The development of scientific concepts through literacy as a mediational tool

Kenneth Phil Ingram

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THE DEVELOPMENT OF SCIENTIFIC CONCEPTS THROUGH LITERACY AS A MEDIATIONAL TOOL

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education:
Bilingual/Cross-Cultural

by
Kenneth Phil Ingram
June 2001
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6/18/01
ABSTRACT

This project analyzes the progress of 20 first grade, Spanish speaking students through a weather science unit. The study observes how students respond to literacy and science learning events. Social interaction, mediational tools, and their results are detailed. This weather science unit is mediated through a variety of social contexts that incorporate mediational tools for cognitive development. Mediational tools are both collaborative and individual works that organize for literacy and science concept development.
ACKNOWLEDGMENTS

Not only throughout this study, but, also, when reflecting on life’s experiences, I have come to realize that I am not alone in my endeavors, or my success. Instead, I am the sum of my experiences and my perceptions of those experiences. Fortunately, those who have influenced my experiences and directions have led me directly and indirectly to this point.

I would like to give thanks to My God and My Father who has blessed me with love, strength, and opportunities; through family, friends, colleagues and professors. His blessings have manifested themselves through others who have touched my life and inspired me. Among the most notable is my mother, who told me, at the age of eight, that I could and would go to college, one day. Then, she proceeded to exemplify hard work and determination as she worked, loved and cared for us. May she rest in peace.

I appreciate my family, no matter how distant we may seem, for the happy, the exciting, the sad, and, even, the trying moments that have helped me mature to this point. They have always been a source of support, learning and strength. My friends, also, merit thanks for their encouragement and patience.
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CHAPTER ONE
INTRODUCTION

By the time students reach the gates, they are tuned out or turned off to reading (Cooter, 1989). What are we doing wrong? How can teachers restructure their curriculum so that it facilitates literacy learning? Unfortunately, the accepted strategies are falling short. Hispanics are currently dropping-out of high school at an astounding rate: It would appear that our current learning philosophies need to be reviewed. One contributing problem is the pedagogy that drives our current "English-only" curriculum; given the passage of proposition 227. This type of pedagogy can "stunt" the personal, social, and academic growth of our language minority students. This study addresses an important area of concern in our students' formative educational years: first grade, Non-English Proficient (NEP) students.

Non-English Proficient (NEP) students are being negated an opportunity to participate in a Bilingual/Cross cultural classrooms. Such classrooms create socioeducational (sociocultural and sociohistorical) contexts which support development of concepts in science and social science. The support is given through cultural
acceptance of first language and the mediation of critical thinking skills, as well as, experience through activity.

In this study, mediation of critical thinking skills in science, as well as, other social contexts across the curriculum, are mediated in the first language. Such mediation takes place in collaborative dialogue that transpires in the course of developing visual, graphic, structures (mediated structures) that organize and represent personal science knowledge which is collaboratively written.

Currently, there is an ever-increasing plethora of curriculum to be taught, as well as, an overwhelming 'push' for our language minority students to transition to a 'proficient English' and pass an English-only standardized test. Many times, science curricula is "traded" for a review of English usage and pronunciation skills. Science concepts and 'student interest' is set aside for isolated, "English only" activities. These types of activities can impede the participation of second-language learners; That is, they may be less likely to participate because of the language difference, but, not for lack of cognitive ability.
Bilingual/Cross cultural education supports NEP (Non English Proficient) students by allowing them to discuss science experiences and develop concepts in their first language while embracing and sharing cultural experiences that are relevant and make valuable connections, with the student, across the curriculum. This is done in their home language while encouraging them to experience a second language.

As students form a strong foundation of language (orthography, graphophonics, syntax, semantics) in their first language, they begin to find interest and a need for second language development because it is relevant to the world around them; They know this. Second language learning can be mediated throughout many science lessons as the teacher (observer) challenges students at different language levels to reach a new learning potential. Sometimes, the student’s potential is challenged in the first language or in both languages. In addition, the Bilingual/Cross cultural teacher (observer) will have to guide and govern second language learning according to the needs and potentials of the students.

The mediation of collaborative, social contexts in science includes reading, writing, listening, and
speaking. A mediated socioeducational context and graphic structure (mediated structures) promotes participation and collaboration in sharing ideas, speaking out loud, clarifying understanding in student led activities, and making knowledge visible. Simultaneously, development of critical thinking skills occurs through dialogue and graphic organization of ideas in a collaborative structure which we call a mediated structure (Flores and Diaz, 1990).

Socioeducational contexts and the artifacts, which are produced as a result, are only part of that which ails our public education. What goes on in our public schools is not a one dimensional problem that exists solely between the teacher and the student; There are many facets of our "educational plight." In all fairness, education should, also, be examined from a sociocultural/historical and sociopolitical perspective. The following sections will attempt to clarify the sociohistorical and the sociopolitical perspectives which influence our current "educational" state, for children of color.
Sociopolitical/Sociohistorical Background

It has been noted that culturally diverse students experience different rates of success and that this difference can only be understood by taking into account the sociocultural and historical factors which permeate our students' education as well as the instruction they receive in the classroom (BEO, p.75). Unfortunately, there is a disproportionate rate of failure which is predominantly exhibited by caste-like minority students.

Much like the goal of a sociopolitical approach, the basic goal of the sociocultural (cultural and historical) approach is to create an account of human mental processes that recognizes the essential relationships between these processes and their cultural, historical and institutional settings. (Moll,p.194)

A sociopolitical approach envisions and delineates the impact that political decisions have on our schools. These decisions affect school funding and the pedagogical practices. Political decisions govern and manipulate both students and teachers, as well as, their success and failure.

Caste-like, language minority students represent a major part of that failure. Caste-like minority students belong to those cultures which have been and are being
mainstreamed into a society against their will or in ignorance. They are incorporated into a society, "more or less involuntarily and permanently through slavery, conquest, or colonization and then relegated to menial status (Bilingual Education Office, 1994)." This type of history has been found as a commonality between caste-like minorities. In addition to the common histories, they share, they are also among the poor, the hungry, the needy and the most likely to fail high school. This persistent academic failure has been exhibited by five ethnic cultures considered to be caste-like: Native-Americans, Mexican-Americans, Native Hawaiians, Puerto Ricans, and Black-Americans (BEO, 1994).

As we consider the many reasons for our student's lack of success, we should note that these cultural groups share many common threads. This lends understanding to a broader historical and sociocultural perspective which reflects our experiences and those of our community. This sociocultural/ sociohistorical perspective guides our educational experiences, perceptions, and practices; At times, a perspective follows a cultural group generation after generation.
This type of perspective helps to mold our "educational attitudes and efforts, given our history and our cultural values." With such a history, we eventually formulate ideas about how we perceive society and our place within it. With time, "our culture" decides how 'our culture' we will interact with society (positively or negatively). It is this type of perspective that gives us a basis for our "Folk Theory."

A 'folk theory' is our idea of what has to be done and what we will do in order to get ahead in life. At one point or another, we decide whether we will go to college, get a job, join a gang, or sell drugs to get ahead in life. In an effort to make the right decisions we come to rely on our experiences and the experiences of those around us. In a way, a 'folk theory' is a self-fulfilling prophecy of what we'll expect and how we'll react to our future.

If one grows up believing that one is poor and ignorant; one may come to believe it and act it out. It may be an improper response, but, it is reflective of the negative experiences across generations which form who we are. The negative experiences become indelible emotional scars. They become scars that are so overwhelming, that
few can overcome their lasting effects. Sometimes, we are
our worst enemies when we subscribe to a folk theory that
keeps us from success.

Ogbu (BEO, 1994,p.85) believes that as children of
caste-like minorities grow, their parents try to raise
them in the shadow of successful role models who have
money, careers, control, speak English and, generally,
have some sort of Anglo features (eyes, nose, skin or
hair). Children will later learn that they cannot change
the color of their skin, or the cultural values on which
they have been raised. They may come to believe that the
icon of success toward which they aspired is not
attainable.

Many caste-like minorities cannot change or do not
wish to change their physical appearance, the way they
talk, the way they carry themselves, or their cultural
practices so that they might be accepted by the
mainstream. However, the children of caste-like minorities
are often disillusioned by the fact that they cannot
change who they are, or where they came from; nor the
responses of others who discriminate against them despite
their education and hard work. These discriminatory
responses relegate the caste-like minority to believe that
he/she cannot be accepted into the mainstream of success, but only to a position of subordination as history has shown to be the truth. This poor self-esteem is reflective of a discrimination that has become a self-imposed segregation: We separate ourselves and rebel against the mainstream culture, as well as, a place and the opportunity for success in our world. We grow up to isolate ourselves from the mainstream group that has its' ways of subtly and overtly making us feel that we are less; Unfortunately, many of us accept this.

Despite the reality of disillusionment, children, in early years, generally, respond to parent and societal influences by seeing education in a positive light and succumbing to its "beliefs, values, and attitudes that support striving for school success..." (BEO, 1994, p.85),

and parents hope that their children will have an acceptable chance at life's opportunity.

Children need to see the connection between success and school; not only through their own eyes but communally through the perspective of their community and families. This is not happening in many of our disadvantaged neighborhoods where language minority students are living.

Unfortunately, caste-like minorities, in general, have not had the opportunity to perceive school as a
“ladder to success.” They are the groups of minorities who were assimilated into the “American culture” by means of slavery or conquest; they involuntarily became American citizens. Native Hawaiians, Puerto Ricans, Mexicans and Indians are still living on much of the land originally theirs before the U.S. succession (BEO).

The Mexican Americans are one example of a conquered people; 150 years ago they ruled what is now the American Southwest. As a result of the 1848 Treaty of Guadalupe, Mexico lost its claim to southwest territories. There had been provisions in the treaty for the Mexican people to retain their land and language but through deceit their land was taken away bit by bit as they were pushed into a position of subordination. This created a loss of Mexican-American economic power and relegated the Mexican-American to the position of wage laborer. They were given menial jobs and forced into ways of life that did not require and did not reward school success (Bilingual Education Office, 1994, p.86). They were devalued and stereotyped as ignorant and lazy.

At that time, Mexican Americans were viewed as a mixture of Spanish and Indian. As a result, they were considered “colored.” This, generally, inferred that they
were inferior to the "white" mainstream. Whenever there were economic troubles in the United States, Mexicans were among the scapegoats for the high unemployment, low wages, increasing crime, disease, and high welfare costs. Many still feel like scapegoats. (Bilingual Education Office). Even now, it is a perception that resonates and guides our negative self-concept and our folk theory.

When Mexican-Americans attempted to get an education to compete for jobs and success (equal pay for equal educational attainment), in many areas, they were discriminated against and seldom rewarded for their education. From such repeated experiences, there came an unspoken decision which realized that education from high school or college brought them little reward as compared with their Anglo peers. Right or wrong, it was a legitimate perspective which became a belief. Currently, Mexican-Americans do as well in school as Anglos but by the third grade they begin to diverge and do "less well" in school than their Anglo counterpart. (Bilingual Education Office, 1994, p.87)

Some explanations of Mexican American dropout rate have included culture conflict, culture deprivation, inadequate I.Q. and language conflicts. However, these
cannot withstand the test of cross-cultural comparisons because other cultures have succeeded.

Other minority cultures have succeeded because they do not share the same history. For example, the Jewish culture has had a remarkable success rate, yet, they have faced much discrimination. However, the Jewish people came to the United States to escape much of the persecution they faced in Europe. They came to seek a better life by choice. This cannot be said for the caste-like minorities.

Also, the Jewish people came to America during the industrial revolution. Many Jewish people had already experienced the industrial revolution in Germany while Hitler was building up for World War II. When these Jewish people came to America, they were already prepared to participate in the American industrial revolution. As a result they were successful. Jewish and other successful immigrants are among those who came to America voluntarily and were not conquered. (Bilingual Education Office, 1994)

The subordination and exploitation felt by many Mexican-Americans has produced certain sociocultural responses. One of which is that Mexican-Americans have begun to believe that there are such things as "job ceilings." There is an unspoken belief that no matter how
hard they try and become educated, they will be stopped by some "Anglo barrier" and not be hired or rewarded regardless of education attained or ability.

In response to these barriers, Mexican-Americans have adopted some survival strategies such as passing, clientship, collective struggles and deviant behavior. Survival strategies were employed as a means to get around barriers which kept Mexican Americans from "getting ahead."

1. **Passing** is the act trying to pass for an Anglo by physical appearance, descent claims, change of ethnic identification and changing their names so that they sound more "American" rather than Hispanic.

2. **Clientship** represents those Mexican-Americans that chose to be "middle-men" between wage-laborers and white land owners in attempts to secure jobs from wealthy land-owners.

3. **Collective struggles** were the efforts of organized Mexican-Americans to create a change for the betterment of their people; such groups included Order of Sons of America, Good Neighbor Clubs, Mexican War Veterans, etc.. It wasn't until after WW II that these groups became more successful. That was only because of the many war
veterans that returned from the war only to be confronted by the same job ceiling they thought they had left behind. It was this group of veterans that organized themselves to achieve redress on several civil rights issues which may not have changed if it had not been for their efforts.

4. Deviant behavior is another way in which some Mexican-American youths have chosen to respond to their legacy of subordination since the Treaty of Guadalupe in 1848. This behavior included usage and sales of drugs as well as other black-market items, gang memberships, and aggressive behaviors (Bilingual Education Office, 1994, p.122).

This is a result of the frustration that is felt among the language minority (Mexican-American) youth who cannot fit in with the mainstream. They do not see or accept the norms of the larger society which seems to shun their existence and their language.

In essence, folk theories for Mexican Americans are represented by the implementation of the four survival strategies mentioned above. Many language minority students have come to understand that they are not Anglo and, therefore, they are not subject to the same requirements for self advancement or upward mobility.
Instead, many language minority (Mexican-American) students have decided that they can only become self actualized through their maintenance of the survival strategies.

Some of these survival strategies are the responses which have allowed the mainstream to stereo-type caste-like minorities as ignorant and lazy about education. These types of stereo-typical references have encouraged employers, school board members, congressmen, and many others in positions of control to believe that L.M.S. are a problem. Some believe that ‘the problem’ can only be addressed by saturating Language Minority Students with an English oriented curriculum, and getting students to pass ‘English’ standardized achievement tests. There are very few people, in control, that believe in the need for culture, and the home language in our public schools. (Bilingual Education Office)

The Problem

Currently, Non-English Proficient (NEP) students are being excluded from bilingual classrooms that create socioeducational contexts and mediate critical thinking skills in science, through literacy, as well as, other
social contexts across the curriculum. How can we use the home language, in a first grade, bilingual classroom, to teach scientific concepts using language arts in mediated structures in the sciences?

Statement of the Problem

The problem will be researched and examined as twenty, first grade, bilingual classroom students investigate a weather unit, in socioeducational mediated contexts, using their first language to share, experience, and participate in the development of critical thinking skills in the sciences.

Research Questions

1. Does the language one speaks reflect one's cognitive ability to develop higher order thinking skills or investigate science concepts? and develop scientific concepts about weather?

2. How can different socioeducational contexts facilitate science dialogue, mediated structures and artifacts which can support (literacy) the three cueing systems graphophonic, syntactic, and semantic) while supporting the development of science concepts and literacy through the students home language?
3. Can critical thinking skills, science concepts, and literacy be embedded in various socioeducational contexts and structures?

**Definition of Terms**

**Caste-like Minorities:** cultural minority groups that have become part of the mainstream culture through conquest, and against their will.

**Critical Thinking Skills:** examine, clarify, organize, reason, analyze, generalize, hypothesize, predict, assess, and synthesize. Also, a trait of reflective/metacognitive students (Jan, 1993, p.8).

**Constructivism:** "places importance on determining the learner's existing ideas, as this knowledge is significant in terms of how children will respond to, or are able to make sense of, what is presented." (Fleer, 1992, p.374)

**Context:** "physical, social, or cultural setting in which individuals function (Bloom, 1992, p.399) and internalize new knowledge.

**Culture:** the patterns of behavior, values, beliefs, traditions, and norms that characterize a group. (Myers, 1990, p.610)
Folk Theory: qualities that a cultural group deems necessary for success.

Internalization: interpersonal processes transform knowledge on social plane into mental activity on the intrapsychological plane where it can later be referenced as personal knowledge.

Limited English Proficient (L.E.P.): students whose ability to speak English is both limited and not proficient.

Language Minority Students (L.M.S.): students whose language is not that of the mainstream culture in the country in which they live.

Metacognitive Thinking: Thinking about one’s own thinking, thinking about one’s ability to learn. (Jan, p.8)

Non-English Proficient (N.E.P.): students whose ability to speak English is non-existent.

Primary Language: First language; language spoken in the home among family members.

Reflective Thinking: Linking ideas to previous/current and predicted experiences while questioning and self-questioning; assessing self and the situation. (Jan, p.8)
Sociocultural/historical: combining social and historical factors (Brown, p. 2992) to understand how we are impacted, and how history and cultural forces make their impression on us.

Socioeducational: combining cultural and historical factors to organize ideas that supports pedagogical practices and a curriculum that mediates connections to understand how we are impacted past, present, and future.

Sociopolitical: combining social and political factors (Brown, p. 2992) to understand how we are influenced, and how we can be influenced in our society and in our schools.

Sociohistorical Background on Education

Currently, many Language Minority Students are faced with a fact memorizing and skill based curriculum. It is a curriculum directed for success in standardized, English achievement tests, not pertinent critical thinking skills. Brown (Allen and Brown, 1976) states that “schools must teach more than facts, concepts, and cognitive skills if they are to prepare students for the complex problems of
dealing with today’s society” (p.37). One might think that the need to help children “cope” in society would not only mean facilitating an awareness of social concerns, but, of also, facilitating a means of communication, and a way of contributing to society. Unfortunately, much of practical elementary school pedagogy is concerned with maintaining silence at the right time. A language minority student in a monolingual English classroom is sure to create more silence than participation. We have to break the silence and allow students to participate.

The tendency to regard quietness as a virtue instead of a convenience and to reward it accordingly tends to support reticent patterns adopted in childhood. Such a pattern of reward for what may, in fact, be a disability, may lead the child to seek similar rewards in other social settings (Allen and Brown, p. 46)

Students whose first language is other than English are maintained in silence because of the language barrier. For instance, discussions, and activities mediating science concepts, are not as fruitful if these students do not understand or are unable to share their personal ideas and experiences. They should be made to feel that their words are valued and have significance in their learning, as well as, the learning of others. In that way, their thoughts and words are given value and relevance. These
English Language Learners (ELL) need to know that they are making connections with these important concepts while maintaining their own language and learning English.

However, classrooms that can support ELL students are not valued in our current societal climate. Bilingual classrooms lost much support because the state could not decide on the most successful means to teach our L.M.S. English. Bilingual programs were not regulated by the state. As a result, we had many interpretations of "Bilingual Program;" Some were good and some were bad.

Without looking into the successful Bilingual/Cross cultural classrooms, misguided people have helped to dismantle most bilingual programs in the state of California. A more sound response would have been to seek out Successful Bilingual/Cross cultural models and develop the criteria for more successful programs. However, Successful Bilingual/bicultural programs were not sought out, studied, and replicated. It’s as though nobody cared or understood the importance bilingual education plays in a child’s social, personal, and academic growth.
Education and Politics

Issues related to school governance and control are not recognized until teachers or parents see and feel the effect in the classroom. Most of the time teachers don't even see the direct impact that employers, school board members, congressmen and court decisions have on our curriculum and classrooms. The effects can be obvious, or subtle and, at times, purposely, inconspicuous. There is a need, however, for teachers and parents to be cognizant of these impacts. Teachers need to understand how schools and school systems operate. As teachers are also "affected personally by control, governance, and financial decisions (Ryan and Cooper, 1992, p.191)."

Currently, the state is responsible for how our schools are managed. Policy decisions and administration of our schools have come under the guidance of the local school boards. However, professional educators, parents, teachers, the business community, standardized testing, the federal government, and the courts play important roles in determining educational policies regarding funding and curriculum in our schools. These of course, tend to affect different schools in different ways and to varying degrees. When we take these variations into
account, we see that two primary differences are at the root of the unequal education we facilitate for language minority students; funding and socioeconomic differences, as well as, different school emphasis.

After the state has apportioned each school district, the districts must allocate the funds to each school based on various factors. Funding will define the expectations for each school's degree of success. Funding will determine who gets which type of education.

The connection between funding and excellence of education is often disputed, but two sociologist have found that states spending more money on education also have students with higher average SAT scores, adjusting for the population of those taking the test in that state" (Ryan and Cooper, 1992, p.221).

This would suggest that funding is an important part of educational success and might, very well, contribute to the betterment of students in less affluent areas. This is a valid argument that would help to explain why education in poorer areas is unequal to that received in upper-income areas. Ryan and Cooper (1992) define "effective schools," as defined by current educational research literature, by looking at high achievement test scores in basic skills which are much easier to measure than citizenship or interest in ideas (p. 254). If there is a
correlation between the higher test scores and higher funding then we need to consider funding as a possible solution to the language minority acquisition of basic skills, as well as, the development of critical thinking skills in the sciences.

As it is now, school districts which reside in economically affluent areas where property values are higher seem to receive greater funding than school districts which are in lower property value neighborhoods.

Within the same state, for example, the average amount of money spent per child in one district may be more than twice the amount spent in another district. Such spending differentials result in great educational disparities, as measured by pupil-teacher ratios, training and experience of staff, and availability of facilities, equipment, and counseling services. (Ryan and Cooper, 1992, p. 221)

These disparities only grow to include the type of curriculum that is provided to the students of lower income areas. For example, some schools may not provide the college preparatory classes or guidance services necessary to students of lower income areas because of the financial constraints.

These constraints are based on where these students live and who they are; usually poor and of a minority status. These students are considered low-achieving,
language minority, and handicapped; they not only require a considerable investment but also a curriculum which meets their needs.

In a community where parents are struggling to put food on the table, there would probably not be enough in property taxes to support and provide language minority students with all the advantages that would meet their needs. In fact many of these needs have been met only because of court decisions. Some of our L.M.S. have met their needs of support and success in drugs, gangs, criminal activities, or, in the security of believing that they will never amount to much.

In 1954, the courts ruled, in "Brown v. Board of Education of Topeka, that segregation in the public schools is unconstitutional" (Ryan and Cooper, 1992, p.139). This court action may have been targeted at racial segregation, but can it be extended to mean that students of a socioeconomic class may not be segregated from the same education that affluent school districts receive.

