds what can be attained alone. The advantages offered by guided foreign language instruction include savings in time, effort, and frustration on the part of the learner. Formal classroom guidance can turn the learning process into a joy and make it considerably shorter (Comenius, 1969).

Some researchers indicate that the linguistic environment provides more support for second language acquisition (Bialystok & Hakuta, 1994; Genesee, 1987; Kottler & Kottler, 2002). Second language may be “‘picked up’ informally because of its widespread use within the environment” (Stern, 1983, p. 16). There is no quantitative research comparing the conditions, the ease or difficulty, or the outcomes of learning languages in a formal setting as opposed to its natural linguistic environment (August & Hakuta, 1997; Faltis & Wolfe, 1999a; Peregoy & Boyle, 1997). Carton and Castiglione (1979) compare learning in non-educational, natural, settings with life in the wild. They point out that



errors and waste are frequent in nature and that without proper care much may pass the learner unnoticed and unlearned. Schachter (1992) draws attention to the “lack of feedback on form, particularly negative feedback, [that] is common in naturalistic language learning situations” (p. 34). Dewey (1947) calls learning that lacks a definite end or plan “stupid” (p. 37) because without the guidance of an experienced teacher, student’s actions may be “sporadic and ultimately fatiguing, accompanied by nervous strain” (p. 37). Larsen-Freeman (2003) believes that “the point of education is to accelerate the language acquisition process, not to be satisfied with or try to emulate what learners can do on their own. Therefore what works in untutored language acquisition should not automatically translate into prescriptions and proscriptions for pedagogical practice”(p. 78).

### **Spolsky’s Theory of Second Language Learning**

Natural and cognitive approaches resulted in a boom in the promotion of new methods of teaching languages, which began in the 1970s (Spolsky, 1988). To Berlitz, Army, Ollendorf, and Direct methods of the first half of the twentieth century, new methods were added: Total Physical Response, Natural Method, Community Language Learning, Silent Way, Suggestopedia, Whole Language, The Lexical Approach, Competency-Based Language Teaching, Neurolinguistic Programming, English for Special Purposes (see Richards & Rodgers, 2001 for the detailed description of these methods and a summary chart *The Chronological Development of Language Teaching* on pp. 314-317 in Shrum & Glisan, 1994).

Spolsky (1988), presenting his theory of second language learning, notes that any theory that seems to lead to a single method is too limited. The theory, he writes, “must be able to account for the success and failure of the many different methods that have been and are used throughout the language teaching world” (1988, p. 378). Good teachers, he says, are eclectic in the sense that they are able to choose from a range of options. Spolsky’s approach reflects a cognitive style that acknowledges “the idea that there are different legitimate ways to achieve the same goal” (Bialystok & Hakuta, 1994, p. 147) and that theories developed by Skinner (behaviorism) and Chomsky (creativity of language) may be not

mutually exclusive but rather complementary (Carroll, 1971). Kottler and Kottler (2002, see pp. 44-45) provide a review chart of strategies adopted from different methods that can be successfully used for teaching English language learners.

One of the features of Spolsky's theory of second language learning is an emphasis on the need to be precise and clear on the nature of the goals and outcomes of learning in terms of linguistic knowledge (grammar and lexicon) and generalized skills (reading, writing, speaking, and listening). The goals help learners take responsibility for learning a second language and they guide teachers' effort (Bialystok & Hakuta, 1994).

Based on Carroll's (1962) model of instruction, Stern's (1983) theory of second language acquisition, Bialystok's (1978) theoretical model of second language learning, and Gardner's (1985) socio-psychological model of second language acquisition, Spolsky (1988) presented his theory in the form of formula:

$$Kf = Kp + A + M + O$$

where  $Kf$  is knowledge and skills at some future time,  $Kp$  is knowledge and skills at the present moment,  $A$  is various components of ability including physiological, biological, intellectual, and cognitive abilities,  $M$  is various affective factors such as personality, attitudes, motivation, and anxiety, and  $O$  is the opportunity for learning the language. Spolsky argued that if any component of the formula is absent, there cannot be a positive outcome in language learning. Looking at the formula, one can see that students come with some given  $Kp$  and  $A$  and that schools are supposed to contribute to the further development of both. The last two components of the formula,  $M$  and  $O$ , are influenced by social context (family/home, school, city, state, and country) that may produce positive or negative attitudes and create rich or poor learning opportunities. According to Spolsky, the chances for positive changes to occur depend largely on *present* knowledge,  $Kp$ , (including knowledge of native language) and the application of conditions relevant to second language learning.

Spolsky (1989) identified seventy four conditions relevant to second language learning. All the conditions are marked as either necessary (without which learning is impossible), graded (the more

something is true, the more its consequence is likely to occur), typical (apply typically but not necessarily), or combined. Only the necessary conditions are reviewed here. These conditions are:

- Opportunity for analysis: learning a language involves an opportunity to analyze it into its constituent parts, the knowledge of which becomes available for recombination (conditions 5 and 57).
- Opportunity for synthesis: learning a language involves an opportunity to learn how its parts are recombined grammatically into larger parts (condition 58).
- Grammatical sensitivity: the ability to recognize constituents and to develop generalizations about recombination and meaning develops control of the structure of second language (condition 30).
- Dual knowledge: developing both knowledge and skills in using that knowledge (condition 14).
- Knowledge of discrete items: Knowing a language involves knowing structural items, such as sounds, morphemes, words, and sentence patterns (condition 16).
- Opportunity for remembering and practicing: learning a language involves an opportunity for new skills to be practiced, which leads to fluency (conditions 61 and 62).
- Human learner: a second language is being learned by a human being who has already learned a first language (condition 21).

### ***Analysis, Synthesis, and Grammatical Sensitivity in Language Learning***

In light of the wealth of learning material, the basic problem of both linguistics and language teaching is finding a way to represent highly intricate linguistic phenomena as a learnable system or structure (Stern, 1983). Since the nineteenth century, linguistics has been concerned with establishing systems of elements and creating procedures for making inventories of elements. The major traditional areas of linguistic investigation are phonetics or phonology (speech sounds), lexicology (words), syntax (sentence structure), and semantics (meaning).

Several necessary conditions in Spolsky's (1989) theory of second language learning are related to creating opportunities for learning "a number of the discrete structural items (sounds, words, structures, etc.), which make up the language" (p. 18). Of course, language learners are not scientists, consciously doing all the analysis, but from an empiricist's perspective, it is assumed that learners are engaged in construction of the L2 grammar rules (Larsen-Freeman, 2003). Larsen-Freeman does not believe that grammar can be learned on its own without any teaching because very few learners are capable of picking up the grammar of a language on their own efficiently, "especially if they are post-pubescent" (p. 78). "Most learners have little control over the factors requiring them to learn a new language or the circumstances available to them for learning it (Bialystok & Hakuta, 1994). Not all individuals are equally able to 'derive grammar' implicitly. For those with low 'noticing' abilities, which are now recognized as an important factor in language acquisition (Skehan, 1998; Schmidt, 1990; Larsen-Freeman, 2003), opportunities should be created to learn how to recognize constituents and develop or understand generalizations about recombination and meaning, how to analyze language into its constituent parts and to learn how constituent parts are synthesized grammatically into larger units (see Spolsky's (1989) conditions 5, 16, 30, 57, and 58). Larsen-Freeman (2003) points to the research that values promoting noticing, considering it a necessary condition, and underlines that noticing is more likely to take place in consciousness-raising tasks.

Dewey (1947) drew educators' attention to the importance of learning to see and to perceive.

When the method of the teacher leads the pupil to *see* in the object features and relations he had not seen before, both teacher and pupil come into intellectual and emotional control of the situation. Then the habit of objective seeing is formed, and the habit operates in subsequent seeing. Experience is immediately enriched, and the capacity of growth, for continuity experience, is expanded and directed. (Dewey, 1947, p. 7).

By forming concepts, it is “equally important to unite and to separate [therefore] synthesis and analysis [further, Vygotsky (1986) cites Goethe] presuppose each other as inhalation presupposes exhalation” (p. 136). Our mind, Bialystok & Hakuta (1994) note, is finely tuned to the analysis of language and our linguistic processors can detect meaning and structure in linguistic signals and interpret them.

Researchers (Bialystok & Hakuta, 1994; Vygotsky, 1986) point out that error analysis and error correction are good ways of teaching students to see and analyze the material though there is still no agreement about correcting student errors. Some methods recommend avoiding error correction (Kottler & Kottler, 2002; Leki, 1992), while others connect correcting student errors with different perception of error correction and with different styles and habits across cultures (Scarcella, 1990). Still other researchers believe that styles and habits can be modified and extended (Davidman, 1981) and that more mature students “learn intuitively to adjust to instructor’s cognitive styles” (Fourier, 1984, p. 153). Peregoy and Boyle (1997) suggest using the teacher’s own judgement depending on student’s second language level, the error type and its importance for communication purposes. Harmer (2001), realizing the importance of error analysis in the teaching/learning process, starts the chapter about handling students’ mistakes (see chapter 7) in his book, using the word ‘feedback’, emphasizing that “feedback encompasses not only correcting students, but also offering them an assessment of how well they have done” (p. 99). The same term ‘feedback’ is used by Larsen-Freeman (2003) who points to the research that has shown that students want to be corrected more than teachers feel is necessary and that feedback may be the most potent source of improvement in the target language. She assumes that self-correction helps learners best because it involves students into an active process and, thus, creates more chances for students to remember the right choices.

### ***Knowledge and Skills in Language Learning***

Spolsky’s Dual Knowledge condition (1989) deals with developing both knowledge and skills in using that knowledge. This condition coincides with cognitive academic language

learning approach (CALLA) designed at the end of 1980s by Chamot and O'Malley (1987b) to provide transitional instruction for upper elementary and secondary students. They created instructional resource materials for use in social studies and mathematics (Chamot, 1986; Chamot & O'Malley, 1987a). The authors claim that one of the components of CALLA is an ESL curriculum correlated with mainstream content subjects. Their approach is based on Anderson's (1985) cognitive theory, which describes both second language acquisition and learning strategies. According to this theory, there are two kinds of knowledge: declarative (facts, rules, sequences of events, know that) and procedural (technical know-how). Anderson indicates that declarative knowledge about a language is a system (grammar rules, vocabulary) that, through extensive practice, leads to procedural knowledge (linguistic functional proficiency). As noted by Dewaele (2002), lack of practice results in overloading short-term memory and consequently in lack of oral fluency in second language production.

Scherba (1974) said that what differentiates learning a language from learning academic subjects, is that language learning is aimed at acquiring skills, thus, knowledge being auxiliary. In learning academic subjects, knowledge and understanding, on the contrary, may be primary goals. Larsen- Freeman (2003), describing the nature of grammar, echoes Scherba in stating that grammar is a skill rather than an area of knowledge. "If we [language teachers] make a simple equation between grammar and knowledge, then we run the risk of grammar's remaining inert, not available for use by our students" (p. 24). Scherba (1974) defines language pedagogy as applied science about the search of processes that may facilitate the language acquisition. The job of teachers is to "*maximize learning* by creating optimal conditions for it to take place" (Larsen-Freeman, 2003, p. 20).

### ***Knowledge of Discrete Items: Vocabulary Enrichment***

Spolsky's (1989) conditions include the knowledge not only of grammar and structure but also the knowledge of vocabulary integrated into functional skills for which the opportunity for remembering condition and opportunity for practicing condition are necessary (see conditions

61 and 62). Among many themes of second language acquisition discussed in recent years, the process of vocabulary accumulation seems to be almost forgotten though this area contributes tremendously to language proficiency because it is hardly possible to understand either oral or written language without knowing vocabulary (Oxford & Crookall, 1990; Levine & Revers, 1990).

As already mentioned, being in the second language environment may enable school students to learn everyday vocabulary within a relatively short period of time (Cummins, 1981). Computerized vocabulary analysis revealed that the 700 most frequent words of English account for around seventy percent of all English texts (Willis, 1990). However, students' vocabulary should be enlarged if they want to participate in academic-content classes.

According to Scherba (1974), vocabulary enrichment, as well as syntax enrichment, takes place through the learners' contact with written language. By reading, students can, to a large extent, subconsciously learn many words. MacNeil (1990) wrote that he had been taught some grammar, and reading had given him vocabulary. Another advantage of learning vocabulary through reading is that it is easier to come to the meanings of the words through context, which dictionaries in some cases fail to provide (Vygotsky, 1986; Leontyev, 1978; Scherba, 1974). "A word in a context means both more and less than the same word in isolation: more because it acquires new context; less because its meaning is limited and narrowed by the context" (Vygotsky, 1986, p. 245).

Reading leads not only to a wider awareness of lexical meaning, it also gives the opportunity to meet a word repeatedly. The cumulative effect of multiple exposures from sustained reading is considerable (Nagy, 1997). The studies that investigated vocabulary enrichment through reading found that reading was effective in improving both vocabulary comprehension and vocabulary enlargement (Mondria & Wit-de-Boer, 1991). Reading is that *active use* of language that establishes meaningful connections (Rivers, 1986). Language is a holistic phenomenon that can be best understood in whole text (Larsen-Freeman, 2003). The

approach to vocabulary enrichment through reading may be justified by Wittgenstein's (1969) ordinary language philosophy. Wittgenstein believed that words are not simply names. It is necessary to determine how words are used in a sentence or a context. The word, according to him, has no meaning at all, except for its use in a context. We usually define words by using them in a sentence or even context. This means that one learns the meaning of a word when one learns to employ it. On the one hand, one can memorize words and rules of grammar, but on the other hand, the real learning comes through doing, i.e., not only rules, but also practice is needed (Wittgenstein, 1969).

Burger, Courchène, Dogerty, and Roberge (1990) assume that reading may be often the student's strongest skill, and because of "the fleeting nature of the message in listening comprehension" (p. 28) they recommend beginning with reading. They argue that it is easier to provide students with help when they read rather than when they listen. They say that reading allows one to go back and review the text. Also, Peregoy and Boyle (1997) point to the research that found that the process of reading in L1 and L2 is essentially the same.

However, mere exposure to reading will not lead to qualitative changes of vocabulary in students' minds (Levine & Revers, 1990; Oxford & Crookall, 1990; Schmitt & Carter, 2000). "Merely subjecting students to abundant comprehensible input" (Larsen-Freeman, 2003, p. 82) will not suffice. Harmer (2001), differentiating between extensive reading (reading at length, for pleasure, and in a leisurely way) and intensive reading (more concentrated, less relaxed, and aimed at the achievement of a study goal) suggests that students be offered appropriate materials and guidance in both kinds of reading. He writes that "reading is the best possible way for students to develop automaticity – that is the automatic recognition of words when they see them. It is by far the best way to improve their English reading (and writing) overall" (p. 204).

### ***Remembering and Practicing***

A fair question to ask would be if there are any rational methods for vocabulary enlargement. Kondratyeva (1974) suggests two approaches for optimal learning of vocabulary by



means of reading: quantitative and qualitative. Quantitative aspects are supposed to answer such questions as how many new words one page of text should contain not to make the process of reading tiresome but so that simultaneously students would accumulate new vocabulary. What is the relationship between reading speed and the number of unknown words? What is the reading speed of the texts containing conceptually more difficult vocabulary?

The qualitative aspect deals with psychological memory attributes, probability of remembering new words, morphology of the target language, the principles of word choice in texts, and the optimal recurrence of words to be remembered. The last term, the recurrence of words to be remembered, is referred to practice (Spolsky, 1988), rehearsal (Sousa, 2001), drill (Stewick, 1974) (the term widely used during the flourishing time of audio-lingual method based on behaviorism), and to frequency in the input (Larsen-Freeman, 2003) that Larsen-Freeman calls a very important factor in second language acquisition, saying that “It pays to stick around!” (p. 82). Researchers distinguish between massed and distributed vocabulary practice (Baddeley, 1982; Sousa, 2001). The first takes place within a short period of time and usually leads to short-term memory (Bloom & Shuell, 1981). The distributed practice that leads to better retention (Baddeley, 1982; Laufer & Osimo, 1991; Sousa, 2001), occurs over a longer period of time. Moreover, as it has been already mentioned, reading provides opportunities for rich semantic relationships (Carr & Mazur-Stewart, 1988).

### ***The Place of Native Language in Second Language Learning***

Spolsky’s human learner necessary condition postulates that “second language learning deals with the learning of a second or later language by a human being who has already learned a first language” (1989, p. 19). Although currently, the first/native language (L1) is not actively incorporated into the teaching process of a second language (L2), there is a debate about its place in the process of second language acquisition.

There are several reasons for why L1 is not given pedagogic recognition. First, the Direct Method of instruction based on behaviorism, held as conventional wisdom that monolingual teaching was

the best way of getting results (Howatt, 1984). Controlled exposure to the target language was supposed to establish habits without interference from native language. Then, contrastive analysis supporters feared the L1 contagion by its use in learning L2, hence, “there was no question of exploiting the learner’s existing linguistic experience and expertise in their own language to facilitate the learning of the L2” (Widdowson, 2003, p. 151).

Next, incorporation of the first language into the study of the second language is commonly associated with the universally condemned grammar-translation method. However, as Widdowson (2003) points out, “with more cognitive views of learning comes the realization that learners cannot be immunized against the influence of their own language” (p. 151). He believes that contact between the two languages is unavoidable and that it is mediated by the principles of universal grammar. Ellis (1994) wittingly remarks that it is obvious that as far as a second language is concerned, there are at least two languages involved. Widdowson (2001) suggests bringing translation back from "its exile" and giving it "a fair informed appraisal" (p. 16). Cohen and Allison (2001) also believe that translation might be desirable and at given stages of language development even essential. Bialystok (2001) and Cohen and Allison (2001) remark that there is little if any available research data about language choice for cognitive processing, thus, assuming that L1 may play a considerable role in it. It is hardly possible for L2 to function without L1 since the last serves as a means for concept mediation to meaning creation in L2. Second-language learning, thus, is “both language learning and concept learning” (Bialystok & Hakuta, 1994, p. 108) and it is “the pervasive truth that learning a new language rarely allows you to set aside all that you have come to know about your first language” (Bialystok & Hakuta, 1994, p. 11). Corder (1999) notes that the whole concept of learning is ultimately connected with previous knowledge with L1 playing an important role at all levels of second language acquisition, from the beginning to the advanced. Corder calls the mother tongue a “heuristic and facilitatory” (p. 25) tool in discovery and creation of the properties of the new language. Swain and Lapkin (2000) investigated the use of L1 and found that it served the following functions: it established an understanding of the task to be managed and made it easier to negotiate and provide justifications for vocabulary and grammar choices. Based on Vygotsky’s

zone of proximal development (ZPD) theory, Brooks and Donato (1994) suggest that L1 may assist language learners in gaining control of the task and consequently in their working at a higher level than might have been possible had they been working without the help of L1. Only when learners gain an understanding of what they need to do, can they proceed with the task (Storch & Wigglesworth, 2003).

The use of native language leads inevitably to translation. Translation may be a cognitive process that transforms sound and form to meaning, which, in turn, is “the most central characteristic of human memory” (Baddeley, 1982, p. 99). Many researchers, including Asher (1982), Laufer & Osimo (1991), Levine & Revers (1990), Nation (1982, 1990), Oxford & Crookall (1990), Perkins (1999) support the help of the native language because translation may often be a useful tool for understanding context, especially when the context does not provide many cues or, more commonly, if the cues rely on words unfamiliar to ELLs. Ellis (1994) writes:

There is clear evidence that the L1 acts as a major factor in L2 acquisition. One clear advance in transfer research has been the reconceptualization of the influence of the L1, whereas in behaviorist accounts it was seen as an impediment (a cause of errors), in cognitive accounts it is viewed as resource, which the learner actively draws on in inter-language development (p. 343).

Hayakawa (1990) writes that children first get acquainted with an extensional world and only later in their life is the verbal world added. Based on this, he distinguishes between *extensional* verbal meaning (denotations) pointing to things and *intentional* meaning (connotations) consisting of ideas, notions, concepts, and feelings suggested in the mind. While denotations create few problems of interpretation and can be explained to second language learners by the use of L2, connotations may cause difficulties of interpretation without the help of L1.

Some researchers call the connection between two languages during the process of a second language learning transfer, giving it characteristics, such as it helps creative thinking, problem solving, learning the environment, developing critical metacognitive skills, and other higher mental processes (Sousa, 2001). Translation or transfer can be related to a constructivist approach in curriculum building when instruction is based on students’ previous knowledge (Brooks & Brooks, 1993; Kole, 2003) . For

second-language learners, the first language is the foundation on which the second language is built. “Skills developed in the student’s native language will transfer to English” (Kottler & Kottler, 2002, p.

25). Older language learners

do not need to start from the beginning when learning a second language. Some of what they already know about one language, applies equally to their second language, no matter what that language is or its relation to their first language. The representation of languages in the mind must make possible this shared access to basic knowledge about language. At the same time, the details of the two languages need to be represented distinctly. It is possible, therefore that the representation that bilingual speakers construct for their two languages may include two components – common representation that is the record of general linguistic knowledge, and separate representations that record language-specific information (Bialystok & Hakuta, 1994, p. 119).

