

A BILINGUAL ENGLISH / SPANISH  
INSTRUCTIONAL MODEL FOR TEACHING SCIENCE  
TO HIGH SCHOOL LIMITED ENGLISH PROFICIENT STUDENTS

by

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of the requirement for the degree  
Master of Arts

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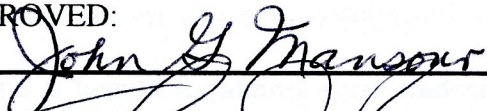
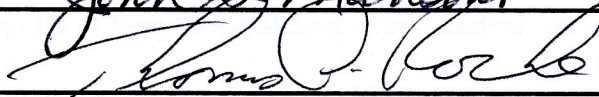
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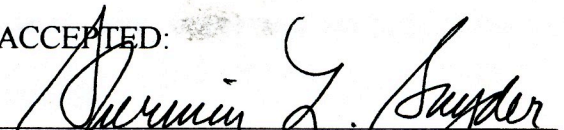
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## ABSTRACT

Enrollments of LEP students are increasing faster than staff can be trained to serve them. This shortage accounts for the continuing neglect of a substantial minority of these students who receive no special language assistance. High school LEP students in particular have a very short time to become prepared and, at any time, be part of a main stream class.

Hispanic high school students need to prepare for success in the U.S. school system, by improving their listening, thinking, speaking and writing skills, in English and in Spanish. By increasing bilingual vocabulary and analyzing written content they will improve these skills.

The purpose of this study was to develop an instructional program to help high school LEP students acquire language literacy and academic literacy. The four basic parts of the program are: utilization of BL/ESL strategies using English as the language of Instruction and Spanish as a resource; Cooperative Learning activities to provide the ideal learning environment; Reciprocal Teaching, a reading comprehension method that can be of benefit for almost every student; and a set of alternate strategies and activities, which will facilitate varied teaching learning environments. The correct implementation of this instructional model will assist students with improving learning skills and communication skill in English as well as in Spanish.

## **ACKNOWLEDGEMENTS**

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# CHAPTER 1

## THE PROBLEM

### Introduction

Historically educators consider the goal of the United States primary and secondary educational system, to be that of offering equal opportunity in education to all members of society. However, a growing number of children who live in households where English is not their primary language can not benefit from this goal. Due to their limited English proficiency (LEP) in many areas of the U.S., and especially in the Southwest, equal opportunity in education of Hispanic children is becoming more challenging for every one involved.

Many students are in poor families, are recent immigrants, and are limited English speakers. These socioeconomic conditions are thought to place children at risk of school failure. There is an overrepresentation of students from some minority groups in the dropout population, which has contributed to the manifested growing concern. Many minority groups will not be prepared for employment, for making personal choices, and for engagement in civic life. Dropouts diminish our democracy, our society, and their own opportunities.

A web of interlocking factors contribute to make dropping out of school much more likely for Hispanic students (Mehan, 1996). These factors include racial and ethnic



identity, gender, socioeconomic status, academic performance, self-concept, family organization, and language fluency.

If the current proportion of Hispanic students continue to drop out, America will have serious consequences from dropouts at a time when education is crucial for employability. America's young people are not going away. If they drop out at the rates that their older siblings do today, the consequences to this nation and its institutions will be devastating.

### **Development of the Problem**

One in five Hispanics dropout ages 16 to 24. The Hispanic dropout rate reached a staggering 30 percent in 1994. While accounting for just 56 percent of all U.S. immigrants, (National Center for Education Statistics, 1996), Hispanics account for nearly 90 percent of all immigrant dropouts.

Students who drop out of high school face a more difficult road to success than their peers who finish high school. The relative earnings of high school dropouts are significantly less than for those students who completed high school. These income disparities are even greater (40 to 50% less) for Latino students. Similarly, high school dropouts experience more unemployment during their work careers (National Center for Education Statistics, 1996).

Young women who drop out of high school are more likely to become single parents at young ages. As a result of these factors, high school dropouts are more likely to wind up on welfare. And, unfortunately, many of our nation's prisons are heavily populated with high school dropouts (NCES, 1996).

The individual student characteristics most often employed in correlation studies are racial or ethnic identity, gender, socioeconomic status, academic performance, self-concept (self-esteem), family organization, and English language fluency. These personal characteristics, when correlated with dropping out, are related in terms of disabling conditions. Disabling conditions are those factors that place students at risk for dropping out and contribute indirectly to lower achievement levels and an increased risk of failure in school (Moll, L. C. 1992).

Education has always been the means by which children of immigrants to the United States enter the economic mainstream of our society (Rumberger, R. W. 1995). As a nation of immigrants, it is important to take pride in the idea that our schools should give children from all cultures and backgrounds a fair chance to succeed in school and thereby in society.

In recent years, however, politician, the media, and uninformed citizens have begun to question the effectiveness of schools for children from non-mainstream cultures. In particular, there is great concern about the education of children from families that originated in Latin America. Latino (Hispanic) children are the fastest-growing groups in our schools. In 1973 they represented less than 6% of all public school children; by 1993 they were almost 12% of all students (NCES, 1996). While other immigrant groups have also experienced substantial increases, Latino students are by far the largest group in absolute numbers.

Latino students are highly diverse. It is inappropriate to make generalizations about students of Mexican-American, Puerto Rican, Cuban, or South American backgrounds; those whose families have been in the United States for hundreds of years,

and those whose families arrived a month ago. . It is inappropriate to make generalizations about those who have entered the growing Latino middle class and those who are struggling in poverty.

Mexican-American and Central American children drop out at almost three times the rate of Cuban-American and South American children, who are near the national average dropout rate (NCES, 1996). Nevertheless, it is worthwhile to consider the characteristics of Latino students as a whole.

Latino students face two major barriers to educational success, low socioeconomic status and language. By any measure, Latino students are far more likely than Anglo students to come from homes in poverty and to have parents who have limited education. Forty percent of Latino children are living in poverty, almost twice the rate for all U.S. children (NCES, 1996). Latino students from low-income families (less than \$19,000 per year) perform less well and are far more likely to drop out than are those from middle or upper income families (Rumberger, R. W. 1995).

A second key factor is language. Of an estimated 2.6 million limited English proficient students in grades Kindergarten through 12th grade, about 75% speak Spanish. Limited English proficient students of all nationalities perform significantly lower than mainstream English speaking students (Collier, V. P. 1992).

A growing number of researchers in the fields of anthropology, sociology, and psychology have emphasized the positive side of living and learning in ethnic minority and immigrant communities. Bilingualism is a feature that characterizes the lives of many children who live in these communities. Children who acquire two languages through their contacts and interactions in their homes, schools, and neighborhoods have



access to a range of resources that are largely unavailable to monolingual English speakers. It is commonly believed that their bilingualism, if maintained, could lead to social and economic rewards. Literature on the cognitive functioning of language minority children who are balanced bilinguals, suggests that bilingualism could lead to cognitive growth (Collier, 1995).

In light of the advantages associated with bilingualism and the contexts in which it is sustained and developed, our society should be concerned about its loss, a recurring phenomenon for most immigrant groups living in the United States. While some non-English-speaking immigrant children develop bilingualism after living in this country for a few years, their children are often English speaking monolinguals or only minimally proficient in their parents' native language. According to recent survey data, even Spanish, a language that some have described as usurping the role of English in the Southwest, seldom lasts beyond the second or third generation (Fillmore, 1991).

Recently, there has been some evidence that the loss of Spanish also occurs at the level of the individual. That is, some formerly bilingual children shift to using only English, regardless of setting. Such a shift may be triggered by a number of factors, including a preference for English or an actual loss of Spanish language proficiency. As Fillmore (1991) has described, communication between these children and their non-English-speaking parents may be impaired, thereby jeopardizing parents' ability to socialize with their own children.

Despite the evidence that shows that a shift toward English is occurring for many Latino immigrant groups, relatively little is known about the routes that the language shift may take and the level at which it occurs. Few people have carefully tracked immigrant

children to study how their bilingualism develops over time and how different factors influence its development (Lockwood, 1996).