Unfortunately, this is, also, a problem which needs to be addressed; Lower socioeconomic students are grouped together in their school districts and are being provided
with an education that does not match that of the more affluent school districts. Ryan and Cooper agree that,

All American schools are not alike... Some schools stress certain types of goals and focus on certain specialties. These specialties may be in the form of a vocational trade, a college preparatory program, a certain type of learning style and even specific sports programs (p. 250)

This idea of educational stratification based on socioeconomic level is, also, suggested by Anyon in her article, titled "Social Class And The Hidden Curriculum Of Work," 1980. In the article, she seems to concur with Ryan and Cooper about how schools located in certain affluent school districts will provide different types of job and career training depending on one's socioeconomic level. For example, poor school districts will teach skills and ideas for vocational jobs, whereas, in affluent schools, students are being prepared for positions which lead to social power and reward. Even school advisors have been known to persuade Hispanic students to take more vocational classes. This type of educational inequality has been addressed throughout history in our courts but still there is a struggle for equity among all who receive a public education.
In 1974, the U.S. Supreme court established, in "Lau v. Nichols, that students who do not understand English are being denied a meaningful education" (Ryan and Cooper, 1992, p.140). As a result of this action, the San Francisco Board of Education is obliged to offer Chinese-speaking students instruction in their own language so that they would be afforded equal educational opportunity. As a result, children whose first language was other than English, were granted the right to be provided with an education that could develop critical thinking skills and important science concepts. Concepts that would, otherwise, be lost until the student could speak the English language. However, the school board never agreed upon the most effective and appropriate manner of implementing such an education.

Bilingual and Cross Cultural Education

Court decisions regarding Bilingual and Cross cultural Education have had an impact on our schools, as well as, the curriculum implemented. However, there is still a need for reform. Bilingual/Cross cultural Education (BCE) is a means by which our students can come
to know, understand and respect their own culture and themselves, as well as, the many diverse cultures that exist in our country.

A Bilingual/Cross Cultural Education takes on a pluralistic view of cultural integration. It inspires the love of one's own culture while inspiring the acceptance of other cultures. Through it, many learn to respect the cultural norms and beliefs of others which allows for the peaceful co-existence of many cultures and the sacrifice of none. This "pluralistic perspective" provides an opportunity students to appreciate diversity. Yet, they can learn to share similarities which serve to enhance our own states of being and perspectives of life.

At one time, many northern Europeans came to this country to escape religious persecution; What they really sought was a pluralistic society (Bilingual Education Office, 1994). A place that would accept them without dissecting their religion or making it less than what it was. America was founded on the idea that all would be welcomed despite their religion, culture, or race; this would indeed reflect the ideas of the pluralistic society which we now strive to regain. Some where along the way we lost sight of the "utopia" that European colonists dreamed
of when they thought of America. Children, women, and men of the "colonization era" envisioned a utopia (an America) just as many now view pluralism for the future of our students.

There are some that choose to believe that cultural pluralism within our schools may threaten the "patriotic American idea" and divide us rather than unite us. They feel that it would destroy our common traditions, values, purposes and obligations toward American duty.

Furthermore,

that it may divert the schools' attention from their basic purpose of educating for civic, economic, and personal effectiveness; and that it may undermine the sense of morality because no universal moral positions are considered acceptable to all elements of our society. (Ryan and Cooper, 1992, p.366)

In essence, these beliefs are what the mainstream believes to be American. Some do not see this country as having many cross-cultural languages and personalities that get along. Instead, they see one strong mainstream that controls and speaks for the minority cultures.

Unfortunately,

it is this mainstream belief that delineates the educational needs of our language minority students; even though the mainstream has, yet, to understand what those needs are or how they can make a difference for our country and for Americans as a whole. "These critics assert that there are limits to pluralism and that those
limits must be articulated by schools and school leaders" (Ryan and Cooper, 1992, p. 366).

Schools and Curriculum

Our schools and school leaders are responsible for the express purpose of providing a certain type of educational experience, which we call the curriculum. The curriculum represents the community values and beliefs about what the young will need in order to develop into good and productive adults. Or, at least, the curriculum includes what the school policy-makers in a particular community believe young people need know.

Ryan and Cooper (1992) define curriculum as "not just the intellectual content of the subjects taught, but also the methods used to teach them, the interactions that occur between people, and the school-sponsored activities that contribute to the life experience" (p.266).

Not only should school contribute to the life experience, but it should build on those experiences which already exist. How are we building on these experiences and ideas if we do not understand what our children are saying? Do they understand us? Are language minority students understanding, as much as, English fluent students? Does it matter if LMS aren't doing as well? Are they
internalizing pertinent ideas and concepts? Is there a viable, successful alternative?

Schools are not elaborating on the experience of the student; They are focusing on the transmission of dominant culture ideas and philosophies. Rather than enhancing our language minority's learning in a Bilingual/Cross Cultural approach, we are depriving them of a language and culture which will better enable them to compete for a job. Employers are looking for bilingual employees to service customers of other cultures. Ryan and Cooper (1992) state that,

If schools offer the young an understanding of only the prevailing culture, the result may be an attitude of smug cultural superiority, a phenomenon that frequently leads nations and individuals to foolish actions. In cultural terms, what we do not know we frequently do not respect. Without mutual respect people easily become enemies. (p.247)

Today, it is in our schools where we see that this may be a true scenario which is being played out. When we look at our students in the schools we see more anger, aggression, and misunderstanding than we’ve ever seen before. We see these misunderstandings between the gangs, words, actions, shootings, and on the walls of our Mexican American neighborhoods. These are the misunderstandings we are fostering in our schools.
We are not preparing our students for the many personal and cultural differences that exist. Our curriculum needs to reflect these differences and allow for students to truly know one another. If a Bilingual/Cross Cultural curriculum were to be organized into our schools and properly facilitated, we might begin to see a difference in how cultures receive one another.

The school is where the curriculum (values and beliefs of the community) is put into effect as a means to educate our youth, and get them to accept both the explicit and implicit curriculum. The explicit curriculum concerns all of the planned learning in content areas such as in language arts, mathematics, science, and all other such subject areas. The implicit or "hidden" curriculum concerns those values and beliefs that are informally prescribed and taught through the instruction and learning environment of the classroom (Ryan Cooper).

The misunderstandings occur when language minority (Mexican American) youth refuse to accept the value and belief system which does not reflect their ideas or those of their culture. Instead, it is a curriculum which is Anglo-centric (English-only, Submersion and Immersion) and does not allow for an instruction in the classroom that
promotes the acceptance of other cultures, much less their own.

Instruction

With an instruction that reflects the unequal funding among various districts and a curriculum that negates our cultural diversity, we create a dichotomy of understandings between cultures. This dichotomy lends itself to varying negative responses that are reflected in society through social superiority or aggression of some type. Unfortunately, instruction of language minority students does not include, explicitly or implicitly, that knowing about our own culture is just as important as knowing about the culture of our peers. A Bilingual/Cross Cultural education helps to facilitate a social system of understanding and acceptance.

Prior to facilitating a Bilingual/ Cross Cultural Education for the LMS, politicians, administrators, and teachers need to be aware that L.M.S bring a variety of learning experiences to their classrooms. A majority of their knowledge is best communicated through their first language. It is through their first language that they learned much of what they know and feel.
Shirley Brice Heath (Bilingual Education Office, 1994) argues that, “language learning is cultural learning” (p. 145). In this respect, children learn to express basic needs, emotions, and understandings of their experiences in their first language. It is in their culture and language that they are empowered to express experiences and feelings with pride and excitement. They are able to share and learn about new ideas. In monolingual, English classrooms language minority students are denied this opportunity.

In addition, Heath (1994) believes that cultural learning includes all the learning that enables a member of a family and community to behave appropriately within that group, which is critical to one’s self identification and whose approval is necessary for self-esteem” (p. 146). As a result of their “cultural learning” (language learning) LMS become aware of the importance of their language and it’s acquisition. They come to understand that they can communicate and share needs and acknowledgements with those they love most (their families); Hence, they feel accomplished and proud of themselves for attaining a very important link with the rest of their language and cultural world.
At times, in certain cultural situations, children rely on their world to such a degree that outside influences take a "back seat" to the home language, until they go to school. Then, they go to school. Suddenly, they are expected to express themselves in a second language. Heath explains that, "children from these groups often come to school bringing language uses and cultural beliefs supporting ways of using language that differ greatly from those of the classroom (p.147)." But, once they meet an English-only or a Limited Spanish speaking teacher they lose voice and understandings, of otherwise, important science and literacy concepts.

Currently, Language Minority Students (LMS) are being denied the use of their first language to connect past experiences to present learning because of the language barrier. In this manner, LMS are not being allowed to participate in our English classrooms. They do not fully comprehend or speak English, well enough. They may not risk being ridiculed for speaking with an accent or confusing meaning when speaking in a second language. Many who have attempted to speak a second language can relate to the uneasiness (fear) in pronouncing the words in a classroom setting.
Shirley Brice Heath (Bilingual Education Office, 1994) states that, "not only is there the general expectation that all children will learn to speak English, but also the assumption that they have internalized before they start to school the norms of language used in academic life (p. 148). Yet, when they arrive in our classrooms, we expect them to respond to our instruction with feats of second language acquisition and no fear; Then, take a standardized test in a second language. Another result may be that they participate without voice. In addition to learning English, LMS are expected to:

1. Use language to label and describe objects, events or information that non-intimates present them.

2. Use language to recount or recast past events or information shared with or given by non-intimates in a predictable order or format.

3. Follow directions from oral and written sources without needing sustained personal reinforcement from adults or peers.

4. Use language to sustain and maintain the social interactions of the group.

5. Use language to obtain information from non-intimates.

6. Use language on appropriate occasions to account for one's unique experiences, to link these to generally known ideas or events, and to create new information or to integrate ideas in innovative ways. (Heath, 1994, p. 148)
Being expected to meet these demands, in English, would, in fact, be a daunting task in a second language. Such a situation could have a definite negative impact on one's perceptions, society, or self-esteem in contexts for learning.

Should a student be expected to participate in their own learning when they can't express themselves in a language they feel comfortable speaking? They can hardly be expected to participate, for maximum internalization, if they barely speak the English spoken in the classroom. Such students would probably end up feeling embarrassed or be made fun of. This is not a situation in which anyone would feel comfortable. This is not a context in which the student would be motivated toward the understanding and internalization of science concepts.

In fact, quite obviously, this is a situation which would make mediation of curricular concepts difficult. Instead, it leads the students to focus on language weaknesses and disadvantages. However, if we can create a socioeducational context using the child's language, culture and experiences, we can open doors to their participation and success in the classroom.
In addition, by incorporating the child's previously learned knowledge and experience into the curriculum and its' instruction, we allow LMS to feel that they have much important, and valuable data to contribute. As teachers, we need to seek out instructional material and modalities of learning which are relevant to our student's understandings and language needs. Then, we can begin to facilitate socioeducational contexts, in science and literacy, which are supported by the students' language (culture). Bilingual education facilitates an opportunity for students to participate and collaborate while making sense of the world around them in their home language.
CHAPTER TWO

LITERATURE REVIEW OF THEORETICAL FRAMEWORKS IN TEACHING/LEARNING

In this section, I'll review how language and thought come together in mediated, social contexts that inspire student interest, activity (mental and mediated), and internalization of important science concepts in a student's first language. This review will serve to delineate how Vygotskian theory (Zone of Proximal Development, Law of Cultural Development, Activity Theory) underlies the theoretical principles of this study. This is a study which uses Vygotskian Theories to support critical thinking skills and scientific concept development for first grade students whose first language is Spanish.

Language and Thought Come Together in Social Contexts

A social context is organized by the teacher, initially, and then becomes one in which children interact verbally and non-verbally to share ideas and questions about anything that they have experienced or want to
experience; In the process, they learn or create something new. It is here that language and thought come together.

For example, six students may share their knowledge of "kick ball" with each other so that they may all play it as they play it in school, or they may create a new game resembling "kick ball" but with different rules. The need to play a game, and have some fun allowed six students to interact together by sharing knowledge and interests to form a by-product; a new type of "kick ball."

Creating such social contexts for children in the classroom is the role of the teacher. These contexts should be encountered in meaningful activities. They should be activities that the students will find interesting, and relevant to their personal self. In addition to sharing experience and knowledge, children will participate more eagerly when they have a voice; A voice in sharing experience, as well as, understanding, and a say in directing and planning the direction of the activity.

In planning such activities, educators should note an important finding from many areas of research: Children learn to communicate largely by communicating. Language inspires thought. This does not mean that students must
talk all the time in order to achieve proficiency. However, children need to speak and listen within situational contexts that are (a) defined at least partly by the children themselves, (b) interesting to them, and (c) relevant in some way to their immediate concerns (Allen, 156). For example:

Margaret has just announced to her kindergarten class that today is Alex’s birthday. Christopher grabs a can of colored markers and a sheet of paper and heads for the classroom’s back table... “Alex! What’s your favorite color?” he calls out. And then, Christopher begins to draw a cheerful picture. With a little help from an adult, Christopher ends his production by spelling out “Happy Birthday to Alex.” Soon, after a brief stay in Angela’s box (The common initial A’s causing some confusion), the birthday card is deposited in Alex’s cubby (Dyson, 1989, p. 1).

This is only one example of how one social activity can give rise to and promote literacy growth. Christopher was led to write by his desire to engage an authentic social activity that, in his culture, involves print--the giving of a birthday greeting. Here Christopher is motivated by his desire to please his friend Alex. Vygotsky (1978, p. 3) argued that, written language, is a complex social tool that functions in various ways in our society, children learn about this tool--its purposes, its features, its processing demands--as they encounter it in
meaningful activities (i.e., celebrating a classmate's birthday).

These meaningful activities are the social contexts which the students and the teacher will create as the student’s interests are developed. Once the students interests have been discovered, the teacher can help the students decide how social contexts can be used to explore the topic. Among the many social contexts available, students can choose sharing, read alouds, role playing and drama as a means of demonstrating understanding or gaining understanding of an idea or concept.

In classrooms we create peer groups brought together by their common age and situation with a need to bond for companionship and acceptance. This in itself promotes a social context for new relationships and understandings. Our social context in life becomes one of people from diverse cultures and backgrounds, sharing new ideas. At first, that social energy will be generated in the children’s talk, including their talk about their drawings. In time, that energy will fuel the development of literacy: reading and writing.

Through the complex dialectic that evolves between children’s own graphic activity and their interactions with others, children come to discover the range of functions served by written
language, including its capacity for social interaction and individual reflection. Indeed, in whole societies, literacy finds a permanent and prominent niche when the information conveyed through written language becomes part of the social network—when people talk about written materials and when those materials can affect their views of themselves and their participation in the world (Dyson, 1989, p. 12).

When children are placed in the group setting of the classroom, like any group of people brought together under the authority of others, they react to the official structure by forming their own social culture. In the children’s social culture, they find the comfort of being in a group that is “in this together,” (Barbara Flores, personal communication, 1997) and at the same time, the opportunity to explore their individual uniqueness as they compare themselves with their peers.

While the teacher establishes the larger structure, the children’s own social concerns may come to infuse school literacy activities with social meaning. For example, the teacher may plan daily writing activities which can become a way for students to work with others and “show-off” their own special abilities, “as a complex dialectic is set up between their own drawing, talking, and writing activity and the response of others to that activity” (Dyson, 1989, p. 13). For example:
by virtue of the children’s responses to each other’s work, their texts themselves will assume some of the functional power of their pictures and their talk, conveying their images and linking them to each other socially. Their texts will become more dynamic worlds that mediate between their own lives, those of their friends, and their experiences in the wider world. It is this process by which writing, through the children’s activity, finds a niche in their artistic, social, and intellectual worlds (Dyson, 1989, p. 14).

These worlds (experiences) are all the products of our daily social interactions. They are the interactions which help us to cultivate our understanding of our experience and the world around us. We make decisions that influence the rest of our lives based on these understandings.

Unfortunately, non-English speaking students do not have language access to understanding what goes on in the English-only classroom: ‘English-only worlds’. Their experiences may not be able to mediate between their own lives, the lives of their friends, and their experiences in the wider English-only world. As a result, non-English speakers are not able to access the process by which their literacy can find a niche in the artistic, social, or intellectual worlds. They have to wait until they can speak and write English correctly. These “English language learners are being deprived of their home language; If the
contexts that illicit or permit use of that competence are absent in the school" (Cazden, 1988, p.10). These children are being deprived of an education which, by law, is guaranteed and basic to every child in America.

At one time, American Indians and Mexicans were whipped if the language of their culture was spoken in the classroom. Today, Children meet with disapproval or misunderstanding when the accent, grammatical mark, or style of their normal community are heard.

This way of thinking about school literacy needs some rethinking. Within the context of this project, Children’s growth as literate people was linked to the social practices that surrounded them, that is, to their discovery of literacy’s rich relevance to their present interactions with friends and their reflections on their experiences. Literacy that helps children to articulate their todays and to make on-going connections with others may be more likely to grow with them into their tomorrows (Dyson, 276).

In an effort to illuminate the importance of social interaction in the classroom we should first consider the broader aspects which influence curriculum instruction, as well as, the perceptions of our students.

These broader aspects are best understood when looking at the "contextual interaction model." Using this model, we can more closely relate the sociopolitical effects of state, community, and school, on the classroom
instruction and pedagogical practices. In other words, the contextual interaction model suggests that achievement is a part of the interaction between values of the ethnic minority group and the cultural values of the larger American society (Bilingual Education Office, 1994).

Therefore, as we consider the lack of achievement in language minority students (LMS) we need to be conscious of the societal and cultural values which are imposed by the mainstream culture on to the language minority student. These are the values which reach our LMS by way of socio-cultural contexts, education and instruction. These values can serve to hinder, or guide the way we teach, and the way children are provided an opportunity to learn.

It has been a long standing assumption, and experience, of linguists that all normal human beings are gifted with a capacity for language. It is, a capacity that is fundamentally equivalent in all, a capacity that has a complexity and potentiality for creative use beyond our scientific ability as yet to fully assess. Current work informs and supports this conception giving explicit to it. If some kinds of children are found to be disadvantaged linguistically vis-a-vis others, the causes are presumed to be not innate but social. Ability for some of the specialized creative uses of language in science, art and social life no doubt varies widely among individuals, in part due to genetic inheritance, but the realization of such activity depends on social opportunities (Cazden, 1988, 10).
However, in many of our classrooms, social opportunities for English language learners are non-existent. This occurs quite frequently when limited and non-English speakers are placed in the classrooms of English-only or Sheltered-English teachers who subscribe to a traditional, submersion methodology; primarily, because they do not speak the language or understand it.

For these students, who are considered out of the mainstream, becoming literate is considered a process of moving, through individual achievement, beyond their present ground, beyond their families and neighborhoods. This is happening at a time when we are realizing the important roles that parents play in our student's learning. When Spanish speaking students from Spanish-speaking homes are placed in non-Spanish classrooms; important information and experience is lost. We are separating the parents from their children's learning because they don't speak the right language; English.

Mental Activity and Mediated Activity

It is the social relationship which Vygotsky saw as the source for higher mental functions and for
internalization. Vygotsky viewed this social construction as a catalyst for language that would inspire higher order thinking and language.

However, Vygotsky, also, alluded to the fact that higher mental processes changed according to the mode of social life. So, internalization of concepts could depend on one's opportunities to interact, share, as well as, be responded to in a guiding manner. A manner which might lead to the acquisition of higher order thinking skills.

Moll (Bilingual Education Office, 1994, p. 45) goes on to express, "The essence of human behavior resides in its mediation by tools and signs." Tools and signs are representative of our modes of communication, as well as, the structures we create to organize meaning and understanding. In other words, you cannot have higher order thinking if the social activity (context) is not planned around the students' potential and experience. Potential and experience is cultivated when using the tools and signs with which the student is most familiar; in this case, language and culture.

Humans use tools (e.g., speech, reading, writing, mathematics, and most recently, computers) to mediate their interactions with their physical and social environment. A fundamental property of tools (be it speech or writing) is that they are first used for communication with others-- to mediate contact with
the world. Much later they are used to mediate interactions with self, as we internalize their use and they become part of our behavioral repertoire. Vygotsky posits a strong connection between intellectual activity and external, practical activity mediated by the use of “psychological tools” such as literacy. (Moll, 1986, 103)

Tools, such as language, reflect the curriculum and the social contexts that teachers facilitate. This is done so that students are better able to internalize what they need to know in a language which allows them to participate. Within these contexts, teachers should consider student's interests, experiences and prior knowledge, including the home language.

The student may or may not actively engage himself with the stimuli to transform the semiotic symbols into personal understanding if they cannot understand. For one reason or another, be it the language barrier, or the mode of mediation, the student may not wish to participate. Participation, of the language minority student, is mediated in a socioeducational context (Diaz and Flores, 1995) that organizes and embraces the tools and experiences that a child brings to the setting.

The key to understanding school performance is not in the study of mental aptitude or attitude toward schooling; it is in understanding the dynamics of material, local settings. To succeed in school one does not need a special culture; we know now, thanks to ethnographic work, that
success and failure is in the social organization of schooling, in the organization of the experience itself. (Diaz and Moll, p. 311)

Whether or not students direct their attention or organize conscious memorization in a socially mediated activity is purely the prerogative of that student. The child may not learn from "just any" organized socioeducational context without it being organized for the student's language, experiences, and knowledge. Much like a "socioeducational context," provided in the classroom, Vygotsky reasoned that language was tied to experiences and knowledge. In fact, Moll explains that,

Language is one of the key tools created by humankind for the organization of thinking. Language bears concepts that belong to experience and to the knowledge of humankind. Tools such as language have developed throughout history. (Moll, 1994, p.45). Tools, like language, that compliment understandings of various concepts, can also be mediated toward the development of higher order thinking skills. Language initiates connections among concepts and leads to higher order thinking skills. According to Vygotsky, it is the social interaction between students and peers, or teacher and students that spurs on reflective and metacognitive thinking: mental activity.
Vygotsky viewed Mental Activity as a point, a socially interactive point, where language and thought came together and concepts became internalized (Moll, 1999, p. 45). Zinchenko (1985) supports Vygotsky's ideas within the framework of his "Activity Theory." Within it, he saw the internalization of semiotic symbols of speech and/or writing as part of an activity in which children engage themselves when they socially interact. Zinchenko states that the "semiotic transformation (internalization) is not of the tools used, but, of their meaning" (Zinchenko, 1985, p. 102). It is this semiotic transformation of symbols (tools or language) into personal meaning which leads to internalization of concepts. Students take an interest in the language or activity then for one reason or another, they decide whether they will interact with it (symbols tools), enough to gain personal meaning.