Success in learning a foreign language, according to Vygotsky (1986), depends on a certain degree of proficiency in the native language since the learners can transfer to the new language the system of meanings they already possess in their own. And in the opposite, a foreign language facilitates mastering the higher forms of the native language. Thus, the acquisition of both the foreign and the native languages belongs to one class of the processes of speech development because the acquisition of a foreign language uses the semantics of the native language as its foundation. “The reciprocal dependence is less known and less appreciated. But Goethe clearly saw it when he wrote that he who knows no foreign language does not truly know his own” (Vygotsky, 1986, p. 160). Vygotsky (1986) states that experimental studies have shown that children’s understanding of their native language “is enhanced by learning a foreign one” (p. 160). Vygotsky (1986) expresses very neatly the relationship between foreign and native languages saying that

the knowledge of the foreign language stands to that of the native one in the same way as knowledge of algebra stands to knowledge of arithmetic, enhancing it and turning it into a concrete application of the general algebraic laws. The child’s approach to language

becomes more abstract and generalized. As algebra liberates the child from the domination of concrete figures and elevates him to the level of generalizations, the acquisition of foreign language – in its own peculiar way – liberates him from the dependence on concrete linguistic forms and expressions (p. 160).

### **Theory-Based Explanations of Failures of the Existing Programs for Linguistically Different Students**

During the last thirty years cognitive psychology has been more widely recognized in education. Language acquisition research, in turn, made use of cognitive approaches in building language learning models. The latest research guided by cognitivists revealed the learners' developmental differences and their needs (García, 1999; Johnson & Newport, 1989; Marinova-Todd, 2003; Oyama, 1976; Salzinger, 1979; Saville-Troike, 1984; Valdés, 2001), underlined the role of the learner's consciousness during the educational process (Bialystok & Hakuta, 1994; Carrol, 1971; Robinson, 1996; Schleppegrell et al., 2004; Schmidt, 1990), and renewed the discussion on skill formation (Harmer, 2001; Larsen-Freeman, 2003; Spolsky, 1989). There are still problems in regard to how the cognitive approach is being realized in practice. Schleppegrell et al. (2004) found that "teachers had few strategies for working with grade-level texts in ways that could provide ELLs with access to the meanings expressed in the texts" (p. 76).

Bialystok and Hakuta (1994) note that

language teaching tends to be an isolated endeavor that rarely looks at assumptions about the nature of language, learning, or the learner. Most attempts to inform teachers about second-language learning have been haphazard and incomplete, just as simply memorizing bone parts would be an inadequate method of training doctors.

(Bialystok & Hakuta, 1994, p. 9)

#### ***Defining the ELLs' Needs and Teachers' Understanding of Students' Needs***

Cognitive theory puts an emphasis on meaningful learning that cannot take place without well defined learners' needs and purposeful actions that enable students to develop strategic learning for reaching the educational goals. Widdowson (1981) notes that needs may be

*goal-oriented* (related to terminal behavior, the ends of learning) and *process-oriented* (transitional behavior, the means of learning). The researcher supports the process-oriented approach to needs by assuming that it “develops a capacity to learn” (p. 6) and that the learner will “activate strategies for learning while the course is in progress” (p. 5). Thus, the process-oriented approach to needs is the means of learning.

The assessment of non-native speakers’ needs by analyzing their reading materials is the first step in designing academic curriculum for linguistically different students (Schmidt, 1981). This approach was used by Echevarria et al. (2004) in constructing the sheltered instruction model of teaching immigrant adolescents. The first phase of their research project was devoted to analyzing the language competence level that would allow students to succeed while reading textbooks, completing assignments, participating in classroom interaction, and grasping the teacher's explanations.

Research on academic language in school may make use of the research on teaching English for academic purposes. The fields of English for Specific Purposes (ESP), or English for Science and Technology (EST), or English for Academic Purposes (EAP) have accumulated research on syntax and vocabulary of ESP/EST/EAP discourse and created programs and teaching materials (Godman & Payne, 1981; Crofts, 1981; Oster, 1981; Schmidt, 1981).

Answering the question about students’ needs in more practical terms, namely about how much students should be informed about language phenomena, Larsen-Freeman (2003) takes the position of a well-informed medical doctor who would explain to the patient all available options of a treatment: “To the best of our ability, therefore, we should help students understand the linguistic options available. I need to insure that my students have knowledge of what is normal and customary in such contexts” (p. 61). Students should be aware of options for uses/pragmatics of language to negotiate meaning and thus, negotiate social relations (Widdowson, 2003). Scherba (1974) insisted that teachers should have good knowledge of history and grammar of the language to be able, when it is necessary, to give answers not only to

*what* but also to *why* without necessarily introducing too much of this special knowledge into formal instruction. Larsen-Freeman (2003) wants students to know *why* to “remove the burden of rote learning” (p. 56) from them. The language teacher, according to Sherba, should possess the knowledge of language to be able to work out teaching strategies leading to language acquisition since strategies to a great extent are being based on language structure. The outstanding scholars in the field of language teaching, such as Jespersen, Viëtor, Sweet, and Hjelmslev pointed to the importance of linguistic knowledge for teaching purposes (Stern, 1983).

It is easier to comprehend the ELLs’ needs if one has encountered the experience of language learning. However, not all programs preparing ESL teachers have as a part of their requirements experience in learning a foreign language (Kreidler, 1986). As a result, ESL teachers might not be aware of their LEP students’ needs.

### ***Curriculum Development and Lesson Planning***

To help teachers in creating curriculum and in planning lessons, the developers of sheltered instruction (Echevarria et al., 2004) worked out a model containing eight necessary components that should be included in the planning of every lesson in a sheltered program class:

- ❖ *preparation* that includes language and content objectives with appropriate content concepts delivered through adaptation of content, supplementary materials, and meaningful activities;
- ❖ *building background* that links concepts between students’ past and new learning by developing key vocabulary in content and school language with multiple meaning;
- ❖ *comprehensible input* provided through explanation of academic tasks with appropriate speech and use of techniques;
- ❖ *strategies* that can be cognitive, metacognitive, and social/affective with scaffolding (a term that the authors associate with Vygotsky’s (1997) notion of the zone of proximal development) and questioning techniques;

- ❖ *interaction*, creating opportunities for learners to communicate through grouping and allowing waiting time for students' response;
- ❖ *practice/application* where language is learned through content with the integration of language skills in new ways of knowledge;
- ❖ *lesson delivery* that supports lesson language and content objectives, promotes student engagement, and is appropriately paced;
- ❖ *review/assessment* that consists of reviewing key concepts and vocabulary and assessing student comprehension of objectives.

Bunch et al. (2001), aiming at the desegregation of linguistically different students, tried to integrate in their project academic content and language learning by following four conditions:

- 1) appropriate preparation and ongoing support for teachers;
- 2) learning tasks that provide context for using academic language with rigorous, grade-level appropriate curricula, keeping in mind the needs of ELLs;
- 3) equal status participation in small groups, with opportunities for ELLs to have genuine access to mainstream peers who serve as linguistic and academic resources;
- 4) instruction that includes an explicit focus on academic language development.

(Bunch et al., 2001, p. 29).

The problem with implementing either model may be that a single classroom teacher cannot do so. In the Bunch et al. sustained-content-language-teaching project, three university faculty members, two graduate assistants, and one full-time staff member provided the preparation and support for teachers. Participating social studies and language arts teachers completed an intensive summer course focused on the program. The support offered by school principals consisted of helping design a student schedule with more heterogeneous classes. In the end, fulfillment of only the first condition of their model made the project extremely expensive.



In sheltered model instruction, teachers received special training in sheltered instruction and used the lesson materials developed by the researcher team in collaboration with practitioners. In spite of this, Short (1993) in her research report about sheltered instruction model admits that the observed lessons with sheltered instruction sometimes displayed educators' lack of comprehension of immigrant students' background and educators' inability to perceive the social, psychological, and cultural perspectives with which the learners come to this country. For example, in order to explain the failure of some students to follow the instructions to draw the American flag, the educators assume that eighth-graders may be not familiar with simple fractional dimensions. However, the possibility that those students failed because they were not familiar with the English measurement system was not considered.

The descriptions of Sustained-Content Language Teaching (SCLT) method (Bunch et al., 2001) and of sheltered model (Echevarria et al., 2004) make it difficult to fully understand how academic language should be developed. Researchers emphasized the importance of students' talking and working in small groups and using intellectual abilities as they "create three dimensional models, analyze and interpret information, summarize data in diagrams, graphs, charts, and tables" (Bunch et. al., 2001, p. 30). Interestingly, Reid (1987) when investigating the learning style preferences of ESL students, found that students of every linguistic background gave group work a minor or negative preference mean. It is not clear how activities that hardly require "the use of language to carry out functions, such as hands-on assignments, measuring, counting, and filling in charts and worksheets" (Valdés, 2001, p. 49) can contribute to ELLs' acquiring the vocabulary and syntax that would allow them to comprehend and develop productive language skills. The researchers (Bunch et al., 2001) mention that synopses in the margins of the text were added to provide cues about the topic of each section of texts. However, these marginal notations were of a general character, such as the interpretation of the mood and purpose of the readings, and "as a group they [ELLs] must still tackle authentic language" (Bunch et. al., 2001, p. 31). The SCLT project developers admit that "even with such support [notations

in the margins], many students need more extensive scaffolding in order to access this material successfully. In addition, under-prepared learners need explicit assistance in developing basic reading skills and strategies for dealing with difficult texts" (Bunch et. al., 2001, p. 31).

The researchers (Bunch et al., 2001) found that the proposed condition about the interaction of ESL students with their mainstream classmates, who were supposed to serve as authentic language models as well as academic resources in explaining complex texts to ELLs as well as instruction including explicit focus on academic language development was difficult to realize "despite the rich opportunities for authentic academic discourse and student interaction" (Bunch et. al., 2001, p. 33). The project developers' assumption that simply being present at the academic discourse would improve ELLs' English proficiency and contribute to their knowledge and skills in academic content was not supported by the evidence. The passive acquisition of skills and proficiency did not happen.

The report on the sheltered approach (Short, 1993) stated that more work is required on the development of vocabulary. Creators of instructional materials as well as teachers, it says, should anticipate possible difficulties and confusion about vocabulary and concepts that may arise in the course of introducing the material. (Research on teaching scientific language that was done in the field of ESP, e.g. on teaching vocabulary (Godman & Payne, 1981), the use of tenses (Oster, 1981), and subjects and objects (Crofts, 1981), may be helpful in creating academic curriculum for adolescent immigrants).

If there were such difficulties with implementing the models in field-testing with large support provided by researcher teams, one can imagine how hard it is for ordinary teachers to implement these models into widespread use. Classroom teachers may find the guidelines of the models almost impossible to follow.

### ***Instructional Materials for Immigrant Adolescents***

Echevarria et al. (2004) explain the failures of sheltered techniques by the fact that few universities and colleges include detailed sheltered instruction topics in the syllabi of courses

taken by future ESL teachers and by *the lack of commercial instructional resources aimed at sheltered instruction courses* (italicized by the researcher). It is very valuable that Echevarria et al. (2004) stress the importance of supplementary reading materials, such as adapted texts, i.e. texts from grade-level textbooks rewritten to reduce the readability demands. “Although time consuming, rewriting text is an effective modification of curricular materials because information is organized in small sequential steps, avoiding long, dense passages” (p. 27). Adaptation, according to Burger et al. (1990), may include taking out extraneous material, simplifying sentence structure and vocabulary, adding titles, marginal notes, vocabulary explanations, and pictures. However, to fulfill the authors’ criteria of ideally rewritten paragraphs would be a task difficult to perform by a classroom ESL teacher alone having only one planning period a day.

Frustrated remarks from teachers, such as "No time, no materials!" and "Teach me Spanish!" [that is, in order to communicate with Latino children] (Penfield, 1987, p. 29) reveal "a strong need for appropriate content curriculum materials adapted to the LEP student" (Penfield, 1987, p. 30). An illustration of the lack of appropriate materials is the fact that students in Valdés' (2001) study had to use reading materials developed for special education students. Penfield (1987) makes references to some student materials (Cantoni-Harvey, 1987; Chamot, 1986; Chamot & O'Malley, 1987a; Enright & McCloskey, 1987) aimed at meeting the needs of ESL students, but ends up concluding that the existing resource materials "cannot solve the complex problems of the academic and social integration of the LEP students in the regular classroom setting" (Penfield, 1987, p. 30). The lack of appropriate instructional materials directly translates into poor academic performance by immigrant students. Wong Fillmore (1986) observed that while Mexican American students perform well with appropriate instruction, they respond to irrelevant curriculum material by losing interest.

Textbooks, according to Webster’s dictionary (1941) are manuals of instruction and are “used as a basis of instruction” (p. 1033). Textbooks are also “a very important matter in ESL and deserve careful consideration (Paulston, 1980). Advantages of textbooks are: they save teachers’

time and, which is especially valuable for new teachers, “can act as a guide that will systematically take the teacher and students step-by step through a series of lessons” (Gebhard, 1996, p. 99). Gebhard points out that certain universities and well-established schools have designed ‘in-house’ language programs that contain day-by day lesson plans with goals for each lesson, steps in implementing them, and all materials needed for the fulfillment of these goals. Possible disadvantages of commercial instructional materials might be the conflict between the author’s ideas and teacher’s beliefs about teaching (Gebhard, 1996) and marginalization of the teacher’s role to that of a technician (Richards, 1993).

In fact, today’s market offers “a plethora of texts” (Paulston, 1980, p. 20), audio- and video materials for teaching language survival skills, communication, reading, writing, listening, speaking, grammar, and vocabulary building. To make use of these materials requires, however, “energy and individual ingenuity” (Paulston, 1980, p. 20) from an ESL teacher because these texts are designed without keeping in mind the special needs of adolescent immigrants. “Few instructional materials are commercially available to guide teachers who work with underschooled [immigrant] teens” (Ruiz-de-Velasco & Fix, 2000). Simons and Connelly (2000) also point to the lack of academic content-area instructional materials in students’ native language for both classroom and library use, which they believe “may be a serious detriment to using the home language as the language-of-instruction” (p. 73). The instructional materials available in Spanish, they say, lack quality. The researchers stress that “it is almost impossible to find appropriate materials to support content-area learning in most languages other than English” (p. 73). They note that the situation when instruction occurs in the native language using instructional materials in English, causes “considerable confusion” (p. 74).

Most instructional materials used in ESL classrooms are either home-made materials devised by ESL teachers themselves or adapted from various textbooks for those wishing to pass the Test of English as a Foreign Language (TOEFL). Oftentimes, neither of these are adequately aimed at high school students. The Internet contains resources for many ESL lessons, but these are a seemingly random,

unrelated collection rather than a well-constructed, cohesive methodology and can be used only as supplement materials to an existing curriculum rather than as the curriculum itself (Valdés, 2001). The lack of availability of high quality commercial instructional materials for ESL students results in frustration and dissatisfaction on the part of ESL teachers. "They [teachers] don't know how to prepare or what to teach... and don't have a clue where to begin" (Wall, 2000, pp. 165-166).

One of the most valuable discussions in Valdés' (2001) book *Learning and Not Learning English: Latino Students in American Schools* is devoted to the comparison of foreign language textbooks with materials immigrant adolescents use in schools. Valdés (2001) makes some interesting observations regarding the importance of the textbook in the process of teaching: "The textbook has the most direct immediate influence on teaching. For young teachers, it is often the textbook that serves as a syllabus for the course and that defines the types of activities that will take place in the classroom" (Valdés, 2001, p. 25). According to research on teachers' use of textbooks, the overwhelming majority of teachers use textbooks as their main curriculum guide and source of lesson plans (Tyson, 1997). The text may be helpful in making a checklist of grammar structures to be taught (Larsen-Freeman, 2003).

It is important to note, Valdés (2001) writes, that foreign language textbooks are commonly thick volumes containing colorful illustrations, grammar exercises, texts and explanations, activities for developing language-learning strategies, and glossaries. Current teachers' editions of foreign language textbooks are usually supplemented by overhead transparencies, video-cassettes and CDs. Materials used for ESL, on the other hand, are most often sets of unrelated texts that do not consciously focus on developing the four key language skills (listening, speaking, reading, and writing). In contrast to foreign language textbooks that employ both English and the target language for the learning process, all ESL materials are only in English. There are neither glossaries nor explanations in the student's native language (Valdés, 2001). Tyson (1997) notes also that most school textbooks are accompanied by teacher manuals that contain enrichment activities for advanced students, activities for slow learners, questioning

strategies, and tips on how to reach students with different learning styles. Nothing of this kind is commercially available for ESL students (Valdés, 2001). With only guidelines and few samples of beneficial models, but without textbooks that would combine teaching ESL and subject areas, teachers' situations can be compared with that of medical doctors familiar with methods of healing but having neither medicines nor instruments at their disposal for the treatment of patients.

While foreign language textbooks are designed to allow students to use them partly independently, without relying fully on the teacher, ESL materials are frequently incongruent, unrelated texts or vocabulary lists. ESL students often struggle to understand the purpose of an assignment or to make sense of words in long vocabulary lists that provide only ambiguous drawings as clues to the words' meanings and result in erroneous conclusions about word meaning by the students (Valdés, 2001). Good textbooks, according to Tyson (1997), should help students if they happen to miss class. "Good textbooks make life a lot easier" writes Paulston (1980, p. 20), providing features of good texts. According to her, good textbooks should follow course objectives, have a proper level of difficulty, offer multiple student activities, contain grammar rules and explanations that are helpful not only for students but for teachers not trained in ESL as well, emphasize vocabulary learning, and meet students' scholastic needs.

Learning outcomes and motivation toward learning are improved if parents are included in the learning process along with the students (August & Hakuta 1997; Kottler & Kottler, 2002; Nieto, 1996; Penfield, 1987; Simons & Connelly, 2000). Yet another advantage available to foreign language learners is their parents' ability to understand the material their children are studying in the classroom. This is possible because foreign language textbooks contain explanations in the parents' native language. The parents of ESL students are completely excluded from the learning experiences of their children if they lack English proficiency (Ortmeier, 2000). They have little understanding of how American schools work and may feel embarrassed or unable, because of their lack of English, to ask questions and express their views

(Simons & Connelly, 2000). Their communication with the school is restricted to “several occasions” (Kottler & Kottler, 2002, p. 15), such as parents conferences, open house at school, field days, and award ceremonies (Kottler & Kottler, 2002). Parents might need, however, an opportunity to help their children on a regular basis.

### ***The Use of Native Language as the Use of Previous Knowledge and Skills***

Possible reasons of the failure of ESL pullout, sheltered and content-based instruction approaches might be not taking into account an important feature of cognitive theory, namely constructing the new knowledge and skills around students’ previous experience. In case of second language acquisition, it is the learners’ knowledge of their native language. Instruction in any of these programs usually does not involve students’ native language. To develop second language skills, Echevarria et al. (2004) suggest strategies, such as visual aids, modeling, and demonstrations for clarification of key concepts. The authors also say that “L1 provides an important support for the academic learning” (p. 107). However, they state that native-language items may be circled as NA (not applicable) in Sheltered Instruction Observation Protocol (SIOP) “because not all sheltered classes need to use (especially for advanced ELLs) students’ L1 to clarify concepts for them” (p. 107). This contradicts the practicing teachers’ views on the use of L1 at the beginning and advanced levels in the process of second language acquisition (Stanley, 2002). Moreover, Echevarria et al. suggest using “websites offering word translation capabilities, and bilingual dictionaries in book and computer program formats” (p. 107) as resources for using native languages. This suggestion again contradicts arguments about deriving a word meaning discussed in this thesis (see section Vocabulary Enrichment). Echevarria et al. (2004) believe that English learners “can use their knowledge of their first language’s structure to make connections with English [syntax]” (p.107). However, none of the teaching scenarios in their book aimed at helping those who deal with LEP students, offers any strategy of forming syntactic skills. As Harmer (2001) notices, students may often be encouraged to perform many tasks, such as reading for general understanding without looking up the unknown words, speaking and writing even

when they do not possess vocabulary and syntax to perform this work, i.e. students are expected “to aspire beyond their current language level” (p. 42).

One can assume that bilingual programs take into account the learner’s knowledge of and skills in the native language while teaching a second language. García’s (1999) research revealed the absence of interaction between L1 and L2 in the teaching process, by stating that “many of the bilingual and ESL programs that New York City high schools have developed for immigrant students are inadequate for these students” (p. 61) because they only “encourage” (p. 62) the acquisition of English while continuing the students’ education in their native language. The Dual-Literacy Bilingual Program that she examined contained ESL classes and academic subject classes taught in the students’ native language (Spanish). In reality, it means that the bilingual program has a monolingual pedagogy: with ESL classes in English and academic subjects in Spanish. Students remain in this program from half a year to one year. From García’s description, it is obvious that the curricula in ESL and academic subjects are not interconnected, existing independently, with “ESL texts either non-existent or extremely easy and childish” (p. 72). To show that the curriculum is extremely “reductionist” (p. 72), García describes two ESL periods spent learning a total of thirteen English words related to family and relatives. Observing the class, she saw that students had trouble understanding the meaning of the introduced words. García’s research reconfirms the assumption about the non-availability of texts for English language learners: “The teacher is left on her own to make xerox copies of appropriate reading materials” (p. 77). García concludes that despite conclusive evidence that L1 is conducive to the extensive growth of L2 (August & Hakuta, 1997; Cummins, 1981; Nation, 1982, 1990; Widdowson, 2003), there is still not much understanding about how to combine English with the students’ native languages. Olsen (1997) believes that the most troublesome feature of existing bilingual programs is the shortage of bilingual teachers “who might make academic content comprehensible and accessible to LEP population while they are in the process of learning



English" (p. 94). Also, she draws attention to the fact that "there are no native-language reference materials in classrooms" (p. 168).