Most studies have focused on language choice and given little consideration to language proficiencies and attitudes. A more appropriate view of language shift takes into account its different components such as language proficiency, language choice, the attitude toward language, the culture associated with a particular language, and the relationships that exist across these components. Although they are clearly related, there is evidence that these aspects of shift may also operate independently of one another.

Hakuta and D'Andrea (1992) found that students who were born in the United States to parents who were immigrants, reported to use mostly English. Hakuta and D'Andrea (1992) also found that while attitudinal factors may be related to language choice, they were not related to language proficiency. In addition, they found students with Spanish maintenance orientation most likely to use more Spanish. However, these same students did not necessarily score well on tests of Spanish language proficiency.

### **Need for the Study**

Scientific and technological literacy are important achievements for both the students who are to become the work force of the 21<sup>st</sup> century and for industrialized nations seeking to maintain their positions in an increasingly competitive global economy. Students who enter school, proficient in a language other than English, have unique opportunities for literacy development. Because of their already developed proficiency in another language, they have the potential for literacy development in multiple languages. Also, they can acquire the scientific literacy needed to benefit

themselves, their families and communities, and the nation as they use their language skills.

The necessity that all Americans develop scientific literacy has been established as a national priority in the National Education Goals 2000. The need to incorporate learners who have been traditionally under-served has also been emphasized by national science organizations (Garcia, 1991). Many educational and political leaders have contributed to this expanded view of literacy as a national imperative.

Curriculum Content Standards for Science (AAAS, 1993) reflect the belief that all students can and must learn enough science to assume their role as concerned citizens equipped with the necessary information and decision-making skills. This paper will provide a method for instructing science to English language learners using English as the primary language of instruction and Spanish as a support language. The intent is to motivate the students to become bilingual, that is, to acquire learning skills and communication skills in English as well as in Spanish.

### **Purpose of the Study**

The purpose of the study was to develop an instructional model for teaching science to high school limited English proficient (LEP) students, using English as the language of instruction, and Spanish as the support language. Students will acquire learning skills, language literacy and academic literacy in English and in Spanish.

### **Research Question**

What are the content and the design of an effective instructional program for teaching science to high school limited English proficient students?



## **Definition of Terms**

- At-risk - In danger of not graduating from high school (Lockwood 1996)
- Balanced bilingual - A person who speaks in both their languages, with equal or nearly equal levels of proficiency (Fillmore 1991).
- Bilingual education - A language acquisition program in which a student's native language is maintained while learning English (Hakuta 1992).
- Cooperative learning - Learning in heterogeneous groups, where every member has a task and all work together to achieve a particular goal (Kagan 1986).
- English as a second language instruction – (ESL) A language acquisition program in which English proficiency is the objective (Jacob 1987).
- English immersion – The act of placing non-native speakers of English in an English only environment (Collier, 1992).
- English language learners (ELL) – Acronym now used instead of LEP.
- Hands On – Refers to classroom activities that allow students to actually handle of manipulate an object in order to facilitate learning (Lazear, 1991).
- Language-minority students -- children in grades K-12 from homes where a language other than English is spoken.
- Limited-English-proficient (LEP) students -- also known as English language learners; language-minority children who have difficulties in speaking, comprehending, reading, or writing English that affect their school performance (Crawford, 1997).
- Pre-literate – One who speaks a language well but can not read or write it (Collier 1995).
- Second Language Acquisition – The act of learning or acquiring a second language (Crawford 1991).
- Self-contained environment - Instructional environment where one teacher is in charge of instructing all core courses.
- Total physical response (TPR). A language learning strategy develop by James Asher in which students demonstrate understanding by responding with physical gestures or by manipulating objects.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **Introduction**

It is important to discuss bilingual education, and its relationship to the English learning process of high school limited English proficient (LEP) students. This chapter will present a brief discussion section followed by practical classroom activities. The first section highlights the natural approach to language acquisition, and it describes the development of second language proficiency. The second section discusses cooperative learning, a classroom management system that can help involve LEP students in learning activities that encourage linguistic and academic growth. Also discussed in this section is reciprocal teaching, a procedure that promotes reading comprehension and the opportunity for students to learn to monitor their own learning and thinking. The third section deals with the fact that less than a quarter of our total limited English proficient student population is actually being served by our educational system. The low percentage of English Language Learners in school does not appear to coincide with the concept that the United States is a land of immigrants. Lastly, much to our benefit and a surprise for many, we will see how research indicates that linguistically and culturally diverse students can achieve academically at high levels above the national norm.

## **Second Language Acquisition Process**

Mainstream classroom teachers are becoming more aware of the need to structure classroom activities to allow participation by students at all levels of English language proficiency. Limited English proficient (LEP) students spend most of their time in all-English-medium classrooms (where English is the only language of instruction used) with native English speakers (Krashen, S.D., 1981). The term limited English proficiency refers to a range of linguistic ability that extends from having no knowledge of English to having some English language skills, but not enough to fully participate in an all-English academic setting (Goldenberg, C. & Sullivan, J. 1995). An LEP student can be of any age, language background, or academic achievement level.

The process LEP students go through in developing English language proficiency is similar to the process young children go through in acquiring a first language (Krashen, S.D., 1981). They listen to and take in a great deal of speech before they begin to speak themselves. When children acquire a first language, they spend years acquiring a knowledge base of their language. In fact, young children are still internalizing grammar and vocabulary five or six years later when they begin school (Krashen, 1981). Second language learners are rarely given that much time to become fluent before they are transferred to and/or expected to achieve in a total English language environment. Teachers can help students attain proficiency more efficiently by using language the same way parents do ((Krashen, 1981). Learning is enhanced by parents and teachers when they:



1. Simplify Communication (i.e., speak in simpler terms). Great care must be taken to ensure that in simplifying communication, the meaning of the intended message is not changed or lost.
2. Talk about issues of immediate content or relevance (here and now).
3. Frequently repeat or paraphrase key words and ideas.

Teachers should expect English language learners to begin language development with a "silent period", (Krashen, S. 1981), when they can understand increasing amounts of English but are not yet ready to speak. This pre-production phase can last anywhere from a few days to a few months. During this stage, students can express their comprehension through physical responses until they are ready to respond orally.

According to Riddlemoser, (1987) when second language learners are ready to speak, their communication often begins with single words, such as "yes" and "no" or simple routines, such as "good morning" or "thank you". Teachers and peers can encourage beginning speech in English when they focus on the LEP student's ability to communicate rather than correcting possible mistakes. The goal of initial speech, is successful communication of an idea; students who can make their ideas understood by others are communicating successfully.

As their speech emerges and their vocabulary grows, LEP students can be increasingly involved in class assignments by participating in reviews of basic factual material. Kagan (1989) indicates that students are more willing to speak (and therefore become more fluent) when they can do so in a small group rather than before the entire class. To provide a non-threatening atmosphere, teachers with LEP students can organize

their classrooms to work in small groups. The following are examples of strategies that meet the needs of second language learners and enhance collaborative working behaviors.

**Using Non-verbal Responses:** There are several ways teachers can check students' understanding of content materials without requiring them to speak before the entire class. During a wrap-up session or before a test, teachers can conduct non-verbal reviews (Garcia 1991):

1. Calling several students to the board to simultaneously work a problem.
2. Posing true/false statements to which class members respond by holding their thumbs up or down.
3. Using a designated physical response (such as standing up or sitting down) to show agreement, disagreement or indicate which of two options students prefer.

In cooperative classrooms (Jacob 1987) teachers may designate a student from each group to respond non-verbally to questions rather than have the whole class participate at once. For example, they may call on "all quartermasters" or "everyone born in July" to answer. Garcia observed teachers in Latino language minority classrooms who organized instruction in such a way that students were required to interact with each other utilizing cooperative learning strategies. It was during student-student interactions that higher order cognitive and linguistic discourse was observed (Garcia 1988). Students asked each other hard questions and challenged each other's answers more readily than they did in interactions with the teacher. Students were likely to seek assistance from other students and were successful in obtaining it.