It is Vygotsky's concept of development that asserts, "cognitive development can be understood as the transformation of basic, biologically determined processes into higher psychological functions" (Moll, p.127). As humans, we are born with certain basic processes (perceptual, attentional, and memory capacities). However
it is Vygotsky's (1978) contention that, through language, socialization, and education, those basic processes may or may not be transformed into higher psychological functions (reflective and metacognitive skills).

Critical Thinking Skills:

Reflection and Metacognition

Critical thinking skills are an important part of learning. Reflection and metacognition are thinking skills that,

help us to access and make sense of our knowledge. Learners and teachers are empowered by being aware of and able to control their thinking, and this is associated with increased motivation, willingness to take risks, enhanced self-esteem and independence. (Jan, 1993, p.4)

Reflective and metacognitive skills need to be considered and understood so that they can become part of the instruction which guides our growing LMS population.

Reflection involves analyzing and making judgements about what has happened; it is integral to every part of learning. It touches most of the processes of the mind. "Metacognition refers to the knowledge individuals have of their thinking processes and strategies, and their ability to monitor and regulate these processes. This requires
learners to analyze, reflect on and monitor their own learning (Jan, et al, 1993, p. vii).

Together, the students and the teacher can engage in a social activity which inspires reflective and metacognitive thinking among the students. These concepts in learning need to be addressed when considering the growth and development of our future leaders.

In spite of this, these are, also, the concepts which are, generally, not being presented to our Language Minority Students (LMS). Instead, much of our curriculum is driven by the need to pass standardized achievement tests that focus on the acquisition of Basic Interpersonal Cognitive Skills (BICS) in English. BICS are reflective of what is basic in learning: isolated letter sounds, letter formation, grammar, pronunciation, vocabulary. Hernandez (1993) states, that,

While such mechanical skills can be of service to students, they do not replace the need for richer language experiences that foster more advanced cognitive processes such as inferring, planning, monitoring, hypothesizing, or problem solving." (p. 350)

Language experiences that foster the, aforementioned, cognitive processes, are metacognitive. These language experiences mediate social contexts and structures that entice children to think analytically about how they
think, why they think, and when they think. Hernandez (1993) goes on to define the metacognitive processes as,

beyond cognition—that is, the learners ability to go beyond memory, beyond comprehension, or beyond writing, to awareness and control to orchestrate the cognitive processes needed to remember, read for meaning, or write expository text. (p. 352)

Metacognitive thinking skills are an important part of how children will cope in our changing, growing mixed-up world. They will better contribute to our society if they can think critically and analytically when making decisions that influence their own lives, as well as, the lives of those around them.

As one might guess, thinking skills are a large part of the learning process. Without thinking, making connections (links) and making sense out of our world, our ability to survive would be severely impeded. Had the first man or woman not had the ability to use strategies for hunting and gathering food, we might not be here right now. We are here because, as humans we are able to think critically, socialize (network), change, and grow; there is mental activity for deliberate purpose. Hernandez (1993) summarizes that,

Theorists such as Vygotsky(1978;1986) and his students followers (Luria 1976; Wertsch 1981) found that cognitive development is based on social
interaction and that language serves as a mediational tool for the development of higher mental functions. (p.353)

Higher mental functions (critical thinking skills) develop students' metacognitive abilities. They organize social contexts that structure opportunities for children and teacher to use language. Such structures, allow teachers and students to mediate (guide and model) questioning, self questioning, and linking ideas to previous/predicted/current experiences, in addition to, thinking critically (examining, clarifying, organizing, reasoning, analyzing, generalizing, hypothesizing, and predicting) (Jan, et al, 1993).

It is difficult for language minority students to participate in the development of these cognitive processes when their ideas are not understood, or they do not understand the classroom language.

There is very little doubt that the most effective means for communicating and interacting is through the child's primary language, especially when the primary language is used to teach academic content. (Krashen and Biber 1988) (Hernandez, 1993, p. 353)

Without creating sociocultural contexts in which the student can identify, we organize failure for ourselves and for our language minority students. We cannot respond to LMS' needs by requiring more lower-level English skills.
(BICS). "The academic level of curriculum must be appropriate. The metacognitive value of bilingual instruction is lost if either language is used to specifically teach lower order skills" (Donato, et al, 1993, p. 17).

We 'write off' the students' valuable experience and participation because LMS are denied the opportunity to feel good about contributing and sharing personal knowledge and experience in their mother tongue. I do not believe that this is our intention. Nonetheless, that is what is happening; our language minority children are falling further behind.

Are we truly making an effort to revitalize our instruction? If so, it should include a Bilingual/ Cross Cultural education that mediates reflective and metacognitive thinking skills for our LMS?

Hispanics and Culture

Currently, Hispanics are facing astounding dropout rates which only seem to be getting worse. Our educational system would seem to have alienated many of our Hispanic students. We need to reconsider how we facilitate and engage our language minority students in learning.
Mexican-American students consistently under achieve on measures of school performance and drop out of school at rates that should be of national concern. Mexican-American students have learned what they have been taught; their low test scores and high drop-out rates result not from the students' perceived lack of ability but rather from what and how they are taught in America. (Hernandez, 1993, p. 350)

One answer to this dilemma might be to create socioeducational contexts that make LMS and their experiences important in the context of their learning. Our classrooms and the instruction that takes place within, paints 'a picture' in the mind's eye, about the importance of other cultures and their languages. That 'picture' is both implicit and explicit. In the former and the latter, it is 'a picture' that rejects the primary language (home language).

If one has a first language of autonomy, family, and security; how can they be expected to give it up for the insecurity of a second language that does not allow them an opportunity to share a valuable, unique part of oneself. "To posses all the knowledge and lose one's own self is as awful a fate in education as in religion" (Tate, 1993, p.21). It represents a loss of an integral part of oneself, in that, it strains cultural perspectives and hinders learning ability, as well as, familial ties.
and self-esteem. In fact, second language requirements are an implicit form of rejection. Would it not make more sense for the student to react against it, explicitly or implicitly? How can one give up their language (a part of oneself)?

Language represents all that is special to our basic communicative needs to understand and make sense of the world around us. Furthermore, How can language minority students understand, value, and embrace important science concepts in English, when they are restricted, implicitly, from participating in the learning context?

Most English speaking first graders would revel at the opportunity to participate in discussions where prior social or cultural experiences can be related to the Sciences (Science/Social Science). Language Minority Students will probably resist participation for fear of embarrassment; There is something wrong with this 'picture.'

When we take into account the needs of our language minority students, we should not only consider their culture, but, also, the manner in which we should prepare for their internalization of important science concepts and literacy. After all, what are we trying to prepare
these language minority students for? The reasons for which we prepare these students, on a daily basis, explicitly and implicitly, is just as important as how we intend to facilitate that preparedness in the mediated classroom contexts.

As we develop socioeducational contexts in the classroom and respect what the student brings to class (language and culture), we, also, provide them the opportunity to participate metacognitively and reflectively. Metacognition and reflection represent the critical thinking skills that will better prepare our LMS for the job force of the second millennium. According to the Committee for Economic Development, a general education would include,

schooling that teaches students to think critically and analytically, to cooperate and communicate as well as compete, to assume responsibility for themselves, to solve problems, and to continue to learn.... With the advent of computers and technology changing at an exponential rate, there is no doubt about the prerequisites for the future job force. In the report, Workforce 2000, put out by the Hudson Institute (Ryan and Cooper, 1994, p. 213),

Many necessary jobs for the future will require the highest education, possible, and the ability to think critically. Only, in such a way, will they be able to fill
the need for professional, technological, and positions in the sales fields.

A Job Force for the New Millennium

Conversely, we are preparing a great portion, of our LMS, for vocational and agricultural positions which will make up less of our job force than it has in the past. Workforce 2000 will reflect, "that greater numbers of well educated people will be needed for our economy, while the poorly educated will be competing for a shrinking pool of low paying, dead-end jobs in the service sector (Ryan and Cooper, p. 213)." Currently, we are preparing our lower socioeconomic language minority students for such a fate. If we truly wish to do our LMS a service, we need to consider learning strategies that facilitate a necessary curriculum. We can facilitate a worthwhile curriculum by preparing LMS for critical thinking positions of social power, decision making skills, and the ability to socially interact with people of different backgrounds, as well as, languages.

Unfortunately, our current system of instruction emphasizes a need for competitive structures rather than
cooperative ones. Just as socioeconomic forces are changing lifestyles within the classroom and the family home, the social skills required for our future job force can be mediated by incorporating strategies recommended by Bilingual/ Cross Cultural education through cooperative, collaborative learning.

As explained previously, Bilingual/ Crosscultural education helps to promote self-identity, as well as, understandings between cultural groups. In this socioeducational context, learning and social interaction will guide academic, social, and future success.

Law of Cultural Development

Social interaction is considered a dominant issue when children’s understanding and internalization of concepts is to be considered. Vygotsky explains how the “social” intervenes in our understandings of the world around us through his Law of Cultural Development. The Law of Cultural Development is explained as,

Any function in the child’s cultural development appears two times or on two planes. First, it appears on the social plane and then on the psychological plane. First, it appears between people as an interpsychological category, and
then within the child as an intrapsychological category (Werstch, 1978, p. 26)

Language, the most universal form of communication, exists on the social and becomes internalized on the interpsychological plane. It provides an avenue to further develop the cognitive processes.

It is Vygotsky's contention that development of learning and cognition are not only part of the brain, stem and cortex, but that development first occurs outside of our bodies and minds when we interact with objects or living things.

For instance, the first time a child hears the term "doggy" (on the social plane) as his mother points toward a dog, which has four legs and fur, a light bulb goes on and the child comes to associate all four-legged, furry animals with the word "dog." It is this type of an experience which the child shall reflect on the next time he sees such a creature.

The child will think back on this prior learning to make the connection with four-legged animals and name them "doggy." With time and exposure to other concepts (through mediated activities) regarding animals, the child will come to find and think-out what makes a dog, a dog and what makes a cow, a "moo."
It is through this participation, child and competent other, that a child comes to think, organize, and recognize what he/she knows. In essence, without this interaction the child would make up a word to represent meaning. The student, being human, has a natural desire to communicate needs and understandings of that which surrounds him/her.

Zone of Proximal Development

It is within the Zone of Proximal Development (ZPD), Vygotsky (1978) that we come to know the level at which the child is operating in relation to a topic and the potential to which he/she can aspire. In a ZPD a student is guided to complete a task. In order to ascertain at what level a student is operating, the teacher may do some problem solving or concept mapping to determine prior knowledge. Once the teacher has done this, it is determined how much more the student can do or learn how to do with the aid of an adult, or confident and competent peer; What is the student's potential with confident and competent help?

Once the mediator (teacher) realizes to what potential the child can rise, the facilitator mediates
toward that potential. The teacher develops a gauge as to what students can do with help, and what the student can do with mediation. Potential is what the student can do with others guiding him or her.

At first, the mediator (teacher or peer) provides complete guidance by modeling and doing most of the work or discussion, but gradually, the student acquires more and more of the responsibility toward completing the task. When internalization of the task has occurred, the student will be able to perform it independently without teacher support and be ready to move on to a new ZPD or to focus on another ZPD which was encountered along the way.

It is the purpose of this study to mediate the ZPD through the use of tools such as the 'first language.' guided questioning, and concept mapping (mediated structures), that occur in a socioeducational context that provides varied opportunity for participation.

It is proposed that the student will be encouraged to participate reflectively and metacognitively in such a socially mediated activity. It is hoped that students may eventually internalize the use of concept maps, as well as, make one up on their own to reflect the knowledge internalized in the investigation of weather.
Basic Individual Cognitive Skills and Cognitive Academic Language Proficiency Skills

From birth, children, through constant interaction with adults, the low processes are transformed radically into higher mental processes (Moll, 1994, p.46). Our current curriculum responds by reinforcing the lower, basic skills.

Basic Individual Communication Skills (BICS) stress the importance of pronunciation of grammar, spelling, isolated vocabulary, letter sounds and formation. Without negating these basic skills, we should shift our pedagogical focus towards the mediation of Cognitive Academic Language Proficiency Skills (CALPS) or higher order thinking skills. Such skills include the higher cognitive processes of questioning, self-questioning, reflecting, and critically analyzing understandings and anomalies.

In BICS, a teacher would teach vocabulary, grammar, and pronunciation in isolation from a literature text. Conversely, in CALPS, a teacher would use abstract
thinking, discussion, and writing to study the same things, but, in the context of literature.

Schools do not generally use CALPS as a means to facilitate learning for Language Minority Students (LMS). Instead, they offer a curriculum based on BICS. "BIC students," usually LMS, are subjected to meaningless, isolated, pronunciation and grammar skills which are haphazard and do not motivate student interest because they are not part of the student’s reality or experience. Students do not look at parts of words or sentence structure when they read for meaning. Instead, they look at whole paragraphs and whole books to achieve a true understanding of the concepts that they seek to understand (Flores, personal communication, 1998). Students find meaning and motivation for learning in ideas that embrace their interests and experiences.

CALPS provides this type of an understanding through broad concepts to smaller ones (whole to part to whole) when the interest of the student is enticed. CALP’s students have their curriculum mediated within social contexts that have relation and importance to the student’s personal self. In a CALPS classroom, the student is enticed to participate in his or her first language. In
such a context, LMS should investigate topics which draw their interest and motivate them to want to write, spell and punctuate within the context of the topic.

Unfortunately, LMS are not receiving a curriculum based on what they know or wish to know. They are being instructed in a manner which deprives them of the opportunity to get the knowledge, in a language, that will empower them to gain new understandings. With such instruction, it is quite logical that LMS students will eventually become bored with the curriculum, presented as it is, and probably dropout of school.

School teachers need to find new activities for mediating the student’s learning. We need to engage children through their interests and experiences. This reflects the child-centered environment which is of primary concern to the pedagogy behind Bilingual and Cross Cultural Education. This type of pedagogy empowers students to act and share in their learning. The facilitator of knowledge needs to be aware of a student’s language and cultural (experiential) background before planning for their learning. We need to use mediational tools that allow for, and elicit students’ participation.
Science and Teaching

The American Heritage Dictionary defines science as, "The observation, identification, description, experimental investigation, and theoretical explanation of natural phenomena (1993, p. 612). Through science, we come to understand that natural phenomena affect our lives. As human beings, we have an innate desire to manipulate our lives and our environment so that we can yield the most to our advantage. Therefore, science should be taught to all children, regardless of language ability. Cognitive processes, such as, classifying, measuring, using space-time relationships, inferring and predicting, and applying, can be mediated within a socioeducational context organized to encourage participation and share experiences. Meanwhile, students are also being guided to make links (connections) with the world around them, as well as, across the curriculum.

The California Science Frameworks (1990) describes science as, "a field that is constantly adapting to new advances in basic knowledge, medicine, and technology." It goes on to explain that, "How the natural world works is important to everyone's education (p.1)." Science affects our lives and the world around us. It should be noted,
that within the context of science, we develop our critical thinking abilities and the art of inquiry. Both of which are detrimental to our survival, as a species, here, on this planet.

Everyday, we are reminded of our environmental "melt-down," and how it will affect our livelihoods. We are approaching a time when environmental concerns will overshadow any threat of war or terrorism. As time unfolds, we are realizing the importance of collaborating with other countries to better understand and control the environmental changes.

Classrooms need to reflect on this serious issue by preparing our children to collaborate positively. Students need to see how we can build on each other's words and ideas to create something good rather than something bad. By creating socioeducational contexts and structures we can mediate students to a positive end. Every classroom, black, white, or brown holds the possibility for contributing to our survival. Unfortunately, our efforts in "first grade science" do not seem to reflect the seriousness of this issue with LMS.

Generally, LMS do not speak the fluid English of their teachers. Or, maybe, language minority students are
seen as incapable of contributing to such a noble cause: Science. Instead, LMS will focus on English language skills taught outside of any Science context.

Science versus English

Some educators have recognized the importance of minority contributions in science, and have found it necessary to make minority participation in science a prime directive. One goal of science education, including earth and space science education, as expressed in the Liberal Art of Science, is to increase the numbers of women, Blacks, and Hispanics who major in natural sciences and pursue science and science-related careers (Barba, 1993, p. 2).

As it stands now, science contexts and mediated structures facilitating science concepts are being sacrificed for English skill drills in LMS. As a result, LMS are not being facilitated with a science curriculum until they are linguistically prepared to enter such a complex subject area. Students are assumed to be cognitively deprived because of their inability to master English.
Somehow, there is a misconception that it is necessary for LMS to learn English before participating in the higher order learning of science concepts.

The notion that students should be exposed to 'higher-order thinking skills' was perhaps salutary. However, some educators voiced reservations about low-achieving students. The belief that 'low-achievers are not ready for instruction focusing on the cultivations of their thinking skills until and unless they have first mastered 'the basics' was commonly asserted." (Foster, 1989, p.461) (Donato, et al, 1993, p.20)

As a result, science literacy is postponed for LMS until they can fully understand and communicate its ideas in English. In contrast, others believe that science should be as important and basic as mathematics and language arts.

English-Only appears to be the prime directive: implicitly or explicitly. However, as stressed in the California State Frameworks (1990), science is not an option; it is a directive. Teachers will have to find a way to teach thematically while making connections across the curriculum that incorporate the three cueing systems: semantic, syntactic, and graphophonic (Goodman 1970, 1984). Teachers are required to expose students to many subject matter areas; Teaching thematically is one way to mediate and connect knowledge across the curriculum.
Students should be exposed to science concepts through socioeducational contexts that mediate and negotiate an understanding, interest, and importance of scientific knowledge.

We need to inspire our Language Minority Students (LMS) to participate in the discourse and experience of science. The nature of the experience is critical. There is no time to postpone the science curriculum; the time for science is now. "Research indicates that if students have not had a positive science experience by the fourth grade, they are probably lost to the sciences for good (Bernhardt, 1996, p. 26)."

The science context should be guided and provide students with the opportunity, "to compare and discuss their observations and interpretations. Talking and writing about science are essential characteristics of excellence in children's science programs (Triangle Coalition, 1986, p. 4). It is through this dialectic that students are allowed to share, learn and check their understandings. In such a social context, students will come to learn from their peers, as well as, from the teachers and the socially mediated structures organized for the context."
Teachers and Tradition

Teachers are continually confronted with a deluge of information regarding LMS and learning, not to mention, the ever increasing curriculum to be taught. Much of this information is based on traditional ideology: taught solely in English. It is the same ideology with which many teachers have been raised. It would be natural for many teachers to teach in a way that we were taught. Most of us have been raised, in our schools, to teach in a way reflective of a traditional, eurocentric method; implicitly or explicitly. Students in such classrooms would be accustomed to the following norms:

- stay in your seat.
- be quiet
- speak only when spoken to
- do your own work
- do not yell out in class
- do not help your neighbor
- do not touch or move anything
- use English
- read the chapter and answer the questions

After many years of traditional schooling, how are teachers to respond when organizing social contexts for
our students. It is difficult to change something which has been ingrained in us throughout our growing and learning years. Teachers who do want to change this style of pedagogy find it very difficult with the current classroom climate (unstable educational philosophies, violence, and crowding). Some lack the support (educational policies, materials, bilingual staff, and interaction with colleagues practicing similar pedagogies).

Faced with these obstacles, it appears that, "teachers become discouraged and disheartened. For lack of any alternative, we fall back on the 'sink or swim' approach (Bernhardt, et al, 1996, p.26)." The 'sink or swim' approach is paramount when English and English 'test-taking' skills become the goal. It, also, becomes the method for assessing LMS' cognitive ability developing "English" skills. English becomes more important than the development of science concepts in mediated socioeducational contexts that foster critical thinking skills.

When language minority students do have an opportunity to experience science, it is in the setting of a traditional classroom. The National Science Foundation
found that science education follows the traditional practice: At all grade levels, the predominant method of teaching was recitation (discussion with the teacher in control, supplementing the lesson with new information (lecturing) (Triangle Coalition, 1986, p.3). These are the traditional classrooms where science curricula consists of reading a chapter, answering review questions, and, possibly cutting and coloring a ditto picture. When we consider a traditional classroom for our LMS, we should critically reflect on its' origins and the origins of those to whom we will mediate knowledge.

The dominant approach in public schools to educating students is that of traditional education. This curriculum has been most effective in educating students that are of western European ancestry who have experienced few economic hardships. However, the United States is a nation of diverse cultures. In spite of the diversity of students backgrounds, the traditional curriculum is heavily skewed to western European culture and ways of thinking. (Bryant, 1997, p. 28)

This is a difficult concept for those who have never learned a second language or culture. It is difficult to understand how learning is different among different cultures. In regards to instructional practices, Some have come to believe, "what is good for the goose is good for the gander."  This philosophy of developing pedagogy and
cumculum, suggests that we should all learn alike. In this case, the gander is an Anglo mainstream and speaks English like all others should. Unfortunately, when LMS cannot live up to the expectations of an Anglo-centric/traditional education, we are considered failures or "at risk."

The mainstream philosophy tradition implies, "If students cannot learn science this way, the teachers reason they must be average or below average (Atwater, 1996, p.42)." This type of assessment is attributed to the child's limited English ability as perceived by the limited 'English-Only' perspective. All the while, the students' cognitive abilities go unnoticed because our classrooms are not prepared to speak their language, embrace their culture or facilitate social contexts and mediate structures that validate their experiences.

Currently, "Many girls, Blacks, Hispanics, and the economically disadvantaged avoid science and technology courses, whenever they can, because their experiences with elementary science are poor or non-existent (Triangle Coalition, 1986, p. 4)." Generally, these students are filtered from the stream that flows into the college preparatory science courses. As a result, most scientists
and engineers represent the Anglo-male. This is quite astounding when we consider that future job opportunities will concentrate in the areas of science and engineering. In delaying science instruction we, also, lessen the pool from which we can draw answers to solve our world problems.

Second Language Learning and Science

Learning the basics of a second language is difficult enough without, also, having to explain scientific concepts to someone assessing your every word. Some students do not communicate what they know or suspect, because they fear that they will say it incorrectly in a second language. "Language learning often begins in silence, as students listen and absorb as much as they can from the environment" (Bernhardt, et al, 1996, p.27).

Likewise, teachers should also understand that for some students, fear of correction -- loss of face-- is a powerful incentive to keep quiet." We cannot always judge our children by what they don't say. We need to look beyond and find ways to get the child to share their knowledge, experience, and help them make connections:
Bilingual/Cross Cultural Education. Bilingual/Cross Cultural Education facilitates opportunity for LMS. Opportunity allows students to experience science concepts while being mediated with the second language in context, but not as the goal for cognitive development. Teachers can observe and assess the potential for second language relevance in different science concepts.