One of the reasons for the unpopularity of bilingual programs might be the lack of consensus among educators concerning the nature of bilingual teaching and the nature of interaction between L1 and L2. Crawford (1996), for example, includes separation of languages for instruction into the list of criteria for effective bilingual education stating that "sustained periods of monolingual instruction promote linguistic development better than concurrent approaches that mix languages during the same lesson" (p. 167). Also Paulston (1980) calls the concurrent approach as "detrimental to learning" (p. 15) saying that her own preference is for the Canadian model with separating the languages by teacher. This approach, in her view, may solve the problem of the shortage of bilingual teachers. However, she does not discuss the impact of concurrent approach on language learners. The separation of languages may contradict the researchers' reasoning about the role of L1 in the process of learning L2 (Brooks & Donato, 1994; Ellis, 1994; Sherba, 1974; Widdowson, 2001, 2003; Vygotsky, 1986).

Widdowson (2003) attributes the failure of bilingual education to the fact that the bilingualization process takes place without contact between native and target languages. He represents the bilingualization *learning process* as follows:

$$L1 \rightarrow L1 * L2 \rightarrow L1+L2.$$

In the middle of the formula,  $L1 * L2$  represents the interaction between two languages. The bilingualization *teaching process*, in practice, suppresses L1 and we have the following formula:  $L1 \rightarrow L2 \rightarrow L1+L2$  meaning that English learners are left alone to make a relationship between their native language and the second language. Cummins (1980) compares bilingual proficiency with the dual iceberg phenomenon, graphically depicting the process of bilingualization as an iceberg with the common base under the water and the two separate peaks representing L1 and L2 on the surface. This representation may help one recognize how hard students have to struggle,

floundering beneath the deep, dark waters in order to get to the surface with proficiency in two languages.

Another reason why interaction between L1 and L2 is being ignored by language pedagogy might be explained by the fact that there is not much research on contact between L1 and L2 and on the extent of its effect on the learners' second language outcomes as well as on the state of their L1 (Bialystok, 2001; Cohen & Allison, 2001; Widdowson, 2001, 2003). "Though we may not know just how and why, there is no doubt that L1 is in some way implicated in L2 acquisition" Widdowson, 2003, p. 152). Widdowson (2003) suggests that monolingual teaching persists, in part, because the beneficial effects of L1 are not overtly and officially recognized, sanctioned, and incorporated into pedagogy. Widdowson (2003) suggests that the use of the L1 is looked upon as a 'forbidden fruit' principle. Thus, the participants of Wall's (2000) case study "were at a point of considering native language support as an under-utilized but potentially viable instructional tool in the classroom" (p. 130), but the political climate created by California Proposition 227 (Black, 1999) made them "uneasy about even mentioning the option of supporting native language" (p.131).

The permissive approach to L1 can be based on the assumption that "learners will draw on the resources of their own language anyway, and that language contact will happen in the learning process without any need for it to be explicitly promoted by actual teaching" (Widdowson, 2003, p. 153). Moreover, Widdowson (2003) adds, L1 can act as a kind of filter, though not Krashen and Terrell's (1983) affective filter, but a cognitive one, assisting the learner in making the input comprehensible and thus avoiding the learners' "alienating effect of having to cope with something foreign without being allowed to refer it to what is familiar" (p.154). Widdowson (2003) proposes that many problems of monolingual pedagogy are self-inflicted and, as a consequence, inflicted on learners; and the reason why monolingual language teaching has persisted as an orthodoxy for so long is that it has never been seriously challenged. Unfortunately there are no English translations of the works by L. Scherba (1974), Vygotsky's compatriot and contemporary, a linguist who made sizable contributions to the theory of

linguistics and to the methodology of foreign language teaching in the first half of the twentieth century. Scherba was straightforward about the role of native language: “We should admit once and for all that the [students’] native language is present at all our lessons, however hard we try to banish it. That is why we should convert it from our enemy to our friend” (Scherba, 1974, p. 10). Vygotsky (1986) writes that

child’s strong points in a foreign language are his weak points in his native language and vice versa. In his own language, the child conjugates and declines correctly, but without realizing it. He cannot tell the gender, the case, or the tense of the word he is using. In a foreign language, he distinguishes between masculine and feminine genders and is conscious of grammatical forms from the beginning (pp. 195-196).

Other reasons for monolingual pedagogy, which make monolingual teaching a virtue of necessity in immigrant-accepting countries, might be, first, a native-speaker teachers’ lack of knowledge and skills in the language of their students to use it as a resource (Banks, 1991; Zeichner, 1993) and, second, the multitude of immigrant students’ native languages. In New York City, forty eight percent of students represent more than one hundred languages (Suárez-Orozco & Suárez-Orozco, 2001). The third reason might be the absence of instructional materials that use the English language learners’ knowledge of their native languages. Thus, not the politics and tradition alone, as Wall (2000) put it, brought her participants to look “for alternatives to status quo” (p. 131), but rather a lack of other possible resources. Meyers (1990) in her recommendations of effective teaching, suggests encouraging the use of native language with the assistance of a bilingual student or tutor since, as she puts it, “vocabulary is easier to plug in if concept [is] understood in L1” (p. 110). However, bilingual helpers are not always available in real classroom situations.

In monolingual teaching Widdowson (2003) sees a possible threat that English may infiltrate other languages and destroy their integrity and vitality. He says: “whether they [teachers of English] realize it or not, and whether they like it or not, what they do is bound to have ideological implications“ (p. 161). It is quite possible that new lawsuits in ESL policies

would appear and, therefore, there is a need to substitute the monolingual teaching orthodoxy for some new approaches.

The TESL-EJ (Teaching English as a Second Language Electronic Journal) held an electronic forum on the use of the students' first language as a medium of instruction in the ESL classroom (Stanley, 2002). The comments of practicing ESL teachers from around the world provide some valuable insights into the issue. The general trend of the discussion indicated that teachers favor the use of L1 for the following reasons:

- ❖ L1 protects students from undesirable misunderstandings and enables a more expeditious presentation of L2. The speed factor of language presentation is an important factor for our adolescent subjects whose time for English acquisition is often limited far beyond the five to seven years that are required to learn a language naturally. An ESL teacher from Poland, noted that the use of L2 only is good at the elementary level to produce quick results for rudimentary communication. The use of L1 is needed to faster and better language learning at more advanced levels.
- ❖ Affective factors. An ESL teacher from Chicago pointed out that her adult students “would either revolt or drop the class due to frustration” (Stanley, 2002, p. 7). The same frustration, exacerbated by the English-only policy, may be reflected in the high drop-out rate among immigrant high school students.
- ❖ Keeping ESL students' mother tongue. A U.S. ESL teacher regretted that the lack of attention to native languages in U.S. education has created a desperate shortage of bilingual/bicultural employees in the fields of education, medicine, law enforcement, and judicial system. Moreover, alienation from the native language creates schisms in communication within families. The teacher compassionately presented the case of a Korean-American teenager who was unable to communicate with his parents without his sister translating for him. Wong Fillmore (1991) also sees the potential danger of immigrant students’ losing the ability to communicate with parents and grandparents as a result of English-only instruction.

The TESL-EJ discussion (Stanley, 2002) revealed that ESL teachers who had knowledge and skills in a second language expressed practical insight regarding teaching/learning methodology, while their monolingual counterparts worried about affective domain or supported the complete ban of L1 from the classroom. Also, teachers who were native speakers of English tended to favor only minimal use of L1, while non-native speakers expressed the preference for the use of L2, particularly for grammar and structure instruction. This trend may serve as an implication for foreign language requirements in the education of future ESL teachers.

Valuable experiments, the results of which favor the use of glossary/dictionary and knowledge of language structure in teaching ELLs were performed by Bialystok (1983). The researcher examined the effect of different cues on the comprehension of a reading passage and on the understanding of its vocabulary. The cues, or inference strategies are “a statement about the unknown based on the known” (Hayakawa, 1990, p. 24). Bialystok compared results in reading comprehension after the application of three inference strategies with those of the control group that did not receive any cues. The inference strategies were: first, picture with the gist of the passage accompanying the text; second, glossary containing all the difficult words in the passage; and third, 15-minute lesson on how to inference, that is how to derive, for example, the information from prefixes and suffixes of the target language, to use the knowledge of native language, and to look for cues in the context. The researcher found that visual aids contributed to general understanding. Lessons on ‘how to inference’ contributed to better understanding than the picture. The dictionary helped in both general and detailed understanding of reading passages. Bialystok (1983) based her study on the assumption that language learning is a cognitive activity that involves many aspects of the learner’s conceptual system. Therefore, she concluded, “language learners can and should, and probably do use, information from a wide range of sources to promote easy and efficient use of language” (p. 122). Performing this experiment in Canada, Bialystok considered dictionary and the knowledge about structure of the language as important cues, which contributed the most in general as well as detailed

comprehension of the reading passages, which is of great value by reading academic content texts.

Simons and Connelly (2000) believe that to develop programs for linguistically different students “we must recognize that ESOL children and youth are ... native speakers of a language other than English” (p. 28). The authors point out that this “important factor tends to be forgotten through misguided political correctness and sometimes through the parameters that relate to compensatory education” (p. 29).

### **Summary**

Presently, there are two popular approaches to theories of language acquisition: the natural and the cognitive. According to research on the critical age of language acquisition, the ability to acquire a second language naturally is relatively short-lived. Linguistically different adolescents have passed the age threshold before which they are able to acquire a second language naturally. Even the avid proponents of the natural approach tend to indicate that adolescents and adults are more responsive to cognitive methods, i.e., through exposure to explanations of linguistic phenomena.

The cognitive approach takes into account the social context in which learning takes place, learners’ characteristics, and learning conditions, the sum of which leads to learning outcomes. It assumes that the knowledge of the native language contributes to the development of the second language, since cognitive theory puts emphasis on conscious, meaningful, and purposeful learning, on the previous experience, and on the intellectual powers of the learner.

These categories are included in the theory of second language learning proposed by Spolsky (1989) who opposes the application of any single method, but favors an eclectic approach by drawing from a variety of strategies and techniques. Spolsky’s theory contains conditions that are necessary, important, or typical for second language learning. Among the necessary conditions are those which create opportunities for developing learners’ abilities to recognize language constituents and to synthesize the constituent parts into larger units. Another necessary condition is the creation of the opportunity for knowledge to be transformed into skills, i.e. vocabulary and structure practice is necessary for integrating

the knowledge of language into functional skills. The first component in Spolsky's formula of second language learning acknowledges the role of the learner's previous knowledge. In the process of a second language acquisition, this knowledge amounts to the learners' knowledge of native language .

The review of qualitative research literature, analyzing major programs aimed at helping immigrant students, revealed that adolescents in schools are deprived of the opportunity to receive meaningful treatment because the entire teaching process takes place in a linguistic environment that does not create much meaning for them yet (García, 1999; Olsen, 1997; Penfield, 1987; Valdés, 2001). This means that the cognitive abilities of adolescents are hardly used, either in the process of second language acquisition or in the development of academic knowledge and skills.

Beginning English language learners do not have at their disposal any materials to explain linguistic phenomena in the learners' native languages. Instead of using time productively, adolescents spend large portions of their school days with little understanding of what is happening in the classroom. They do not get appropriate support from academic subject-area teachers since these teachers believe that it is the ESL teacher's responsibility to take care of all LEP students' needs.

There exist guidelines and regulations regarding the cooperation of ESL and regular classroom teachers, attempting to ensure that ESL classes provide LEP students with reinforcement and explanations of the material covered in mainstream classes. However, the heavy teaching load of both ESL teachers and regular classroom teachers, makes it virtually impossible to follow these guidelines. Few existing commercial instructional materials take academic language development of LEP students into account.

Existing bilingual educational programs have so far failed to serve linguistically different immigrant adolescents for several reasons, the main one being the lack of well-worked out methodologies. Other problems include the shortage of qualified bilingual teachers and the absence of appropriate instructional materials.

Sheltered instruction and sustained-content language teaching methods require a substantial time investment for creating instructional materials for both the ESL teacher and academic subject teachers. The task of producing a course that would satisfy the needs of a

linguistically different group and/or individual learners is hard to accomplish by school teachers who spend much of their time in the classroom with students. Moreover, as the research points out, students in classes with sheltered instruction do not cover the quantity of academic material comparable to mainstream classes.

Reading is not only the most valuable tool to extract the information but also is the main source to enlarge the second language vocabulary and to improve the second language skills altogether. However, it is a hard task for immigrant students to extract the information from authentic science textbooks without any additional support. Researchers believe that translation may be a cognitive process that transforms sound and form to meaning. Translation, they say, may be often a useful tool for understanding context.

Adolescent immigrant students cannot fully use their cognitive abilities in a situation where they have no opportunity to receive help based on the knowledge of and skills in their native language. The existing methodologies fail to take into account that native language can be a valuable instrument for adolescent immigrant students, both in acquiring English language skills and in their cognitive academic development.



## **CHAPTER 3 – Research Methodology**

### **Introduction**

The findings of developmental psychology and psychological linguistics presented in Chapter 1 show that adolescents, being at the stage of formal operations and being able to operate with abstract concepts and ideas, can use cognitive approaches to learning. This enables them to study successfully academic subject areas in a high school setting. Immigrant adolescents, though they lack skills in the English language, are able to apply cognitive approaches to both English language learning and academic subjects. The proponents of content-based language instruction believe that English language instruction can be integrated into academic content instruction. However, the analysis of instructional methods in Chapter 1 and 2 reveals that the presentation of new material to adolescent immigrants, using English only as a medium of instruction, presents a serious barrier for adolescents' understanding of written and oral instruction. It slows down considerably the learning process because of the enormous amount of linguistic material they must first acquire in English.

In learning a new language, the application of different cues based on the previous knowledge is very helpful. However, making inferences may be hard for school adolescents in subject area classes when simultaneously the meaning of many words and academic concepts are unfamiliar to them. The students' native language may be useful for understanding context when the context does not provide many cues. Some researchers (Cohen & Allison, 2001; Kottler & Kottler, 2002; Sousa, 2001; Widdowson, 2001, 2003) believe that translation may be a cognitive process that transforms sound and form to meaning.

The purpose of this study was to examine if the use of instructional materials based on subject area textbooks and supplemented with native language support contributes to acquiring knowledge and skills in a subject-matter area. The primary objective of the study was to compare the achievements of adolescent immigrant students while they were using printed instructional materials with native language support in a subject area to their achievements when such supporting instructional materials were not

provided for them. Other objectives were to explore the perspectives of the usefulness of these materials by adolescent immigrant students, their parents, subject-area teachers, and ESL teachers as well as the impact of the availability of the materials on student and teacher classroom behavior. This chapter presents the research design used to answer the research questions.

### **Research Questions**

The central question addressed by this research study was:

- Do printed instructional materials with native language support afford a significant increase in adolescent immigrant school students' achievement in high school geometry as measured by chapter tests?

The related questions were:

- How does the second-language learners' use of proposed instructional materials with native language support compare to their self-reported use of other resources?
- What is the perception of second language learners toward the usefulness of printed instructional materials with native language support?
- What is the perception of the parents of second-language learners toward the usefulness of instructional materials with native language support in being more involved with their child's learning and assisting their child's learning?
- What is the perception of academic subject-area teachers regarding how instructional materials with native language support affected the classroom environment, involvement of second-language learners, and success of second language learners?
- What are the perceptions of ESL teachers regarding the usefulness of instructional materials with native language support in defining the language material to be taught and in explaining word meaning and sentence structure?

- What is the impact of availability of instructional materials with native language support on teachers' and linguistically different students' classroom behavior as measured by classroom observation?

### **Research Design**

This study used a quasi-experimental design supported by the analysis of qualitative data. The question regarding academic achievement was answered by the analysis of the chapter tests in geometry where students were given the opportunity to use materials containing the support in their native language while covering a unit of the textbook that was used in a mainstream class. To answer the related questions of the study, classroom observations were carried out, surveys gathered from students and their parents were analyzed, and interviews with ESL teachers, and subject matter teachers were conducted.

### **Pilot Study**

At the beginning of the school year, when students started covering a unit for which bilingual support was prepared, the school experienced difficulties in securing licensed science teachers. Since the biology classes, the subject for which support materials were prepared were taught by substitute teachers, the classroom environment did not represent a normal classroom setting. In addition, the number of Spanish speaking learners was smaller than expected. The research committee proposed that the researcher conduct a pilot study to explore the potential for qualitative observations that would add depth to the study as well as test surveys and interview protocols.

The pilot study took place during the last week of August and the first two weeks of September. The researcher attended biology and ESL classes daily except Mondays. The seating chart used in biology classroom placed all the immigrant students together at one corner of the classroom, allowing the researcher to observe all the immigrant students. The observed intense facial expressions of attentiveness and being on task during the teacher's presentation of concepts as well as asking questions of each other to clarify the presented material suggested immigrant students' motivation in studying the subject on the one hand and their struggle to understand the classroom presentations on the other hand. While taking

notes, students tried simultaneously, but not always successfully, to locate the concepts being presented in the instructional materials with native language support given to them. This suggested that it would be necessary to ask the subject area teachers to refer immigrant students to a page in instructional materials when certain concepts are being explained. This would give linguistically different students the chance to use visual aids from the textbook if there were any as well as to make, where possible, connections between orally presented phrases, their printed image in English, and the meaning in their native language.

The teacher in ESL classroom received the instructional materials with support in Spanish together with oral and written instructions of how to use them before the school year started. A copy of the materials was given to some students taking biology, but not to all of them. At the beginning of the school year, according to the ESL teacher, the students' curriculum was still not fixed and the teacher did not have the exact list of English language learners taking biology. The researcher identified these students through the counselor's office and made sure that all of them had support materials. However, observations of the ESL classroom revealed that ESL students taking science courses often worked independently. Most attention and class time was devoted to beginning language learners who were taught basic survival skills in English. The intermediate and advanced level ESL students received occasional help when they asked the Spanish speaking ESL teacher and the Spanish speaking teacher aide for the meaning of some English words and phrases. In order to encourage ESL teachers to use the proposed instructional materials in their classroom, it would be beneficial to show them how they can use the assignments prepared by the researcher.

The pilot study provided several categories of teacher and immigrant student behaviors that could be monitored through in-class observation. Students' being on task could be judged based on the number of times per class period they were being disciplined by teacher in both subject area and ESL classroom. Their attentiveness and concentration could be monitored by body language, by note-taking, by following the teacher's instructions (e.g. when told to turn to a certain page, the student turns to that page; when the teacher asks a question, the student pages through the notes or textbook) as well as by student-to-student

discussions that included gestures to notes, textbook, or teacher presentation. Students' participation in class work could be monitored by the number of times per period students ask questions and by the number of students' responses to a teacher's questions. The use of native language support materials in subject area classroom could be monitored by approximate number of times students would point to words in the margins of instructional materials during class period.

The impact of instructional materials with native language support on subject matter teachers could be observed by the number of times per class period they referred students to translated words in the margins. The use of instructional materials with native language support in ESL classroom could be evaluated by the amount of time per class period when students worked using the proposed materials. The helpfulness of the materials to the ESL teacher could be judged by the number of times per period teachers looked confused and would consult the answer key as well as by the number of assignments per section teacher altered. The observation protocol used in the study can be found in Appendix J.

Short interviews with seven students and with the biology teacher showed some positive response to the use of instructional materials with native language support. Students "liked being able to see the word without having to get out a translator". The format of the instructional materials gave them the chance "to learn English". The biology teacher liked the approach of displaying the materials "because it made it easier to explain some of the concepts to the students". She wanted her linguistically different students to have more units with Spanish language support.

The pilot study identified several issues that had been omitted while planning the study. First, individual meetings with subject area and ESL teachers, rather than sending letters to them, were necessary to make sure that teachers were aware of the goals of the study and the structure of materials. Second, a meeting with immigrant students before the study would be desirable, to explain to them how they could better benefit from the materials with support in their native language. At this meeting they would be asked to deliver to their parents letters, both in Spanish and English, describing the goals of the study, a questionnaire, also in Spanish and English, to be completed at the end of the study, as well as letters of consent that needed to be signed by students and by their parents. And third, more keys to ESL

section assignments were added to ease, on one hand, the work of ESL teachers by assisting students in academic subject matter and, on another hand, to give the opportunity to motivated students to use the materials independently.

### **The Subjects and the Situation**

The study was performed during the spring semester 2005-2006. Since only two ESL students were taking the one-semester long biology course for which instructional materials were available and had been used in a pilot study during the fall semester, native language support needed to be prepared in another subject. For two reasons, geometry was chosen. First, in algebra immigrant students were provided with two textbooks, one in English and another in Spanish, thus confounding the variables to be examined in this study. Second, few immigrant students were taking such courses as chemistry or physics making it hard to get a large enough sample in those courses.