As an alternative to traditional individualized and competitive classrooms, cooperative learning has risen in popularity in the last two decades. Mehan (1996) has



shown it to be an effective learning system for both academically advanced and lower achieving students. In addition to promoting learning, this system has been found to foster respect and friendship among heterogeneous groups of students. For this reason, cooperative learning offers much to teachers who are trying to involve English language learners in mainstream classroom activities. Also, some language minority students come from cultural back ground which encourages cooperative interaction, and they may be more comfortable in an environment of shared learning.

### **Basic Elements of Cooperative Learning**

Several elements distinguish cooperative learning from whole class instruction, individualized instruction, and traditional forms of group work. Cooperative learning includes the following basic elements: (Rivera, C., & Zehler, A. 1990)

1. Heterogeneous groups of students with assigned roles to perform.
2. Lessons structured for positive interdependence among group members.
3. Identification and practice of specific social behaviors.
4. Evaluation through whole-class wrap-up, individual testing, and group recognition.

Cooperative learning consists of student-centered learning activities completed by students in heterogeneous groups of two to six. Through a shared learning activity, students benefit from observing learning strategies used by their peers. English language learners further benefit from face-to-face verbal interactions, which promote communication in a natural and meaningful way.

When students work in heterogeneous groups, issues related to the capabilities and status of group members sometimes arise, cooperative learning addresses these issues

by assigning roles to each member of the group. The roles students perform relate to the smooth functioning of a group regardless of its learning task. Therefore, it is important for every student to understand each role and its importance to the cooperative learning system. Students with an assigned role to perform feel they share the responsibility for the success of the group and can interact within the role as an equal to others in the group (De Avila, Duncan & Navarrette, 1987).

**Sample Roles for Cooperative Learning Groups:** According to Rivera & Zehler (1990)

the following is an example of roles for cooperative learning groups.

1. Quartermaster's task is to get the materials the group needs to do its work. He also makes sure everything is put away and cleaned up before the group leaves the center.
2. Inspector's job is to help the group finish on time. He watches the clock and makes sure everyone will be ready to go to the next activity at the signal.
3. Supervisors are like a shop's foreman. They make sure the group work together and finish the assignment
4. Couriers are responsible for materials that are in short supply. Some items must be shared by more than one group. Their job is to find those materials, make sure they are used quickly in your group, and pass them on
5. Reporters job is to write what happened in the group. During the wrap-up, the reporter will tell the whole class about the group work done (p 87).

The title given to the role may vary; some teachers use the terms, Captain, Time keeper, Task master, Supply keeper, and Sharer. Roles provide all members with a purpose that is separate from the academic activity and enable them to contribute to the successful completion of the learning task. By rotating assignments on a daily or weekly basis, teachers enable all students to develop skills as leaders and as helpers. After establishing student learning groups, teachers may next consider structuring the lessons to create a situation of positive interdependence among the members of the groups.



Several strategies encourage students to depend on each other in a positive way for their learning. First, limiting available materials, which creates the need for sharing. Second, assigning a single task for the group to complete collaboratively. Thirdly, assigning each student only a certain piece of the total information necessary to complete the task, such as reading only a portion of an assigned chapter, or knowing only one step in a complex math problem. Finally, students are made responsible for each other's learning and only through sharing their pieces of information will the group be able to complete an assignment. (Rivera, C., & Zehler, A., 1990)

Another important element in cooperative learning classrooms is the social behavior necessary for success in working cooperatively. These behaviors include sharing, encouraging others, and accepting responsibility for the learning of others. They must be overtly identified by the teacher, practiced in non-threatening situations, and reinforced throughout the school year. (Tharp, R. G., & Gallimore, R. 1988)

Cooperative learning can be used with any type of students. It makes sense in particular for teachers who have LEP pupils in their classes because all students are given frequent opportunities to speak and because a spirit of cooperation and friendship is fostered among classmates.

### Reciprocal Teaching

Palincsar & Brown, 1984, defined reciprocal teaching as:

a reading program designed to improve the reading comprehension of students of all ages that emphasizes cognitive strategies in a progressive mode through dialogue. The term reciprocal describes the nature of the interactions: each person acts in response to the other(s). The main two

components of reciprocal teaching are comprehension fostering, which includes the four strategies of question generation, summarization, prediction and clarification. The dialogue includes prepared conversations and questions that guide the comprehension process and product. The structure of the dialogue and interactions of the group members require that all students participate, and foster new relationships between students of different ability levels. The program uses a process, in which teachers are initially more responsible for producing questions, guiding the dialogue, and showing the students how to comprehend text. Eventually, the students become more responsible for the products, creating questions for each other and guiding the dialogue with less input from teachers (p 169).

A typical reciprocal teaching session begins with students reading an initial paragraph of expository material, with the teacher modeling how to comprehend the paragraph. The students then practice the strategies on the next section of the text, and the teacher supports each student's participation through specific feedback, additional modeling, coaching, hints, and explanation.

The strategies include commenting and elaborating on summaries of paragraphs, suggesting additional questions, providing feedback on their peers' predictions, and requesting clarification of material not understood. Although reciprocal teaching has several important components that distinguish it from other reading approaches, it is flexible. For example, in some forms of reciprocal teaching, the cognitive dialogue precedes the text reading exercise; thus, cognitive dialogue takes place while the students are reading the text.

## **Bilingual Education**

Language diversity inspired the Bilingual Education Act of 1968. In its 30 years of existence, it has grown due to the variety of languages spoken in the United States, to the number of minority-language speakers, and most dramatically, to the enrollment of LEP students. According to the Census Bureau (1993) United States residents now use more than 325 languages at home, including at least 137 Native American languages.

Congress made some changes in the Bilingual Education Act when it voted, in 1994, to reauthorize the law for the fifth time. The new law added two important principles to the former Bilingual Education Act: (Crawford.1997)

1. Given access to challenging curriculum, language-minority and limited-English Proficient (LEP) students can achieve to the same high standards as other students.
2. Proficient bilingualism is a desirable goal, which can bring cognitive, academic, cultural, and economic benefits to individuals and to the nation (p. 42).

English proficiency is a central goal of Title VII, the federally funded program that implements Bilingual Education; but not the only goal. A priority of equal importance has been achievement in academic content areas. In 1994, Congress added the priority of preserving, not replacing, a child's native language. There are two reasons for preserving the first language. First, the first language serves as a foundation for learning, and second it serves as a source of valuable skills. Latest research demonstrates that bilingualism is no longer considered a handicap to cognitive growth, but probably an advantage (August & Hakuta 1997).



English-language instruction is a key component of all bilingual education programs in the United States, whether funded by Title VII or state and local resources (Hopstock et al. 1993). Yet English acquisition is just one of several critical skills and areas of knowledge that LEP students need to master.

It was previously believed that the more children were exposed to English, the more English they would learn. This idea sounded like nothing more than common sense to laymen and educators alike. However, when it comes to language, research has been unable to support the time on task theory of English acquisition, (Rossell & Baker 1996). Second-language input must be comprehensible to lead to acquisition; otherwise it amounts to meaningless noise. Research suggests that language acquisition is a natural process that cannot be speeded up (Collier & Thomas 1989) -- although no doubt it can be slowed down through inappropriate schooling.

Due to such factors as local policies against native-language instruction, shortages of fully bilingual teachers, parental preferences for English-only instruction and lack of adequate concentrations of limited English proficient students in a given school to justify a bilingual program. (Hornblower.1995). Even in schools with bilingual programs, Spanish instruction is typically given in some subjects and for a few years only. For these reasons, a large proportion of Latino students are taught most or all subjects entirely in English. The majority is not fully proficient in English when they enter school. About one half of this majority, participate in bilingual programs, language acquisition programs in which a student's native language is maintained while learning English (Hakuta & D'Andrea 1992).