For some LMS, learning a new language may feel like a betrayal of their home language and culture. In a bilingual/cross cultural classroom, science concepts can be mediated in the students' first language so that their development of critical thinking skills is not 'stunted' by second language only requirements.

As teachers observe and prepare students for a second language in science, they can plan meaningful contexts that support science concepts learned in Spanish. Then, as "students begin to open up, it is better to focus initially on what they say rather than how they say it (Bernhardt, et al, 1996, p.27)." In this manner, students are not deprived of the opportunity to share their language and their understandings of science knowledge while refining their English.
Classrooms should facilitate social contexts where students can participate—drawing, speaking, writing, and reading—in a way that makes them feel comfortable. These social contexts should facilitate a science that promotes the development of their cognitive abilities. These contexts should be organized to sponsor CALPS, not BICS. A BICS curriculum would simplify or 'water-down' science concepts.

"Watering-Down" Science

"If you oversimplify the grammar and vocabulary, you deprive the students of the very words and linguistic structure they need to understand the science (Bernhardt, et al, 1996, p.27)." Despite language and cultural differences, we must find ways to meet the science needs of our LMS, without negating them the opportunity to experience the CALPS they need in our ever changing world.

In classrooms where science is taught, LMS receive a "watered-down" simplified science. In some cases, it is reasoned that science concepts cannot be taught while students are struggling to learn English skills. This creates a self-fulfilling prophecy. Current school politics and philosophies reflect that school board
members, superintendents, administrators and teachers presume that because a child doesn't speak English, the child is, also, incapable of higher order thinking skills when it comes to science concepts. They do this implicitly and explicitly.

This pedagogical practice is based on the notion that if second language learners do not articulate (in English) their ideas, they are not learning or developing their cognitive abilities and something is wrong with them. However, this lack of articulation (in English), generally, occurs because LMS do not feel proficient enough to voice their ideas. Likewise, the teachers are limited in their ability to communicate in the child's language and understand the vast amount of valuable knowledge that the child has actually brought to the classroom context.

Science and the Multicultural Environment

In the article, The Multicultural Science Classroom, Mary M. Atwater (1996) expects two critical elements in a creative science curricula. One element is that students should see how science is part of their living experience.
In addition, "Teachers must have the ability to communicate with all their students and create an environment in which all students desire to communicate with the teacher and other classmates (Atwater, 1996, p. 43)." Instead, we put our students into 'half-baked,' 'sink' or 'swim,' 'English is the goal' bilingual classrooms, when available. Then, when LMS finish a unit, we have our limited and non-English proficient students take a written, or, oral test knowing that they cannot read it. They flunk the test and we resign ourselves to make sure they learn English before we mediate (mediate) anymore science.

In contrast to such a classroom, but much like a bilingual/cross cultural classroom, "A multicultural classroom would see students who are not ability grouped learning science. In this setting, active students think and talk about science to each other (Atwater, 1996, p. 44)," as well as, the teacher. This is done in a language that they are most comfortable speaking. These students, also, express more understanding when spoken to in their home language.

"Everyday, more than 6 million students come to school from homes in which a native language other than
English is spoken (Bernhardt, et al, 1996, p. 5). "Many of these children have come from Hispanic America. These students are expected to assimilate or acquiesce to the mainstream teaching and learning styles. LMS are held accountable to meet the challenges of a new culture and a second language before being expected to develop critical thinking skills in the Sciences.

It is the teacher, with the support of the administration, who should be able to organize social contexts and mediated structures that encourage LMS to discourse and experience critical thinking skills in science, despite, language and cultural differences. "We must be of the possibility that through content and activity selection, we may be limiting student's learning (Berliner, 29).

Cultural Inclusion and Science

Cultural inclusion is the integration of the learners culture into the academic and social context of the science curriculum to aid and support academic learning (Baptiste, 1995). Language is a very important component in one's culture. Recognizing culture gives
value to student experience and knowledge. Simultaneously, it allows for the mediation of valuable science concepts.

"Culturally inclusive classrooms, socially mediate science concepts by organizing for cooperative learning, constructivism, questioning techniques, strategies of inquiry, creative and critical thinking, and authentic assessment of student performance (Bryant, p. 50). However, these practices are not as effective when teachers believe their students to be limited by their inability to speak English. Efforts are focused on English language development. As a result, pedagogical practices that could make a difference for LMS are not reflective of our current classroom climate, which serves a large Hispanic population.

The business of conducting class as usual, will have to change if LMS are to succeed. Cultural inclusion stresses changing science programs to make them culturally consistent, relevant, and meaningful to diverse populations (Baptiste, p. 34). The organization and facilitation of science concepts must be changed so that cultural learning styles are respected.

Because learning preferences and styles have been identified as important variables in the scholastic success (or failure) of ethnic minorities in the United States, determining how
these students process information in a science classroom can provide valuable information on which to base responsive instruction and educational experiences. (Cazden, 1988, p. 20)

Learning preferences and styles need to be looked at critically as we strive to redesign a curriculum that provides a foundation for cross cultural learning. The design of the current curriculum is failing our LMS. Alternatives need to be sought. Among the alternatives sought, bilingual/cross cultural (multicultural) science programs encourage the use of the home language. Much like multicultural programs, bilingual/bicultural programs see the value of a student's home language. They use this first language to guide the development and mediation of science concepts for our second language learners. This shows respect and value for other cultures and recognizes that,

Multicultural dialogue is more than just mere talk or chat. It is a meaningful exchange of ideas and emotions among stakeholders in a culturally diverse society." In addition, "Multicultural dialogue fosters familiarity between students about their needs, concerns, and goals. Such a dialogue should be embedded in the daily activities and discussions that typify American schools. (Bonner, 1996, p. 50)

The need for dialogue in learning contexts is a practice common to the histories of many caste-like minorities. Grandparents and parents, as well as, aunts
and uncles that have gone before us passed down important survival information. This has been the historical learning context of many caste-like minorities. The oral tradition had been a popular way of socially mediating knowledge before the traditional, Euro-centric pedagogy took over.

There is more than one way to learn science, and "every student has a unique learning preference, style, and approach" (Cazden, 1988, p. 21). Teachers of science must understand that the traditional Eurocentric perspective has been at the root of the educational goals set for our LMS during the last four centuries. Still, we cannot remember a time when it was successful for any caste-like minority group as a whole. Yet, we adhere to the vision of the traditional paradigm: an English-only America. This tradition implies that LMS learn English, or, be denied knowledge of the sciences: contrary to Lau versus Nichols. (Bilingual Education Office, 1994)

Traditional environments, instructional practices, and methods being used need to be replaced. We need to find a way to let go of a pedagogy that has not served to engage our LMS. The "new" pedagogy should enlighten and entice our LMS' ability learn more about science and the
critical thinking skills that create opportunity for all. Until this happens, however, LMS will focus on the learning of a second language.

In planning science contexts, teachers should remind themselves to consider the following:

1. Assume students can learn.
2. Use exciting and challenging hands-on activities.
3. Talk to students about their learning styles.
4. Develop a repertoire of content strategies and activities.
5. Learn about the history and culture of the various groups.
6. Help students see themselves as future scientists and appreciate the multicultural history of science.
7. Build opportunities for success into curriculum and create climates conducive to learning.
8. Provide diverse learning experiences (in and out of class).

Not all LMS have learned "strictly" from a traditional, eurocentric textbook. Some LMS have learned successfully from their experiences and dialogues. Some cultures do learn more in dialogue and experience than
what others learn while sitting quietly at their desks, reading a book. The Eurocentric, traditional perspective is in no way reminiscent of the oral tradition of America's 'caste-like' minority cultures.

Oral Tradition and Group Discovery in Science

"The oral tradition as a means of reporting group discoveries from one generation to another needs to be addressed by historians of science (Ronan, 1982) and to be included in earth, space, science textbooks for children (Barba, 1993, p. 6). In addition, we need to validate the oral tradition as a tool for inspiring our students' participation in the discourse of science.

When organizing for the discourse in a social context, we are also recognizing that people do not learn science in a vacuum. Vygotsky (1978) explains the dynamics of social interaction in his Law of Cultural Development. Basically, he emphasizes the importance of social interaction that is guided by discussion in the group. In fact, for many caste-like minorities, a group effort has been the cornerstone of their cognitive development and learning.
In contrast, many of our classrooms promote individual achievement through use of curricular materials and pedagogical practices.

By insisting on identifying a particular individual as being a "discoverer," of knowledge, we neglect the fact that many cultures do not value individualism and 'discovery,' but rather see the group as being the important entity (Barba, 1993, p. 4).

The conflict and, possibly the barrier to LMS learning is that, in the 'eurocentric mainstream curriculum,' individual achievement is rewarded and considered tantamount to success.

However, one cannot dispute the fact that many important scientific contributions were made through group discovery and passed from one generation to another via the oral tradition. For example,

nearly 2000 years ago, Africans living in what is present day Tanzania discovered a technology for producing carbon steel, a method which was not matched in Europe until the mid-nineteenth century (Barba, 1993, p.4).

Another group contribution includes the,

discovery of mining procedures used to extract silver ore from Potosi mountain developed by the Quencha Indians is a group discovery which was passed orally from father to son (Barba, p. 6).

These are only a few of many discoveries that were yielded through social interaction.
These group discoveries, however, did not adhere to the "scientific method." Nor, did they present their findings before a recognized science community. Instead, they shared this valuable information within the culture through the oral tradition of teaching their students. This is not acceptable to the "powers that be" in the teaching of science. Hence, much of this knowledge is disregarded as "folk practice or quackery" (p. 6). As long as curriculum and the social contexts are organized to continue to de-value these group contributions, our LMS will not be afforded a meaningful opportunity to learn.

LMS deserve an opportunity to learn in a socioeducational context that has been part of a successful cultural practice, for generations. LMS are empowered by opportunities to interact with their peers in groups that share and build new knowledge about Science and related concepts through oral tradition. "Some cultures value group discovery and not individual initiative; thus group discoveries need to be included in our instructional materials (Barba, 7)." Teachers, now and in the future, will need to be prepared to facilitate a dialectic which guides development of science concepts. The teachers will need to understand how and why social
interaction is useful in facilitating the development of
science concepts.

Significance of the
Proposed Study

The significance of the study derives from its goal
to illustrate the importance of providing socially
mediated contexts that support, guide, and encourage
student participation and internalization of scientific
concepts. Learning is first social, then it becomes
personal. This topic is relevant because learning is a
social activity. In order that students have successful
and meaningful learning opportunities, teachers need to
organize learning within a mediated socioeducational
context that fosters metacognitive and reflective thinking
skills in the students' first language. This study
attempts to show the value of organizing such contexts for
language minority students so that the experience leads to
school success.
A qualitative research design was used for this ethnographic case study. Participant observer is the strategy used for data collection. This type of strategy allowed for interactive observation. A participant-observer is a person who has a role at the site in which he or she intends to study. Although participant-observer is not considered a traditional ethnographic role, it is a participative role in which the ethnographer is sensitive to student needs and records phenomena as faithfully as possible. Participant-observers, generally, rely on observation, video and audio tape transcriptions, as well as, artifact collections.

In this study, the role of ethnographer was played by the teacher. Before beginning this study, students and teacher had been together 6 months prior to starting this unit on weather. In that time, the teacher and students were able to establish a supportive and working relationship. In creating such a relationship the teacher established a positive atmosphere, encouraging ways, friendly demeanor, served as a guide, a translator, a fair
disciplinarian, a catalyst, a mediator, a model, and somewhat, of a child. Establishing such roles requires a great deal of thought.

This type of working relationship complemented the data collection. In providing students with an opportunity to explore, question, and answer with little or no apprehension, the children were able to respond more authentically. The teacher mediated an environment conducive to the discovery of knowledge, and the generation of knowledge.

Social scenes observed included small group, whole group, and individual participation was mediated in planned, as well as, spontaneous activities. Discussion was mediated and meaning was made in whole and small group settings.

In this particular study, the teacher acted as the ethnographer with the role of participant-observer. The teacher/ethnographer organized this study with a wholistic approach while emphasizing Vygotskian Theory.

The teacher/ethnographer created socioeducational contexts, which are founded in Vygotsky (1978): The Law of Cultural Development. The Law of Cultural Development explains that students, first, learn on the social plane.
then internalize what they have learned on the interpersonal plane. This Vygotskian perspective provided a basis for this investigation and the daily pedagogical practices used to mediate learning and opportunity.

In addition, the teacher/ethnographer has been teaching for 3 years in a first grade, bilingual classroom. The teacher in this study is of the same cultural background as the students and speaks the students native tongue fluently.

In the course of this project/study, the teacher/ethnographer actively sought student participation in Spanish and English. Students' cognitive abilities were not considered when selecting participants for discussion or other data collection. Multiple data collection strategies were employed: salient observation, discussion, shared reading and writing, both video and audio tape transcriptions, as well as, artifact collection.

Design of the Study

The study lasted from January to June of 1997. This study focused on capturing and documenting of L.M.S. acquisition of science language and concepts, as well as, literacy related to weather.
Goals for development in this weather unit are as follows:

- weather cycles and evidence of internalization.
- how weather changes affect our lives and evidence of internalization.
- Gain an understanding of the weather cycle. How do the forces of nature work to change water into a solid, a gas, or a liquid?

Embedded within the goals were the following science concepts and processes:

**Science Concepts**

- Patterns, cycles, and change.
- Water cycle (evaporation, condensation, precipitation, accumulation).
- Social implications of weather.

**Science Processes**

Appropriate science processes according to the California Frameworks curriculum guide include:

1. Observing- The scientific thinking process from which fundamental patterns of the world are constructed. As we learn to observe critically, we gain an understanding of our environment. We need to learn to use it effectively.
2. Communicating- The scientific process that conveys ideas through social interchanges. As humans, we are able to create and use language and symbols to share ideas.

3. Comparing- The scientific process that deals with concepts of similarities and differences. (p.147)

4. Ordering- The scientific process that deals with patterns of sequence and seriation. Ordering is the process of putting objects in a linear format. (p.147)

5. Categorizing- The scientific process that deals with principles concerning interactions. Categorizing is the process of putting objects or events together using a logical rationale. (p.147)

6. Relating- The scientific process that deals with principles concerning interactions, seeing relationships between and among things in our environment is quite different from comparing or categorizing objects on the basis of their characteristics. (p. 147)

7. Inferring- The scientific process that deals with ideas that are remote in time and space. Logical conclusions made from a chain of reasoning or answers derived through reasoning from evidence and premise. We make inferences based on pre-established patterns observed and communicated previously (p. 147)

8. Applying- The scientific process by which we use knowledge. Various scientific knowledge is tied together to create new knowledge or make new
connections to understand the changing world around us (p. 147)

Overview Charts

The 'overview chart' details (brief descriptors) each category and shows how and why the structure and social context were organized and mediated. The chart includes the following categories: 1) science concepts; 2) science processes; 3) objective; 3) artifacts; and 5) a briefly stated reason for developing and mediating the context. The following charts provide an overview of the complexity of socioeducational contexts used during the weather unit (see Appendix A).

The Selection of Social Contexts to be Analyzed

Eight salient social contexts and their structures were chosen to be analyzed. The social contexts selected to be analyzed, included those that: 1) were audiotaped; 2) had artifacts; 3) used mediated structures; 4) showed links across the curriculum; and/or 5) those social contexts in which students showed interest.
Methods of Data Collection

Methods of data collection included the following: teacher’s science unit journal, teacher observations, lesson plan book, transcriptions, video, and artifacts (student work, charts, and diagrams). Together they will serve as a guide in sequencing, reasoning, and recreating our weather unit.

The teacher’s science unit journal recounted social contexts in the science unit and personal observations of the social context. Some observations were recorded simultaneously; others, were recorded after school or the next day.

The teacher’s lesson plan book was written weekly, but changed according to student interest and teacher needs. The teacher’s lesson plans were not ‘set in stone.’ However, the teacher did try to maintain the focus in discussions.

Transcriptions were taken from taped social contexts. They were both planned and spontaneous. Video taping was done while students participated in shared reading, collaborative text writing (student writers), concept mapping (brainstorming), guided questioning, and during hands-on activities.
Artifacts were used to mediate for understanding of higher order thinking skills associated with the science curriculum, and to inspire collaboration. ‘Hands-on’ activities encouraged student interest, as well as, kinesthetic, and the mediation of student’s personal experience.

The artifacts were organized into the context of science and language learning. Science and language learning are reflected in experiments, collaborative text writing samples (charts, concept maps, diagrams), individual writing, drawing and making ‘art’ activities.

Social scenes observed included small group, whole group, and individual participation in mediated, as well as, spontaneous activities. Discussion was mediated and meaning was made in whole group, small group, and individual settings.

Selection criteria for discussion/interviews were both planned and spontaneous using guided and open-ended questions to entice participation. Additional selections included sustained observations, artifacts, and video/audio tape transcriptions from student teacher dialogue. Student work and experience was selected without attention to learning level of the student. Instead,
student work was selected because of the way it makes learning, on the social plane, visible. It, also, complimented the learning experience of internalization.

Limitations of the Study

Limitations of the study may affect data collection and student participation. Some limitations could be controlled by the teacher and others are unavoidable. These limitations included: time allowed for unit, class interruptions, timing, organization of curriculum, student and teacher attendance. The teacher/researcher should also concern themselves with the following: artifact collection and biases created in the treatment of data that has not been corroborated.
CHAPTER FOUR
ANALYSIS AND RESULTS

This chapter will specifically analyze eight salient, social contexts. They include the dialogue (teacher/student and student/student) and artifacts as presented in the chart in the previous chapter. As previously noted, these social contexts are organized by the teacher as students' needs dictated. The student's needs can be defined in grade-level standards, California State Frameworks, (1990) and their interests. These contexts were part of a first grade weather unit that used mediated structures within many socioeducational contexts. Social contexts facilitated the learning of scientific concepts and literacy in the child's first language.

Overview of Social Contexts

In a social context, the teacher is a model, a guide, a demonstrator, and a sociocultural mediator (Diaz and Flores, 1990, 2000). As such, the teacher organizes the teaching/learning of the student. This organization will "bridge the gap:" between that which is known and that yet to be learned. Children can feel pride and self-worth in knowing that they have shared personal, valuable
knowledge. In this type of socioeducational context the teacher mediates their ability to possess and contribute relevant, valuable knowledge.

The goal is to use ability and knowledge which is attainable through mediated guidance. Thus, students are provided a situational context which allows them to reach their learning potentials.

The teacher plays an important role, not only organizing the teaching, but, also, in mediating the discussion through the use of concept maps, guided questioning, and mini lessons. These socially, mediated structures clarify understandings in the home language by connecting them to prior experience. (Flores, personal communication, 1999)

Learning becomes authentic in such a socially mediated context. Learning is natural because knowledge is collaborative and negotiated through student consent and experience. Such learning is interesting and valued by the students because it’s on their terms and the teacher accepts it, or negotiates it, with them, so that it becomes valid.

Social contexts are part of our daily lives and aid in our understanding the world around us. One day, our students will be adults. Adults regularly network to gain access to better living. This networking represents a social context for gaining information.
In this study, students were given opportunity to share, relate, question, and organize new ideas for better understanding. They found themselves immersed in many social contexts which required them to read, write, and perform mathematical functions. They needed to make connections across academic disciplines and think critically (questioning, searching, reasoning, and responding) about what they do and say.

Socially Mediated Contexts

Socially mediated contexts, created in the class, prepare students to participate in society. We need to organize how our students participate socially. In that way, we can help them develop the skills necessary to succeed in our world, across the social contexts, languages, cultures, modalities, and philosophies.

In a bilingual classroom, English Language Learners can participate in either English or Spanish. Language is a great part of moving across the many social contexts in life. In a socioeducational context, language becomes an issue of participation and the internalization of scientific concepts. The point is, students are empowered to participate in a socially mediated context when they
are allowed to respond in a manner that is natural: their 'known' first language. However, this opportunity is not being presented for many of our language minority students.

It seems to make sense, that the language in which dialogue is provoked, would be the language which is spoken at home; a language nurtured since birth. After all, it is a mode of communication valued for its' importance in communicating needs and emotions. Such a social structure should be sought for its' ability to help us make sense of the world around us (science).

The idea of the social context is further supported by Vygotsky's Law of Cultural Development. The Law of Cultural Development states that learning is a social process which first occurs on the social plane and is later internalized on the interpersonal plane (Vygotsky, 1978). In other words, knowledge is first social, then becomes internalized: knowledge passes to the interpersonal plane. It is internalized as experience, interest, and participation dictates its' importance to our social being. In essence, learning is context specific to the activity organized (Vygotsky, Wertsch; activity theory). Organized activities are made 'context specific'
when students are mediated the opportunity to reflect on, prior, current, and future social settings which support the ‘linking’ of valuable experiences (knowledge) to create new understandings.

Furthermore, social contexts are authentic when communication is two-way. This type of context allows the student a chance to question, answer, and clarify his or her understanding in English or Spanish. This type of interaction may or may not include the teacher, but it does entice the student to participate. This social interaction occurs within a setting that encourages participation while bridging the learning gap for a child’s success. If the goals are participation and internalization of science concepts, the setting should not be one that excludes the child’s’ first language.

The Use of Mediated Tools

In a social context setting, students are mediated toward their potential using a variety of learning tools. As demonstrated in this project, the tools (language and mediated structures) which were used to mediate CALPS were the concept maps, diagramed charts, and guided questioning used throughout the lessons. Vygotsky would reason that
these tools exist on the social plane outside of the child. The tools were used to organize and create further understandings. In essence, these externally mediated tools become internalized as personal meaning (Vygotsky, 1978). As such, the child is able to adopt some of the organizational patterns presented through the various socially mediated structures organized by the teacher.

That is, the externally mediated tools such as concept maps, diagramed charts, and guided questions, which are on the social plane, led the child to become interested enough to participate in the topic; one way or another. These mediated structures helped students to graphically and visually organize knowledge to share ideas, to make experiential connections, to discuss, to observe, to share-write, to share-read, and to express internalization in many different ways. Through want or some sort of consent, the child acknowledged his/her social interaction and transformed the semiotic symbols of the activity into his/her personal meaning (Zinchenko, 1985; Vygotsky 1978); be it completely in accord or contrary to what the sender had intended.

In this case study, we used tools (socially mediated structures) such as concept maps, diagramed charts, guided
questioning, and other activities to mediate an understanding of weather concepts. Student and teacher created a "zone of potential development" toward which a student could aspire with guided, competent, and confident assistance. This zone was most notably referred to as the "Zone of Proximal Development (ZPD)." Zones of proximal development are learning potentials (goals) toward which the student and the teacher will aspire.