The sample consisting of twenty immigrant tenth and eleventh graders was an in-tact school population in a moderately sized city in the Midwest. According to the school district policy, all students whose native language was Spanish were being placed in this school, the population of which comprised 950 students. Students with Hispanic origin made up nineteen percent of the school population. Over eight percent of students attended ESL class compared to statewide average of students with non-English language background of 6 percent. African American students constituted thirty nine percent of the school population (NCES, 2004a). The number of students receiving free or reduced-priced lunch in this school was higher than the state average, sixty six percent versus twenty seven percent (NCES, 2004a). In 2003, the percent of tenth-graders scoring proficient and above in mathematics was twelve percent (state average forty six percent). Only thirty three percent of eleven-graders reached proficient level in reading (state average sixty one percent) (NCES, 2004b).

### **Treatment and General Procedures**

The proposed materials were aimed at adolescent immigrant students who had reading skills in their native language. The use or nonuse of printed bilingual instructional materials was the independent variable.

### ***Instructional Materials With Native Language Support***

Instructional materials with native language support were designed based on the following textbook used in mainstream classroom: Schultz, Hollowel, Ellis & Kennedy (2004), *Geometry*. Each section of the instructional materials contained, in addition to academic subject content objectives, English language support objectives. Thus, the treatment contained materials of two types:

- ❖ Materials for the use in the mainstream classes. They contained sections of the textbook in English where Spanish translations of English words could be found in the margins of each page. This format was supposed to help students understand the reading passages and to save time otherwise spent on looking for translation of words in dictionaries or electronic translators and on guessing which meaning would be appropriate in the given context. A sample of these content materials can be found in Appendix A.
- ❖ Special English language assignments. These assignments were based on vocabulary and sentence structure of content texts to meet the English language development objectives. The language section assignments included linguistic material of the corresponding textbook sections. A sample of these ESL materials can be found in Appendix B.

The instructional materials with native language support were developed in accordance with Spolsky's (1989) set of conditions necessary for language learning. All key issues of the academic subject areas were preserved. The texts underwent only a slight reduction in the length of reading materials in light of the lower reading speed of language learners (Kondratyeva, 1974). Students were able to use materials for independent work, for review, and as a reference if needed.

What students had were the pages of a regular textbook, slightly shortened where possible, but without removing any essential information. Words and phrases that might present difficulties for understanding by English learners were marked with numbers above them and their translation in Spanish was placed in the margins of the page where these words and phrases appear in the text. Verbs were translated in the form as they appear in text that is, not simply the infinitive, dictionary, form was given.

This kind of translation was expected to draw students' attention to the meaning of different language structures. Being able to find the translations of the words on the same page that is being read has the potential of increasing the immigrant students' reading speed. Placing translations in the margins and not above or next to the words in the text was chosen to not disturb more advanced ESL students while they read sections and to preserve the wholeness of texts in English.

The goal was to help all students, more advanced as well as those whose vocabulary and reading skills are very low. This led to marking and translating many words. Translation of a word marked on one page would appear several times on subsequent pages because with the great amount and variety of linguistic material, it is hardly possible for students to store the words after only one or two presentations.

The materials developed for the use in the ESL classroom were made based on the vocabulary and sentence structure of corresponding sections of the textbook. Linguistic phenomena were explained both in English and in Spanish. Translations of the phrases and sentences were given to assist students in understanding the meaning of certain linguistic structures. To reinforce the vocabulary, each ESL section contained specially designed assignments. The vocabulary to be practiced was represented by academic terms as well as by non-academic words because academic terms are explained and examples are given by means of non-academic vocabulary. Since ESL teachers were not expected to know either the academic subject or Spanish, keys were provided to certain assignments. These keys could also assist motivated students who wished to improve their English skills independently.

Students were advised to read subject matter sections containing native language support prior to their presentation in classroom. Then, after they were exposed to the material in the subject area class, reinforcement in the ESL classroom followed. The fact that the materials contained the support in students' native language also had the potential to involve parents in helping their children. One aim was to fashion a collaborative relationship between students, parents, and the school.

### ***Experimental Design***

The study used a one-group posttest design OXO where O indicates a measurement and X indicates a treatment. The posttest design allowed comparisons of students with themselves. In response



to guidelines concerning research ethics, the decision was made not to create a control group since students who otherwise would have been in a control group would have been bereft of materials that might be beneficial for them. Also, the small number of subjects did not provide the chance of having both experimental and control groups.

Students' achievement was measured on a unit covered without any native language support materials. The next unit was covered with native language support materials and followed by post-testing. The study concluded with a unit that was covered without bilingual materials and subsequent testing. The following sequence was applied: measurement → treatment → measurement → no-treatment → measurement. Table 3.1 on the next page presents the experimental design, timeline, and the ESL objectives for the study.

### *Collecting the Qualitative Data*

Though the treatment did not last for a long period of time, there was the potential for maturation as an alternative explanation of any change that occurred. Students were constantly in the target language environment, attended mainstream classes throughout the experiment, and could have been helped or tutored by sources outside of school. To explore this potential rival hypothesis, questionnaires to be completed by students contained questions about other resources they may have used to improve their English during the course of the study. Any maturation effect was to be removed by three measurements, the last of which was carried out after a no-treatment period.

Classroom observations and questionnaires addressed to students and parents, both in English and Spanish, and interviews with teachers were intended to determine the perceived usefulness of the materials as an opportunity for learning. The survey for students can be found in Appendix F. The survey for parents can be found in Appendix G. Appendix H presents the interview protocol used with the geometry teachers and Appendix I the interview protocol used for the ESL teacher.

**Table 3.1 Experimental Design and Timeline**

Weeks	No Treatment	Treatment	ESL Objectives
G E O M E T R Y			
	Unit 6 Shapes in Space (Solid Shapes, Spatial Relationships, Coordinates, Lines and Planes, Perspective Drawing)	Unit 7 Surface Area and Volume	
1		Chapter 7.1 Surface Area and Volume	Comparisons, conditionals, that/those, one/ones, general and academic vocabulary
1		Chapter 7.2. Prisms	Verb forms and their functions, general and academic vocabulary
2		Chapter 7.3. Pyramids	Passive Voice, reinforcement of general and academic vocabulary
2		Chapter 7.4. Cylinders	Functions of the verb <i>to have</i> ; review: verb forms and their meaning, comparisons; general and academic vocabulary
3		Chapter 7.5. Cones	The functions of the verb <i>to be</i> , review: verb forms and their meaning, comparisons; general and academic vocabulary
3		Chapter 7.6. Spheres	Irregular plural form of some nouns; review: verb forms and their functions, comparisons; reinforcement of general and academic vocabulary
4		Chapter 7.7. Three- Dimensional Symmetry	Review: verb forms and their meaning, comparisons; vocabulary reinforcement
	Unit 8. Similar Shapes (Scale Factors, Similar Polygons, Similarity Theorems, Area and Volume Ratios)		

### ***General Procedures***

The participating school was contacted during the week before the spring semester started and again during the week prior to that when students started covering the chapter with treatment. The researcher made sure that the participating teachers understood the problem being addressed and treatment provided. A copy of the letter to the geometry teachers can be found in Appendix C. A copy of the letter to the ESL teachers can be found in Appendix D. Counselors of participating students were asked to organize meetings with the participating teachers and to identify linguistically different students taking Geometry. Letters to the immigrant parents, both in Spanish and English, (Appendix E) with suggestions on how they could help their children to succeed in school academically using the instructional materials with native language support were sent before the treatment. ESL students in each geometry class were told how they could benefit from the materials with support in Spanish. Each student received a letter in English and Spanish with the explanation of the purpose of the study (see Appendix N). Students were also asked to take home the parent questionnaire and the parental consent forms.

### **Instrumentation**

The dependent variables of the study were the grades on chapter tests administered by classroom teachers and keyed to learning activities and content objectives. The immigrant students were exposed to the same tests and performed the same assignments as those given to the mainstream students. A comparison of grades was made using the  $t$  test, one of the most commonly used inferential statistics for examining differences between two means (Krauthwohl, 1998). The  $t$  distribution takes into account the not normal distribution of small samples.

To answer the related questions of the study, students and parents' survey questions were prepared (Appendices F and G). Interview protocols (Appendices H and I) were developed for use with geometry teachers and ESL teachers to answer the research questions regarding their perception of the usefulness of the proposed instructional materials for the success of English language learners in academic subjects and in the development of English competency.

The Student Survey was intended to find out what learning resources were the most helpful and effective in students' work. The answers could help determine if ESL students' achievement was due to treatment or some other source. Other goals of the Student Survey were to investigate the students' perception toward the usefulness of course materials with native language support and whether students would prefer and be willing to have instructional materials with native language support in all school subject areas.

Parents were asked if native language support enabled them to better understand what their children study in school and to help their children with school matter. The Parents Survey sought the parents' opinion on whether materials with native language support were helpful in their children's studies and whether the parents supported the idea of providing their children with such materials in all school subject areas.

The subject matter teachers were asked if printed instructional materials helped them establish contact with immigrant students. Teachers expressed their opinion about ESL students' involvement in classroom activities when the treatment was available. Involvement was defined here as immigrant students' participation in the class activities, immigrant students' interest in subject, the quality of home assignments, and the overall progress in the certain subject. It was valuable to learn what teachers liked and disliked about instructional materials with native language support and what suggestions they had for improving them.

The ESL teacher, in addition to questions addressed to the Geometry teachers, was asked if instructional materials with native language support were helpful and useful in preparing the ESL curriculum and ESL lesson plans as well as in presenting of the meaning, form, and structure of the English language. The ESL teacher was asked if the instructional materials with native language support in the proposed format allowed her to coordinate the ESL curriculum with the subject matter curriculum and, thus, if these materials were helpful in meeting the needs of high school immigrant students.

Data was also collected from classroom observations. Students were observed in two situations: in the geometry mainstream class and in the ESL class.

In geometry classes, attention was given to the ESL students' being on task and attentive, to their concentration, participation in class, and to their use of native language support materials. This was monitored by the number of times per class period students were being disciplined by teacher and by the incidence of facial expression/body language that communicate attention and concentration. Features of students' positive behavior included students' note-taking parallel to the teacher's presentation or demonstration and students' following the teacher's instructions, e.g. when told to turn to a certain page, the student turns to that page, when teacher asks a question, student pages through the notes or textbook and/or points to answer in notes or textbook. Students' positive behavior also included student-to-student discussions accompanied by gestures to notes, textbook, proposed instructional materials, or teacher presentation. Negative behavior included student's staring in space, not taking notes, sleeping, and conversing with other students on topics not related to the class discussion. Students' participation in class was evaluated by the number of times per period students asked questions and by the number of students' responses to teacher's questions per class period. The use of native language support materials was measured by the approximate number of times students point to words in the margins of instructional materials.

Geometry teachers' contacts with linguistically different students were observed by looking for answers to the following questions. How often does the teacher attempt to use native language support materials by pointing at and pronouncing the numbered words in the text and referring ESL students to translation in the margins?

In the ESL classroom, the emphasis during the observation of students was made on whether instructional materials helped the students to understand English language structure. This was done by observing students' performance while they worked on special language assignments that were prepared based on the geometry textbook. The purpose was to identify if these materials helped students construct phrases and sentences in English. The features to be observed and instruments to be used were the same as in observations of the geometry classroom, except that the use of instructional materials with native language support could be measured by the amount of time per class period students worked using them.

The aim of the observation in the ESL classroom was to see if the materials designed to develop English learners' skills in reading scientific texts and to reinforce the general and academic vocabulary were used. The attempt was made to find out through observation if the instructional materials enabled the ESL teacher to demonstrate connections between form and meaning. The observation performed in the ESL classroom was used additionally to research and analyze the linguistic needs of ESL students. See the Observation Protocol in Appendix J.

### **Limitations of the Study**

The use of an in-tact sample limits the generalizability of the findings to other populations. Random selection of subjects was impossible. Only one school district expressed interest in participating in the study. The school district recommended the school with the largest number of immigrant students.

The experiment conducted only in Geometry and only with the ESL students' native language being Spanish limits the study. It would have been more beneficial to have a larger sample of immigrant students with different native language background and studying more, if not all, academic subjects with instructional materials having support in students' native language. Such a study was impossible to perform by one researcher, however.

Further, immigrant students were not isolated in completely controlled laboratory conditions. They lived in a target language environment that could considerably influence their progress. They could have been positively influenced by help from relatives who have spent considerable time in the U.S., by supportive neighbors, by encouragement from their families to watch educative television programs and videos, and by the availability of financial resources that would enable them to acquire books, videos, and computer programs that aid in language development. They could have just as easily been negatively influenced by the restraints spending long hours at work in order to financially support their families, by a lack of resources to acquire TV sets, computers, videos, CDs, and dictionaries, and even by a lack of transportation that would keep them from visiting learning centers, such as the public library. To evaluate these possible extra-curricular effects on students' achievements, questions about additional learning

opportunities were included into students' questionnaire (Appendix F). Questions 1 and 2 were designed to examine if and what kind of resources ESL students used to succeed in school and what sources, from their point of view, were the most effective. The responses to these questions could contribute to answering the question if there would be a rival explanation of the hypothesis of the usefulness of proposed materials.

Also, research describes individuals for whom the 'silent period', time when learners cannot participate in any language productive activities, may take more than two or three years. Then suddenly they would surprise teachers with quite efficient language skills (Peregoy & Boyle, 1997). A treatment that lasts less than a semester may not show any positive results with such students and thus may limit the value of the study. One should keep in mind that learning in general and second language learning in particular is a long, complex, and gradual process. "Learners do not master forms with their first encounter [and] form-meaning-use correspondences do not simply first appear in the interlanguage in target form" (Larsen-Freeman, 2003, p. 87). Krathwohl (1998) notes that because of the diverse features of the study and its design pattern it may be hard to judge the effect size based on a single study. The analysis of effect sizes of several studies is needed to find the conditions that produce the most effective intervention.

## **CHAPTER 4 – Results and Analysis**

This chapter describes the characteristics of the subjects and presents the data that was collected to answer the central question of the study, namely, whether printed instructional materials with native language support afforded a significant increase in adolescent immigrant students' achievement in geometry as measured by regular classroom tests. Also, it presents the outcomes of students' and parents' answers to questionnaires and interviews of teachers to understand the perception of students, teachers, and parents toward these materials.

### **Characteristics of the Students**

The mid-western urban high school involved in this study had seventy one students receiving ESL services. Twenty two of them were enrolled in Geometry classes taught by five different teachers. One student left for her home country during the study and one student chose not to participate. The majority of students, eighteen, were sophomores. Two students were juniors. There were twelve female and eight male students.

The school defined ESL students as follows: newcomers (NC)—those who "have been in the U.S. school for less than a year," non-English speakers (NES)—those who "have been in the U.S. for more than a year but are still extremely limited in terms of communicating orally in English and have limited reading/writing skills," and limited English proficient (LEP)—students whose "speaking ability may be stronger than their reading and writing ability." The student sample was represented by twelve NES and eight LEP students. By the time of the study, one student had been in the U.S. for eighteen months, two students two years, ten students three years, six students four years, and one student, defined as NES, five years.

### **Characteristics of the Teachers**

All five Geometry teachers were Caucasian Americans certified to teach high school mathematics. Their teaching experience ranged from ten to sixteen years and their tenure at the school where the intervention was conducted ranged from less than a year to five years. None of



them had an ESL endorsement. Each was exposed to a foreign language either in high school or college. All five teachers had attempted to learn Spanish, the native language of their linguistically different students.

The ESL teacher emigrated to the U.S. from a Central American country. Spanish was the native language for her and her ESL students. She completed a linguistic education back in her home country, majoring in English and French, and she had an endorsement in teaching ESL.

### **Research Questions**

The quantitative component of the study aimed to find an answer to the following question:

- ❖ Do printed instructional materials with native language support afford a significant increase in adolescent immigrant school students' achievement in high school geometry as measured by chapter tests?

To investigate the qualitative aspect of the study, additional questions related to the use of instructional materials with native language support were included:

- ❖ How does the second-language learners' self-reported use of instructional materials with native language support compare to their self-reported use of other resources?
- ❖ What is the perception of second language learners toward the usefulness of printed instructional materials with native language support?
- ❖ What is the perception of the parents of second-language learners toward the usefulness of instructional materials with native language support in being more involved with their child's learning and assisting their child's learning?
- ❖ What is the perception of academic subject-area teachers regarding how instructional materials with native language support affected the classroom environment, involvement of second-language learners, and success of second language learners?

- ❖ What are the perceptions of ESL teachers regarding the usefulness of instructional materials with native language support in defining the language material to be taught and in explaining word meaning and sentence structure?
- ❖ What is the impact of availability of instructional materials with native language support on teachers' and linguistically different students' classroom behavior as documented by classroom observation?

***The Impact of Printed Instructional Materials With Native Language Support on ESL***

***Students' Achievement***

To answer the first research question, the analysis of the chapter tests in geometry was performed. The test data were collected for the chapter preceding the treatment (Chapter 6: Shapes in Space), for the chapter with treatment (Chapter 7: Surface Area and Volume), and for the following chapter without treatment (Chapter 8: Similar Shapes). Table 4.1 presents immigrant students' performance on these chapters.

**Table 4.1 ESL Students' Performance on Chapter Tests**

Student	Teacher	Ch 6	Ch 7	Ch 8
1 NES	1	54	50	63
2 NES	1	82	88	75
3 NES	1	70	72	-
4 NES	1	67	65	74
5 NES	1	75	77	65
6 LEP	1	70	70	-
7 LEP	1	67	65	74
8 NES	1	72	68	75
9 LEP	2	80	100	100
10 NES	2	100	95	100
11 NES	2	90	100	100

12 LEP	2	80	90	100
13 LEP	2	50	50	85
14 LEP	2	90	95	100
15 NES	3	48	76	65
16 NES	4	65	67	46
17 LEP	5	94	103	105
18 LEP	5	65	70	105
19 NES	5	73	77	107
20 NES	5	27	49	82
M		70.95	76.35	84.50
SD		17.32	17.01	18.25

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As shown in Table 4.1, the mean on Chapter 6 was 70.95, the mean on Chapter 7 was 76.35, and the mean on Chapter 8 was 84.50. The researcher hypothesized that the ESL students' performance on the chapter with intervention would rise in comparison to their performance on the previous chapter, which actually happened. The researcher also assumed that, left without treatment, ESL students' results on the chapter following the intervention would decrease. The opposite took place: the ESL students' achievement on the last chapter, chapter 8, was the highest. Geometry teachers gave a plausible explanation for this unexpected outcome. They evaluated the relative difficulty level of the three chapters as easiest for Chapter 8, more difficult for Chapter 6 and most difficult for Chapter 7. In fact, according to geometry teachers' judgment, Chapter 7 (treatment) was the most difficult not only among these three chapters but in the entire course. Chapter 8 was judged to be one of the easiest in the course. The higher difficulty level of Chapter 7 compared to that of Chapter 6 could make it more difficult to see an increase in test scores on this chapter, which ESL students nevertheless managed to achieve.

Given the differences in the difficulty level of the three chapters, the null hypothesis was tested for Chapters 6 (without treatment) and 7 (with treatment) only. The following null hypothesis was tested: there is no difference in ESL student performance on a chapter test with native language support compared to a chapter test without native language support. The alternative hypothesis was that the ESL student performance on a chapter test with native language support would be greater than their performance on a chapter test without native language support. The *t* test for dependent samples was used, with each student serving as his/her control (Hinkle et al., 1982). Table 4.2 presents the descriptive statistics for the ESL students' performance on Chapters 6 and 7 chapter tests. Table 4.3 presents the *t* test results.

**Table 4.2 Paired Samples Statistics**

	N	M	SD	SE
Chapter 6 (Without Treatment)	20	70.95	17.32	3.87
Chapter 7 (With Treatment)	20	76.35	17.01	3.80

**Table 4.3 Paired Samples Test on Paired Differences**

N of the Pairs	<u>M</u> of the Differences Between the Paired Scores	SE	<i>t</i>	<i>p</i> -value
20	5.4	2.016	2.68	.05

As shown in Table 4.3, the *t* statistic for this comparison is 2.68, which is significant at the  $p=.05$  level. The null hypothesis is rejected. The ESL student performance on the chapter test given native language support was significantly higher than on their performance on a chapter test given no native language support.

Given the fact that the difficulty level of the three chapters differed to such an extent that not all the comparisons, i.e. ESL student performance on Chapter 8 compared to Chapter 7, could be reasonably made, an examination of ESL student performance compared to non-ESL student performance was made. Appendix O presents the test scores received by non-ESL students and Table 4.4 presents the descriptive statistics for the two student groups on each of the three chapter tests.