In bilingual education, as in regular education, the quality of classroom instruction and the integration of English as a second language instruction is essential in determining the success of Latino students (Lockwood, 1996). All bilingual and ESL teachers should keep in mind the true meaning of the word bilingual – two languages – so the main objective of BLE / ESL instruction is the development of communication skills in two languages.

LEP students outside of the Bilingual/ESL Program commonly fail to complete their education. Some educators and the general public believe that outside factors like poverty, language differences, and or dysfunctional family, some of which are beyond the purview of schools, may influence. Although outside factors affect rate of dropout, failure of the school system to provide opportunities for acquiring proficiency in English poses a more prominent threat to LEP student success. High school grades are a more critical period in students because dropout usually takes place during the secondary years (Rumberger, 1995). For many students, intervention in high school is too late. Census data cited by Rumberger (1995) show that almost half of Latino males who dropped out of school did so before they completed the first year of high school. Failure in the early grades ultimately leads to low academic self-esteem, frustration, truancy, delinquency, and dropout (Garcia, 1991). Besides, the non-retention policy in the elementary grades does not challenge students to dedicate themselves to do school work.

As Hornblower (1995) points out, of the nearly 45 million students in the USA school system, approximately 2.6 million are non-English speakers. Only about 600,000 limited English proficient students benefit from title VII funds, the funds that serve ESL and Bilingual Education Students. The remaining 2 million do not benefit at all. These

numbers demonstrate that only 23.07% of the total LEP student population is somehow benefiting from chapter VII funds. By equalizing chapter VII funds used in programs for LEP and Bilingual students, the quality of education for LEP students can be enhanced.

### **Cultural Diversity and Second Language Learning**

The extent to which students are linguistically and culturally diverse is not fully recognized (Cavazos, 1990, p 249). Populations identified as linguistically and culturally diverse have been perceived by the majority of society as linguistically, cognitively, socially, and educationally vulnerable because of their non-mainstream culture and their lack of English proficiency at the critical age for schooling (Cavazos, 1990). This perception has led to educational programs to cull those characteristics that put this population at risk (Barona & Garcia, 1990). Hispanic students are typified as academically unsuccessful (Lucas, T. et al, 1990).

Recent research has redefined the nature of our linguistically and culturally diverse students' educational vulnerability. It has destroyed stereotypes and myths and laid a foundation to review present educational practices in search of new initiatives. This foundation recognizes the homogeneity and the heterogeneity within and among, linguistically and culturally diverse populations. No one set of descriptions or prescriptions will suffice (Rivera, C., & Zehler, A. 1990). However, it is useful to give particular attention to features shared by members of these populations, including their bilingual/bicultural character and certain aspects of their instructional circumstances.

Population change characterizes students as particularly vulnerable in U.S. educational institutions. The number of limited English proficient (LEP) students in



American schools for school year 1989-90 was estimated at approximately 1,927,828, which represented around 5.2 percent of all students in school (U.S. Department of Education, 1991). The previous school year (1988-89), the percentage of LEP students in U.S. schools was estimated at about 4.6 percent (U.S. Department of Education, 1991). The increase in LEP students has been dramatic in many areas of the country.

Linguistically and culturally diverse students find themselves in a vulnerable situation upon entering U.S. schools. However, they can achieve academic success, when provided with appropriate instruction tailored to meet their specific needs. Recent research (Barona, A., & Garcia, E. 1990) has documented effective instructional practices used with students from homes where English is not the primary language of communication. These studies included examination of elementary and high school classrooms, and are concentrated largely on Latino students.

The United States continues in a trend of ethnic and racial population diversification, a fact that is particularly evident among young and school age children. (Barona, A & Garcia, E 1990). State and national reports regarding the academic achievement, economic condition, and future employment prospects of our culturally and linguistically diverse children indicate significant academic underachievement, high poverty rates, high teen pregnancy rates, and low-skill-low-paying employment opportunities. Also, the next generation of ethnic and racial minority children continues to be placed "at risk" in today's social institutions (Barona, A & Garcia, E 1990). The future may lie in understanding how a diverse population, in such a situation of risk and vulnerability, can achieve social, educational, and employment competence.

**Effective Instructional Practices:** Lucas et al (1990), researched of educational effective practices used with linguistically and culturally diverse students in selected sites throughout the United States. These studies identified specific schools and classrooms whose Latino, American Indian, Asian, and Southeast Asian language minority students were particularly successful academically, with academic achievement measured at or above the national norms. It is important to note that much of these data have concentrated on Latino students. The case study approach adopted by these studies included examination of students in the primary and secondary classrooms. Teachers, principals, parents, and students were interviewed and specific classroom observations were conducted to assess the dynamics of the instructional process. The results of these studies provide important insights with regard to general instructional organization, literacy development, academic achievement, and the perspectives of students, teachers, administrators, and parents.

**High Levels of Communication:** A large number of common attributes were identified in the instructional organization of the classrooms studied. Functional communication between teacher and students and among fellow students was emphasized more than might be expected in a regular classroom. Teachers were constantly checking with students to verify the clarity of assignments and the students' roles in those assignments. Classrooms were characterized by a high, sometimes even noisy, level of communication emphasizing student collaboration on small group projects organized around learning centers. (Lucas et al, 1990). This organization minimized individualized work tasks, such as worksheet exercises, and provided a very informal family-like social setting. The

teacher either worked with a small group of students or walked about the room assisting individual students as they worked on their projects.

**Language and Literacy:** Another feature noted in the classrooms studied was language of instruction. In classes with Spanish speakers, lower grade (K-6) teachers used both Spanish and English, whereas upper grade (7-12) teachers utilized mostly English. However, students were allowed to use either language (Lucas, T, et al, 1990). With regard to the literacy development of Spanish-speaking students, observations revealed the following:

1. Students progressed systematically from writing in the native language in the early grades to writing in English in the later grades.
2. Students' writing in English emerged at or above their grade level of writing in Spanish,
3. Students' writing in English was highly conventional, contained few spelling or grammatical errors, and showed systematic use of invented spelling.
4. Students made the transition from Spanish to English themselves, without any pressure from the teacher to do so (p. 87).

**Perceptions through Interviews:** Classroom teachers were highly committed to the educational success of their students. They perceived themselves as instructional innovators utilizing new learning theories and instructional philosophies to guide their practice. They felt that they had the autonomy to create or change the instruction and curriculum in their classrooms, even if they did not follow the district's guidelines to the letter. They had high academic expectations for all students and they served as advocates for their students. Teachers rejected any suggestion that their students were intellectually



or academically disadvantaged (Lucas et al (1990). Principals tended to be well informed and highly articulate about the curriculum and instructional strategies undertaken in their schools. They were also highly supportive of their instructional staff, taking pride in their accomplishments. They reported their support of teacher autonomy, although they were quite aware of the pressure to conform strictly to district policies regarding the standardization of curriculum and the need for academic accountability.

Parents expressed a high level of satisfaction with and appreciation for their children's educational experience in these schools. All indicated or implied that their children's academic success was vital to the children's future economic success. Both Anglo and non-Anglo parents were quite involved in the formal parent support activities of the schools. However, Anglo parents' attitudes were somewhat distrustful of the schools' specific interest in doing what was best for their children. Conversely, non-Anglo parents expressed a high level of trust for the teaching and administrative staff.

The research partly described above addressed some significant practical questions about effective academic environments for linguistically and culturally diverse students:

1. The schools in these studies considered native language instruction key in the early grades (K-6).
2. No common curriculum was identified in these studies. However, a well-trained instructional staff, who implemented a student-centered curriculum, with literacy development in all aspects of instruction.
3. Teachers consistently organized instruction so as to insure heterogeneous small-group collaborative academic activities requiring a high degree of student-to-student interaction.

4. Teachers were the key players. They gained the confidence of their peers and supervisors. They worked to organize instruction, create new instructional environments, assess instructional effectiveness, and advocate for their students. They were proud of their students, academically reassuring and consistently demanding. They rejected any notion of academic, linguistic, cultural, or intellectual inferiority in their students.