As the teacher worked with each individual student, their zone of potential development was taken into account. Science concepts were mediated through guided-questioning in discussions and diagrams while considering the ZPD. Generally, advanced students were asked more difficult questions than students that were more challenged. Within each social context, students and teacher established what they knew and what they would like to know.

When the teacher established what was known and what needed to be known, he/she organized and mediated the development of ideas and concepts. This type of planning prepared the child to meet his/her potential. Together, teacher and student, bridged the gap between the known and the unknown.
Analysis of the Eight Salient, Socioeducational Contexts

The eight salient, socially mediated structures, in context, will be analyzed sequentially as they occurred during the weather unit. This analysis will include the following social contexts and mediated structures (See APPENDIX A):

- Literature study
- Experiment: Does Air Occupy Space?
- Balloon play and shared reading
- Experiment revisited: Does Air Occupy Space?
- Our world and our atmosphere demonstration
- Our world in space
- Small group concept map of the sun (Sol a sol)
- Individual concept maps

These eight salient, mediated structures will analyze the lessons for purpose, content, organization, and results. Some of the socially mediated contexts may not have dialogue transcriptions or artifact collection because evidence was not retained or the spontaneous development of the context did not allow for it.
Explanation of Specific Social
Contexts Embedded and Used
Throughout the Weather Unit

This section gives purpose and description to those activities which are prevalent across the many different socially mediated contexts facilitated during this study. These are the embedded structures which seem to give rise to mediating students toward their potential. A potential which is mediated in student centered, risk-free settings that seek to empower children through mediated activity.

Class Science Library

The books were displayed standing, with their covers facing the viewers as source of enticement. This social context was mediated so that students would begin to see it as a source of interest. In short mini-lessons, teachers can quickly peruse a book and discuss interesting points. The teacher chooses books, not so much, for the written information, but for the descriptive drawings or pictures that generally attract a first grade student. These pictures inspired attention and dialogue that mediates new knowledge. These brief book reviews helped students to understand the value of the books and the ease with which one can find points of interest worth
investigating. In this case study, our classroom, science library focused on weather.

**Choral Reading**

The third reading of the text is done by the children. They read aloud, together. In this way the children support each other, i.e., if one doesn’t know, the other does. (Flores, 1992-97). Students are inspired to participate in the reading experience because of the support and guidance they receive from their peers.

**Collaborative Text-Writing**

In this context, students write with teacher mediation and student support. In small or whole group contexts, the teacher can facilitate an opportunity for students to see their potential in writing, as well as, reading. The teacher mediates their ideas from oral (open forum) to written, and, then, back to oral (reading). Students are encouraged to share their important ideas with the class so that they can collaboratively transform them into written language. In an open-forum, students can spell out (syllabically or fluidly) their thoughts, as well as, those of their peers. Then, they can see those thoughts manifested in written language. In the collaborative context, they are correcting and clarifying
personal thoughts without risk. In some cases the students copy the collaborative work into a science journal. The writing structure created by their collaborative effort is displayed around the room for later reference or when reading around the room.

**Grouping (small)**

Smaller group contexts allow students to get more individual attention and recognition. This context stresses more initiative and participation by the student. They can no longer "be lost in the crowd." These groups usually consist of 4-6 students and are heterogeneous, in nature.

**Grouping (whole)**

Generally, whole group setting included all members of the class in a socially mediated context. Generally, more students are participating and there is less student risk involved because individual participation is reduced. Ideas, collaboration, and negotiation of meaning were mediated in an 'open-forum' because of the number of students involved. This sharing and support encouraged students to participate. These settings reflect a part of our society in which we can learn and share with others (networking). However, some students preferred the smaller
group setting because they received more personal encouragement and they have more 'voice.'

Links

Links represent the relationships between content areas. Driver and Bell (1986) suggest that "learning involves constructing meanings. People construct meanings of what they hear or see by generating links between their existing knowledge and new phenomena attended to" (447). In this study, the teacher mediated links (connections) between science (weather) and social studies (effects of weather on our lives). The connections were mediated so that students could begin to see and think of how our world, as well as, the science and social science concepts come together to help or hinder our society. Simultaneously, language arts' skills were being embedded, in a natural manner, throughout the unit. At this time, decoding and encoding were made visible through teacher mediation and the artifacts produced. Teacher mediation through guided questioning, discussion, and activity made the 'links' across our curriculum more visible and more natural; even, to the youngest of minds.
Little Books

Little books can be student illustrated, colored, and written books. In such a context, students can collaboratively write text, or draw illustrations which the teacher can format as a little book. Little books can include books with familiar or predictable text already written. These 'little books' should reflect and enhance the concepts and vocabulary of the theme being studied. They can be revisited for memorization, and further scrutiny of key elements which will enhance a student's literary abilities and conceptual understandings.

Open Forum

It is a setting that attempted to maximize participation within large or small groups. Students were less constrained because they were allowed to speak aloud without, necessarily, raising their hand. However, students were cautioned to not interrupt their peers who have the floor. Sometimes kids speak over one another, but it's not the end of the world. Open forum wasn't a part of every socioeducational context mediated by the teacher. It was generally mediated when a context requires a collaborative effort, i.e., brainstorming, spelling, collaborative text-writing. It was less controlled by the
teacher and more controlled by the students; Hence, less risk for the student.

Pantomime

While in the social context of shared reading, the teacher found pantomime as useful way to elicit answers from the children. Sometimes it was used as a means to "unstump" the students when they didn’t know what kind of answer the teacher was looking for. At other times, the teacher would use pantomime to make the discussion a little more lively and fun, or to make the discussion more fluid.

In this vignette, pantomime is used to make things lively and keep the kids participating in the discussion.

Teacher: (pointing to water vapor in diagram) El sol va calentando las partículas de agua, y cuando hace calor empiezan a ... (teacher shakes body like heated water particle)

Student: mover

Teacher: Moverse, sí. Y cuando ya no pueden soportar el calor y el movimiento se van para...

(teacher points upwardly)

Student: Arriba
Teacher: Y flo... (teacher makes a floating gesture with the hand)

Student: Flotando.

**Phonemic Visibility**

In an attempt to make learning contextual and thematic, phonics was taught within the topic area being discussed. It was found in literature, collaborative writing, and student ideas that were brought into discussions. For instance, as students study 'animals;' ‘animals,’ also, became visible phonetically. In the midst of a learning event, the teacher highlighted an 'animal word' and sounds out its’ phonetic components (beginning, middle, or end sound; decoding; encoding; word family). The teacher took time to syllabicate an 'animal' name or refer to a word family that the word is part of. This was done in the context of a socioeducational context: a collaborative and social learning experience. As the teacher mediated a reading, writing, or oral discussion, phonics was embedded in the learning experience as part of the science theme.

**Picture Walk**

Guides students to critically view pictures and to read or make sense of the informational value of a book.
through those pictures. It worked well for emerging readers where pictures support written text. This context allowed teachers to mediate a higher order text. Also, it reduced non-reader anxieties about literacy. Adults read pictures on a daily basis to make sense of the world around them.

Reading Around the Room

It was an opportunity for students to be aware of the valuable resources that are available to them in their own environment. This context needed to be revisited several times a year. Students needed to be reminded of the wealth of words and ideas that were available to them, 'at a glance.' 'Reading around the room' was an organized, regular social context that allowed students to reflect on their wealth of knowledge.

Teachers need to specifically tell students to make use of these words and ideas in their daily writings when appropriate, or, as they like. Science and social studies concepts were brought to light with old and new connections emerging from the reading. This context was, especially, dynamic when many of the structures read were the result of a collaborative student effort.

The processes and dynamics of meaning and knowledge development are robust and
highly personal. Learning from this perspective is personal in the sense that children feel connected to and have ownership of the ideas they have generated. (Bloom, 1992, p.411)

As such, the students were compelled to participate. The ideas read are personally owned by them and their 'age-group' peers who share a common bond. They were motivated to remember and feel a sense of pride when sharing their work: their art.

In the process of sharing collaboratively, the teacher made semantic, syntactic, graphophonic, and orthographic (Goodman 1967,1976) systems visible in mediation, as necessary.

Shared Reading

Shared reading was one way to make literacy less intimidating for our young, emerging readers and empowered them to participate in literary events. This type of reading experience was organized to familiarize the children with a difficult-to-read book. In a shared reading context,

the teacher reads books aloud which the students cannot yet read themselves. The children are invited to join in. Teacher and students read aloud together using an enlarged text (i.e., big book) or individual student copies of text (not both). The teacher revisits the text to point out features, i.e., nouns, verbs, punctuation, etc.
to demonstrate strategic reading, i.e., using strategies (predicting, confirming, and self correcting) relating to the cueing systems (semantic, syntactic, and graphophonic)...

engages students as readers and respondents to questions... Shared reading can be done with small or large groups. (Flores, Shared reading handout, 1995)

Using these types of texts to mediate science concepts, the students were better prepared to interact with the text. In the scenario presented here, an overhead projector transparency of a big book. The students seemed to enjoy the overhead more for the reading portion. When they looked more specifically at the pictures, they seemed to prefer the big book.

In addition to the large text, the teacher supported the children and the meaning of the text by reading the text for them, or with them. These moments permitted the student to sample the text without fear of being called upon to read 'round robin.' Then, when the text was revisited, students were invited to join the reading or to follow along in a manner which was comfortable for them.

Shared reading needs to be done on a daily basis. In this way, the teacher can monitor, deliberately guide, and observe the students' reading behaviors. The teacher needs to deliberately make visible the way the text works, e.g., directionality, spacing, wordiness, language patterns, meaning, letter/sound
correspondences, high frequency words, etc. (Flores, Shared Reading Handout)

Even though a text may have seemed too difficult, it was socially mediated for understanding, by the teacher. As a result, the teacher and students created a 'zone of potential.' Within this zone, the students were allowed to participate in developing reading and vocabulary skills, otherwise reserved for second or third grader reading at grade level.

The students felt successful because the reading event allowed them to participate without risk and fear. Afterwards, students felt like readers rather than non-readers. One is more likely to continue an endeavor, such as learning to read, if one could be made to feel successful along the way.

This socially mediated context guided the student’s performance in a task that he or she had not mastered. This guidance allowed the child to complete the task with a feeling of success for his or her efforts. In this context, the teacher was facilitating an opportunity for students to be successfully challenged, and supported to go beyond themselves.

In a socially mediated context where shared reading became choral reading (students read chorally). One or two
of the students were chosen to track the text with a pointer. One student supported a student who didn’t track very well. The others watched and read aloud, correcting each other as necessary.

Generally, not all students read out loud with the rest of the group, but they did appear to be engaged with the text. The voices of their peers offered them support while looking very critically at the letters, that make the sounds, that make the words. There were, also, students that read ahead as to predict and then listen to the voices of their peers to see if their prediction was correct.

**Shared Writing (Collaborative Text Writing)**

It was the co-construction of either narrative or expository text. Within it, teacher and students used shared-spelling to write out ideas which resulted from discussions or brainstorming sessions. In this context, the teacher used markers and chart paper to mediate the successful writing of student’s ideas. The teacher, also, mediated syllabication, punctuation, syntax, and semantics, throughout the socioeducational context. This context was one in which students could speak out aloud
and help one another to participate successfully, in a literary event, with little risk.

Singing and Chanting

Singing and chanting allowed our students to rhythmically set writing and reading to a pattern. Many of these songs and chants contain rhymes and short anecdotes which interest the children. These patterns were learned and memorized for further understanding of word and syntactical patterns. Such patterns were recognized by first or second language learners. Like shared reading, it provided a risk free environment that was fun.

Read Aloud

This socially mediated context, also, created a risk free atmosphere. Teachers mediated literacy by reading aloud to students. Listening to others read allowed children to focus on the content, the rhythm, orthography, syntax and the semantics. Comprehension was paramount, but other cueing systems were just as important, depending on the objective of the context.

Room Environment

Room environment that was co-constructed, in one form or another, continually challenged students to think, to recall, and to read. This is especially true when the
environmental text was relevant to the course of study. A study in which they personally took part in creating.

Student ideas became tangibly visible. Students were inspired when they looked up and saw their thoughts written out. They sensed ownership in collaborative structures that they had helped to create. They were made to feel special when they saw their effort and work successfully conveyed in a new communicative medium (writing).

It would seem natural, for humans, to want to express themselves in as many as possible. Children are always looking for a way of expression. When they see their ideas written up on the wall, they are encouraged to make sense of it, again, and again.

Eight Salient Mediated Socioeducational Contexts and Structures

**Literature Read Aloud and Shared Reading**

Read alouds are non-threatening social contexts that allowed students to immerse themselves in a story while listening to the fluid, rhythmic reader. In this case, the book, *El Aguila Del Viento*, by Lada Josefa Kratky, was
mediated and shared in a whole group and a small group context.

This particular story produced a sociocultural context which mediated connections between literature, science and experience. Simultaneously, inferences, comparisons, and 'cause and effect' were made more visible. All along, important language arts' skills were being addressed in the context.

This story, *El Aguila Del Viento*, by Lada Josefa Kratky, depicts an American Indian, Gluscabi, who learns how detrimental the wind is to our human existence. One day, Gluscabi couldn't fish because of the strong winds created by the powerful wings of an eagle. Gluscabi searched for the eagle. He trapped the eagle in a mountain top crack (between rocks) and the eagle was no longer able to flap its' wings. At first, Gluscabi found satisfaction in his deed. However, his people began to suffer in the absence of the wind. The waters began to stagnate, the air became warm, and fish began to die. Gluscabi realized what he had done and returned to the eagle to make a compromise. Gluscabi proposed that the eagle not flap his wings too forcefully in exchange for his freedom. The
eagle agreed to make only soft breezes in exchange for his release. Gluscabi him set him free.

They went through the book doing a picture walk, made predictions and discovered the importance of wind in the story. Dr. Flores looked critically at the illustrations that depicted weather influences. She used the illustrations and guided questioning to draw out weather knowledge from the students' previous weather experiences.

While going through the book, on a picture walk, she would, occasionally, reflect back to previous pages to mediate a 'before and after' ('cause and effect') visual image in their mind's eye.' This helped to show how wind, actually makes a difference in our world. With Dr. Flores as the guide, the story was mediated, sometimes, negotiated, without having actually read the text. Sometimes, she negotiated vocabulary from the text that would, eventually, need clarification: remar, sufriendo, poderosas, etc.

In addition, Dr. Flores (1997) mediated connections between the story and the students' personal experiences with the wind and weather. The mediated discussion led them to hypothesize what would happen to us today with little or too much wind. Naturally, students responded
with the concepts from the story, but Dr. Flores used guided questions to elicit other creative responses. One student replied, "No podemos volar papalotes" [We couldn't fly kites.] Another student answered, "El viento va a tirar casas y árboles" [The wind will blow down houses and trees.]. In this way, students could more, clearly delineate the effects of weather (science) embedded in the literature context, as a result of teacher mediated connections.

Afterwards, students participated in a read aloud of the same book. In this context, the teacher modeled fluidity, rhythm, tracking and punctuation.

Later, the story was revisited. This time Dr. Barbara Flores read the story, from the big book, allowing students to participate in a shared reading. They were especially excited when they came to the part with Gluscabi's rowing song because they loved to chant it (Nu-lin-tu, nu-lin-tu, nu-lin-tu). The students were motivated and seemed to feel confident because they remembered their previous experience with the text. Dr. Flores tracked and read as students followed her lead. Occasionally, she stopped to embed a science concept or to clarify meaning,
but, generally, she kept a fluid, rhythmic pace as she read the story.

Afterwards, the teacher and students charted the story into its’ four parts (characters, setting, problem, solution). Here, the teacher mediated the organization of the story into four components. The teacher guided and acted as a catalyst by generating guided questions. These guided questions allowed students to come up with the correct response for filling in our graphic organizer (‘four parts of the story’ chart). The social context was an ‘open forum’ in which students collaboratively contributed to organization and spelling of our ideas. Students then wrote their ideas on their own individual charts (four parts of the story worksheet).

This context would, also, be revisited in small groups with little books (El Aguila Del Viento). In small groups, the teacher would make phonics (the graphophonics system) visible in shared and choral reading contexts. Vocabulary and semantics were, also, discussed in context. References to weather, as well as, ‘explanations of its’ concepts began to make more sense as we progressed through the weather unit.
Experiment: Does Air Occupy Space?

This social context mediated a hands-on experiment: Does Air Occupy Space? This context supported an understanding of 'weather concepts' as defined by California, Science Frameworks,(1990); "We live on the surface of the earth, surrounded by a blanket of air called the atmosphere, which we need to live. We breathe the air of the atmosphere; we depend on the atmosphere... (p. 106)."

Also, first grade science curriculum included the study of matter and its' properties; "What is matter and what are its' properties? Matter occupies space, it has substance, and we can measure its weight (p.41)." Air is matter and it occupies space.

This hands-on science experiment, "Does Air Occu

Space?", helped students understand our earth's atmospheric properties and its' relevance to our lives. The air bubble which surrounds our earth, contains our weather and life force (oxygen). It is both relevant and pertinent to our survival and quality of life. Such a topic is not easily mediated without establishing need, experience, and context for inspiring interest and participation. The teacher created the importance of
'atmosphere' in such a way that Language minority students were compelled to investigate air and weather in a natural, 'hands-on' manner.

In this context, the learner participated in the experiment by going through the scientific method (question, hypothesis, materials, procedure, observations, results, and conclusion) with the teacher as the 'deliberate' mediator. Students graphed their hypothesis, performed the experiment individually, discussed and share wrote about the process, materials, investigation, and the conclusion. In addition, this context inspired oral language development, and made all the cueing systems (semantic, graphophonic, syntactic, and orthographic) (Goodman, 1970) visible in collaborative text writing and reading.

The students were very excited when they saw all the science experiment materials laid out in front of them so that they could do an experiment. Students and teacher filled a large, deep container with water. Then, the teacher modeled how a cup could be submerged into the container of water. The teacher began by asking the students if they thought that the cup could be lowered
without wetting a paper towel, which had been tucked-into the bottom of the cup.

Students and teacher discussed the three different ways that the cup could be lowered: upright, upside-down, horizontally. Students wrote the question with the teacher, drew the picture, and copied it into their science experiment journals (See Appendix C)

While they copied, the teacher called them up, one at a time, to ask them how they would hypothesize the outcome of lowering the glass in each of the three different positions. Each student graphed his or her hypothesis personally, by filling in a square on the graph.

Then, in groups of five, during group rotations, each student had an opportunity to lower the glass into the water to see if their hypothesis was correct or not. Each time, we lowered our glass in a different position. We co-wrote our procedure and results, which would be later copied into their science journals. (See Appendix E) Afterwards, we discussed our observations of what the water was doing and why it might not have wet the towel when the cup was upside-down.

Teacher: ¿Qué Vimos?
Student: hundir el vaso
Teacher: Cuando lo pusimos abajo, ¿no se mojó? ¿boca arriba?
Student: Se mojó
teacher: ¿Al lado?
student: Se mojó.
teacher: ¿Abajo?
student: No se mojó.
teacher: ¿Por qué? ¿Tiene una tapadera mágica?
(student puts cup in the water, upside-down)
teacher: ¿Qué viste?
student: Burbujitas
student: El agua entró un poco.
teacher: ¿Cómo sabes que no se mojó?
student: No entró el agua hasta arriba.
teacher: ¿Pueden ver donde está el agua?
student: Sí.
student: Agua está atrapada.
student: Estaba boca abajo y la servilleta está hasta arriba. (While the cup is still submerged, the teacher tilts cup to let bubbles escape again)
teacher: Bubbles are made of...
students: aire

teacher: ¿Cuándo vieron las burbujas?

students: Cuando volteaba el vas...

student: Cada vez, el agua se hacía para arriba.

teacher: ¿Por qué no se mojó el papel?

student: El aire

student: El aire no dejaba que el agua entrara.

teacher: ¿Qué pasó cuando el vaso estaba al lado?

student: No vemos burbujas.

teacher: ¿Dónde va el aire?

student: El agua empuja el aire para afuera.

After a series of guided questioning and sharing of ideas, students began to discover, from one of their peers, that air and water must have force. It’s good when a teacher can simplify and explain things to our students, but it’s even greater when a teacher can get students to see each other as teachers. Sometimes, seeing their peers as teachers helped them believe in their own ability to develop and gain knowledge. Perhaps, it was because they were ‘age-mates’ and of the same cohort group: a group (with similar backgrounds) united in some struggle” (The American Heritage Dictionary, p.136). In this case they were united in the struggle and joy of learning.
They shared their culture, their language, and many of their values and beliefs. They struggled to gain an understanding of the world around them: a new culture, and new ideas in the field of science. Together, through social interaction they came to sense the things that they had in common and gained a sense of 'comfort:' they were at ease. They began to express themselves more openly and participate more freely. Questions and ideas were deliberately guided in two way discussions where, eventually, students became the teachers in formal and informal settings. The adult was no longer the only person in the room that developed and expressed knowledge. Their 'age-mates' exemplify the cohorts potential.

In this mediated teaching learning context, they, also, recognized, through mediated opportunities, their own abilities and possibilities to understand and find relevance in the world around them. This dialogue allowed students to verbalize their experiences with the experiment. Guided questioning was used to elicit their ideas and observations (memory and related experiences). Discussion and questioning had to be mediated in such a way, that students would be 'driven' to discover
properties of 'air,' and feel a sense of ability, as well as, accomplishment.

As they investigated, discussed, and referenced other previously mediated structures, students were given the opportunity to further explore their understandings of air. The concepts discussed and experienced in this hands-on experiment continued to be related to future discussions, new concepts, and activities which supported the weather learning recommended by the California Science Frameworks. Later, the students wrote about what they learned in the conclusion of the experiment.

Personally, a 'hands-on' experiment was a good way to attract student attention and 'energize' our weather unit. Students appeared to be very motivated and enticed by our discussions, as well.

Certainly, there were some students that were not paying attention at all times; The teacher was a little distracted by this. However, when the teacher took a closer look, it was observed that, many times, these students were distracted because they were interacting with environmental text and illustrations. They were silently reading environmental text. In other cases, students were talking about personal weather experiences
and experiences with the experiment. As a result, the teacher became more careful not to stifle all of their distractions.

It is true that students shouldn’t talk or play-around when the teacher is talking. However, there are, also, times when the teacher can detect ‘appropriate’ distractions from ‘inappropriate’ ones and deal accordingly.