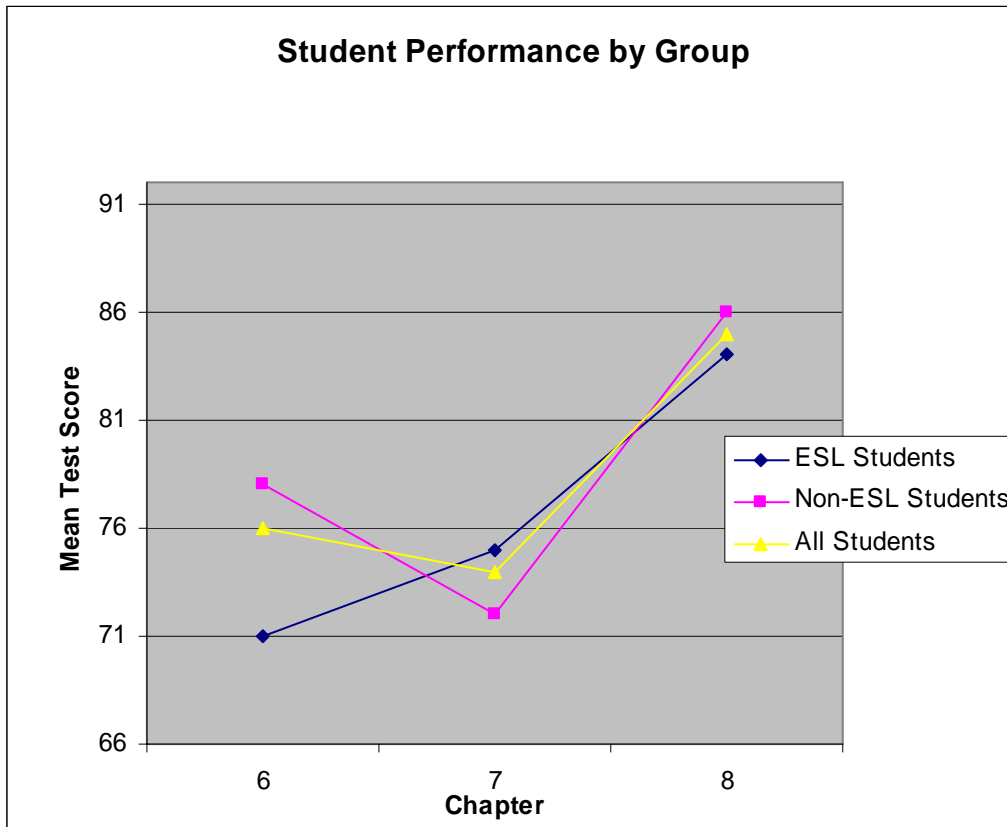
**Table 4.4 Summary of ESL and Non-ESL students' performance**

	Chapter 6			Chapter 7		Chapter 8	
	<u>N</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
ESL	20	70.95	17.32	76.35	17.01	84.50	18.25
Non-ESL	32	78.13	12.81	71.88	15.70	86.72	12.74
Total	52	75.37	14.96	73.60	16.20	85.92	14.81

Figure 4.1 on the next page provides a graphical presentation of these same data. The pattern of the average chapter test scores for all students is consistent with the teachers' ratings of the relative difficulty of the material in the three chapters. The mean score on Chapter 8 was substantially higher than that on either Chapter 6 or Chapter 7, more than half a standard deviation. The mean score on Chapter 7 did decrease in comparison to that on Chapter 6, but that difference is relatively small. What is striking is that the performance of the non-ESL students was consistent with this trend, but the performance of the ESL students deviated markedly for Chapter 7, the chapter for which the intervention was conducted.

A series of one-way ANOVAs was conducted, using the chapter test score as the dependent variable and ESL/non-ESL as the independent variable. The results of this analysis are presented in Table 4.5.

**Figure 4.1. The Performance of ESL, Non-ESL, and All Students.**



**Table 4.5 One-Way ANOVA: ESL Versus Non-ESL Chapter Test Score Means**

		SS	df	MS	F	Sig
Chapter 6	Between groups	633.61	1	633.61	2.94	.09
	Within groups	10784.50	50	215.69		
Chapter 7	Between groups	246.47	1	246.47	.94	.34
	Within groups	13136.10	50	262.72		
Chapter 8	Between groups	56.71	1	56.71	.26	.62
	Within groups	10690.97	48	222.73		

As shown in Table 4.5, the non-ESL students do not differ significantly from the ESL students on any of the chapter tests.

The answer to the first research question, whether printed instructional materials with native language support afford a significant increase in ESL students' performance can be summarized as follows: the null hypothesis that there was no difference in ESL student performance on a chapter test with native language support compared to a chapter test without native language support was rejected in favor of the alternative hypothesis. The paired samples test on paired differences (see Table 4.3) demonstrated a significant increase in ESL students' performance when printed instructional materials with native language support were available for them.

***The Comparison of Instructional Materials With Native Language Support to Other Resources***

To answer the question about the ESL students' self-reported use of the instructional materials with native language support compared to the use of other resources, students' answers to the student questionnaire were analyzed. Two questions asked ESL students to evaluate a variety of learning resources in regard to their helpfulness (Question 1) and effectiveness (Question 2) in studying English and Geometry (see Appendix F). Table 4.6 presents the frequency distributions for the student responses to Question 1 as well as the mean for each resource. The mean response was calculated by assigning 5=Very Helpful, 4=Helpful, 3=Somewhat Helpful, 2=Not Helpful, and 1=Have Not Used.

**Table 4.6 Frequency Distribution of Students' Evaluation of the Helpfulness of Learning Resources (N=20)**

Resources	Very		Somewhat	Not	Have	M
	Helpful	Helpful	Helpful	Helpful	Not Used	
	N	N	N	N	N	
Dictionaries	6	10	4	0	0	4.10

Books	6	11	3	0	0	4.15
Videos	5	6	6	3	0	3.65
Computer	4	4	7	3	2	3.15
TV Subtitles	2	7	9	0	2	3.35
Family/Friends	8	6	6	0	0	4.10
Geometry Supplement	9	5	6	0	0	4.15
ESL Supplement	8	6	6	0	0	4.10

As shown in Table 4.6, the majority of ESL students reported having used the various learning resources. Looking at the number of ESL students who rated resources as 'very helpful' and 'helpful', books (17), dictionaries (16), family/friends (14), subject area materials with native language support (14), and ESL materials with native language support (14) were generally reported as most helpful. Videos (11), TV subtitles (9), and computer programs (8) were reported as less helpful.

Table 4.7 presents the frequency distribution for students' responses to Question 2 in regard to the effectiveness of different resources using the scale from 0 to 10 with 10 being the highest.

**Table 4.7 Frequency Distribution of Students' Evaluation of the Effectiveness of Learning Resources (N=20)**

Resources	0	1	2	3	4	5	6	7	8	9	10	M
Dictionaries	0	0	0	0	1	0	1	2	8	3	5	7.95
Books	0	0	1	0	1	2	1	4	5	3	3	7.35
Videos	0	0	0	1	2	4	4	2	4	1	2	6.50
Computer	0	0	1	1	4	4	3	3	1	1	2	5.75
TV Subtitles	3	0	1	3	2	5	0	4	1	1	0	4.50
Family/Friends	1	1	0	0	0	2	0	4	4	4	4	7.35
Geometry Supplement	0	0	1	0	1	2	2	1	2	4	7	7.65



ESL Supplement      0   0   1   0   1   3   0   5   2   3   5   7.45

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Table 4.7 shows the consistency of students' responses in regard to the effectiveness of different resources with their responses to the first question concerning the helpfulness of the resources. Dictionaries (7.95), texts having native language support (7.65), ESL materials with native language support (7.45), books (7.35), and family/friends (7.35) were reported by ESL students as most effective. Videos (6.50), computer programs (5.75), and TV subtitles (4.50) were reported as less effective.

Judged on the students' self-evaluation, resources such as videos, computer programs, and TV subtitles do not represent a serious threat as a rival explanation of the increase in ESL student achievement. There was one resource that needed further explanation. Seventy percent of students reported family members, relatives, and friends as very helpful and helpful. On the effectiveness scale, family and friends were also judged to be highly effective (7.35). To see whether this resource could affect the students' performance, ESL students' answers to Question 2 in regard to the self-reported effectiveness of help provided by family members, relatives, and friends were correlated with students' test scores on Chapter 6. This chapter was chosen for the correlation analysis because it was not contaminated by the effect of treatment. Table 4.8 contains the paired data on the effectiveness of the help provided by family members as self-reported by students using a one to ten scale and the test scores on Chapter 6.

**Table 4.8 The Relationship Between the Effectiveness of Help Provided by Family/Friends and Students' Test Scores (N=20)**

The Self-Reported Effectiveness of Resource	Test Scores
8	54
9	82
8	70
0	67

9	75
5	70
1	67
10	72
7	80
7	100
10	90
5	80
9	50
7	90
10	48
8	65
7	94
9	65
8	73
10	27

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To determine if there was any linear relationship between the two variables, the Pearson product-moment correlation coefficient was calculated. The computed Pearson  $r$  value of  $-.17$  did not exceed the critical  $\rho$ -value (.378) at .05 level of significance for one-tailed test. Thus, the null hypothesis that the correlation is zero was retained. Student chapter test scores were independent of their perception of the effectiveness of support provided by families and friends.

Seventy percent of students evaluated instructional materials with native language support as very helpful and helpful, thus, ranking them next to books and dictionaries. On the effectiveness scale, these materials ranked next to dictionaries. The high ranking of books and dictionaries confirms the literature findings that adolescent second language learners rely heavily on non-fleeting printed instruction (Paulston, 1980; Tyson, 1997; Valdés, 2001; Meltzer &

Hamann, 2004) and native language (Spolsky, 1988; Widdowson, 2001, 2003; Bialystok, 1983, Scherba, 1974; Vygotsky, 1986).

***The ESL Students’ Perception of Instructional Materials With Native Language Support***

Questions 3-7 of the ESL student survey (see Appendix F) investigated how the ESL students perceived the printed materials with native language support. Table 4.9 summarizes students' responses. Mean scores were calculated by assigning 5=Strongly Agree, 4=Agree, 3=Undecided, 2=Disagree, and 1=Strongly Disagree.

**Table 4.9 Frequency Distribution of Students’ Responses to Perception of Instructional Materials with Native Language Support**

<u>Materials Contributed to</u>	<u>Strongly Agree</u>	<u>Agree</u>	<u>Undecided</u>	<u>Disagree</u>	<u>Strongly Disagree</u>	<u>M</u>
Understanding in Classroom	6	9	5	0	0	4.05
Understanding of Homework	6	11	3	0	0	4.15
Saving Time on Homework	7	10	2	1	0	4.15
Improving English	1	13	5	1	0	3.70
Performance in Other Subjects	2	12	6	0	0	3.80

N=20

The majority of students agreed and strongly agreed that the printed instructional materials with native language support were helpful to them. Seventy five percent of the students agreed/strongly agreed that the translations into their native language helped them gain a better understanding of what was being discussed in the classroom compared to the situation when there was no support in Spanish. Seventy percent of students agreed/strongly agreed that the explanations in Spanish contributed to their English proficiency and their performance in other subject areas besides geometry. The materials were most helpful, according to the survey, in students' independent work: eighty five percent of students agreed/strongly agreed that printed translations and explanations in Spanish helped them gain a better understanding of their

homework assignments and enabled them to finish the assignments in less time compared to the situation when the support in their native language was not available.

Further, question 8 (Appendix F) asked about the students' preference concerning the type of a textbook they would use to study academic subjects. The following five choices were offered:

- 1) to have two separate textbooks, one in English and another in Spanish;
- 2) to have a textbook in Spanish only;
- 3) to have a textbook in English only;
- 4) to have a textbook in English with words translated into Spanish and grammar/structure explained in Spanish;
- 5) and the choice "undecided".

Table 4.10 presents students' responses.

**Table 4.10 ESL Students' Preferences for Instructional Materials**

Type of Materials	Frequency	%
Separate Textbooks in Two Languages	1	5
Textbook in English Only	3	15
Textbook in Spanish Only	0	0
Textbook in English With Explanations in Native Language	14	70
Undecided	2	10

N=20

Students clearly preferred to have a textbook in English with words translated in Spanish and grammar/structure explained in Spanish. To check whether the frequency distribution of preferences deviates from a chance distribution, the Chi-Square test was used. The following null hypothesis was tested: the distribution of students' preferences for the type of instructional materials is not different from a random distribution. With  $\chi^2 (4, N=20)=32.5, p<.05$ , the null hypothesis that the observed frequencies of students' preferences for the type of instructional

materials are distributed randomly was rejected. This finding supports assertions in the literature that native language is a powerful tool in learning a new language (Scherba, 1974; Vygotsky, 1986; Spolsky, 1988; Widdowson, 2001, 2003; Bialystok, 1983; Bialystok & Hakuta, 1994; Corder, 1999; Cohen & Allison, 2001; Ellis, 1994).

The same type of statistical test was carried out to find out whether immigrant students would like to have in all school academic subjects textbooks in English with native language support and English grammar/structure explained in their native language. Students' responses to this question are shown in Table 4.11.

**Table 4.11 ESL Students' Willingness to Have Instructional Materials with Native Language Support**

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Frequency	8	8	4	0	0
%	40	40	20	0	0

N=20

None of the students rejected the idea of having textbooks in all subjects with native language support. Four students could not decide, and sixteen students agreed or strongly agreed with having native language support. The Chi-Square test was performed to check the null hypothesis that students' choices were randomly distributed. With  $\chi^2(4, N=20)=16, p<.05$  the null hypothesis was rejected. Students do prefer textbooks with support in their native language.

Given these findings, the perception of second language learners toward the use of printed instructional materials with native language support revealed the following:

- In their work ESL students rely most of all on books (i.e. printed matter) and dictionaries (i.e. native language support).
- ESL students' responses revealed that native language support materials were most helpful in their independent work.

- ESL students reported a strong tendency toward using textbooks in English but with native language support in comparison to Spanish-only textbooks.

***Immigrant Parents' Perception of Instructional Materials with Native Language Support***

A survey with four questions about materials with native language support was given to ESL students' parents. See Appendix G for a copy of the questionnaire. Seventeen surveys were returned, resulting in a response rate of eighty five percent. Table 4.12 presents the frequencies of parents' ratings of the materials. Mean values were calculated by assigning 5=Strongly Agree, 4=Agree, 3=Undecided, 2=Disagree, and 1=Strongly Disagree.

**Table 4.12 Immigrant Parents' Perception of Instructional Materials with Native Language Support**

Issue of Questions	Frequency of Responses					
	SA	A	U	D	SD	M
Better Understanding of Child's Studies	8	9	0	0	0	4.47
The Opportunity to Help Children	7	10	0	0	0	4.41
Helpfulness of Materials to Children	11	6	0	0	0	4.65
Desire for Native Language Support in All School Subject Areas	11	6	0	0	0	4.65

As shown in Table 4.12, none of the parents rated the materials as 'undecided', 'disagree', or 'strongly disagree'. Parents agreed/strongly agreed that the instructional materials with support in their native language gave them a better understanding of what their children study in school and the opportunity to help them with their schoolwork. They agreed/strongly agreed that native language support materials were helpful for their children and expressed the wish that their children have textbooks with explanations in their native language in all academic school subjects.

### ***Geometry Teachers' Perceptions of Instructional Materials With Native Language Support***

Four of the five geometry teachers who worked with ESL students were interviewed for the purpose of learning their perception of the usefulness of materials with native language support. One geometry teacher with whom a meeting for the interview could not be arranged sent a short e-mail message. The questions addressed to geometry teachers can be found in Appendix H.

***Question 1:*** *What was your experience in establishing contact with immigrant students with and without printed instructional materials with native language support?*

Two of the four teachers responded to this question in terms of their experience with individual students while the other two teachers responded more generally. The two teachers who responded in terms of individual students reported that four of the five students used the materials extensively and one student did not use them because this student was “very bilingual.” One student (who reported that he had been in the U.S. for five years by the time of completing the Student Survey but whose English proficiency level was defined by the counselor’s office as NES (non-English speaker) – being “extremely limited in terms of communicating orally in English” and having “limited reading/writing skills”) was “overwhelmed by the quantity” of material. This theme was supported by a teacher who reported more generally about her students. She pointed out that “for some of them it was a little cumbersome. It was difficult for some of them.” The fourth teacher interpreted the students’ reluctance to use all kinds of materials, including the proposed ones, as a lack of motivation: “Students do not want to put extra time.” This teacher felt strongly that ESL students should be placed in the same classroom rather than distributed across several teachers’ classrooms.

In answering the first question, the geometry teachers described the actions and the behavior of their students rather than their own as teachers. One inference is that the teachers were relatively passive, essentially allowing the ESL students to use or not to use the materials. A letter-note handed in to each teacher (see Appendix C) and oral explanations given prior to the

covering of chapter with treatment and at the time when each teacher received a copy of materials were perhaps not sufficient to enable teachers to be more active in encouraging ESL students to use the native language support materials in classroom. It might be that a small workshop could have helped teachers in gaining some skills in using the materials.

***Question 2:*** *What is your opinion about ESL students' involvement in what was going on in your classroom with and without native language support materials?*

The teachers' response to this question varied. One teacher responded that ESL students were not participating in class work and were not willing to ask questions. She felt uncomfortable about asking the ESL students to use the instructional materials because she thought it would embarrass them in front of their peers. Three of the teachers reported positively, saying that they saw the students actively using the materials ("... but I did see that they would go back and forth.") or that they believed the materials to have been helpful to students ("I think it helped her a lot.").

***Question 3:*** *What kind of expectations do you have of linguistically different students? Did the availability of native language support materials influence these expectations? Did they allow you to set more definite requirements for immigrant students?*

All four teachers stated that their expectations of ESL learners did not differ much from those of non-ESL students in general. One teacher responded that the availability of materials with native language support did not change her expectations of students because the native language support was not available for all the assignments she used in class. Two teachers added specific expectations such as: "to learn from a written word" or to not necessarily "understand the word problem as whole" but to "know key words." Teachers' responses to this question illustrates the variability of their expectations. Some teachers expect their students to know only key words while other teachers expect the students to derive meaning "from a written word."

***Question 4:*** *If you noticed any changes in ESL students' performance while they were exposed to native language support materials what were they?*



One teacher responded that she did not observe any changes in her ESL students. She said that students were not motivated to learn English and “would rather have somebody speak to them in Spanish.” A second teacher noticed that some ESL students “were actually reading and trying to read more themselves instead of discussing it with others.” Two teachers said, without specifying the changes, that students “did better with that extra support” and that they “relied on it a lot.”

**Question 5:** *What do you like most about the materials with native language support?*

One teacher responded that she liked that the primary materials were in English and only support was provided in students’ native language and that it was easy to find the words. Another teacher speculated that materials may save students’ time because students “did not have to ... go back and forth” since “any information that they wanted was in front of them.” A third teacher liked the explicitness of materials. She said that she liked them especially in regard to a student whom she described earlier as being overwhelmed by the quantity of materials.

**Question 6:** *If you noticed something negative about materials, what is it?*

One teacher declined to respond because she thought that language development was not her “area of expertise.” A second teacher responded that what made it difficult to use the materials was that similar support was not available for all supplemental materials, e.g. worksheets, computer generated tests, or teacher-made problems. She believed that in order for materials with native language support to be really helpful, they needed to be used all the time. A third teacher wished the materials to look like real textbook pages with colored pictures and drawings. Finally, one teacher said that her bilingual student noticed several English words that did not match with Spanish translations.

**Question 7:** *What are your suggestions for improving printed materials with native language support.*

Two teachers wished to have all the materials with native language support. One teacher thought that the availability of native language support could serve as a link between school and parents and, thus, enable parents to help their children. The concern for one teacher was that

special education children might find pages of instructional materials too complex and wondered whether they needed to be modified or simplified.

The majority of the teachers reported that the materials had been helpful. They saw the students using the materials and believed the use of the materials to have been helpful to these students. They thought that the format, while not ideal in terms of layout, was very usable. The teachers reported that the materials were more efficient to use than dictionaries. One teacher, however, reported that the materials had not been helpful. She believed that ESL students should all be placed in the same classroom rather than dispersed across several classes.

***The ESL Teacher's Perceptions of Instructional Materials With Native Language Support***

The Interview Protocol for the ESL teacher can be found in Appendix I.

***Questions 1:*** *If the instructional materials were helpful in your teaching, how helpful were they?*

The ESL teacher responded that the materials helped her know what her students were learning in geometry.

***Question 2:*** *What do you think of the possibility of using proposed instructional materials in creating curriculum for high school ESL students?*

The ESL teacher said that not all students in her classroom were taking geometry. She had to divide students into two groups and start first with “general ELL materials”. Then, she would give assignments prepared for ESL part of instructional materials to students who were taking geometry. She said that the ESL objectives developed in instructional materials “worked also for ELL class because it really guided” her. To the additional question asked at the end of the interview about the curriculum for ESL students, the ESL teacher admitted that she did not have any official curriculum and had to depend on common sense.

**Question 3.** Since ESL teacher's native language was the same as that of her students, she used it always for clarification and needed explanations. Since she did not experience the troubles in establishing contact with her ESL students because of the difference in language, Question 3 (Appendix I) was omitted from the interview protocol.

**Question 4:** *If you noticed any changes in ESL students' performance while they were using materials with native language support, what were they?*

The ESL teacher responded that students' attitude changed because exercises in English became more meaningful for them.