### **Summary**

These features of effective classrooms for linguistically and culturally diverse students contribute, above all, to the establishment of an interactive, student-centered learning context. This type of instruction provides abundant and diverse opportunities for speaking, listening, reading and writing in English and in their native language.

A focus on social interaction encourages students to take risks, construct meaning, and seek reinterpretations of knowledge within compatible social contexts (Rivera & Zehler.1990). Within this knowledge-driven curriculum, skills are tools for acquiring knowledge, not a fundamental target of teaching events. Therefore, we may gladly conclude that linguistically and culturally diverse students can be served effectively. These students can achieve academically at levels at or above the national norm. The instructional strategies that serve these students acknowledge, respect, and build upon the language and culture of the home. Students become important partners with teachers and parents in the teaching/learning process. Teachers play the most critical role in students' academic success.

## **CHAPTER 3**

### **METHODOLOGY**

#### **Purpose**

The purpose of the study was to develop an instructional model for teaching science to help high school limited English proficient (LEP) students, acquire language literacy and academic literacy using English as the language of instruction, and Spanish as the support language.

#### **Research Design**

The research design selected for this study was descriptive. "Descriptive research is the most common form of research used in adult education. Because of the immediate need to define and describe the fields of practice, the methodology will continue to be important in advancing knowledge" (Merriam and Simpson 1995, p.71).

With respect to the research project, the first step was to collect data from texts and journals, as well as conferences and workshops. Information was also obtained by the researcher from three years of teaching experience at Percy L Julian School, a Middle School of the Roosevelt Elementary School District in Phoenix, Arizona. Classes at Percy L. Julian were composed of all seventh or eighth grade Hispanic students in a self-contained environment.

It was while teaching at Percy L. Julian that the researcher perceived the need for an instructional program for upper grades (7/12), in which students would enhance the



learning of English skills without losing their native Spanish speaking ability. The researcher truly believes that limited English proficient (LEP) students at the Junior High and High School grade levels would be well served to develop communication skills, study skills, and thinking skills in English and in Spanish. At Percy L Julian the researcher experimented, with great success, the teaching of the entire curriculum for the 7<sup>th</sup> and 8<sup>th</sup> grades, using English as the language of instruction and Spanish as a resource. An indication of the success achieved during two years of teaching the same group of students, was determined by testing personnel from the Phoenix Union High School District (PUHSD) who yearly test the incoming students. Compared with other schools' graduating 8<sup>th</sup> graders they found the researcher's 8<sup>th</sup> grade graduates placed noticeably above the average in English proficiency and in Mathematics.

The population observed during the school year 1997/98, and which will be assessed during the school year 1998/99, were high school students of Hispanic descent primarily of Mexican origin. Students' ages range from 14 to 17 years old. Most of them come from families of low socioeconomic status, with a total annual income of less than \$19,000.00 (they qualify for free lunch under this classification). About 30% are juniors and seniors who have not yet pass their science courses needed for graduation. Most of these students have been in our school system, four years or more, without acquiring English proficiency, academic proficiency or the necessary studying skills, to compete in main stream classes. The other 70% are freshman students primarily from our feeder schools, with varied levels of communication skills in English as well as in Spanish. About three to five percent of the 70% are not proficient in either language or are monolingual new comers with varied levels of academic proficiency. These varied

individual conditions are thought to place these students at a disadvantage for school success. These rather heterogeneous groups of students make it a real challenge for staff members to succeed in the process of teaching.

The researcher observed, through six years of bilingual teaching at the middle school and high school, that students were accustomed to speak only Spanish in the classroom, the school's campus, the street and their home. Students are heard listening to Spanish radio "La Campesina" and only watch television in Spanish. The language of instruction mostly use by bilingual teachers is Spanish with out regard to the students' age, grade level and communication skills.

### **Source of the Data**

Initial data for this paper came from journal articles and texts on bilingual education. Information from bilingual education and English as a second language conferences and workshops contributed to the study. The researcher attended and analyzed information from two of the National Association of Bilingual Education (NABE) conferences, in 1994 in Los Angeles, California, and in 1995, in Phoenix, Arizona. At North High School 1997-98, the researcher successfully completed the year long Title I Literacy Training. Also how to research using the Internet was learned through North High School June 30, 1998, Connecting Technology and Learning (Using the Internet in the Classroom) workshop.



## **Procedure**

Based on the researcher's experience and the research done, the curriculum presented in this study is an attempt to develop an effective classroom program for linguistically and culturally diverse Hispanic students, in an effort to facilitate student success as high school LEP students. The curriculum includes a program with the methods, strategies and activities that give the students English proficiency and the opportunity to use their native language to facilitate the learning process and promote the development of bilingual skills.

The instructor makes use of English as the primary language of instruction, with Spanish as a resource, complemented with bilingual / ESL teaching strategies. Teacher uses visual displays (e.g., graphs, charts, pictures), objects, and authentic materials, like newspaper and magazine clippings, in the lessons and assignments. The inclusion of videos prepared with an anticipatory guide, is an excellent way to achieve cognitive development as well as language skills. All audio-visual materials are meant to be previewed before showing them to the class. Students are given an anticipatory guide – a list of statements about the content of the video – which they use to indicate agreement or disagreement with each statement before viewing the video. After viewing the video teacher and students check and discuss responses

Cooperative Learning strategies provide for diversity and individuality in learning styles and aids students in the socialization process. Paired and group activities promote student interaction and decrease the anxiety many students feel when they must perform alone for the teacher in front of the class. Students learn and share among themselves with the teacher as a facilitator who checks on the students' understanding and progress.

Through demonstrations and hands-on activities real world applications show the value of the content being taught. They combine group participation with individual effort to achieve a clearly defined goal. The approaches are especially helpful for students with limited English proficiency, who benefit from the hands-on lessons and homework assignments. Home projects also encourage parental support for their children's education. Another advantage for LEP students is that they can express themselves in the language they speak most comfortably, this allows them to learn technical vocabulary as their English proficiency increases.

### **Reciprocal Teaching**

Reciprocal Teaching is designed to improve the reading comprehension of students and emphasizes cognitive strategies in a progressive mode through dialogue (Mehan, 1996). Reciprocal Teaching is a reading program designed to improve the reading ability of students. It emphasizes cognitive strategies in a progressive mode through dialogue. This reading program includes four strategies: question generation, summarization, prediction and clarification. This is precisely what LEP students need most. Reading is not an easy task; it takes a lot of practice and a persistent attitude in order to gain improvement. Strategies for reciprocal teaching include commenting and elaborating on summaries of paragraphs, suggesting additional questions, providing feedback on peer predictions, and requesting clarification of material not understood. The use of reciprocal teaching in English and in Spanish either as introductory or a review activity is to be planned at least once a week.

The primary mission of the program is to assist high school English language learners in developing their English and Spanish proficiency, intellectual, academic, and collaborative skills to ensure success as students, and full participation in American society.

The outcomes targeted in this program are the following:

1. Students will improve their listening, thinking, reading and writing skills in English as well as in Spanish. (Dual literacy in L-2 and L-1)
2. Students will increase their vocabulary in English and Spanish.
3. Students will lose the fear of using a textbook in English.
4. Students will learn how to find answers by scanning the English textbook, focusing on the illustrations, studying the graphs and interpreting charts.

### **Assessing the Limited English Proficient Student**

Integrated language and content instruction is an instructional approach to develop students' academic language ability and facilitate their transition to mainstream classes. So many students come to United States schools under-prepared for the required grade-level work that educators can no longer rely on transfer of knowledge and skills as students learn English on the way to entering a mainstream track. There simply is no time to delay academic instruction until these students have developed high levels of English language proficiency if they are to stay in school, succeed in their classes, and graduate with a high school diploma.