In general, all learners seemed interested and motivated to participate in this socially mediated structure. The lesson appeared successful, in that, it was organized to be student centered while the teacher acted as sociocultural mediator. Such a socially mediated structure inspired and encouraged learning. It promoted learning because,

children are encouraged to bring their knowledge to the shared construction of an answer, there is a good chance that they will be able to assimilate some of the information that is offered and, as a result, will be able to add to and, if necessary modify their internal model of the world.” (Wells,p.59)

This socially mediated structure and many others throughout the unit continually attempted to facilitate ‘comfortableness,’ relevance, and opportunities to learn more in a risk-free setting. Such settings require a lot
of organization, pedagogical knowledge, acceptance, patience, and praise while maintaining focus on curricular objectives. The students demonstrated their use and acquisition of new scientific concepts, as evidenced through their dialogue.

Mediated Socioeducational Contexts and Structures

In this socially mediated context students and teacher briefly discussed pictures and the significance of the text, Buen tiempo, mal tiempo. This book was selected because it depicted and described weather concepts recommended for mediation with first grade students. Concepts included for study were the physical bases of weather (heat, sun, rain, clouds, wind, etc.), patterns, change, and 'cause and effect. These concepts are supported by pictures and appropriate, grade-level text.

In this socially mediated context, students were invited to echo read, with the teacher modeling fluidity, grammar, and syllabication of difficult vocabulary. Afterwards, the learners share read selected pages of the book with the teacher mediating understanding through drawings and clarification of text comprehension.

The mediated focus of discussion was on 'air.' The discussion included air in our bodies, how plants use air,
and how air particles are trapped in a balloon. For example, a balloon can resemble our atmosphere and the air which occupies that space: hence, our experiment ('air occupies space').

During the early portion of our discussion, students reflected on the lungs; a unit studied four months prior. In this "hands-on" social context, students were provided with a balloon to investigate the qualities of air. Students are presented with a flat balloon. Prior to blowing up their balloons, the teacher mediated a brief discussion regarding the flat balloon and the air that filled it.

Spontaneously, the teacher found himself in the midst of a mini-lesson. Mini lessons may be planned or may arise out of an interest of the students and to help them make other connections.

Teacher: Vamos a ver. Aquí adentro de este globito. ¿Qué hay adentro de aquí?

Students: Nada.

Teacher: Es un globo desinflado. ¿Qué está adentro?

Students: ¿Aire?

Teacher: ¿Hay mucho aire aquí?
Students: No.

Teacher: No, está desinflado. En el aire hay gotitas y partículas como químicos y otros pedacitos de cosas, de oxígeno que flota en el aire. Nosotros necesitamos oxígeno para respirar. Y el oxígeno es parte del aire que nos rodea.

Even in the context of this experiment, 'Air Occupies Space,' the teacher took time to embed a mini lesson about the oxygen in the air around us and how we need it to breathe.

The mini lesson was nothing more than a brief 'drawing from the past' that helped students make a connection with a unit, the 'body,' previously studied in our class. This was a context specific moment which related to a previous learning event. This 'drawing from the past' is a moment in which the topic was made relevant and functional because it was context specific.

This mediated, 'student driven' mini lesson served as a review and a 'link' to another important reason (our livelihood) for studying and understanding the functions of air. Thus, the opportunity to reflect and reinforce the
concept of air and its' importance to our lives was supported and students were further enticed to participate.

Students and teacher discussed the particles of air in the balloon. The teacher, briefly, made an analogy between a balloon expanding and the human lungs. In essence, their new understandings of air helped them to make a connection between life, air, and weather. However, it was still obvious that this concept of air would continue to need more mediation. My role was to mediate a link between their prior knowledge, from another context, to this new knowledge.

This activity allowed students to manipulate and play with air in a non-threatening context (a balloon). Many of them were so excited about getting to play with a balloon. Most could blow it up, but some needed help. They were encouraged to poke, squeeze, throw, and catch the balloon for at least twenty minutes.

In that course of time, the teacher was able to walk, casually around the room and mediate weather concepts through individual and small group discussions. This kinesthetic experience appealed to the senses and made the abstractness of air more tangible and visible. This type
of "activity" made the topic of 'air' much more palpable and relevant for a mediated discussion with students at this grade level.

Here, the students were provided with the opportunity to, simultaneously manipulate, discover, and discuss the properties of air (gas, density, pressure) within the elastic confines of a balloon. Somehow, it was hoped that this guided discussion might continue to develop students' understandings of how air occupied space in the experiment and in our atmosphere (occupying space and supporting life).

The objective was to allow students to discover, with deliberate guidance, in what ways air can occupy space, and to highlight its properties, as well as, its' importance. The teacher goes on to return the focus of the discussion toward the hands-on activity. A personal balloon was enough to captivate a student’s attention and return them to the task at hand.

Teacher: Yo les voy a dar un globo para que trabajen con su aire. ¿Puedes soplarlo? (Some students, try as they may, cannot blow up their balloons). Practicando vas a mejorar,
no te preocupes. Okay, hey, you did a great job! Ahora, ¿qué vamos a hacer?

Students: Amararlo.

Teacher: No solo amarrarlo, pero atra...

Student: (Martin) Atraparlo.

Teacher: ¿Atrapar a que?

Student: (Martin) Al aire.

Teacher: Al aire que esta adentro (Reaffirming that the student is correct)! Yo tengo el aire atrapado aquí adentro.

Students: Uhu!

Teacher: No puede escaparse, ¿huh?

Students: No.

In this context the teacher really wanted to enforce the idea of trapped air so that students might make a connection with their science experiment. If the students could understand the idea of the air being trapped, they might begin to better understand how it is that the paper in the glass (Experiment: Does Air occupy Space?) didn’t get wet. In concretizing this concept, the students might, also, understand how the air was able to escape when the glass was submerged right side up or on its’ side.
Teacher: ¿Qué está haciendo? ¿Hay un espacio ahí adentro del globo?

Students: No

Teacher: ¿No?

Students: Sí

Teacher: ¿Qué está ocupando ese espacio dentro del globo? (Long pause...) ¿Qué acabamos de poner en el globo?

Students: Aire

Teacher: ¿El aire está ocupando...?

Students: El globo

Teacher: El espacio en el globo, ¿Está ocupado por quien?

Students: (long pause)

Teacher: Por el aire. ¿Qué está ocupando el globo? ¿Qué es lo que está ocupando el espacio dentro del globo, ahorita?

Students: El aire.

Teacher: ¿El aire está empujando contra que? Las paredes del... (students finish sentence)

Students: Globo.

Teacher: Sí, estas son las paredes del globo y el aire está empujando las paredes para
hacerlas más (students finish teacher’s sentence).

Students: Grandes.

Teacher: Sí, y lo has hecho (Reaffirming that the student is correct). Vamos a ver lo que pasa cuando le pongo más aire. (Teacher blew the balloon bigger) ¿Qué está pasando?

Students: El globo se está haciendo más grande.

Teacher: El aire se está ocupando más. (students finish teacher’s sentence).

Students: Espacio.

Here, using the balloon as a visual aid, the teacher tried to show students how air pushed back and had force (pressure). This was done when the teacher poked the balloon and then released it to show that the air would push back. The connection hoped to be made here, was in direct relation to the air in the upside down glass. The air in the glass pushed down against the water to keep it from wetting the paper. The trapped air in the glass occupied that particular space because it had no where to go.

Teacher: ¿Qué pasa cuando empujo el globo con mis dedos? ¿Cambia de forma (el globo)?
(teacher applies pressure to balloon walls with fingers) ¿Qué van a hacer las partículas de aire?

Students: No, no sale el aire

Teacher: Mira la forma cuando meto mi dedo. ¿Ha cambiado la forma?

Students: Sí.

Teacher: ¿Qué pasa cuando empujo? ¿Yo tengo más fuerza? o ¿El aire tiene más fuerza?

Students: El aire.

Teacher: ¿Sí?

Students (Martín) El dedo tiene más fuerza.

Teacher: El dedo tiene más fuerza que el aire. Pero, después, quito el dedo y el aire empieza a empujar las paredes del globo otra vez. Yo le vuelvo a pegar a la pared del globo. Después, le quito la mano y las partículas regresan a empujar la pared del globo. Entonces, todas estas partículas de aire están empujando porque quieren salir.

¿Qué va a pasar aquí si les quito el dedo para que salgan? ¿Qué van a hacer? (teacher diagrams a balloon showing molecules...
pushing up against walls of balloon and creating pressure).

Students: Se van a salir rápidos.

Teacher: Quiero que tomen nuestras notas.

Afterwards, the teacher then had the students write their understandings in their science journals (See Appendix C) They copied the balloon figure from the chart paper as diagrammed by the teacher with their help during the discussion and manipulation of 'balloons at play.'

In another instance, a cognizant student made a connection dealing with the particles that float in the air. The connection was made because this observation was in reference to an earlier statement that the teacher made about air particles. A student (Martin) remembered the concept of 'air particles' mentioned earlier, and connected them to a prior experience in his home. Martin then visualized what an 'air particle' looked like; Hence, he could visualize 'air.' Air, now became visible and tangible and the concept of air became 'workable' for Martin.

Student: (Martin) Yo vi partículas, así, en mi casa. Se estaban flotando. Eran así (he pinches his fingers to signify tiny).
Teacher: Sí, muy pequeñas, muy bien Martin. Y de eso hay en el aire. Y ahora vamos a llenar esto (globo) con más aire que tiene más partículas y gases y otras cosas que flotan en el aire y vamos a ver lo que les pasa. Aquí, dicen ustedes que, ¿qué hay adentro (del globo)?

Students: Poquito de aire

Teacher: Poquito de aire y que, poquito de polvo y... un poco de...

Students: Oxígeno

Teacher: Y el oxígeno. ¿Sabemos para que usamos el oxígeno para...? (teacher inhales deeply)

Students: respirar

Teacher: Y el oxígeno, ¿entra a nuestros pu...?

Student: Pulmones

Teacher: Tal como entra a un globo, llenando y ocupando espacio.

Martin brought his personal experience from home to share and to show that he understood what the teacher was talking about when discussing the particles. In fact, in an earlier discussion, he had, also, made this statement about the particles floating in the rays of the sun that
came through a window. The student was recognized for his connection, but not a lot of time is spent on this connection because it had already been discussed and because it was not the objective.

The intent of this socially mediated context was to enhance learning through a variety of modalities (visual, kinesthetic/tactile, and audible) and mediate connections across the curriculum. As such, the disciplines of Language Arts and Science complement and support one another. 'Echo' and 'Shared' Reading and discussion were mediated for understanding of interrelated ideas while the cueing systems: graphophonic, syntactic, semantic, orthographic (Goodman, 1970, 1984) were made visible through the reading and writing experience. Reading, pictures, discussion, guided questioning, hands-on activities, and past experience were the structures which inspired learning and connections of interrelated ideas.

The topic of 'air' was developed in this way to guide understanding of important science concepts while developing other academic skills in context. Throughout the socially mediated activity, students seemed to be enticed to participate with enthusiasm for learning. The children seemed happy and willing to participate in a
risk-free, hands-on, interesting, and pertinent study of weather. In this context, the children did not have to worry about making a mistake, instead, they found interest, support, importance, and relevance in their mediated study.

In many instances, I saw students eager to share their knowledge and experience. Students were helping students to spell, read, and understand concepts. Shy and challenged students were taking risks by participating with the help of their peers. Gifted students were leading discussions and clarifying 'weather ideas' by explaining weather concepts to their classmates. Discussions were interactive in an open-forum setting that did not stifle student participation.

As a result, students were engaged in their learning because the topic was made relevant, fun, risk-free, and it addressed the learning modalities (kinesthetic/tactile, visual). Mediated social contexts facilitated these qualities to better support children's learning.

Re-visit ing the Experiment: Does Air Occupy Space?

To further complement our understandings of weather, done in the fourth week of the unit, we revisited our experiment. We chorally read our collaboratively written
text, shared our experiences with the ‘hands-on’ activities, and discussed new understandings of weather. In the process, we were able to see connections between the concepts and the experiment. Such connections included the water cycle, heated air molecules and our ‘air-bubble’ (the atmosphere where air occupies space).

In fact, the objective of this lesson was to reestablish a foundation for our collective weather knowledge, and its’ patterns within the air and space it occupied (our atmosphere). This was accomplished by re-visiting and reading their science project chorally with teacher and discussing concepts of air and space in conjunction with weather concepts.

The following dialogue shows how the teacher used guided questioning to initiate successful responses from the more challenged students.

Teacher: ¿Por qué es que el agua no pudo tocar la servilleta en el vaso?

Students: Estaba atrapada el agua.

Teacher: ¿Qué estaba empujando el agua?

Students: El aire

Teacher: ¿Porque el aire ocupa ...?

Students: Espacio
Teacher: ¿El aire... (extending arms)?

Students: Ocupa espacio.

Teacher: ¿Dónde está el aire?

Student: Dentro del vaso

Teacher: ¿El aire está atrapada porque no puede es...?

Students: Escapar

Students and teacher went on to compare the air pocket to that which we had found in the balloon and in our atmosphere. With pictures of the our planet earth, from space, the teacher mediated the idea of an air-bag (our atmosphere), similar to a balloon, around the earth. The teacher explained how our atmosphere helped us to maintain our lives. The teacher explained that without our atmosphere, we could not breathe or live. The teacher, also, asked the students what they thought was in our atmosphere that helps us to breathe (mini-lesson). The students responded with, "oxygen."

The teacher mediated and guided students' understandings of weather by helping them to observe, more closely, and interpret what they saw. This type of interaction helped the children to develop a framework (Wells, 1986, p. 62). This framework becomes a basis for
understanding past experiences, present understandings, and new information regarding weather.

The Atmosphere and Our Earth (Hands-on Activity)

Once again, the teacher organized for a socially mediated context that supported previously discussed and experienced weather concepts. This context included a model (world globe) which students could manipulate and a hands-on activity depicting the earth in its' atmosphere. Such contexts guided the students to develop their own vision of what the earth and atmosphere look like in space: A topic that they find fascinating and enticing.

The globe and the hands-on activity are social structures that supported an understanding of the atmosphere and the weather within the atmosphere. Manipulation of the world globe prompted interest, discussion, and understanding. This context was mediated within small and whole group settings.

In this context, students were to discuss the air around us and what we see in it. Then, they co-constructed our atmosphere and earth on a large chart pad. The teacher acted as a mediator of the drawing and writing. The teacher drew as mediated discussion would allow him to. The teacher used guided questions to mediate discussion
and focus the topic. Students gave descriptions of what had been previously discussed, using the model earth. Then, students created a similar model using the co-constructed drawing as a guide. The world globe was, also, used as a model for the drawing and coloring of the earth.

The following dialogue used student responses to create knowledge about our earth. Students were provided a model of the earth, and a globe, to help the teacher draw.

teacher: ¿De qué color se ve mucho?
students: Azul

teacher: ¿Qué crees que es el azul?
student: Es el mar.

teacher: Muy bien. ¿Qué otros colores veen?
students: Verde, café, amarillo

teacher: ¿Qué está alrededor de la tierra?
students: ¿Agua?, ¿tierra?, ¿aire?

teacher: ¿Una bolsa de ...?
students: Aire

teacher: ¿En el aire hay...? (teacher makes "o" face)
students: Oxígeno

teacher: ¿Qué otras cosas hay en el aire?
students: bóxido de carbono
The students made their own model of the earth and its' atmosphere with a paper plate and light blue construction paper for atmosphere. The student models of the earth and atmosphere were then hung about the room and used as reference throughout the rest of our study.

Revisiting subject matter through different mediated structures allowed students to see 'like' concepts from different perspectives. In addition, weather vocabulary and concepts were reinforced within a familiar setting. A familiar setting was one in which the student had had experience with similar ideas and vocabulary. As a result, students felt comfortable in relating and explaining ideas, and in participating in discussion because they had already experienced such a context.

This 'context specific,' social context and structure gave rise to much student interest, so the teacher decided to venture out into 'space.' Sometimes, it’s a better choice to follow student interest than to follow teacher
plans. In this case, it worked so that the lesson could be complementary to our already, in progress, weather unit.

**Earth in Space**

Space was not the focus of this unit, but had a great deal of student attention and was used to support weather concepts. Had the teacher not seen the amazement in the students’ eyes when space was discussed earlier, he might not have pursued this topic. The topic was introduced in one day. It mediated concepts dealing with orbit, sun, seasons, atmosphere, and gravity. Then, throughout the rest of our weather investigation, we referred back to our experience as necessary. Here, “a concept mediates the acquisition of other related knowledge.” (Flores, personal communication, 1999)

This socially mediated context received the most attention in a one-day lesson. The lesson did not consist of anything difficult and did not produce an artifact other than a dialogue and its’ transcription. It was the product of student interest, and, in the process, was mediated to complement understandings of weather concepts.

The context was introduced with the teacher sharing colorful, solar system books that would later be put in the student, weather library. It was here, that the
teacher briefly, but, purposely, discussed the planets in sequence from the sun; ordinal numbering was used. Then, focus was specifically put on the earth. Distance to the sun and temperature were discussed while emphasizing our need for heat and its' effect on our world.

The discussion was 'open forum;' Children were allowed to have free discussion within reason, including, side discussions with those sitting next to them. However, student interest in the subject matter, also, allowed them to listen attentively when the teacher spoke. Most attention was given when the teacher modeled the reenactment of the earth in rotation around the sun.

Prior to turning out the lights, students were admonished to act responsibly, otherwise, they might not get a turn at taking the earth on its' orbit around the sun. Then, using a globe and a bright light, the teacher modeled how the earth and atmosphere rotated around the sun.

As the teacher moved the earth (globe) around the sun (bright light held by student), he demonstrated the orbit, day and night, tilt of earth's axis, and discussed seasonal effects relative to our geographical location on the earth and orbital position. A bright sticker was
placed on the globe to mark our location; This, really
drew a lot of "oohs" and "ahhs." It is amazing how simple
things can draw the interest of the child. This hands-on
experience encouraged a lot of questions, listening, and
participation.

In addition to student interest, this context was
organized so that the learner could manipulate the globe
and rotate it around sun, and participating in discussion
(sun, day and night, seasons, water cycle).

When the teacher had finished the four brief mini-
lessons (sun, seasons, day and night, water cycle), the
students were allowed to give the earth a rotation around
the sun. The teacher used this time to revisit topics
covered in the mini-lessons by referring to globe as
students moved around the sun. Students seemed to
participate and listen better as they were, sometimes,
able to answer questions by looking critically at the
demonstration. For instance, the students were asked about
Rialto: Was it day or night? Was it Summer or Winter?
Which portion of the earth was closer to the sun? Of
course, students needed mediation, but they really showed
interest in knowing. Every time the teacher discussed
night and day, or the seasons, the students were frantic
to know where the sticker was. Later, students were to
draw and/or write about what they saw and learned in their
weather journals (See Appendix E)

**Sun Brainstorm (Concept Map) and Little Books**

This social context provided an opportunity to
mediate science concepts, as well as, language arts skills
(encoding and decoding). Prior to the brainstorming
children had participated in shared reading of *De sol, a
sol*, by Gail Gibbons. This book vividly depicted (text and
illustrations) how the sun affects our planet. The only
other things required for this social context were butcher
paper, markers, as well as, prior experience, knowledge,
and participation.

In the course of this mediated activity, students
participated in collaborative text writing, shared
reading, small group discussions, and guided question
contexts. In addition to being in a small group structure,
they individually wrote and read their 'sun' brainstorm
with peer assistance.

Prior to beginning our sun book, we had already read
several stories that included the sun as an important
factor. However, immediately prior to organizing this
context, the teacher and students had already read and
discussed an informational book, *De sol a sol*, by Gail Gibbons, about the sun. This book colorfully illustrated and explained various facets of the sun.

This book, *De sol a sol*, by Gail Gibbons, was first read on transparency in small groups of five students. Then, students were given their little books and student selected pages were read. Some students preferred to read on their own, by choice. The illustrations were colorful, attractive, full of weather clues, and the text wasn’t too dense. At first students were only going to construct suns using various pieces of orange and yellow construction paper.

However, in the course of making the suns, the teacher asked the students if they would like to make sun books (See Appendix D). The students agreed unanimously by voting. The next question was whether they should make them individually or as a group. Eventually, it was organized so that it would be both an individual and a group effort.

In their groups, the students created a brainstorm of their sun knowledge. The teacher provided them with a marker and chart paper on an easel. A student was chosen by the teacher to act as the writer; All students would
get a turn and peer support in writing and reading. Together with the minimal guidance of the teacher, students co-constructed their own brainstorm web. When students had difficulty, the teacher, who sat at a distance, asked guided questions so that they could answer their own questions, and continue.

They began by discussing how they would write and how they would construct their web. They had co-constructed a sun brainstorm (See Appendix B) with the teacher before, but now, they had to construct a Sun brainstorm on their own. Their efforts were mediated with guided questioning.

The following vignettes depict how the social contexts (shared writing and guided questioning) were embedded in the social context to facilitate the co-construction of two mediated structures: a “sun” brainstorm and a sun book.

Teacher: Necesito que me escriban. Vamos a hacer algo que se llaman cuadros sinópticos. (teacher writes). Es una telaraña de ideas. Por ejemplo, Ustedes saben muchas cosas del sol. Vamos a escribir lo que saben en los cuadros sinópticos. Vamos a ver cuanto saben acerca
del sol (Ulises came to front to write for group with teacher guidance).

Students began by following teacher directions to start their web of ideas. At this point students were encouraged to write collaboratively by helping each other to spell when it was their turn to help. Students were not forced to write if they did not want to. Most did make the effort to write because they felt comfortable in knowing that their peers would help them.

Teacher: En el centro de la hoja, el va a dibujar un sol. ¿Cómo se escribe la palabra, sol?

Students: S-O-L

In this excerpt, students were still not sure that they possessed knowledge about the sun that was worth contributing to the group. The teacher knew that they did have important ideas to contribute to the group. However, they were holding back because they were not sure, and, at times, feared the risk.

Teacher: Muy bien. ¿Qué saben ustedes acerca del sol?

Students: (no response)
Teacher: (teacher reminds them of earlier mediated activities). Vimos la película, acabamos de leer el libro del clima, y leímos el cuento acerca del clima en la mañana. ¿Qué recuerdan de lo que hicimos?

The teacher makes the situation 'context specific' by recalling an event in which we shared the knowledge. One student finally dares to say something regarding the sun: "calienta." This response gives rise to more shared writing and another concept related to the sun.

Students: calienta

Students: C-a

Teacher: Ca-li-en-ta (teacher syllabicates with fingers).

Students: li-en-t-a, calienta

Teacher: ¿Qué más hace el sol.

Student: Calienta el viento.

Teacher: Vi-en-to, ¿cuántas sílabas?

Students: v-i-e-n-t-o, (Ulises writes it)

Teacher: ¿Qué más hace el sol?

Students: (no responden)
Once again students aren't quite sure about what they want to say. The teacher realizes that they need a little more deliberate guidance and asked a related question.