**Question 5:** *What are the most valuable features in materials with native language support.*

The ESL teacher liked the answer keys provided at the end of each section and the glossary that helped students "read faster."

**Questions 6 and 7:** *If you noticed something negative about materials, what is it? What are your suggestions for improving printed instructional materials with native language support?*

The ESL teacher said that for students with special needs the instructional materials were too difficult.

The interview with ESL teacher revealed that materials that were designed based on geometry text, helped the teacher to know what students learn in geometry. The ESL objectives for each section of the geometry textbook could guide the ESL teacher in her lesson planning. With ESL materials tied to subject area, the ESL teacher noticed positive changes in her students, such as increased self-esteem and improvement of attitude towards learning. English became more meaningful for students because it was more functional. Glossaries in native language facilitated the speed of reading and learning. The negative remarks about the materials concerned the needs of special education students.

### ***Classroom Observations***

The observation protocol to collect the information can be found in Appendix J. During the time when the chapter with treatment was covered, the researcher visited the school twice a week but had to divide time among five geometry and one ESL classrooms. Appendix P contains the summary of the observations.

The extent to which the prepared instructional materials were used in classrooms differed from teacher to teacher. Some teachers distributed the copies of the chapter and worksheets with

native language support as soon as they started covering this chapter. Some teachers needed to be reminded a couple of times to provide the students with the materials. Their reluctance to provide students with copies turned out to be the consequence of their style of instruction: students in these classrooms spent more of the class time working on computer generated assignments or worksheets that were not part of the instructional materials with native language support and hence did not provide native language support to students. In one classroom, the observer could not record any use of materials. In those classrooms where the material was covered using the regular textbook for a chapter for which native language support was provided, the researcher was able to see the ESL students trying to figure out the content of assignments by using the translations in the margins of the pages. In two classes, the researcher managed to observe teachers' explaining to their students how they might use the materials with translations. During the period of observation there was no opportunity to see any teacher's explanations of geometry content to the whole class or any discussion in which the whole class would participate. Students were either working independently, in groups or on computer generated assignments. In classrooms of three teachers students were observed using the glossary in the margins of the text from three to more than fifteen times per period. No cases of disruptive ESL students' behavior were observed in geometry classes.

In the ESL classroom, the teacher would first discuss with all the students linguistic material proposed in the section objectives using general vocabulary. For reinforcement, ESL students taking geometry would work on assignments based on the geometry text. Only once geometry taking ESL students were observed working collectively under the ESL teacher's direct guidance. Otherwise, most of the teacher's attention or class time was devoted to less advanced ESL students who were not taking geometry.

Observations in the geometry classroom revealed that teachers rarely used the instructional materials with native language support to communicate geometry concepts to their ESL students. ESL students, when working on assignments that contained native language support, were

working independently by using the native language glossaries. In ESL classes, the wider use of instructional materials based on geometry text was hindered by the fact that not all ESL students in the classroom studied geometry and, as a consequence, geometry-taking students were generally working independently.

### **Summary**

Twenty students from a mid-western urban high school participated in the study. They were taking a geometry class taught by five different teachers and attended an ESL class taught by a teacher whose native language was the same as that of her students. By the time of the study the ESL students' stay in the U.S. ranged from eighteen months to five years.

The study consisted in providing ESL students with native language support materials based on one chapter of the geometry textbook. These materials were used in mainstreamed classes. Reinforcement assignments based on the same geometry chapter text were provided also for the ESL class. ESL students' results of the teacher-administered tests on chapter preceding the treatment, chapter with treatment, and the chapter after the treatment were analyzed statistically. The *t* test for dependent samples demonstrated that ESL students' test scores significantly increased when students were provided with materials that included native language support.

The ESL student survey revealed that adolescent second language learners relied on printed instruction (books) and native language (dictionaries) in studying both subject areas and English. Materials provided for the study were cited by ESL learners as being helpful learning resources, next to books and dictionaries. Native language support materials, as self-reported by ESL students, were most helpful in their independent work. The survey demonstrated the ESL students' preference toward having regular subject area textbooks in English containing page by page glossaries and explanations in their native language.

Parents' responses showed that the instructional materials with support in their native language gave them a better chance of understanding what their children study in school and enabled them to help their children with their schoolwork. They supported the idea of their

children having textbooks with explanations in their native language in all academic school subjects.

Three out of four interviewed geometry teachers ascribed positive changes in the performance of their ESL students to the availability of materials with native language support . One teacher noted that instructional materials with native language support might be a learning resource connecting students and parents in regard to school matter and two teachers said that materials enabled ESL students' reading.

The interview with ESL teacher revealed that materials that were designed based on geometry text gave the teacher the opportunity to know what students learn outside of the ESL classroom. The ESL objectives designed for each ESL section that, in turn, were based on corresponding geometry textbook section, guided the ESL teacher in her lesson planning. Using ESL materials tied with subject area, the ESL teacher noticed such positive changes in her students as increased self-esteem and more positive attitude to learning. English became more meaningful for students, according to the ESL teacher, because it was more functional. Glossaries in native language facilitated the speed of reading and learning.

One geometry teacher and the ESL teacher noted that native language support materials needed improvement to meet the needs of special education ESL students. Geometry teachers wished all teaching resources, that is, textbook, worksheets, and practice tests be provided with native language support similar to that involved in the study. All teachers wished students have the sets of materials with native language support in all school subject areas.

## CHAPTER 5 – Summary, Recommendations, and Conclusion

### **Summary of the Study**

This study was designed to help adolescent immigrants who need simultaneously to acquire a new language and, using this new language, to gain knowledge in a variety of subject matter fields. At the core of this study is the cognitive approach to learning. It stresses that learning results in interactions between what learners already know and the new information they encounter. In contrast to behaviorist criticism in regard to mind and consciousness, a cognitive approach to learning emphasizes purposeful, intelligent actions that lead learners to the awareness of their own powers (Dewey, 1947).

The research project involved instructional materials that attempted to meet the needs of high school immigrant students. By designing the instructional materials, Spolsky's theory was used that emphasizes the role of the learner's native language in the process of second language learning. The knowledge of native language was assumed to be an important component of immigrant adolescent students' previous knowledge. The instructional materials, following the Spolsky's theory, attempted to create opportunities leading to language learning.

This study investigated whether printed instructional materials with native language support afford a significant increase in ESL students' achievement in geometry. The instructional materials of this kind were intended to serve immigrant students as a tutorial that could replace live tutors. Additionally, these materials may serve as a link between students and their parents, whose second language needs improvement as well. They can also guide ESL teachers in the development of an ESL curriculum and be a helpful tool in subject area teachers' instruction if they want to be sure that their instruction reaches the minds of linguistically different students.

To investigate the impact of printed instructional materials with native language support on students' achievement, a chapter of a geometry textbook was augmented by a Spanish translation of English words and phrases that could create problems in comprehension by

linguistically different students. English words/phrases in the text were marked with numbers. The corresponding numbered Spanish translations could be found in the margin of the same page. To reinforce the vocabulary and structure of this chapter text, special assignments were prepared to be used in ESL classroom.

Immigrant students' performance on two chapters, one covered without and another with native language support, was compared. Questionnaires filled out by students and their parents were analyzed to investigate their perception of the instructional materials. Interviews with teachers were conducted to obtain their opinions about the method.

The statistical analysis of linguistically different students' test performance in geometry on chapters without and with treatment supported the research hypothesis that instructional materials with native language support contributed significantly to the improvement of students' performance. ESL students did considerably better with the materials than without them. The comparison of ESL students' performance with the performance of non-ESL students across the three chapters showed that on average ESL students were lagging behind the non-ESL students on the first chapter, but scored higher than non-ESL students on the chapter for which the support in native language was available and then managed to close the gap between ESL and non-ESL students in the final chapter. This trend suggests the value of repeating the research.

The analysis of ESL students' survey supported the reviewed literature findings that high school ESL learners preferred to work with printed sources of materials (books, dictionaries) (Harklau, 2002b) as compared to such sources as video and computer programs. Because intervention materials of this study contained both elements, namely they were based on texts and offered translations tied with the context, they were, as the student survey demonstrated, among the students' most helpful resources. Because materials with native language support help students to overcome difficulties while they read, these materials may contribute to creating "challenging environments for learning in which students can respond in meaningful ways to text" (Meltzer & Hamann, 2004, p. 35).



The proponents of the using native language of immigrant students as a medium of instruction in academic subject areas will find it interesting that none of the students reported a preference for having a textbook in Spanish only. However, though they do prefer working with English texts only, the ESL students' survey showed that students would like explanations in their native language to be available for them.

Another important finding of the ESL student survey was that students valued native language support materials most of all in their independent work. This phenomenon is likely connected, as the classroom observation revealed, with the passive role of subject area teachers in using the materials in communication with their linguistically different students. Both classroom observations and interviews with subject area teachers did not show any change in teacher's behavior as a consequence of the use of instructional materials with native language support, though teachers made statements about positive changes in their ESL students while students were using the instructional materials. On the other hand, the role of native language support materials in students' independent work may be connected with the nature of reading process, which is an independent process inherent in all future self-directed learning. Acquiring the skill of reading independently is a large part of preparing these students for self-directed learning, which is necessary in higher education and on-the-job training.

There was also a positive response from parents of ESL students in regard to the helpfulness of materials with native language support in parents' better understanding of what children study in school and in getting the opportunity to help their children. The potential to involve parents and family into ESL students' school work cannot be underestimated.

### **Limitations of the Study**

#### ***Sample Size/In-Tact Sample***

One of the serious problems of the study is the sample size. It was determined largely by the willingness of school districts and schools to participate in the study. The wide spectrum of high school curricula, and the policy of the State Department of Education permitting schools to

select their own textbooks made it impossible to involve a larger sample since the researcher was responsible for the preparation of the native language support that was based on the textbook used in mainstream class. These conditions caused the inability to randomly select subjects.

### ***Instrumentation***

Students' performance in geometry was measured by teacher-prepared tests that were not standardized and differed from teacher to teacher. Almost all students who were taking these tests received passing scores. According to the school report available on Internet, only twelve percent of tenth graders scored proficient and above in mathematics in 2003, and in school year 2004-05 school did not make adequate yearly progress. Such imbalance between the classroom test results and those received on state tests may be a sign of the lack of reliability of classroom teacher made tests as an instrument to measure students' progress and, thus, make the choice of the measuring instrument designed for the study dubious.

The possibility that students' achievement could be influenced by sources other than treatment was removed by the analysis of students' responses in regard to helpfulness and effectiveness of different possible learning resources in their studies.

### ***Generalizability***

Materials with native language support were provided only for the geometry course and for Spanish speaking students only, which limits the generalizability of the research findings to other subject areas and to immigrant students with other language backgrounds.

### **Recommendations for Replication and Further Studies**

This study was the first attempt to investigate the impact of printed instructional materials with native language support on linguistically different high school students' performance in an academic subject area. The statistical analysis of the tests demonstrated that under the treatment conditions immigrant students improved their performance on classroom teacher-made tests. To verify the value of the method, it would be desirable to take into consideration the following suggestions for replicating or widening the study:

1. To increase the sample size.
2. To include other academic subjects of high school curriculum, such as algebra, science, social studies, and American literature.
3. To enrich the study by providing instructional materials with multi-lingual support in order to assist immigrant adolescents with different language backgrounds.
4. To conduct a study while assisting groups of students at different levels of English proficiency, comparing the impact of printed instructional materials with native language support on beginners, intermediate, and advanced students.
5. To use instruments other than teacher-prepared tests.
6. To compare the impact of printed materials with native language support on students belonging to different age groups. It would be of educational value to investigate the application of these materials in grades four through twelve.
7. To compare the impact of printed instructional materials with native language support on female and male students.
8. To compare students' performance in academic subjects when they use printed instructional materials with native language support to the performance of students receiving other types of instruction, for example, sheltered method of instruction.
9. To conduct a study based on a qualitative design with the purpose of investigating the experience of students and their parents in regard to printed instructional materials with native language support.

### **Conclusion**

In spite of much discussion among educational scholars concerning collective forms of activities for students and cooperative methods, one should keep in mind that students, including immigrant adolescents, are individuals who might prefer to ponder individually over academic and linguistic content. Some students would want to compare, review, or simply get a better understanding of certain concepts. Students would want to have the opportunity to look up

vocabulary or structure, if forgotten. This may apply especially to adolescent immigrant students who may already have reading skills in their native language but may feel reluctant to ask questions in mainstream class out of fear of exposing their English language limitations. Second language learners should not constantly be made solve puzzles by guessing the meaning of words and phrases, which may push them to the verge of frustration or depression. ESL students need to have a reference source on English language structure with explanations in their native language and vocabulary/structure reinforcement assignments with answer keys to them because students do not always have a teacher or a competent person available to guide them. Third, the researcher would rather support Ruiz-de-Velazco & Fix (2000) in that the immigrant adolescents with zero knowledge of English need to be provided with a short initial segregated period for learning basic English.

Instructional materials with native language support can be used not only at school but in families and in weekend/evening schools for students and their parents, who also need to master the official language of the country that adopted them. Yet another valuable feature of printed instructional materials with native language support is their potential for enhancing the accountability of all participating parties, that is, of students, their parents, and teachers for success in school. As noted by teachers in the interviews, such "student-oriented" materials will give students the help they need and continue to "help them in the long run".

The proposed method, as the interviewed teachers noted, helps students master their reading skills. Native language support materials enhance comprehension and reading speed. Reading must not be a mere subject in school. It needs to be incorporated across the whole school curriculum (Sollish, 2006). Reading by itself is the functional activity in learning a language. Reading enables students to learn independently. By mastering reading skills, students will be able to go beyond the borders of survival English and to acquire skills leading to success.

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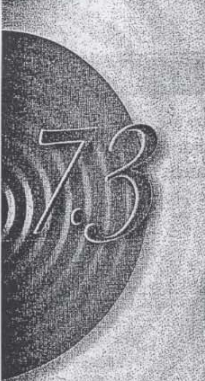
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# Appendix A

## A Sample of Instructional Materials for Geometry Class



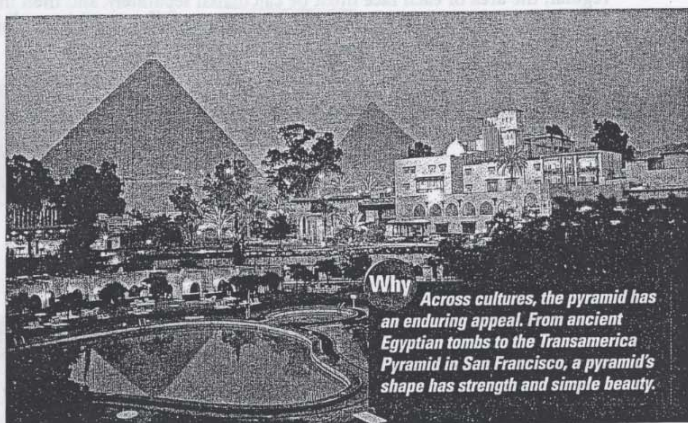
**Objectives**

- Define and use a formula for the surface area of a regular pyramid.
- Define and use a formula for the volume of a pyramid.

**ESL Objectives**

- Passive Voice
- General and academic vocabulary

# Surface Area and Volume of Pyramids



**Why** Across cultures, the pyramid has an enduring appeal. From ancient Egyptian tombs to the Transamerica Pyramid in San Francisco, a pyramid's shape has strength and simple beauty.

p. 445

1-superficie

2-a través de culturas

3-una atracción duradera

4-antiguas

5-tumbas egipcias

6-forma

7-tiene

8-fuerza

9-sencilla

10-belleza

11-poliedro

12-que consiste

13-que es

14-tres o más

15-caras

16-que comparten

17-solo

18-llamado

19-cada

20-arista

21-en común

22-con

23-plano

24-altura

25-longitud

26-su

27-cuya(s)

28-todas

29-corta

30-se llama

31-altura lateral (de la cara inclinada)

32-como

33-son denominadas

34-por la forma

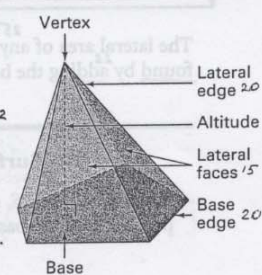
### Pyramids

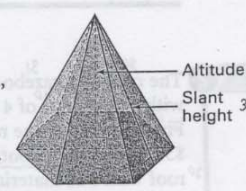
A pyramid is a polyhedron consisting of a base, which is a polygon, and three or more lateral faces. The lateral faces are triangles that share a single vertex, called the vertex of the pyramid. Each lateral face has one edge in common with the base, called a base edge. The intersection of two lateral faces is a lateral edge.

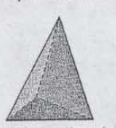
The altitude of a pyramid is the perpendicular segment from the vertex to the plane of the base. The height of a pyramid is the length of its altitude.

A regular pyramid is a pyramid whose base is a regular polygon and whose lateral faces are congruent isosceles triangles. In a regular pyramid, all of the lateral edges are congruent, and the altitude intersects the base at its center. The length of an altitude of a lateral face of a regular pyramid is called the slant height of the pyramid.

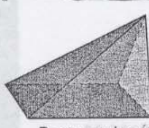
Pyramids, like prisms, are named by the shape of their base.



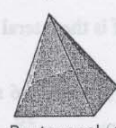




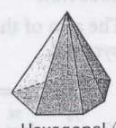
Triangular pyramid (3)



Rectangular pyramid (4)



Pentagonal pyramid (5)



Hexagonal pyramid (6)



## Appendix B

### *Sample of Instructional Materials Used in ESL Class*

(Section Assignments and Reference Materials)

Section 7.3

ESL Objectives

- Passive Voice
- General and academic vocabulary

#### **I. Complete the sentences by using the verbs in parentheses. Consult the Table on p. 150**

1. Many products (*son empacados*) in boxes that are prisms (package).
2. The volume of the aquarium (*es encontrado*) by using the volume formula (find).
3. The surface area of a prism (*puede ser dividido*) into the area of the bases and the area of lateral faces (may, break).
4. How much glass (*fue utilizado*) to cover the walls of the building? ( use).
5. Every oblique prism (*puede ser comparado*) with a right prism with the same base and height (can, compare).
6. The lateral area (*está dado*) by the following formula (give).
7. A hexagonal prism (*está mostrado*) at right (show).

#### **II. Complete sentences choosing from those in parentheses. Consult rules on pages 149 and 150.**

- 1) Lateral faces of a pyramid share a single vertex (*a-calling, b-called, c-calls*) the vertex of the pyramid.
- 2) A pyramid is a polyhedron (*a-consists, b-consisted, c-consisting*) of a base and three or more lateral faces.
- 3) The relationship between triangular prisms and pyramids (*a-can verify, b-can be verified, c-could verify*) by dividing a triangular prism into three triangular pyramids.
- 4) The pyramids in Egypt (*a-constructed, b-is constructed, c-are constructed*) of limestone.
- 5) Louvre is a museum (*a-shown, b-shows, c-showed*) on page 451.
- 6) It (*a-stated, b-was stated, c-have been stated*) that two pyramids with the same height and with the bases of the same area have equal volumes.
- 7) The volume of the pyramid (*a-finds, b-is found, c-found*) using the following formula.
- 8) Every oblique prism (*a-can be compared, b-compares, c-compared*) with a right prism with the same base and height.