However, the issue of assessment has not yet been resolved. Neither traditional language tests nor content achievement tests are adequate to assess students who are



transitioning into English. Inadequacies in current practices have led many educators and observers of the educational progress in the United States to call for changes in assessment procedures.

There are several reasons to assess student learning in the classroom: to place students in classes, to measure student progress and achievement, to guide and improve instruction, and to diagnose student knowledge of a topic before it is taught.

The demand for assessment alternatives to paper-and-pen multiple-choice tests has grown among language and content educators who want more accurate measures of their students' knowledge (Short, Deborah, 1993). . The areas of an integrated language and content course like: problem solving, content-area skills, concept comprehension, language use, communication skills, individual behavior, group behavior, and attitude. These areas can be assessed through alternative measures. Alternative measures may simply entail incorporating illustrations, labeling, open-ended questions, essay writing, skill checklists, reading/writing inventories, teacher observations, student self-evaluations, performance-based tasks, oral reports, and interviews into existing tests. Other alternative assessment would permit students to demonstrate their knowledge and abilities over a long period of time, as through portfolios.

ESL and bilingual educators have to attend to a wider range of assessment practices. Besides measuring student achievement within the course, assessment has always played a gatekeeping role in deciding which students have the prerequisite English to be placed in which class and, later, if a student is prepared to exit from that class. In the not too distant past, students frequently entered and exited ESL/bilingual (BE) education programs only on the basis of their oral language proficiency test scores.



Alternative assessment, in its diverse formats, has become the trend. As assessment increasingly reflects instruction that is occurring in the classroom, teaching to the test has been de-emphasized. Assessment fulfills its purpose when it reflects actual classroom practices, not a one-time standardized exam. Although these measures allow better demonstration of student knowledge, they can create confusion for teachers of language minority students, and must be carefully selected.

Some assessment tools can be used exclusively for checking content comprehension, whereas others can be designated as language development measures. However, even within a language assessment instrument, teachers must make a choice whether to measure fluency or accuracy. Variety of assessment procedure is particularly important for language minority students. Successful implementation of an assessment procedure requires that: students be given frequent opportunities to demonstrate the growth of their knowledge base; assessment tools be varied to meet individual learning styles, needs, and current skill levels; and that students be made aware of the assessment objectives in advance.

Teachers must always remember that in integrated language and content courses they are doubly burdening the students. They are demanding that students learn enough English- academic English--to be mainstreamed and that they receive, process, and retain content information, much of which can be unfamiliar in terms of their prior schooling and life experiences. But, we have no choice. Time and interest take their toll on our students' educational careers. Time because many students do not have the needed 5-7 years to master English before approaching a content course in mainstream classes.

Interest because a grammar-based curriculum is not particularly appealing to a student who wants to fit into the school environment.

After all, at the heart of instruction is the desire to help our language minority students learn, and at the heart of assessment is the need to determine whether our students have learned. We must assist them in that process by trying new alternatives that are not so language bound, time restrictive, or autonomous. Teachers must advocate assessment practices that mirror instructional practices. Focus needs to be on students' strengths and opportunities to demonstrate ability, skill, and knowledge through the medium that suits them best, whether oral or written or even, in the case of beginner students, pictorial.

To increase test success, familiarize students in advance with the assessment measures; give them adequate time to complete the tasks and help them to take some responsibility for their own evaluation, especially through self evaluation tools such as student checklists, scales, written descriptions, reports, and portfolios. Self-evaluations offer students opportunities for reflection, and they encourage students to take responsibility for assessment.

## **CHAPTER 4**

### **CURRICULUM PROGRAM**

#### **Introduction**

Research indicates that for LEP students, placed in mainstream English academic content classes, the language of instruction acts as a barrier to school success (Cummins, 1986). Postponing content instruction until these LEP students master English sufficiently and keep pace with their English-speaking peers, often results in underachievement and eventually in the LEP students leaving school.

Current research in second language acquisition indicates that a critical element in effective English as a Second Language instruction, is access to comprehensible input. (Krashen, 1988). One way to provide comprehensible input directly to the LEP student is by teaching content in English and Spanish, using strategies and techniques that make the content comprehensible to the second language learner. A second language can be effectively learned by upper grade students when it is the medium of instruction, not the object (Krashen, 1988).

By utilizing an integrated approach in a bilingual setting, LEP students can begin academic studies earlier. An integrated approach increases proficiency levels in English and Spanish, simultaneously with increased understanding of subject matter. Academic success and bilingualism for LEP students is facilitated, which is precisely the purpose of this study.



The intent of this paper is to benefit students with the development of an Effective Instructional Model for teaching Science to high school limited English proficient students, in a bilingual setting, using English as the language of instruction, and Spanish as the support language. In doing so, careful consideration must be given to the following series of activities and or strategies commonly used in order to facilitate comprehension to LEP students: Bilingual/ ESL strategies, Cooperative Learning, Reciprocal Teaching, and Alternative Activities and/ or Strategies.

### **Bilingual English as a Second Language (ESL) Strategies**

In many instances, LEP students need coaching and practice to improve their cognitive processing and production of content material. In order to do so, it is important for teachers to build upon the skills and knowledge students have already mastered. Before entering into new material, new topics, teachers are to informally pre-test, verifying whether students have enough prerequisite knowledge to continue with the proposed curriculum. In the case of a deficiency, teachers must plan activities in their instruction to remedy this deficiency. Background knowledge of the topic at hand should be provided as a baseline for comprehension. (Cummins, 1986).

To initiate the lesson, objectives and activities are announced to the LEP students. Objectives are viewed through a slide show, using the classroom computer and the TV monitor. The objectives are to be reviewed orally before instruction begins. It is also helpful to connect the lesson in the context of its broader theme and preview upcoming lessons before initiating instruction.

Information may be presented through diverse media: graphs, demonstrations, pre-reading, and pre-writing strategies. The instruction should be student-centered where the teacher has the role of a facilitator increasing student-to-student academic interaction.

By using multiple media in the classroom, teachers reduce the reliance on language and place the information in a context that is more comprehensible to the students. Teachers should:

1. Try to use visual reviews with lists and charts.
2. Paraphrase the salient points where appropriate.
3. Have students provide oral summaries themselves. (Lockwood, 1996)

During the second language acquisition process, students make mistakes; this is natural in the process of learning a language. It is important that the students understand the information, but that there not be an emphasize on the grammatical aspect of their responses. When possible, though, modeling the correct grammatical form should be part of the facilitation process.

Teachers should plan for students to manipulate new material through hands-on activities, such as role plays and simulations, TPR (total physical response), laboratory experiments, drawing pictures and story sequences, and write their own thoughts (Lindholm, 1991).

The Language Experience Approach method should be incorporated. After students have an experience (e.g., going on a field trip), they dictate to the teacher a summary of what happened. Teachers usually record on the board exactly what the students say, students then work together to organize the written ideas and if desired make corrections.

### **Cooperative Learning**

Cooperative learning provides for diversity and individuality in learning styles and aids students in the socialization process. Cooperative paired and group activities promote student interaction and decrease the anxiety many students feel when they must perform alone or for the teacher in front of the class. Students learn and share among themselves with the teacher as a facilitator who checks on the students' understanding and progress.

Teachers need to become facilitators applying a student-centered approach to teaching and learning (Garcia, 1993). This will allow students to assume more responsibility for their learning. When activities are planned to actively involve students in each lesson, the students can better process the material presented and simultaneously acquiring language.

Cooperative activities allow students to question, discuss, argue and share. Student intelligence is channeled toward positive academic and social outcomes. A commonly used cooperative strategy is the Jigsaw developed by Elliot Aronson. In the Jigsaw, a main topic and or mini topics of study are selected by the teacher. Students number off within a group and join mini-topic groups to research and become experts in



one aspect of the topic. In time, they return to their original group and teach their peers the content learned. Groups are set up so each student (in a class, or more generally, in a group) has one or two pieces of information needed to solve the puzzle but not all the necessary information. Students must work together, sharing information while practicing their language, negotiating, and utilizing critical thinking skills. This learning structure gives the student language development, but also academic reinforcement.