Teacher: ¿Cómo ayuda a nuestro planeta?
Students: Crecen las plantas.

Teacher: Cre-cen, ¿qué letras para la silaba? "cre"
Students: La c-r-e

Teacher: (teacher waits)
Students: c-e-n

The teacher continued to use guided questioning as a means to make students aware of their own knowledge and experience which is valued here in this social context.

Teacher: Crecen las plantas, ¿qué otras cosas hace el sol?
Students: Calienta la tierra

Teacher: ¿Cómo se escribe? "la"
Students: L-A

Teacher: Tie-rra
Students: La t-i-e-r-a

Teacher: (teacher rolls "RR" sound harder so students can hear and make correction).
   Tie-RRa.

Students: Doble RR
Teacher: ¿Qué más sabemos del sol?, ¿Qué más calienta?
Student: El cuerpo

Together the students and the teacher continued to co-construct and make connections between the world around us and our own lives.

The following day, the students continued with the same so that they could finish their group brainstorm (web). The teacher reviewed what they would be doing in the group so that they were more prepared to participate. Together they were encouraged to reflect on the knowledge and ideas that they had shared about the sun.

In this example, students were using shared reading and discussion to reflect on weather concepts. In a social context such as shared reading, the student was prompted to revisit a text with which he or she was familiar. In addition, they were more likely to risk reading aloud because they were not the only student reading in such a context.

Teacher: Vamos a revisar el cuadro sinóptico que ustedes han hecho, okay y vamos a ver, ¿cuáles fueron nuestras ideas; para que
sigamos terminando el libro del sol. ¿Por qué es el sol muy importante para el ...? (no response), ¿el qué? ¿El ...?

Students: Clima

Teacher: El clima, muy bien, el clima, y vamos a ver ¿qué cosas hace el sol?. Yo lo reviso, tú lo leas conmigo y lo revisamos juntos.

The students share read with the teacher as another student tracks what they had written the previous day.

Teacher: El sol ayuda a formar una nube (Said with the students).

All: El sol ayuda a las plantas a crecer. Con el sol cre...

Student: crecen (another student helps with unknown part of the sentence)

Student: (Ulises) las plantas

Teacher: Muy bien, uno ayudando al otro. Marta empezó y Ulises terminó, muy bien. El sol (teacher points at text and students read).

Students, Martha and Ulises, help one another in the process of shared reading. The teacher recognized them for helping one another. As a result, the students were left with the idea that they could work together to bridge gaps
in literacy. Students were encouraged to participate in literacy events when the risk is minimized. Martha was an emerging reader and Ulises was a beginning reader. Martha had recently begun to participate more vocally in our co-constructed literacy and text. She was much more vocal in a small group than on an individual basis. She seemed to feel more comfortable in a small group setting because of the support she could get from her peers.

The students continued to share read and make connections between concepts. The teacher continued to use guided questioning as a means to get students to give up pertinent weather knowledge. They continued reading what they had already written.

Students: Hace viento
Teacher: Muy bien. (teacher cont.) El sol calienta las gotas y cuando calienta las gotas ¿qué dijimos que pasaba?
Students: Que se hace vapor.
Teacher: Y vapor, ¿qué es vapor?
Students: (start to read) mo-le-cu-las, moléculas
Teacher: Muy bien
Students: (reading off brainstorm chart) El sol calienta la tierra, El sol calienta el cuerpo, (Martha helps, and finishes the word when the others are not paying attention)

Teacher: Muy bien, Martha

In the following dialogue, the teacher makes an error in article noun agreement: "las animales" instead of "los animales." It should be stated as "los animales." The students realized this and corrected the teacher.

Teacher: (Teacher continues) El sol ayuda a las...

Students: ¿Las animales?

Teacher: ¿Las animales?

Students: (Martha): (student corrects teacher) los animales

Teacher: Mr. Ingram lo dijo mal pero Martha está escuchando y mirando con sus ojos, fijándose en los sonidos y lo que estamos escribiendo.

The teacher accepts responsibility for the error and recognizes how well Martha was paying attention. In doing so, the teacher, also, allowed the students to recognize that adults can make errors, too.
Students need to realize that mistakes in literacy are made by all. In addition, the teacher demonstrated that one can be open to correction without becoming defensive or being hurt by such constructive criticism. Students can learn and grow from the curricular experience, in many ways. Embedding other lessons for children to learn from are side benefits we can organize for, or allow them to happen spontaneously. More specifically, the sun holds important interest for us and our world, so it is a pertinent mini-lesson.

The 'sun' brainstorm revisits a topic which underlies the 'driving force' (the sun) of our climate. The California, Science Framework, 1990, explains that the sun is an essential element in our world’s climate: "The water cycle governs much of the environmental conditions on earth... The sun warms the earth and drives the water cycle. Clouds can be observed and are part of the water cycle (p. 194)." This context mediated these concepts in a setting where students were both teachers and learners. In the process, they shared and clarified important weather concepts regarding the impact of the sun on our world, and in our solar system. Also, they had done it while incorporating language arts skills in encoding and
decoding, "as they journey toward becoming proficient readers and writers in their first language, Spanish, in the first grade." (Flores, personal communication, 1999)

**Individual Concept Maps**

This socially mediated context allowed the learner to discover how much they, actually, did know. They drew a weather concept map, by brainstorming all that they could.

After, much investigation and discovery, the students made their own brainstorm web. In the process, the teacher used guided questioning to encourage their efforts and provide them the support within their zone of potential development. This particular vignette shows how the teacher prepared the students; initiating their efforts by questioning what they already knew. The guided questions inspired the children to reflect and respond appropriately.

Teacher: Ustedes van a hacer su cuadro sinóptico propio.

Students: De clima.

Teacher: Entonces, en el centro de tu papel, ¿qué vas a hacer?

Students: Un círculo.
Teacher: Muy bien. Y ¿qué vas a escribir dentro de tu círculo?

Students: El clima.

Some students were glancing around to see how other students were organizing their papers. They probably felt a little lost with a blank sheet of paper. The teacher sensed that they might need a little more guidance, so he continued to question further.

Teacher: ¿Qué estamos estudiando?
Student: El clima.
Teacher: ¿Dónde lo vas a poner? ¿En un cuadro sinóptico? ¿Dónde pones el tema?
Students: En medio.
Teacher: Exacto.

Without telling the students how to begin, the teacher questioned the students about how they should begin to make a brainstorm web (concept map). The teacher continued to see confusion on the faces of many students. They seemed to feel abandoned and unable to understand how to implement what the teacher had explained. The teacher went on to further clarify the construction of their brainstorm web.
Teacher: Ahora, poniendo todos los palitos, todo lo que necesitas, escribame todas las ideas, palabras que se relacionen con el clima. Pueden empezar con todo lo que recuerden acerca del clima. No tienen que ser perfectos con su escritura (teacher responds after seeing many erasing,)

Students: (no response)

Teacher: Sólo, escriba de acuerdo con los sonidos que sabes tú. Después lo podemos revisar juntos. ¿Cuáles son las cosas que tú sabes acerca del clima? Ustedes piensen en tus cabezas y después escribalo en tu hoja, poniendo los palitos apropiados. (Seeing some rather blank faces, the teacher continues to guide the attempts of the students with questions). Cuando tu hablas con tu mama acerca del clima (in reference to the homework writing assignment), ¿de qué hablan? Recuerdense que hablemos acerca del clima aquí. ¿De quee hemos hablado? ¿Qué cosas hemos hecho que tienen que ver con el clima? Sólo
escriba esas ideas que recuerdas. ¿Cómo te afecta el clima? (pause...) ¿Qué hace el clima? (pause...) ¿Dónde está el clima? (pause...) Tu escriba tus ideas en la hoja, por favor.

Following this barrage of questions, the students seemed to be thinking rather than staring with blank faces. Children began thinking quietly, then, some wrote. The teacher went around to individuals to guide their development of the concept mapping, as needed.

Some students were writing and others were still not sure how to continue after the last "weather word" they wrote. The teacher approached them on an individual basis. The teacher looked over the Brainstorm (concept map) and found a word, pointed to it; Then, he had the student read it. The teacher went on to question them in such a way that he elicited weather ideas that the students weren't sure of. The student went on to believe that he or she did know something about the weather and wrote it. However, the student may not have gotten to this point without the guided questioning of the teacher. The students wrote because they were made to feel that they did know something about the weather. For example," the deliberate
mediation demonstrated how the teacher was the sociocultural link across social contexts and the children's prior knowledge." (Flores, personal communication, 1999)

Teacher: (pointing at text, lluvia, on student's map)

¿Cómo ocurre esto? ¿Cómo pasa eso? (no response) ¿Qué cosas recuerdes que hicimos acerca del clima? ¿Libros?, ¿Qué cortamos? ¿Recuerdas? (teacher points to another word, aire, on the same paper). ¿Qué es eso?

Student: aire

Teacher: ¿Qué cosas hace el aire?

Student: (goes back to previous word, lluvia)

Teacher: ¿Qué es eso?

Student: lluvia

Teacher: ¿Cómo se hace la lluvia? ¿Cómo se forma?... ¿Qué pasa?

Student: Gotitas van para arriba.

Teacher: Entonces, escribelo. Esto es algo que sabes acerca del clima. (pause... teacher points to another word; viento) Hicimos muchas cosas afuera acerca del viento... ¿Dónde ocurre el clima?
Student: En el mundo
Teacher: (teacher uses hands to make a spherical shape insinuating our atmosphere) ¿Dónde?
Student: En la bolsa de aire (atmosphere)
Teacher: (teacher points to word, nubes, on student's paper) ¿Cómo se forman estos?
Student: (student writes) "moleculas"
Teacher: (teacher goes to Adriana's paper) ¿Qué dice aquí?
Student: Viento.

Continuing within this social context, the next vignettes show how the teacher searches for a word in the brainstorm web which will empower the student. When the teacher does choose a word that seems to leave the student speechless, he went on to a different concept that allows the student to participate. For instance,

Teacher: ¿Cómo se hace? (student does not seem sure about how to respond) (pause...) (teacher goes to another word) ¿Qué dice aquí?
Student: lluvia
Teacher: ¿Cómo se forma?
Students: Moleculas de agua
Teacher: Bien, escribámelo. (teacher goes to another student) (pointing to the word, invierno). 
Esto es parte del clima.

Students: Sí.

Teacher: ¿Hay otra?

Students: (student writes about other seasons)

Some students were still finding it difficult to stay focused. While guiding students, the teacher tried to reassure students; He let them know that they were doing a great job with what they had done so far. Afterwards, the teacher initiated a few guided questions that got the students back on track. The students re-focused by interacting with the teacher and the guided questions posed. Eventually the students were incited to act and reflect upon the experiences and knowledge that they had.

Teacher: (teacher goes to another student). Esto es excelente. ¿Qué necesitas para formar estas partículas.

Student: Sol.

Teacher: ¿Cuándo es que encuentras mucho sol.

Students: En el verano. (student writes ideas)

Teacher: (teacher glances over at Martha's paper) Muy bien, Martha. (teacher looks at word, nubes,
on Sal's paper) ¿Qué son estas cosas? ¿Cómo se hacen?

Student: (student writes more ideas on their paper).

Teacher: Muy bien, ¿Qué necesitas para que esto pasé? ¿Qué tiene que hacer el agua para irse para arriba?. (no response). ¿Qué nos da el sol? (students write new ideas encouraged by teacher questioning). Muy bien, Hacen buen trabajo ustedes.

Teacher: (teacher continues to question Sal, and points at word, lluvia) ¿Cuándo vemos mucha lluvia?

Student: ¿Cuándo está nublado.

Teacher: Sí, ¿durante que temporada vemos muchas nubes?

Student: En el invierno (student writes).

Teacher: ¿Invierno es parte del clima?

Student: Sí.

Teacher: No solo el invierno pero, ¿hay otras también? (student writes more) (teacher goes to Martha's and points to the word, nieve)

¿Cuándo vemos mucho de esto?

Student: Cuando hay hombres de nieve.
Teacher: Sí, eso es algo que yo no había pensado. Buena idea, (Teacher goes to Marissa's paper and points to Lluvia). Tú sabes muchas cosas acerca del clima. ¿Qué necesitas cuando hay lluvia?

Student: (Marissa explains it to the teacher in a quiet voice then writes diligently).

It was this type of social interaction that prompted students to reach their potential with competent and confident guidance. As they repeat the task they gain more control over mastery of the task. Eventually they can perform the task with less and less help until they are able to do it on their own.

Summary

This chapter analyzed the data collected as a result of mediated social contexts in science. Social contexts constituted the learning activities organized by the teacher. These socially, mediated events provided students with an opportunity to participate successfully. They allowed the students to participate in their own learning by using their first language as a foundation for developing science concepts and language learning.
Embedded in these socioeducational context were science processes that helped the students to organize knowledge; to engage students in ordering (sequencing), categorizing, inferring, relating and observing, and the comparing of weather concepts (Flores, personal communication, 1999).

Concepts explored in this study included the social implications of weather, as well as, patterns, cycles, and changes that occur in our natural world as a result of the weather cycle.

These concepts and goals were mediated within various social contexts and their structures. Such social contexts include the following settings: small and whole group discussions which include guided and open-ended questioning; shared reading and writing; pantomime; and hands-on experiments.

It is in these social contexts that mediated structures such as charts/diagrams, worksheets, literature review sheets, concept maps (brainstorming), weather journals, little books, drawings, writings, and dialogue (ideas) were co-created. The underlying assumption was that, amidst the sharing and discovering, in various contexts, we can develop and enhance our understandings of the world around us.
CHAPTER FIVE
INSIGHTS ABOUT LANGUAGE MINORITY, FIRST GRADE STUDENTS LEARNING SCIENTIFIC CONCEPTS

This study generated a variety of experiences, observations, and new knowledge about how Language Minority Students (L.M.S.) learn scientific concepts while gaining language proficiency in their first and second language.

Language proficiency means the use of both Spanish and English. This language proficiency includes other knowledge: use of letter sounds, orthography, grammar, and science concepts.

This study mediated language proficiency skills in context with science concepts despite students' limited English abilities. It showed how important science concepts and language proficiency skills can be combined in socially mediated contexts that follow state guidelines in Science and Language Arts, in spite of, student English language level. It, also, shows the power of the bilingual teacher as sociocultural mediator.
I combined science knowledge to create a pedagogy that parallels language learning in both languages within student centered social contexts. The goals embedded throughout the mediated social structures were made relevant to the child’s personal experience: culture through language. These types of social contexts embraced the students’ personal experience, ability, and interests.

This study has sought to demonstrate how the organization of many socioeducational contexts provide deliberate guidance to make science concepts and language learning visible in that same context. The framework for this study lies in Vygotskian theory (Werscht, 1991). The following three Vygotskian concepts were pivotal in the teaching/learning of scientific concepts.

Law of Cultural Development

Any function in the child’s cultural development appears twice, or on two planes. First, it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category. This is equally true with regard to voluntary attention, logical memory, the
formation of concepts, and the development of volition...
Social relations or relations among people genetically
underlie all higher functions and their relationships
(Wertsch, p. 26). Through the transcribed dialogues across
the various socioeducational context one can see how this
Vygotskian concept was actualized.

Activity Theory

The Activity Theory is a socially interactive point
where thought and language come together. Thoughts that
were once, only, on the social plane, are now internalized
on the intrapsychological plane as personal, useable
knowledge. Kozulin explains that it is, "the use of
objects that leads the child toward the cognitive mastery
of situations" (xlv). This was demonstrated through the
children's dialogue as they engaged in scientific
processes.

Zone of Proximal Development

The Zone of Proximal Development is the, "actual
developmental level as determined by independent problem
solving" and the higher level of "potential development as
determined through problem solving under adult guidance or
in collaboration with more capable peers" (Wertsch, p.28).
This is a difficult concept to grasp, but once we start teaching to the potential, we can never go back.

Using the aforementioned framework, teachers can organize mediated structures that embed science and language arts goals. Socially mediated structures in this study were used because they facilitated a variety of risk-free settings that encouraged participation. These mediated structures and the teacher made the subject matter relevant to student interest.

In addition, the socially mediated contexts allowed for collaborative work, student work and the sharing of ideas. Students' ideas were valued and made important when they were collaboratively written, and, then, made part of the environment; a resource for later reference and to make links across the curriculum. As a result of such contexts, the following insights were made visible:

- Links were mediated across the curriculum and made context specific. Connections between literature, science, and social science were generated.
- Children knew more than they thought. Guided questioning mediated prior knowledge by eliciting and encouraging participation. Students' ideas became important when they were collaboratively
written in large print to become a permanent part of the room environment.
- Guided questioning helps students discover their own knowledge and ability.
- The zone of proximal development was set up by mediation of discussion, structures, student experience, and student interest (at times, student interest mediated zone?). The teacher could modulate discussion to challenge, but guide learning for success.
- Curriculum evolved 'into' and 'from' student interest. Topics can be mediated more successfully when the teacher is flexible with the curriculum.
- Science can support literacy proficiency because students are interested and the topic is basic to our human nature: survival.
- Student-led contexts working collaboratively with less teacher mediation: confirming, negotiating, and sharing.
- Talk can be regulated by the teacher for different types of discussions and learning. For example, discussions should reflect a variety of opportunities for students to speak and/or listen.
- Graphic organizers (mediated structures) allowed personal ideas to be made tangibly visible. They mediated a structurally coherent organization of our personal thoughts and create a reference for future knowledge.

- The students felt empowered through contextual structures that raise expectation, but provide support through mediation in collaboration. 'bridging the gap.'

- Teacher modeling was an important form of mediation. It mediated knowledge, behavior, independence, and opportunity. This type of modeling should be embedded throughout the curriculum. It may require reinforcement, but, eventually, the children will make these behaviors into their own learning repertoire.

- Hands-on contexts allow students to use other modalities to learn. Sight and sound are the two most commonly used modalities used in classroom setting. Hands-on, social contexts provided opportunities to grasp difficult science concepts. Hands-on, social contexts were fun and engaged the students' tactile, kinesthetic, and auditory senses.
Insights for Change

- Observation note taking and cassette taping could have been better planned. Some observations were not transcribed until the day after the event, or later. Some observations were never written. They should have been taken during, or immediately following mediated socioeducational contexts. In addition, the tape recorder was not always available, or ready for usage.

- Traditional influences of the teacher served to stifle student participation or work. As students, we have learned from our teachers, how to be teachers. As a result, we carry some traditional teaching values within our pedagogy. We expect children to always raise their hand to talk, to sit in rows, to be quiet, to not touch things, to stay in their seats, and to believe that the teacher always knows everything.

- Scientific vocabulary was not used enough. Children are capable of grasping the concepts behind these, seemingly, difficult words. If we provide the mediation and opportunity to use them; They will.
The duration of the unit spanned 3.5 months. Generally, a single unit does not run this long. There were many holidays, school events, testing, and daily disruptions which made planning, and timeliness very difficult. However, for the purposes of this study, weather study was always resumed. I was trying to be as complete as possible in our study of weather. Interruptions didn’t allow for continuity, but student interest was never lost. Not only was interest maintained, but, it, also, complemented the direction of the unit.

- English language development could have been increased throughout the unit. However, the primary purpose of this study was to develop scientific concepts in the first language.

- Weather videos could have been used more often to provide the students with more tangible, visible imagery. This imagery could enhance weather concept development because it serves to concretize and reinforce new and prior experience with different types of weather.

- Limitations in the scope of this study precluded many other materials and social contexts, originally
in the study, from being discussed in this project analysis.

However, the experience of language minority students was made relevant and valuable when expressed in the 'home language.' Understandings of science concepts and language learning is supported because communication was two-way: expression was shared and responded to, by being accepted, confirmed, or disconfirmed and questioned. This form of communication is the essence of being human and developing knowledge of the world around us.

Language minority Students bring a wealth of knowledge, experience, and interest to our classrooms. However, our school districts deny its' value because L.M.S. don't speak English well enough and 'English' is the goal. Many administrators, directors of curriculum, and voting citizens do not believe that L.M.S. can develop important science concepts, that are universal, while developing language proficiency skills that are applicable to both English and Spanish language learning. The English language becomes the sole goal, and science is peripheral; Limited English speakers get English, not important science concepts and critical thinking skills.
As we design our pedagogy to appreciate, understand, respect and respond to the needs of our L.M.S.; they, as well as, their parents will participate more in their learning.

This case study showed the power of mediation of science concepts, to language minority students. Science concepts were made valid when, they were first, made comprehensible and relevant.

The learning of science concepts is comprehensible when it is in the child's first language. Using the 'first' or 'home' language, students can, more freely, participate, share, confirm, disconfirm, question, and develop new understandings of science concepts. However, these opportunities are being negated and/or stifled in monolingual classrooms where development of English skills is much more important than the mediation of science concepts.

Language Minority students, such as Hispanics are not doing well in our schools. Hispanics are not, inherently, inferior to other cultural groups. Hispanics are as capable as any other cultural group; yet, many are doing less well in school than other cultural groups in the United States.
It is the contention of this study, that something has provoked these negative results. In an effort to assess and understand how to help our students, we should look critically at the 'whole' Hispanic student. Taking on a sociocultural and sociohistorical perspective allows us to see where these students come from, and where they stand so that we can create a pedagogy that embraces their needs and experience, as they are. Then, we can provide them with the opportunity to move themselves forward; toward their potential. They can, even, use the knowledge of their first language to better acquire the second language.

Throughout United States history, Hispanics have, generally, been relegated to a menial status position. Mexicans, in particular, represent a culture conquered twice; once by the Spanish, and, then, by the Anglo settlers of the U.S.. In both cases, their land, language, and culture was taken and reshaped according to the invading culture. Since then, there have been many years of discrimination and oppression which have impeded Hispanic success over generations; This has made an indelible impression on future generations and their beliefs about success.
Across the years, many Hispanics in our country have come to accept a subordinate position in our society. They have assimilated to the Anglo mainstream group reluctantly and less successfully than other cultural groups.

The pedagogy of Bilingual and Cross Cultural education attempts to facilitate socioeducational contexts that value student experience (culture) and language. Language Minority Students are, naturally, empowered when they can communicate to share pertinent experience, ability, and interest.

In our study of weather, limited English students in the first grade were empowered to learn science concepts because their language and experience (knowledge) were respected and valued. Bilingual/Cross Cultural pedagogy promotes socioeducational contexts that mediate science concepts in the students’ first language. Science knowledge and its’ social implications represents a fundamental part of our existence.