#### **III. Pair English words with their Spanish equivalents.**

- |                 |             |
|-----------------|-------------|
| 1) at right ___ | a) resolver |
| 2) leg ___      | b) igual    |

- |                        |                                |
|------------------------|--------------------------------|
| 3) solve ____          | c) a la derecha                |
| 4) equal ____          | d) el mismo                    |
| 5) amount ____         | e) distinto                    |
| 6) therefore ____      | f) cateto                      |
| 7) like, the same ____ | g) cantidad                    |
| 8) unlike ____         | h) por consiguiente, por tanto |
| 9) find ____           | i) cada                        |
| 10) each ____          | k) hallar/encontrar            |

**II. Relate the words in *italic* to their Spanish equivalents.**

1. It may *help* to copy a net and fold it to form a prism.  
a) ayuda    b) ayudar
2. You can find the volume of a cube with the *help* of this formula.  
a) ayuda    b) ayudar
3. It may help to copy a net and fold it to *form* a prism.  
a) formar    b) forma
4. Every card has the same size and *form*.  
a) formar    b) forma

**V. Pair the words with the same or similar meaning.**

- |                    |                |
|--------------------|----------------|
| 1) draw ____       | a) last        |
| 2) interior ____   | b) evidence    |
| 3) show ____       | c) can         |
| 4) ancient ____    | d) sketch      |
| 5) height ____     | e) inclined    |
| 6) form ____       | f) inside      |
| 7) slant ____      | g) demonstrate |
| 8) ultimate ____   | h) altitude    |
| 9) be able ____    | i) old         |
| 10) proof ____     | k) shape       |
| 11) occur ____     | m) equal       |
| 12) congruent ____ | n) happen      |

**VI. Pair the words that have the opposite meaning.**

- |                      |                      |
|----------------------|----------------------|
| 1. perpendicular ___ | a) above             |
| 2. more ___          | b) take into account |
| 3. oblique ___       | c) useless           |
| 4. the same ___      | d) vertex            |
| 5. helpful ___       | e) destruction       |
| 6. base ___          | f) none              |
| 7. construction ___  | g) parallel          |
| 8. each ___          | h) less              |
| 9. below ___         | i) different         |
| 10. ignore ___       | k) right             |

**VII. Match the words below with their definitions**

- |                    |                 |                        |
|--------------------|-----------------|------------------------|
| 1) regular pyramid | c) pyramid      | e) rectangular pyramid |
| 2) lateral edge    | d) slant height | f) vertex              |

1. A polyhedron consisting of a base, which is a polygon, and of three or more lateral faces \_\_\_\_\_
2. The intersection of two lateral faces \_\_\_\_\_
3. The length of an altitude of a lateral face of a regular pyramid \_\_\_\_\_
4. A pyramid that has a base in the shape of a rectangle \_\_\_\_\_
5. A single point that is shared by all lateral faces of a pyramid \_\_\_\_\_
6. A pyramid whose base is a regular polygon and whose lateral faces are congruent isosceles triangles \_\_\_\_\_

**Keys to Section 7.3**

- 1) 1 – are packaged, 2 – is found, 3 – may be broken, 4 – was used, 5 – can be compared, 6 – is given, 7 – is shown.
- 2) 1b, 2c, 3b, 4c, 5a, 6b, 7b, 8a.
- 3) 1c, 2f, 3a, 4b, 5g, 6h, 7d, 8e, 9k, 10i.
- 4) 1b, 2a, 3a, 4b, 5.
- 5) 1d, 2f, 3g, 4i, 5h, 6k, 7e, 8a, 9c, 10b, 11n, 12m.
- 6) 1g, 2h, 3k, 4i, 5c, 6d, 7e, 8f, 9a, 10b.
- 7) 1c, 2b, 3d, 4e, 5f, 6a.

**Functions of the verb forms**

<b>infinitive</b>	<b>participle I</b>	<b>past</b>	<b>participle II</b>
<p>work fall be draw carry</p> <p><b>1. Present Tense-<i>Presente</i></b></p> <p>They <u>work</u> 5 days a week (usually, always). – <i>Ellos <u>trabajan</u> 5 días a la semana (usualmente, siempre).</i></p> <p>I/you/we/they - <u>work/fall/draw/carry</u> he/she/it – works/falls/ draws/carries</p> <p><b>I am</b> you/we/they <b>are</b> he/she/it <b>is</b></p> <p>This <u>is</u> an important chapter. – <i>Este <u>es</u> un capítulo importante.</i></p> <p><b>2. Future= will +infinitive</b> They <u>will draw</u> a graph. – <i>Ellos <u>dibujarán</u> una gráfica (parte de futuro).</i></p> <p><b>4. Imperativ</b> <u>Draw</u> it here. – <i><u>Dibújalo</u> aquí).</i></p>	<p>working falling being drawing carrying</p> <p><b>1. Continuous Tenses – (Acciones continuas)</b></p> <p><i>be+participle I</i> From 9 to 11 they <u>are (were/have been/had been) carrying out</u> an experiment (continuous action). <i>Desde 9 hasta 11 ellos estan (estaban) realizando un experimento (acción continua).</i></p> <p><b>2. Acciones en futuro</b></p> <p>be +participle I I am going to the library tonight. – <i>Yo voy a la biblioteca esta noche.</i></p> <p><b>2. Describen sustantivos</b> the <u>working</u> people - <i>el pueblo <u>trabajador</u></i></p> <p><b>3. Sujeto y complemento de sujeto</b> <u>Learning</u> geometry is more than <u>memorizing</u> formulas. – <i><u>Aprender</u> geometría <u>es</u> más que <u>memorizar</u> formulas</i></p> <p><b>4. Complemento</b> I like <u>studying</u> geometry. – <i>A mi gusta <u>estudiar</u> geometría.</i></p> <p><b>5. Complemento con preposición.</b> We can see a cone <u>by rotating</u> a right angle triangle around one of its legs. – <i>Nosotros podemos ver un cono <u>al girar</u> un triángulo recto alrededor de uno de sus catetos.</i></p>	<p>worked fell was/were drew carried</p> <p align="center"><b><u>Pretérito</u></b></p> <p>1. The temperature <u>fell</u> yesterday below 30F. <i>Ayer la temperatura <u>cayó</u> bajo 30F.</i></p> <p>He <u>drew</u> a graph. – <i>El <u>dibujó</u> uno gráfico.</i></p> <p>A pyramid <u>had</u> the height of 4 inches. – <i>Una pirámide <u>tenió</u> una altura de 4 pulgadas.</i></p> <p>This prism <u>was</u> oblique. <i>Este prisma <u>estaba</u> inclinado.</i></p>	<p>worked fallen been drawn carried</p> <p>1. Perfect and Past Perfect (have/had+participle II)</p> <p>They <u>have/had</u> already <u>made</u> a graph. – <i>Ellos ya <u>han hecho</u> una gráfica.</i></p> <p><b>2. Describen sustantivos</b> The <u>fallen</u> heroes – <i>Los héroes <u>caídos</u>.</i></p> <p>– The <u>found</u> results – <i>Los resultados <u>que fueron encontrados</u>.</i></p> <p><b>3. Adverbial modifier (Modificador adverbial)</b></p> <p><u>Based</u> on this formula, we find the area of a prism. – <i><u>Basado</u> en esta formula, nosotros encontramos el area de este prisma.</i></p> <p><b>4. Passive Voice (Voz passiva) be + participle II</b></p> <p>- is (are) obtained – <i>es (son) obtenido(s)</i> - will be drawn – <i>será(n) dibujado(s)</i> - have (has) been found- <i>fue(ron) encontrado(s)</i> - can (could) be shown <i>puede(n) (podrían) ser mostrado(s) or se pueden mostrar</i></p>

**Active                      versus                      Passive**

<p><i>In Active voice sentences it is important WHO performs the action. (En frases que contienen voz activa es importante notar QUIEN dirige la accion)</i></p>	<p><i>If the ACTION or RESULT OF THE ACTION is more important, you can use Passive. (Si la ACCION o el RESULTADO DE LA ACCION es mas importante, entonces se puede usar la voz passiva).</i></p>
<p>a) <u>Al-Khwarizmi used</u> algebra in his scientific work in geography and astronomy. – <i>Al-Khwarizmi usó álgebra en su trabajo científico sobre geografía y astronomía.</i></p> <p>b) In this chapter <u>students will investigate</u> the surface area of solid objects. - <i>En este capítulo los <u>estudiantes investigarán</u> la superficie de los objetos sólidos.</i></p> <p>c) <u>The word geometry comes from</u> the Greek word <i>geometria</i>. – <i>La palabra geometría proviene de la palabra griega geometria.</i></p>	<p>5) One of the first books about algebra <u>was written</u> in the ninth century. – <i>Uno de los primeros libros sobre álgebra <u>fue escrito</u> en el siglo IX).</i></p> <p>6) In this chapter surface area of solid objects <u>will be discussed</u>. – <i>En este capítulo el area de la superficie de los objetos sólidos <u>será discutida</u>.</i></p> <p>7) A plane <u>can be named by</u> three points that lie in the plane. – <i>Un plano <u>puede ser denominado por</u> tres puntos localizados en un plano</i></p>

**Passive Forms (voz pasiva) = be + Participle II**

Present (presente)	is written – <i>está escrito</i> are written – <i>están escritos</i>
Future (futuro)	will be discussed– <i>será(n) discutidas</i>
Past (pasado)	was shortened – <i>se abrevió</i> were invented – <i>fuleron(están) inventados</i>
Present Perfect	has been used – <i>ha sido utilizado</i> have been used – <i>han sido utilizados</i>
Past Perfect	had been used – <i>habia(n) sido utilizado(s)</i>

can be compared – *puede ser comparado o pueden ser comparados*  
 could be found – *podría ser encontrado o podrian ser encontrados.*  
 should be corrected – *debe(n) ser corregido o se debe(n) corregir*

## Appendix C

### *Letter to the Geometry Teachers*

Dear Educator:

In your class you have several ESL students. Literature in education as well as empiric experience show that it is not feasible for both ESL and subject-area teachers to prepare linguistically adequate and academically challenging instructional materials for secondary school students. For the purpose of the study in which your school agreed to participate, you and your ESL students will be provided instructional materials that take into account the development of both language and content. The intent of the study is to see if such instructional materials can assist both ESL and subject-area teachers in organizing the teaching process and whether these instructional materials may have a positive impact on ESL students.

As you can see, the materials correspond to the content of the textbook you use in your mainstream class. Grammar and vocabulary items that may cause difficulty in comprehension by ESL students are explained either in English or in the ESL students' native language. Special sections are developed for work in the ESL classroom. You may look through them to get an idea of what your ESL students cover in their ESL classroom.

Explaining new concepts to students, try to pronounce words clearly and keep in mind that students have many words translated in Spanish. The translations are in the margins of each page in the materials received by linguistically different students. You can improve immigrant students' comprehension by naming the page in the textbook where the discussed material is located and by referring students to Spanish equivalents of some words in the margins.

In attempting to maximize the results of this program, we ask you please check your ESL students' assignments carefully, paying attention not only to content but also to language and provide a feedback:

- 1) either correct mistakes and ask students to construct 1-2 sentences with the incorrectly used word or structure for the student to practice the proper use, or
- 2) underline mistakes and ask students to correct them.

According to the research study protocol, the immigrant students should be exposed to the same tests and should do the same assignments as those expected of the mainstream students. We ask you please to provide us with all assessment results of units covered with and without printed bilingual materials during the whole period of the experiment.

Your feedback about these instructional materials will be greatly appreciated. Thank you for your cooperation.

## **Appendix D**

### ***Letter to the ESL Teacher***

Dear ESL Teacher:

You have the important task in the facilitating the assimilation of foreign students into American society and enabling their future success as productive members of this society. With this responsibility, it is unfortunate that, according to the research, there is a glaring lack of instructional materials for secondary school ESL students contributing to their inability to achieve adequate knowledge and skills both in the English language and in academic school subjects. The goal of this study is to determine whether the availability of instructional materials that take into account the development of language skills parallel with acquiring knowledge in academic subject areas, will bring appreciable improvement in ESL students' scholastic outcomes.

As you can see, one part of the materials corresponds to the content of the textbook your students use in their mainstream class. Grammar and vocabulary items that may cause difficulty in comprehension by ESL students are explained mostly in the ESL students' native language. From this part students are supposed to read the corresponding sections at home before they start covering them in the mainstream class and to work with them in the mainstream class.

Another part of materials intended for the reinforcement of language material of the content texts is developed specifically for the work in the ESL classroom. The sections from this part are to be covered in your classroom after the introduction of the corresponding mainstream class sections. To properly use these instructional materials, we would like you to coordinate the coverage of certain ESL sections with the corresponding sections intended for the mainstream class. Try to reinforce linguistic material to ESL students after they read the section of the academic content in their subject areas. You may create your own assignments based on assignments developed in instructional materials.

Your feedback about these instructional materials will be greatly appreciated. Thank you for your cooperation.

## Appendix E

### *Letter to the Parents*

Dear Parents of \_\_\_\_\_

English proficiency is one of the main keys to the success of your son/daughter in school. Your son/daughter may experience difficulties with academic subjects because of their insufficient knowledge of English vocabulary (words) and structure (grammar). We have designed bilingual education materials to assist them in biology/geometry. This bilingual approach will also give you an opportunity to be involved in your child's learning process. What you can do for your child is:

1. Explain to your son/daughter that success is the result of persistent work. Nothing comes by itself.
2. Be interested in what your son/daughter is studying in school. Ask him/her every day about what they learned, read, and did in school. You may discuss all this in your native language.
3. Advise/check that your daughter/son ***read the section in the textbook before it is covered in class***. This strategy will give her/him a better chance to understand what is going in class.
4. In instructional materials in biology/geometry your son/daughter has recently received, there are sections that include both English and Spanish. Just read the words and sentences in Spanish and ask your child to give the equivalents in English. To help you in this, answer keys are given to almost all assignments of each section. This may provide a tremendous amount of help to your son/daughter. By helping your child, you can learn or improve your English as well.
5. Know that you are always welcome at school both to clarify any questions concerning your child's school performance and to see what children do in class.

We are looking forward to working together with you. Our cooperative efforts have a great potential for the success of your son/daughter in school and in future life!

Your feedback about these instructional materials will be greatly appreciated. We ask you that you please take the time to complete the questionnaire that will be mailed to you later. The decision if immigrant adolescents will be provided with native language support materials, like those your daughter/son used in Biology/Geometry, depends largely on you. Thank you for your cooperation.



Apreciados Padres \_\_\_\_\_:

La proficiencia en inglés es una de las claves del éxito para sus hijos en la escuela. Ellos podrían experimentar dificultades con temas académicos debido a su insuficiente conocimiento de vocabulario (palabras) y estructura (gramática) en Inglés. Hemos diseñado materiales de educación bilingüe para ayudarles en Biología/Geometría. Esta aproximación bilingüe dará una oportunidad a los padres para involucrarse en la educación de sus hijos. Lo que pueden hacer por ellos es:

1. Explicar a sus hijo/hija que el éxito es el resultado del trabajo constante. Nada viene por sí solo.
2. Estar interesado por lo que sus hijos/hijas están estudiando en la escuela. Preguntarles a diario qué han aprendido.
3. Aconsejar a sus hijos / hijas **LEER LA SECCION DEL LIBRO DE TEXTO, ANTES DE QUE SEA VISTA EN CLASE. NO HABRA EXITO ALGUNO SIN LECTURA.** Esta estrategia les dará un chance de entender qué sucede en clase.
4. En materiales de instrucción que sus hijas / hijos han recibido recientemente, hay secciones que incluyen ambos idiomas, Inglés y Español. Sólo lea las palabras y sentencias en español, y pregunte a sus hijos que le den los equivalentes en Inglés. Esto proveerá una tremenda ayuda para ellos. Ayudando a sus hijos ustedes también podrán mejorar su inglés.
5. Sepan que ustedes siempre serán bienvenidos en la escuela para aclarar cualquier pregunta respecto al desempeño y ver lo que ellos hacen en las clases.

Eseramos trabajar junto con ustedes. Nuestros esfuerzos y cooperación son un gran potencial para el éxito de sus hijos / hijas en la escuela y en la vida futura!

Sus comentarios acerca de estos materiales instructivos serán muy apreciados. Les pedimos, por favor, tomar su tiempo, para completar el cuestionario que les será enviado por correo más adelante. La decisión, si adolescentes hispanohablantes serán proporcionados con libros de texto que tienen explicaciones en su idioma nativo, como esos que su hijo/hoja utilizó en la biología/geometría, depende en gran parte de sus respuestas. Gracias por su cooperación.

## Appendix F

### *Student Survey*

7. Evaluate each resource in regard to its helpfulness in your studying English, Geometry/Biology.
- 1) Spanish-English/English-Spanish dictionary.  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 2) Books to help you with English.  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 3) Videos to help you with English  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 4) Computer programs to develop your English.  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 5) Computer programs in Biology/Geometry.  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 6) Close-caption inscriptions on TV set.  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 7) Texts having in margins words translated into Spanish.  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 8) English language explanations and assignments provided for sections in Geometry/Biology  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
  - 9) Family members, relatives, or friends.  
a) very helpful    b) helpful    c) somewhat helpful    d) not helpful    e) have not used
8. Mark the effectiveness of the above resources in your studies. Use the scale from 0 to 10, zero being the lowest and 10 the highest. (The same number may be used more than once).
- 1) Spanish-English/English-Spanish dictionary \_\_\_\_
  - 2) Books to help you with English \_\_\_\_
  - 3) Videos to help you with English \_\_\_\_
  - 4) Computer programs to develop your English \_\_\_\_
  - 5) Computer programs in Biology/Geometry \_\_\_\_

- 6) Close-caption inscriptions on TV set\_\_\_\_\_
- 7) Texts having in margins words translated into Spanish\_\_\_\_\_
- 8) English language explanations and assignments provided for sections in Geometry/Biology\_\_\_\_\_
- 9) Family members, relatives, or friends\_\_\_\_\_
3. The explanations in Spanish helped you gain a better understanding of what was being discussed in the classroom compared to the situation when there is no support in Spanish.
- a) strongly agree b) agree c) undecided d) disagree d) strongly disagree
4. The explanations in Spanish helped you gain a better understanding of your homework assignments compared to the situation when there is no support in Spanish.
- a) strongly agree b) agree c) undecided d) disagree d) strongly disagree
5. The explanations in Spanish enabled you to finish your homework assignments in less time compared to the situation when there is no support in Spanish?
- a) strongly agree b) agree c) undecided d) disagree d) strongly disagree
6. The explanations in Spanish contributed to your English proficiency.
- a) strongly agree b) agree c) undecided d) disagree d) strongly disagree
7. The explanations in Spanish contributed to your better performance in other subjects.
- a) strongly agree b) agree c) undecided d) disagree d) strongly disagree
8. When you studied Algebra last year in this school, you used two textbooks, one in English and another in Spanish. If you were given the following choices, what would you prefer:
- a) to have two separate textbooks, one in English and another in Spanish
- b) to have a textbook in English only
- c) to have a textbook in Spanish only
- d) to have a textbook in English with words translated in Spanish and grammar/structure explained in Spanish
- e) undecided
9. You would like to have textbooks in all subjects with words translated in Spanish and grammar/structure explained in Spanish.
- a) strongly agree b) agree c) undecided d) disagree d) strongly disagree

1. Evalúe cada recurso con respecto a su utilidad en sus estudios de inglés and biología/geometría.

1) diccionario inglés-español/español-inglés

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

2) libros para ayudarte con inglés

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

3) videos para ayudarte con inglés

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

4) programas de computadora para desarrollar tu inglés

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

5) programas de computadora en biología/geometría

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

6) las inscripciones en inglés en el televisor

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

7) los textos que tienen en márgenes las palabras traducidas (que se traducen) en español

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

8) las explicaciones de la estructura/gramática del idioma inglés y las tareas proporcionadas (que se proporcionan) en el ESL parte de biología/geometría

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

9) los familiares/amigos

a) muy útil    b) útil    c) algo útil    d) no útil    e) no he utilizado

2. Marque la eficacia de los recursos siguientes en sus estudios. Utilice la escala de 0 a 10, cero es el más bajo y 10 el más alto. (El mismo número se puede utilizar más que una vez).

1) diccionario inglés-español/español-inglés \_\_\_\_\_

2) libros para ayudarte con inglés \_\_\_\_\_

3) videos para ayudarte con inglés \_\_\_\_\_

4) programas de computadora para desarrollar tu inglés \_\_\_\_\_

5) programas de computadora en biología/geometría \_\_\_\_\_

6) las inscripciones en inglés en el televisor \_\_\_\_\_

- 7) los textos que tienen en márgenes las palabras traducidas (que se traducen) en español \_\_\_\_\_
- 8) las explicaciones de la estructura/gramática del idioma inglés y las tareas proporcionadas (que se proporcionan) en el ESL parte de biología/geometría \_\_\_\_\_
- 9) los familiares/amigos \_\_\_\_\_
3. Las explicaciones en español te ayudaron mejor entendimiento de lo que pasaba en la clase comparado a la situación cuando no hay apoyo en español.
- a) totalmente de acuerdo b) de acuerdo c) indeciso d) en desacuerdo e) en total desacuerdo
4. Las explicaciones en español te ayudaron a entender mejor el trabajo asignado para la casa comparado a la situación cuando no hay apoyo en español.
- a) totalmente de acuerdo b) de acuerdo c) indeciso d) en desacuerdo e) en total desacuerdo
5. Las explicaciones en español te dieron la oportunidad de acabar tu trabajo en menos tiempo comparado a la situación cuando no hay apoyo en español.
- a) totalmente de acuerdo b) de acuerdo c) indeciso d) en desacuerdo e) en total desacuerdo
6. Las explicaciones en español ayudaron tu proficiencia en inglés.
- a) totalmente de acuerdo b) de acuerdo c) indeciso d) en desacuerdo e) en total desacuerdo
7. Las explicaciones en español te ayudaron a mejorar tu progreso en otras clases.
- a) totalmente de acuerdo b) de acuerdo c) indeciso d) en desacuerdo e) en total desacuerdo
8. Cuando usted estudió la álgebra el año pasado en esta escuela, usted utilizó dos libros de texto, uno en inglés y otro en español. Si usted sería dado las elecciones siguientes, que usted preferiría,
- d) tener dos libros de texto separados, uno en inglés y otro en español
- e) tener uno libro de texto en inglés sólo
- f) tener uno libro de texto en español sólo
- g) tener uno libro de texto en inglés que tiene en márgenes las palabras traducidas (que se traducen) en español y las explicaciones de la estructura/gramática del idioma inglés explicado en español
- h) indeciso
9. Te gustaría tener textos con explicaciones en español para todas tus clases y materias.
- a) totalmente de acuerdo b) de acuerdo c) indeciso d) en desacuerdo e) en total desacuerdo

## Appendix G

### *Parent Survey*

1. Recently, your child got school materials in Biology/Geometry with explanations in Spanish. With these materials you could better understand what your child studies in school.  
a) strongly agree    b) agree    c) undecided    d) disagree    d) strongly disagree
2. The explanations in Spanish gave you the opportunity to help your child(ren) with their schoolwork.  
a) strongly agree    b) agree    c) undecided    d) disagree    d) strongly disagree
3. You believe that materials with explanations in Spanish were helpful for your son/daughter.  
a) strongly agree    b) agree    c) undecided    d) disagree    d) strongly disagree
4. Overall, you would like to have textbooks with explanations in Spanish in all the subjects your child(ren) are taking.  
a) strongly agree    b) agree    c) undecided    d) disagree    d) strongly disagree

### *Cuestionario para Padres*

11. Recientemente, su hijo/hija recibió en la escuela materiales impresos en biología/geometría, con explicaciones en Español. Con estos materiales usted comprende mejor lo que sus hijos ven en la escuela. Está usted,  
a) Totalmente de acuerdo    b) De acuerdo    c) Indeciso    d) En desacuerdo    e) En total desacuerdo
12. Las explicaciones en español le permiten ayudar a su hijo/hija con las tareas de la escuela. Está usted,  
a) Totalmente de acuerdo    b) De acuerdo    c) Indeciso    d) En desacuerdo    e) En total desacuerdo
3. Cree usted que los materiales en español serán útiles para su hija / hijo?  
a) Totalmente de acuerdo    b) De acuerdo    c) Indeciso    d) En desacuerdo    e) En total desacuerdo
4. Le gustaría que hubieran libros con explicaciones en Español, para todas las materias que toma su hija / hijo en la escuela?  
a) Totalmente de acuerdo    b) De acuerdo    c) Indeciso    d) En desacuerdo    e) En total desacuerdo

## **Appendix H**

### ***Interview Protocol for Geometry Teachers***

1. What was your experience in establishing contact with immigrant students with and without printed bilingual instructional materials?
2. What is your opinion about immigrant students' involvement in what was going in your classroom with printed bilingual support and without it (students' participation in classroom activities, their interest in the subject)?
3. What kind of expectations do you have of linguistically different students? Did bilingual support materials influence these expectations? Did they allow you to set more definite requirements for immigrant students.
4. If you noticed any changes in ESL students' performance while they were exposed to bilingual support materials, what are they?
5. What do you like most about printed bilingual instructional materials?
6. If you noticed something negative about printed instructional materials, what is it?
7. What are your suggestions for improving printed bilingual instructional materials?