In a paired group activity called peer tutoring, students learn and share among themselves, with the teacher as a facilitator who checks on the students' understanding and progress. The tutors learn to explain and clarify concepts while the tutored students have the benefit of one-on-one interaction in a non-threatening manner (Garcia, 1991). The Dyad involves listening and talking exchange between two people (a triad is sometimes formed in the case of an odd number of participants). It is the exchange of supportive listening. The talker is limited to talking for a given amount of while the partner listens attentively. The partner is given an equal amount of time to talk about the given topic. In a true Dyad what is said is maintained in confidentiality, however depending on the topic, whole group or small group processing may follow.

Some common cooperative strategies were developed by Spencer Kagan and printed in his book Cooperative Learning 1992. . With the cooperative learning structure Think-Pair-Share, students are allowed some thinking time for recalling relevant present and past knowledge. They pair with a student to discuss the knowledge that is later shared in whole class discussion. An interesting variant of this strategy is Think Pair Square in which pairs combine to share with their team of four before sharing with the class. Combining different structures creates variables of cooperative group strategies.

Another common Kagan strategy used to develop verbal abilities is the roundtable. At the beginning of the class the teacher poses a question which has many possible answers. An example would be, - Name all the animals that you can think of that would live in a Grassland Biome? The students make a list on one piece of paper each writing one answer, then passing the paper to the next person as the paper circulates around the table. This may be a timed activity or race. Recognition may be given to teams that get the most answers, or the class may be recognized for meeting a sum of team contributions.

### **Reciprocal Teaching**

Reciprocal teaching is an instructional procedure designed to enhance student's reading comprehension. It is characterized as a dialogue between teacher and students. Each person acts in response to the other(s). The dialogue is structured by the use of four strategies: questioning, summarizing, clarifying and predicting. Information is presented in a progressive mode through dialog following the cognitive strategies of reciprocal teaching (Palincsar & Brown, 1984, 1989).

Critical thinking skills need to be modeled by teachers in a step-by-step approach to reasoning. Increasing opportunities for student thought about the subject matter is fundamental. Increasing the percentage of inferential and higher order thinking questions asked, teachers encourage students' reasoning ability, such as hypothesizing, inferring, analyzing, justifying, predicting. The language used by the teacher or students need not be complex for thinking skills to be exercised. For example, to help students predict an outcome, event, situation or definition, a teacher might read the title of a story and ask what the story might tell.

Teachers must create opportunities to focus on thinking skills. Thinking skills can be developed through teacher-student questioning or through scheduled activities like problem/solving and decision/making. For example:

1. Predicting, categorizing and inferring are easily addressed in the warm-up and motivation phases of a lesson.
2. Observing, reporting and classifying, which can be done orally, in writing or pictorially, fit nicely into presentation and application phases.
3. Sequencing, summarizing and justifying are skills that suit lesson reviews (Palinscar & Brown, 1984, 1989).

Students can practice their summarizing skills and, as they get more proficient, their descriptive language skills, by writing headlines for lessons and topics discussed in class. For example, teachers may ask students to write a headline describing the results of a science experiment or to create title and sub titles. Students summarize a lesson, reading, an experience, or a video, by drawing illustrations and describing them in writing.

### **Discovery Learning Activities**

Discovery learning activities allow students to discover new information on their own with guidance from the teacher. Students, individually or in a group, discover the results. Problem-solving activities and open-ended experiments are examples of discovery learning.



Using inquiry learning activities, students investigate a topic of their own choice and teachers act as facilitators. The students identify a problem, hypothesize causes, design procedures or experiments, and conduct research to try to solve the problem.

### **Alternative Activities and or Strategies**

Education over the years has provided us with many effective strategies. New research, changing reality for students and modern technology provides us with new strategies and techniques every day. When a teacher asserts that a new technique works, it is only reasonable to try to incorporate it in the lesson. A teacher creates a repertoire of successful activities, many which have not been mentioned in this report, which follow the general perimeters of the instructional program while providing the students with variety.

Each and every student learns in a somewhat different way (David Lazear, 1991). Schools need not fail to reach a student because of the wide range of ways students learn. Teachers can help meet the different learning styles of their students by varying the presentation and reinforcement of information in the following ways:

1. Alternate activities to address the visual, logical, spatial, aural-musical, tactile-kinesthetic modes of learning.
2. Find out if your students prefer to learn from listening to theory or from applying information through hands-on activities.
3. When re-teaching information, choose a different mode of instruction.

While introducing new topics in class, a teacher may encourage students to share knowledge they may already have about the topic, along with any relevant real-life

experiences they may have had. Begin units with the K-W-L technique, by distributing the "Know-Want to know-Learned" sheet to students individually at the start of each unit. Students complete the first two categories at this point. This information may then be shared in front of the class for the teacher to get a diagnosis of the background with which the students are coming to the unit. The learned category is completed at the close of the unit.

To teach study skills to LEP students frequently requires assistance in teaching how to study. This is especially true of students in middle schools and high school. By teaching them study skills, teachers will give the students an important tool that they can use throughout their academic careers. Students should be shown how to develop and use graphic organizers (Title I Literacy Training - North High School 1997 -98).

1. Outlines for summarizing, for making predictions.
2. Time lines for organizing and sequencing events chronologically, for comparing events in different settings.
3. Flow charts for showing progression and influences on an outcome, for showing cause and effect.
4. Mapping for examining movement and spatial relations.
5. Graphs and charts for organizing and comparing data.
6. Venn Diagrams for comparing and contrasting.

Teachers dedicate some time to develop the students' skills in analyzing the textbooks as a whole. They can demonstrate how to use the parts of a book (table of contents, index) to find information. The headings, subheadings, and illustrations in chapters to organize and enhance the information passages. Teachers should help



students learn to draw inferences, synthesize information, make judgments, and provide justifications in order to become successful students.

Standard set of procedures and routines should be repeated continually, until they become a second nature to the students. Before students begin an activity, teachers should lead the student to actively read and analyze the entire list of instructions, verifying through questioning techniques, that all students understand what is expected of them. Then, students work on each step individually before moving on to the next step.

Assignments like research papers and laboratory reports are of particular interest to LEP students and their teachers. It is beneficial to discuss the model clearly so that the students know how each part is structured and why each section is important. Students should then be given practice using the format before using it for a required assignment.

Computer-assisted instruction and the use of the Internet in the classroom are also being implemented in many secondary school programs. Through programs like "Slide Show" the researcher illustrates the daily agenda, reviews objectives and presents visuals as part of instruction. Through the Internet students become a part of authentic interactive projects which take place with other students from around the country (and the world). At North High School, for the 1998-99 school year, Internet services are to be available in each classroom.

Homework expectations are taught at the beginning of each semester. Student's achievement rises significantly when teachers regularly assign homework and students conscientiously do it. Homework can help students develop good habits and attitudes. It can teach students self-discipline, responsibility, and it can encourage love for learning.



Also, it is necessary that students realize the benefits and the importance of balancing their TV watching time between English and Spanish. The researcher has designed a logging form for students to identify the channel, the time, name of program observed, and their comprehension.

Teachers write a summary of a lesson or reading passage or write out the steps for solving a problem or for doing a science experiment on individual sentence strips. Strips are a rectangular long piece of paper where statements or single words are written. Teachers either write one sentence per strip or several sentences. These strips are distributed, out of sequence, to the students, grouped or as a whole class. The students then organize the strips into the proper sequence. (Title I Literacy Training - North High School 1997 -98).

Formatted logs can be used to reflect reading done from a textbook, a supplemental reader, a trade book or magazine, and newspaper article. Three categories may be set up on a standard form: what I understood; what I didn't understand; and what I learned.

### **The Effective Instructional Program**

In developing the Effective Instructional Program for teaching Science to high school limited English proficient students, teachers will first identify the desired content and objectives. It is often useful to specify critical thinking or study skills to target as well. Many lesson formats include four phases: warm-up or motivation; presentation of new material in whole group or small group work; practice and application of new material; review or informal assessment to check student understanding.