## **Appendix I**

### ***Interview Protocol for ESL Teachers***

1. If the printed bilingual materials were helpful in your teaching, then how helpful were they (contribution to faster and clearer presenting of the meaning, form, and structure of English compared to English only approach, saving the planning time, selecting the linguistic material)?
2. What do you think of the possibility of using the proposed instructional materials in creating curriculum for high school ESL students?
3. What was your experience in establishing contact with immigrant students with and without printed bilingual instructional materials?
4. If you noticed any changes in ESL students' performance in English while they were exposed to bilingual support materials, what are they?
5. What are the most valuable features in printed bilingual instructional materials?
6. If you noticed something negative about printed bilingual instructional materials, what is it?
7. What are your suggestions for improving printed instructional materials with native language support?



**Appendix J**  
***Observation Protocol***

Features to be observed	Instruments and measurements
Students in subject area classroom	
3) Students' attentiveness, concentration and their being at task	<ul style="list-style-type: none"> <li>❖ number of times per class period students are being disciplined by teacher</li> <li>❖ facial expression/body language that communicate attentiveness and concentration</li> </ul>
4) participation in class in oral discussions	<ul style="list-style-type: none"> <li>❖ number of times per period students ask questions</li> <li>❖ number of students' responses to teacher's questions per class period</li> </ul>
5) the use of native language support materials	<ul style="list-style-type: none"> <li>❖ approximate number of times students point to words in the margins of instructional materials during class period</li> </ul>
Students in ESL classroom	
1) students' attentiveness, concentration and being at task	<ul style="list-style-type: none"> <li>❖ number of times per class period students are being disciplined by teacher</li> <li>❖ facial expression/body language that communicate attentiveness and concentration</li> </ul>
2) participation in class and oral discussions	<ul style="list-style-type: none"> <li>❖ number of times per period students ask questions</li> <li>❖ number of students' responses to teacher's questions per class period</li> </ul>
3) the use of instructional materials	<ul style="list-style-type: none"> <li>❖ amount of time per period spent on using the bilingual materials in ESL class</li> </ul>
Geometry teachers	
1) referring students to translated words in the margins	<ul style="list-style-type: none"> <li>❖ number of times per period</li> </ul>
2) checking students' assignments	<ul style="list-style-type: none"> <li>❖ number of corrected versus only marked (circled, underlined, or designated with +/- sign) language mistakes</li> </ul>
ESL classroom teachers	
8) the use of bilingual materials	<ul style="list-style-type: none"> <li>❖ amount of time per class period</li> </ul>
9) the helpfulness of the materials to the ESL teacher	<ul style="list-style-type: none"> <li>❖ number of times per period teachers looked confused and had to consult the answer key</li> <li>❖ number of assignments per section teacher alters based on proposed printed materials</li> </ul>

*Notes to Observer*

Facial expression/body language that communicate student's attentiveness and concentration

positive behavior

- ❖ Student's note-taking is parallel to the teacher's presentation or demonstration
- ❖ When told to turn to a certain page, the student turns to that page.
- ❖ When teacher asks a question, student pages through the notes, textbook, or bilingual instructional materials
- ❖ When teacher asks a question, student points to answer in notes, textbook, or bilingual instructional materials
- ❖ Student-student discussions include gestures to teacher's presentation, notes, textbook, or bilingual instructional materials

negative behavior

- staring in space
- not taking notes
- discussing with classmates a topic not related to class objectives

**Appendix K**

***Kansas State University Informed Consent Form***

Dear Parent:

My name is Luba Ramm. I am a doctoral student at Kansas State University. I would like to kindly ask you to give consent in allowing your son/daughter to fill a questionnaire about the printed bilingual instructional materials that your son/daughter used in Biology/Geometry. The questionnaire will help in understanding how these materials help students in learning both Biology/Geometry and English. Filling this questionnaire does not have any risk either to your child or to you. The confidentiality of those who fill out the questionnaire will be guaranteed. Neither your name nor your child's name will appear in any record.

If you have any questions about this questionnaire or about the nature of this research, please contact:

Dr. Jacqueline D. Spears, Principal Investigator: (785) 532-5530, email: [jdspears@ksu.edu](mailto:jdspears@ksu.edu) or

Committee on Research Involving Human Subjects, Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224, email: [comply@ksu.edu](mailto:comply@ksu.edu)

**Informed Consent:** I understand that this project is research and that participation of my child is completely voluntary. I also understand that if I decide to let my child participate in filling the questionnaire, I may withdraw my consent at any time without any explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

I verify that my signature below indicates that I have read and understand this consent form and willingly agree to let my child fill the questionnaire under the terms described and my signature acknowledges that I have received, signed, and dated copy of this consent form.

Student's Name (Printed): \_\_\_\_\_

Student's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of a Parent/Guardian \_\_\_\_\_ Date \_\_\_\_\_

*Formato de Aprobación Kansas State University*

Apreciado Madre / Padre:

Mi nombre es Luba Ramm. Soy estudiante de Doctorado en Kansas State University. Quisiera pedirle, encarecidamente, que permita a su hija /hijo llenar un cuestionario acerca de los impresos materiales educativos bilingües que su hija / hijo uso en biología/geometría. El cuestionario permitirá a entender cómo estos materiales ayudan a los estudiantes en el aprendizaje de biología/geometría y del inglés.

Llenar este cuestionario no representa ningún riesgo para usted o su hijo / hija. Se garantiza que aquellos que llenen el formato permanecerán confidenciales. Ni su nombre, ni el de su hijo / hija, aparecerá en ningún archivo.

Si tiene alguna pregunta referente al cuestionario, o acerca de la naturaleza de esta investigación, por favor contacte a:

Dr. Jacqueline D. Spears, investigadora principal: (785) 532-5530,  
e mail :jdspears@ksu.edu o al Comité de Investigaciones que Involucran Personas (Committee on Research Involving Human Subjects), Fairchild may, Kansas State University, Manhattan, KS 66506. (785) 532-3224, e-mail: [comply@ksu.edu](mailto:comply@ksu.edu)

Aprobación: I entiendo que este proyecto es una investigación, y que la participación de mi hija / hijo es completamente voluntaria. También comprendo que si decidí permitir a mi hijo / hija participar llenando el cuestionario, también puedo retirar mi aprobación en cualquier momento, sin ninguna explicación, castigo, o pérdida de beneficios, o en la situación académica en la que me encuentre.

Certifico que mi firma, abajo, indica que he leído y comprendo este formato de aprobación y voluntariamente acuerdo el permitir a mi hijo / hija llenar el cuestionario, bajo los términos descritos y mi firma reconoce que he recibido una copia firmada, con fecha, de este formato de aprobación.

Nombre del Estudiante (Impreso) \_\_\_\_\_

Firma del Estudiante \_\_\_\_\_ Fecha \_\_\_\_\_

Firma del Padre /Madre o Guardián \_\_\_\_\_ Fecha \_\_\_\_\_

## Appendix L

### *Kansas State University Informed Consent Form*

Dear Parent:

My name is Luba Ramm. I am a doctoral student at Kansas State University. I would like to kindly ask you to give consent in filling a questionnaire about the printed bilingual instructional materials that your son/daughter used in Biology/Geometry. The questionnaire will help in understanding how these materials helped students in learning both Biology/Geometry and English.

Filling this questionnaire does not have any risk either to you or to your child. The confidentiality of those who fill out the questionnaire will be guaranteed. Neither your name nor your child's name will appear in any record.

If you have any questions about this questionnaire or about the nature of this research, please contact:

Dr. Jacqueline D. Spears, Principal Investigator: (785) 532-5530, email: [jdspears@ksu.edu](mailto:jdspears@ksu.edu) or

Committee on Research Involving Human Subjects, Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224, email: [comply@ksu.edu](mailto:comply@ksu.edu)

**Informed Consent:** I understand that this project is research and that my participation is completely voluntary. I also understand that if I decide to participate in filling the questionnaire, I may withdraw my consent at any time without any explanation, penalty, or loss of benefits, or academic standing to which I may be otherwise entitled.

I verify that my signature below indicates that I have read and understand this consent form and willingly agree to fill the questionnaire under the terms described and my signature acknowledges that I have received, signed, and dated copy of this consent form.

Parent's Name (Printed): \_\_\_\_\_

Parent's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

***Formato de Aprobación Kansas State University***

Apreciado Madre / Padre:

Mi nombre es Luba Ramm. Soy estudiante de Doctorado en Kansas State University. Quisiera pedirle, encarecidamente, que nos permita presentarle un cuestionario acerca de los impresos materiales educativos bilingües que su hija / hijo uso en biología/geometría. El cuestionario permitirá a entender cómo estos materiales ayudan a los estudiantes en el aprendizaje de biología/geometría y del inglés.

Llenar este cuestionario no representa ningún riesgo para usted o su hijo / hija. Se garantiza que aquellos que llenen el formato permanecerán confidenciales. Ni su nombre, ni el de su hijo / hija, aparecerá en ningún archivo.

Si tiene alguna pregunta referente al cuestionario, o acerca de la naturaleza de esta investigación, por favor contacte a:

Dr. Jacqueline D. Spears, investigadora principal: (785) 532-5530,  
e mail :jdspears@ksu.edu o al Comité de Investigaciones que Involucran Personas (Committee on Research Involving Human Subjects), Fairchild, Kansas State University, Manhattan, KS 66506.  
(785) 532-3224, e-mail: [comply@ksu.edu](mailto:comply@ksu.edu)

Aprobación: I entiendo que este proyecto es una investigación, y que la participación de mi hija / hijo es completamente voluntaria. También comprendo que si decidí permitir a mi hijo / hija participar llenando el cuestionario, también puedo retirar mi aprobación en cualquier momento, sin ninguna explicación, castigo, o pérdida de beneficios, o en la situación académica en la que me encuentre.

Certifico que mi firma, abajo, indica que he leído y comprendo este formato de aprobación y voluntariamente acuerdo el llenar el cuestionario, bajo los términos descritos y mi firma reconoce que he recibido una copia firmada, con fecha, de este formato de aprobación.

Nombre del Padre/Madre (Impreso) \_\_\_\_\_

Firma del Padre/Madre \_\_\_\_\_  
\_\_\_\_\_

Fecha

## Appendix M

### *Kansas State University Informed Consent Form*

Dear Educator:

My name is Luba Ramm. I am a doctoral student at Kansas State University. I would like to kindly ask you to interview you about the printed bilingual instructional materials that you used in your classroom. Your opinion and insights will help in understanding if and how these materials helped students in learning Biology/Geometry and English. Participating in interview does not have any risk to you. Your anonymity will be guaranteed. Your name will not appear in any record.

If you have any questions about this interview or about the nature of this research, please contact:

Dr. Jacqueline D. Spears, Principal Investigator: (785) 532-5530, email: [jdspears@ksu.edu](mailto:jdspears@ksu.edu) or

Committee on Research Involving Human Subjects, Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224, email: [comply@ksu.edu](mailto:comply@ksu.edu)

**Informed Consent:** I understand this project is research and that my participation is completely voluntary. I also understand that if I decide to be interviewed, I may withdraw my consent at any time without any explanation, penalty, or loss of benefits, or academic standing to which I may otherwise entitled.

I verify that my signature below indicates that I have read and understand this consent form and willingly agree to be interviewed under the terms described and my signature acknowledges that I have received, signed, and dated copy of this consent form.

Teacher's Name: \_\_\_\_\_

Teacher's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Appendix N

### *Letter to the ESL Students*

Dear English language learner,

There are two intentions of the materials you have received:

1. To facilitate a better understanding of the concepts being taught in subject areas in your classes and
2. To speed the process of acquiring English

**For both of these intentions to come true, it is absolutely necessary for you to read.** While reading, you will repeatedly encounter the same words and eventually you will be able to remember and use them. You can further expedite the process of learning the words provided in the margins if you play word games with your family members.

With materials containing support in your native language, you will not have to waste your time on searching for unknown words in the dictionary and guessing which meaning to apply in a given situation. The meaning of many words is given in the margins of every page.

Each section contains English language assignments. Please read the explanations, complete the assignments, and check your work using the keys at the end of each Language Section.

The aim of the study in which you are participating is to find out whether texts with native language support are of any use for high school students with English as their second language and if it is worth publishing the whole textbooks with native language support.

Thank you for your cooperation.



Estimados estudiantes de inglés,

Los textos y materiales que han recibido tienen dos intenciones:

1. Aumentar su entendimiento de los conceptos que están aprendiendo en las varias materias en sus clases
2. Hacer más rápido el proceso de aprender inglés

**Para cumplir ambas intenciones, es absolutamente necesario leer.** Mientras que leen, van a encontrar varias veces las mismas palabras desconocidas, y ultimamente van a recordar y saber usar esas palabras. Ustedes pueden hacer más rápido el proceso de aprender las palabras que están escritas en los márgenes si usan las palabras en juegos con sus familiares.

Con materiales que contienen apoyo en su idioma, no tendrán que pasar tiempo buscando palabras desconocidas en el diccionario y adivinando cual de los significados hay que usar en cada situación. El significado de muchas de las palabras se encuentra en el margen de cada página.

Cada sección está basada en el texto que se usa en la clase y contiene tareas en inglés. Por favor, lean las explicaciones, completen las tareas, y chequeen su trabajo usando las claves que se encuentran en el término de cada sección.

La intención del estudio en el cual ustedes participan es averiguar si textos con apoyo en el idioma nativo pueden ayudar a estudiantes de escuela secundaria que están aprendiendo inglés y si será de mérito tener textos enteros con apoyo en sus idiomas nativos.

Gracias por su cooperación.

## Appendix O

### *Non-ESL Student Performance on Chapter Tests.*

Class 1	Chapter 6	Chapter 7	Chapter 8	
	70	90	100	
	60	50	70	
	100	70	100	
	80	60	85	
	60	75	70	
	70	75	60	
	70	80	95	
	70	60	75	
	80	80	100	
	70	70	90	
	90	70	100	
	80	50	80	
	100	95	100	
	100	90	100	
Class 2	90	50	80	
	70	50	75	
	80	95	100	
	70	50	75	
	50	50	70	
	80	90	100	
	70	60	75	
	70	65	75	
	70	70	75	
	90	65	75	
	70	80	95	
	80	75	100	
	60	75	80	
	90	100	100	
	90	50	80	
	90	90	100	
	90	85	100	
	90	85	95	
N=32	M	78.12	71.88	86.72
	SD	12.8	15.7	12.74

## Appendix P

### *Summary of Classroom Observations*

#### *Day 1*

Classroom 1: Students do not have yet materials. They work in groups. ESL students, predominantly girls, are in a separate group discussing the matter not related to geometry. Several students are at the computers. The researcher asked the teacher to provide ESL students with materials as soon as possible.

Classroom 2: There is only one ESL student in this classroom. Students are working independently on their worksheets. The researcher explained to the ESL student how she could use the materials independently home.

Classroom 3: The only participating student is absent.

Classroom 4: There are four ESL students in this classroom. The teacher gives the assignment from the textbook. She tells the ESL students that they may use the materials with translations. Students work independently. The teacher observes the class and approaches from time to time some students to look at what they are doing. The researcher stopped at each of the students to explain how they can use the materials demonstrating it on solving one or two problems. Students seemed to be involved.

#### *Day 2*

Classroom 1: Students still do not have materials.

Classroom 3: Practice for test taking. No use of materials.

Classroom 5: Students work on assignments from the textbook. During twenty minutes of observation Carmen uses the glossary in the margins around five times, Catalina four times, Juanita seven times, Patricia five times, Ernesto nine times, and Francisco two times.

ESL classroom: ESL teacher gives assignments designed by the researcher to students taking geometry. There is no teacher aide in the classroom. The ESL teacher asks the researcher to explain to students how they can use the materials. Students are very attentive. All of them look to be concentrated on the content. We work on several geometry problems together. Students' faces are very expressive in showing either the inability to understand or the full comprehension. They give suggestions on how to solve a problem from their seat. We practice vocabulary. Students respond in chorus. All students are on task.

*Day 3*

Classrooms 1: Practice for test taking. One student from this class, when asked during the lunch break about the materials, responded that she did not have any.

Classroom 3: Students work independently on assignments in worksheets. Adriana has a worksheet that contains Spanish support provided by the researcher, but the translations in worksheets are not in the margins, they are given right above the English words. It is impossible to count how often Adriana makes use of translations. She is concentrated on her work.

Classroom 4: Teacher is disciplining for a long time a non-ESL student. Students work on assignments from the textbook. There are instructional materials with support in Spanish on ESL students' desks. Franco's tip of the pencil goes back and forth from the text to translations in the margin of the page sixteen times. Maria uses the glossary nine times, Juan eleven times, and Carlos two times.

ESL classroom: The majority of students taking geometry ask the ESL teacher to allow them to work in the library on a report in Social Studies and they leave the classroom.

*Day 4*

Classroom 1: Some students work on their assignments in worksheets. Other are at computers. A small group of four female ESL students are discussing in Spanish a topic not related to geometry. The researcher approaches them and asks if they could give Spanish equivalents for English words *height*, *width*, and *length*. Dolores and Angelina shrug their shoulders. The researcher asks them to explain the meaning of these words using a drawing. Girls cannot do this either. The researcher tells the teacher about this incident. The teacher's response to this is that Angelina gets good grades on her tests. She manages to figure out the meaning of the words in her head when she sees a drawing, or sometimes words are not needed at all. The problem asks to find *a*, *b*, or *c*.

Classrooms 3, 4, and 5: Practice for test taking.

ESL classroom: The principal is observing the class. Students have a different seating arrangement with desks in a circle. They work on a newspaper material.

*Day 5*

Classroom 3: Students work on their assignments individually. They come up to the teacher if they have questions. Cassandra works on the assignments that have Spanish support. During fifteen minutes she uses the glossary about seven times.

Classroom 4: Practice for test taking.

Classroom 2: Students work independently on their assignments. There is a quiet music in the classroom. Teacher is at her desk. Lucia works on the assignments that have Spanish support. During ten minutes she uses the glossary four times.

ESL classroom: The teacher explains to all students comparison forms. All students participate actively. The teacher uses both instructional materials prepared for the study and her own materials. Students give examples trying to make the content of sentences interesting for students in the class.

Day 6

Classroom 1: Students work in small groups, individually, and at computers. ESL students do not work on assignments for which support in Spanish is provided.

Classroom 2: Student left the classroom to work in a lab.

Classroom 4: Students are working on assignments in worksheets in which they have Spanish translations placed above English words. Since translations are not in the margins, it is impossible to count how many times students use the support in Spanish. ESL students are on task.

ESL classroom: Students work on verb forms and their functions. The teacher uses first her own worksheets on which all students work. Then students taking geometry work on assignments designed for them. They sit in a circle and work in pairs or in a group of three students while the teacher works with students who do not take geometry. Students are on task.