Traditionally Madeline Hunter, known worldwide for her Essential Elements of Instruction, considered these four phases within EEI as anticipatory set, teach to an objective, active participation and closure.

Lessons contain extension activities to reinforce or extend the concepts covered. A series of lessons thematically linked into units provide for sustained student interest as well as the opportunity to build systematically on prior activities.

Certain planning procedures are more critical than others. These are:

1. Selecting principal vocabulary terms to teach as a pre-activity.
2. Providing the opportunity for students to discuss the information and material orally, preferably before any written work is assigned.
3. Designing class activities for student-to-student interaction.
4. Deciding the use of real literature or adapted materials.

The strategies and or activities described above constitute the backbone of the proposed Effective Instructional Program for teaching Science to high school limited English proficient students. English is used as the language of instruction and Spanish serves as a support language.

This model is to be applied at North High School, in a quarter system of instruction (9 weeks semester). It has the following characteristics:

1. General academic (science content) and language skills tests teacher prepared will be administered in order to assess the students' language and science literacy. The test will be available in English and in Spanish. Results from the tests will determine learning strategies to be used for each student and to select the members for cooperative learning groups within the class.

2. Phoenix Union's CRT (criterion reference test) will be the designated pre-test and post-test to determine academic growth. Pre-testing will occur at the beginning of the semester. Post-testing will occur at the end of each semester.
3. Key vocabulary terms are to be studied in cooperative groups and defined through discourse in the class. Students are to complete vocabulary homework assignments prior to class, using a pre-designed format. The homework includes looking up and copying Spanish definitions from glossary, then copying a relevant sentence or statement found in the English textbook.
4. Objectives are presented on a single classroom TV screen using the computer slide show program. Students will read, and analyze content. To demonstrate comprehension and cognitive development, students will identify key words, using them to recount the content, complemented by Spanish discourse when needed.
5. A minimum of 7 and no more than 10 topics will be studied during a quarter. One review audio video tape will be viewed in English at the end of each topic studied during the 9 weeks course. An anticipatory guide will be prepared for each video.
6. An essay video report will be assigned to be written (typed, 2 page double space) after the students view each video. The anticipatory guides may be used to assist the preparation of the essay, preferably written in English.
7. A minimum of five sessions of reciprocal teaching will be scheduled on odd weeks (1,3,5,7,9) as a reinforcement activity for reviewing content and the development of oral skills. Spanish materials are available for selection at the beginning of the semester (depending on the group's language proficiency). More English is to be used as the semester progresses.



8. At least four science laboratory practices will be scheduled on even weeks (2,4,6,8).  
Kinesthetic skills are emphasized along with application of the Scientific Method of study.
9. Assessment will be insured through unit tests at the end of each unit, periodic verbal and written sub-unit tests (announced and unannounced), a mid-term test and an end term comprehensive final exam (the CRT post-test).

The program model just presented is an effective and replicable program. It is a research-based program with components, materials, and procedures developed to lead the student to success. The intention is for it to be applied in a bilingual setting using English as the language of instruction and Spanish as the support language. It will produce high levels of academic performance and the development of two languages for high school English language learners (ELL). ELL is an acronym replacing ESL. ELL is a positive term referring to all people with the goal of learning English. It avoids the term limited a word that may be derogatory.

## CHAPTER 5

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

The purpose of the study was to develop an instructional model for teaching science to high school limited English proficient (LEP) students, using English as the language of instruction, and Spanish as the support language. Students will acquire learning skills, language literacy and academic literacy in English and in Spanish. The program was conceived through observations, the researcher's eight years of teaching experience as a bilingual teacher, research found in Journals and Educational Publications, and the researcher's participation in staff development workshops at North High School through the years 1995 – 98.

Language and poverty are the two major barriers that effect the success of Latino students. For over two decades the dropout rate of Hispanics has remained around 30% (NCES 1996), even though the population increment has been greatest during this same period. The socioeconomic status of the students and their families is determined by a series of factors of which the school has no control. The barrier that the effective instructional program can impact, is that of language. Secondary LEP students have only a few years to acquire necessary English language. This urgency has driven the researcher to identify and discuss some approaches that enhance LEP student learning.

The effective instructional program targets language development by focusing on key concepts, using more visual and hands-on experiences, and encouraging students to use their linguistic and cultural background. Through the integration of language and content instruction using English as the target language of instruction and by making content comprehensible using BLE/ESL strategies LEP students are enhancing bilingual communication skills, expanding vocabulary banks, and analyzing content in English and Spanish to ensure comprehension.

Summarizing, the four essentials that make up the proposed effective instructional program to teach Science to LEP students are:

1. The use of Bilingual/ESL methods in order to facilitate comprehension.
2. Cooperative Learning, which ensures active participation for LEP students.
3. Reciprocal Teaching, which provides LEP students opportunities to improve reading proficiency.
4. Alternative Strategies and Activities, which impact learning most in the LEP population, while offering instructors opportunities to vary the learning environment.

## **Conclusions**

Inquiry-based approaches and cooperative learning help the student become successful because students are directly engaged in their own learning process. Learning takes place within a social context and is particularly effective with LEP students who come from diverse backgrounds and levels of literacy with varying levels of English



language proficiency. Development of group ownership and school membership is promoted when students observe their cooperative results.

Reciprocal teaching allows the teacher to model prediction, questioning strategies, and reading - writing practices which students apply in order to obtain good study skills. Students through processing and practice learn to apply study skills on a daily basis, and hopefully throughout the rest of their lives, leading them to be successful educated members of society.

Bilingual /ESL methods are the solution for raising language and academic expectations in LEP populations by making the instruction comprehensible. LEP students can perform at the same or even higher academic level as main stream students can. By exposing LEP students to the use of both languages, they use their first language and all the prior knowledge that came with it, as a tool toward further development of their second language. Students experience appreciation for advantages of bilingualism, augmenting feelings of self-esteem.

The researcher's Effective Instruction Program pulls together Bilingual/ ESL strategies, Cooperative Learning, Reciprocal Teaching, with availability of alternative strategies and Activities including the use of computers in the classroom. This multi - instructional environment which is created offers students the multiple approaches needed to reach diverse students at their level of competence. Through pre-testing the instructor has the ability to shift the approach to the needs of that particular group of students. Frequent monitoring of allows for adjustments in the teaching – learning process.

It is anticipated that after correct implementation of the curriculum model, students should:

1. Improve their listening, thinking, reading and writing skills in English as well as in Spanish (Dual literacy in L-2 and L-1).
2. Increase their vocabulary and communication skills in English and Spanish.
3. Confidently use textbooks and written material in English.
4. Apply study skills by scanning the English textbook, focusing on the illustrations, studying the graphs, interpreting charts, and others.
5. Personally feel good about themselves and their intellectual growth (self-esteem).

### **Recommendations**

For LEP students the primary mission of the school is to assist them in developing their English language, intellectual, academic, and collaborative skills to ensure full participation in American society. This is achieved through the implementation of the curriculum model developed by the researcher. LEP learners in high school settings must be given every opportunity for efficient language development and instruction in depth rather than breadth.

The schools administration should encourage the support of parents and the school community. Parents regardless of their language background are valuable resources and can volunteer in the classroom. Collaborative efforts should be made to reach Hispanic parents through multiple outreach programs; health education, health insurance issues, ESL, computer literacy, volunteerism, etc.

The task of literacy of the Hispanic Community is a task for the whole schools.

The Hispanic population, which currently nears the seventieth percentile (70%) at North High School, will not diminish in numbers. This curriculum model creates an environment in which Hispanics feel compelled to learn English, yet comfortable about using their Spanish as a bridge toward academic success.

Verifying growth of students who follow this curriculum programming would be interesting. By comparing pre and post standardized testing of students who are involved in content centered Bilingual/ESL courses; research would verify progress.



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