The past, the present and the future of our world, ‘has’ and ‘will’ depend on a collaborative effort to solve our world problems. Speaking more than one language will definitely be an asset in our growing global economy. It is possible that, one day, one or more of our students
could contribute to this effort in English, Spanish, or any other language. It won't matter which language they use when the need comes. We need to cultivate literacy and sow science concepts; even at the first grade level.
APPENDIX A:

OVERVIEW CHARTS
<table>
<thead>
<tr>
<th></th>
<th>Mediated Structure</th>
<th>Science Concepts and Processes</th>
<th>Objective</th>
<th>Artifact</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Weather songs and poems</td>
<td>Concepts: air, wind, heat, change</td>
<td>Participate in chanting and</td>
<td>Mediated</td>
<td>Mediate fun, risk-free context that would allow for mediated connections</td>
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<td></td>
<td>in choral reading and tracking of enlarged text</td>
<td>Processes: communicating, relating, inferring, observing.</td>
<td>discussion of poems and songs.</td>
<td>weather reading and discussion</td>
<td>between science, poetry &amp; chants that reflect our social world &amp; weather</td>
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<td></td>
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<td></td>
<td>(not avail.)</td>
<td>within it.</td>
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<td>1.2</td>
<td>Weather science book display</td>
<td>Concepts: Weather in various states of change</td>
<td>Participate in shared reading and exploration of weather.</td>
<td>Spontaneous, self-interest reading and discussion (not avail.) (append. D)</td>
<td>Mediate a risk-free, attractive book setting, weather concepts,review higher level text with picture walks, ideas which elicit interest and ideas which are valued.</td>
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<td></td>
<td></td>
<td>Processes: communicating, observing, inferring.</td>
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<tr>
<td>1.3</td>
<td>Calendar math and</td>
<td>Concepts: seasons, days, months, cycles, weather vocabulary</td>
<td>Participate in choral chanting;</td>
<td>Discussion (not avail.)</td>
<td>Mediate opportunities for students to manipulate environment in student led social context while patterns &amp; sequences in weather are made visible and discussed.</td>
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<tr>
<td></td>
<td>language Arts</td>
<td>Processes: communicating, observing, relating, comparing.</td>
<td>discussion.</td>
<td>(not avail.) photos (append. D)</td>
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<td>1.4</td>
<td>Literature study, El Aguila</td>
<td>Concepts: wind, force, change.</td>
<td>Participate in picture walk; read</td>
<td>Discussion (not avail.); charted, four parts of story (append. F); Tcher jrn. p. 1</td>
<td>Mediate connections between literature, science, &amp; personal experience, eliciting inferences, comparisons, &amp; cause and effect while making phonics visible in context of new vocabulary in literature.</td>
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<tr>
<td></td>
<td>del Viento, by Lada Josefa</td>
<td>processes: observing, communicating, comparing, ordering, relating, inferring, applying.</td>
<td>aloud; discussion of weather concepts.</td>
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<td>Kratky</td>
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<td>1.5</td>
<td>Thermometer reading</td>
<td>Concepts: air, temperature, degrees, heated molecules.</td>
<td>Participate in read aloud, reading thermometer &amp; discussion weather.</td>
<td>Dialogue transcription (append. p.) not avail. (append. ?)</td>
<td>Mediate concept of weather in air, heated air molecules; effects of heat on our bodies; giving students a manipulative to imagine through sight and touch (senses).</td>
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<td></td>
<td></td>
<td>Processes: observing, communicating, relating, inferring.</td>
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<tr>
<td>Mediated Structure</td>
<td>Science Concepts and Processes</td>
<td>Objective</td>
<td>Artifact</td>
<td>Purpose (Reason for mediating social context)</td>
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<td>1.6 “Favorite-weather” graph</td>
<td><strong>Concepts:</strong> What does weather look and feel like; Which do we like the best? <strong>Process:</strong> observing, relating, inferring, comparing, communicating, categorizing, applying.</td>
<td>Participate in discussion, share experience, &amp; graph favorite weather choice.</td>
<td>Weather graph (append. G) &amp; discussion (not avail.); Seasons chart (append. G)</td>
<td>Mediates hands-on context eliciting personal experiences; likes &amp; dislikes regarding weather, reasoning and comparing (to other seasons), complements other collaborative text writing when teacher uses it for reference.</td>
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<tr>
<td>2.1 Collaborative literature reading (El Regalo, by Esther Navarro) in small groups</td>
<td><strong>Concepts:</strong> Drought, rain, evaporation, condensation, precipitation, &amp; water cycle. <strong>Process:</strong> communicating, relating, comparing, inferring, applying.</td>
<td>Participate in picture walk, collaboratively reading, &amp; weather discussion.</td>
<td>Discussion (not avail.); Teacher journal, p.3 (append. D)</td>
<td>Mediates reading experience that allows for risk-free reading, phonemic visibility in context, &amp; bridges ideas of sci., social sci., &amp; personal experience.</td>
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<td>2.2 Choral reading of poem in small &amp; whole group.</td>
<td><strong>Concepts:</strong> rain, plants, seeds, &amp; harvest. <strong>Process:</strong> communicating, relating, inferring.</td>
<td>Participate in choral reading &amp; discussion</td>
<td>Discussion (not avail.); Teacher journal, p.4</td>
<td>Mediates reading experience allowing for risk-free, fun, chanting, phonemic visibility, &amp; bridges ideas of science, social science &amp; personal experience.</td>
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<tr>
<td>2.3 Collaborative ‘weather’ brainstorm</td>
<td><strong>Concepts:</strong> any &amp; all weather concepts available for discussion. <strong>Process:</strong> communicating, relating, categorizing, inferring.</td>
<td>Participate in collaborative writing, brainstorming &amp; weather discussions</td>
<td>Collaborative ‘weather’ brainstorm (append. ); discussion (not avail.); Teacher journal, p.4</td>
<td>Mediates open forum for sharing &amp; writing personal ideas collaboratively (risk-free) to make chart part of environment for reference.</td>
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<td>2.4 Thermometer reading &amp; graphing in small group</td>
<td>Concepts: weather in air, temperature, degrees, &amp; heated molecules. Processes: communicating, relating, observing.</td>
<td>Participate in hands-on thermometer reading, discussion, &amp; graph</td>
<td>Weekly graph sheet (append. G); discussion (not avail.); Teacher jrnl, p.6-8</td>
<td>Mediate structure where students explore thermometer (hands-on), reading thermometer, &amp; graph with teacher mediation.</td>
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<td>2.5 Revisiting literature text in small group</td>
<td>Concepts: wind, force, &amp; change. Processes: observing, communicating, relating, inferring, categorizing.</td>
<td>Participate in shared reading &amp; make ‘wind sock’ depicting 4 parts of story</td>
<td>Wind sock (append.); depicting 4 parts of story, discussion (not avail.); Teacher jrnl, p.6</td>
<td>Mediate sequencing activity depicting change, promotes discovery through sequence &amp; discuss science concepts embedded in literature; making phonics visible in context of decoding.</td>
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<td>2.6 Weather coloring book with ‘weather text’ description of seasons in whole, small, or individual</td>
<td>Concepts: seasons, weather, change, &amp; cause and effect. Processes: communicating, observing.</td>
<td>Participate in shared &amp; choral reading, discussion of weather/change.</td>
<td>Discussion (not available); Coloring book (append.); Teacher jrnl, p.6</td>
<td>Mediate risk-free context allowing for mediated connections between science &amp; personal experience; to make ‘cause &amp; effect’ visible through coloring, shared reading, &amp; exper.; making phonics visible in context of decoding.</td>
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<td>3.2 'Weather' question brainstorm</td>
<td>Concepts: any &amp; all weather concepts. Processes: communicating, relating, categorizing, inferring.</td>
<td>Participate in collaborative writing, and brainstorming</td>
<td>Weather brainstorm (append. B); Teacher jrn1, p. 8</td>
<td>Mediate open-forum, risk-free opportunities for students to share ideas &amp; questions, and make phonics visible while encoding/decoding.</td>
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<td>3.3 'Our favorite seasons' graph (indiv. &amp; small grp.)</td>
<td>Concepts: season &amp; effects. Processes: observing, communicating, categorizing, comparing, relating, inferring.</td>
<td>Participate in discussion of weather concepts and effects.</td>
<td>Weather graph (append. G) &amp; discussion (not available); Teacher jrn1, p. 10</td>
<td>Inspire interest in weather by allowing student experience &amp; preference to make weather personally important.</td>
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<td>3.4 'Seasons' chart, collaborative text writing (whole grp.)</td>
<td>Concepts: seasons &amp; changes. Processes: communicating, categorizing, observing, relating.</td>
<td>Participate in collaborative context writing.</td>
<td>'Seasons' chart (append. H)</td>
<td>Mediate a collaborative social context where all participate successfully in sharing &amp; encoding ideas (visible phonics).</td>
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<td>3.5 Water exploration in (small grp.)</td>
<td>Concepts: properties of water &amp; measurement. Processes: observing, communicating, relating, comparing.</td>
<td>Participate in explor., share what seen, felt, heard, tasted</td>
<td>Photos (append. D); discussion (not available); Teacher jrn1, p. 10</td>
<td>Mediate fun, hands-on experience involving senses &amp; mediated science discussion integrating measurement.</td>
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<td>4.1 Read around the room w/ students tracking mediated weather structures.</td>
<td>Concepts: seasons, change, wind, air, heat, cycles, temp., &amp; molecules. Processes: observing, communicating, relating, comparing.</td>
<td>Participate in shared &amp; choral reading, discuss weather elements &amp; cycles of change.</td>
<td>Mediated weather reading; discussion (not available); Teacher jrn1, p. 10</td>
<td>Mediate a fun, risk-free context that would allow for mediated connections between science, &amp; personal ideas; and, to make 'personal' weather ideas visible through writing.</td>
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<td>4.2 Hands-on science experiment: Air Occupies Space</td>
<td>Concepts: air occupies space, air has force and moves many things. Processes: observing, communicating, comparing, ordering, categorizing, relating, inferring, applying.</td>
<td>Participate in hands-on experiment by going through scientific process.</td>
<td>Transcript. (append.); experiment jrn1 (append. C); Photos (append.); Teacher jrn1, p.10</td>
<td>Mediate hands-on participation while developing science concepts (weather &amp; scientific method), oral language development, &amp; phonemic visibility in collaborative text writing.</td>
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<td>4.3 Concept map (Brains-storm of good &amp; bad weather effects)</td>
<td>Concepts: Any and all weather and its' effects on us. Processes: observing, communicating, relating, categorizing.</td>
<td>Participate in collaborative text writing, and brain-storming</td>
<td>Bad &amp; good weather chart (append. H); Teacher jrn1, p.11.</td>
<td>Mediate open-forum, risk-free opportunity for students to share ideas &amp; questions, while making phonics visible while encoding.</td>
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<td>5.2 Time and temperature in small group</td>
<td>Concepts: air, molecules, heat, thermometer, change. Processes: observing, communicating.</td>
<td>Participate in thermometer reading, graph, guess next reading and discuss.</td>
<td>Chart (append. G); discussion (not available); Teacher jrn1, p.12.</td>
<td>Mediate hands-on experience that allows for science &amp; math (approx., count by twos, add/subtr., measuring) connection.</td>
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<td><strong>5.3 Air molecule role playing in small and large group</strong></td>
<td>Concepts: air, heat, wind, change, molecules, &amp; energy. Processes: observing, communicating, relating, applying.</td>
<td>Participate in discussion of heat &amp; personal experiences with hot surfaces, &amp; role play of heated molecules.</td>
<td>Pinwheel (not avail.); Discussion (not avail.); Teacher jrnl., p. 13;</td>
<td>Mediate fun, risk-free context to allow for links between science &amp; social science (heated molecules, &amp; personal experiences) while developing vocabulary to explain concepts.</td>
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<td><strong>5.4 Video, Mind, by Scholastic</strong></td>
<td>Concepts: air, heat, wind, change, energy, &amp; molecules. Processes: observing, communicating, relating, inferring, applying.</td>
<td>Participate in viewing video, mediated discussions, &amp; 'heated air-molecule' role playing.</td>
<td>Discussion (not avail.); Pinwheel (not avail.); Teacher jrnl., p. 13;</td>
<td>Mediate visual imagery of weather while making connections to personal experience, &amp; to weather concepts that are more easily explained (oral language development) because of student interest &amp; experience.</td>
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<td><strong>5.5 'Air' brainstorm in small group</strong></td>
<td>Concepts: any and all weather that focus on 'air' and related concepts. Processes: observing, communicating, relating, brainstorming.</td>
<td>Participate in collaborative text writing, and brainstorming.</td>
<td>'Air' brainstorm weather chart (append----); Teacher. jrnl., p. 14;</td>
<td>Mediate open-forum, risk-free opportunities for students to share ideas &amp; questions, while making phonics visible during encoding and decoding in collaborative text writing.</td>
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<td><strong>5.6 Read aloud, En. el Invierno, by</strong></td>
<td>Concepts: snow, ice, cold, change, &amp; health. Processes: observing, communicating, relating.</td>
<td>Participate in discussion of cold weather elements and effects.</td>
<td>'Seasonal effects' chart (append H ); Teacher. jrnl., p.15;</td>
<td>Mediate a collaborative discussion (weather) for the purpose of demonstrating its' importance in our lives (cold, health, dinosaurs, clothing, shelter, homeless).</td>
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<td>6.4 Thermometer reading in small group context</td>
<td>Concepts: heat, air molecules, sun, measurement. Processes: observing, communicating, ordering, relating, inferring.</td>
<td>Participate in reading thermometer in cold, warm, &amp; hot water while discussing how heat is measured &amp; why it happens.</td>
<td>Discussion (not avail.); Tcher. jrn1., p.16; (append. G)</td>
<td>Mediate temperature measurement of cold, warm, &amp; hot water; discuss change over time while each student holds thermometer &amp; makes an effort at reading temperature. The teacher can think out loud as he/she looks at the overhead transparency to mediate the temperature graphing, as well as, the thought processes necessary.</td>
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<td>6.5 Shared reading of book, El Sol, in small group</td>
<td>Concepts: sun, heat, molecules, air, &amp; importance (relevance). Processes: observing, communicating, comparing, relating, inferring.</td>
<td>Participate in picture walk while sharing understandings of the weather concepts depicted &amp; connecting personal experience.</td>
<td>Discussion (not avail.); Collab. Text of Sun brainstorm (append. B); Tcher. jrn1., p.18</td>
<td>Mediate opportunity to represent their personal understandings and make phonics visible while encoding and decoding in collaborative text writing social context.</td>
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<td>6.6 Hands-on simulation of earth's rotation around the sun.</td>
<td>Concepts: earth's orbit around sun; seasons; weather; atmosphere (air bubble occupying space within 'space'). Processes: observing, communicating, relating, inferring, applying.</td>
<td>Participate in rotating earth globe around sun &amp; discuss seasons &amp; air bubble; atmosphere for breathing.</td>
<td>Transcription (not avail.); Tcher. jrn1., p.18</td>
<td>Mediate hands-on personal experience that reinforces previously &amp; discussed concepts dealing with air occupying space, seasons, and the social importance of these concepts in our lives &amp; universe. Make reference to world and atmosphere structures (artifacts &amp; diagrams) made earlier in weather unit.</td>
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<td>Mediate context where students can notice change over time &amp; discuss those changes, hold thermometer in their hands, and make approx. readings of temperature then discuss our readings of prior temperatures and their graph.</td>
<td>Mediate understanding using overhead projector in 'attention getter,' allowing students an opportunity to build on previous lessons (molecules, heat, change (states of water, etc.).</td>
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<td>Mediate context that is risk-free and fun, but allows for weather connections to be made visible, building on concepts. Also, dramatizing &amp; singing add to children's learning, as well as, interest.</td>
<td>Mediate open forum for sharing ideas about the sun while providing an opportunity to make phonics and encoding more visible through collaborative text writing &amp; shared reading.</td>
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<td>Participate in collaborative writing, diagram, share reading &amp; discussion.</td>
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<td>7.4 Collab text writing related to the sun. Processes: communicating, observing, relating, inferring.</td>
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<td>7.1 Graphic recording of temperature &amp; sun. Discussing how temperature &amp; sun are measured &amp; why it happens.</td>
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<td>8.3 Literature circle, La.</td>
<td>Concepts: plants, growth,</td>
<td>Participate in picture walk and discuss elements of weather which affect plants.</td>
<td>Discussion (not avail.)</td>
<td>Mediate a social context that would support the importance of weather, in our lives, and provide an introduction to the plant unit.</td>
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<td>Margarita, in small group.</td>
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<td>8.4 Water jars (one opened, one</td>
<td>Concepts: any &amp; all weather</td>
<td>Participate continually throughout the study of weather in a brief discussion of evaporation &amp; the weather cycle within classroom.</td>
<td>Transcription (not avail.)</td>
<td>Mediate a social context that supports the study of weather by emphasizing the water cycle (evaporation, condensation, precipitation, etc.) that occurs in our classroom despite the absence of the sun &amp; allows the student to see the process for themselves, on a daily basis.</td>
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<td>8.5 Individual concept</td>
<td>Concepts: any and all weather</td>
<td>Participate in writing and drawing weather concept map.</td>
<td>Discussion (not avail.)</td>
<td>Mediate a social context which provides a casual, &amp; fun experience that allows for review of the water cycle while it is happening and further supports what has already been discussed, read, and written about weather.</td>
<td></td>
</tr>
<tr>
<td>mapping of weather knowledge.</td>
<td>concepts. Processes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>observing, categorizing,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>communicating, ordering,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>relating, inferring.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B:

COLLABORATIVE AND INDIVIDUAL BRAINSTORM CHARTS
Literature Brainstorm
Individual Brainstorm I
Individual Brainstorm II
Individual Brainstorm III
Individual Brainstorm IV
Individual Brainstorm V
Small Group Brainstorm I
Small Group Brainstorm II
APPENDIX C:

SCIENCE EXPERIMENT
Investigación

¿Hay algo adentro del globo?

No

Hay aire empujando las paredes del globo. Ocupando el espacio. El aire está atrapado. Cuando saltamos el globo, el aire se escapa.

Balloon Investigation
Problem: 5/13/97
Usando un vaso, ¿Te
Creas que podríamos
hundir una toalla sin
mojarla?

Materiales:
 vasos, agua, toalla
y una recipiente

Procedimiento:
1. Primero—pusimos el
vaso al lado con
el papel adentro. Lo
metimos al agua.
 Resultado: Se mojó el
papel.

2. Segundo—pusimos el
vaso boca arriba
con el papel adentro.
Hundimos el vaso en
el agua.
 Resultado: El papel se mojó.

3. Tercero—pusimos el
vaso boca abajo con el
papel adentro. Después, hundi-
mos el vaso en el agua.

* Discusión

¿Qué pasó?

* Se metió el agua
  a los vasos boca
  y boca arriba

* el vaso boca abajo
  no se mojó el papel

* El aire no dejaba
  que el agua entrara
  Vimos las burbujas y

Experiment Process
Conclusión

primero

1 hipótesis

aba incorrecta o

papel se mojo.

2 hipótesis estaba

correcta. El papel se mojo.

con Escribí mi hipótesis

incorrecta. El papel no se

mojo.

Yo aprendí que el papel en el

vaso no se moja cuando

aire está atrapada.

El aire ocupa el espac.

aire

espacio

aire

espaço

aire

espaço
APPENDIX D:

PHOTOGRAPHS
Experiment Photo
Collaboration

H₂O Hat
Weather News
Weather Library

Weather Bulletin Board
Collaborative Writing

Weather Poems
Water Painting
APPENDIX E:

SAMPLES OF STUDENT WORK
Earth and Atmosphere
Weather Activities
Weather Journal I
Weather Journal II
Painted Weather Cycle
APPENDIX F:

MEDIATED LITERATURE STRUCTURES
Story Sequence
El Aguila Del Viento

Los personajes
1. Gluscabi
2. El águila
3. La gente

El lugar
1. Una montaña
2. El pueblo

El problema
1) Hubo mucho viento
2) No hubo bastante viento

La solución
1) Gluscabi metió al águila a la grieta
2) Sacó el águila de la grieta y después de que prometió que no iba a bajar sus alas, voló.

Las cuatro partes de la historia

Written Four Parts of the Story
APPENDIX G:

MEDIATED STRUCTURES IN MATH
¿Cuál es tu estación favorita?

Los niños del salón quieren más a la primavera que a las otras estaciones del año. Menos les gusta el invierno y el otoño.

¿Cuál te guste más?

El otoño y el invierno se empatan.

¿Cuántos necesitan para empatar se con los de calor?

11

Weather Graph
Había 5 moléculas de agua en el cemento absoluto. A 4 de las moléculas y se evaporaron. ¿Cuántas moléculas se quedaron?

4 = 1 molécula se quedó.

Había 5 gotas y hubo 4 más y se fueron.

¿Cuántas gotas son? 5 + 4 = 9.

Molecule Math
### How Hot Is It?

Look at the outside thermometer. Write the temperature on the chart.

<table>
<thead>
<tr>
<th>Day</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lunes</td>
<td>94° AM</td>
</tr>
<tr>
<td>Martes</td>
<td>94° AM</td>
</tr>
<tr>
<td>Miercoles</td>
<td>78° AM</td>
</tr>
<tr>
<td>Jueves</td>
<td>90° AM</td>
</tr>
<tr>
<td>Viernes</td>
<td>93° AM</td>
</tr>
</tbody>
</table>

At the end of the week, fill in the graph. Color the boxes to show how hot it was each day.

---

**Daily Temperature Graph**

Lunes y martes, bastante caliente. Martes a media mañana fue frio.

Miercoles estuvo media frio.
Time and Temperature Chart

Desde la mañana la temperatura ha subido
AM      PM    Subió 12°
68° → 80° desde la mañana.
El Clima
hace cosas malas.

- rayos
- tira los casas
- tira circos
- tornados
- avienta las plantas
- llueve fuerte
- relámpagos
- mata personas
- tira los árboles
- inunden las casas
- tormentas
- mata las plantas
- los animales se mueren
- nos enferma

Bad Weather Chart
Modeling the Weather Cycle
<table>
<thead>
<tr>
<th>Los</th>
<th>La ropa</th>
<th>La comida</th>
<th>¿Cómo te sientes?</th>
<th>Cosas buenos</th>
<th>Cosas malas</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Verano</td>
<td>Shorts</td>
<td><em>agua</em> (frio)</td>
<td><em>calor</em></td>
<td><em>playa</em></td>
<td><em>incendios</em></td>
</tr>
<tr>
<td></td>
<td>vestidos</td>
<td><em>hielo</em></td>
<td></td>
<td><em>alberca</em></td>
<td><em>buenos</em></td>
</tr>
<tr>
<td></td>
<td>camiseta</td>
<td><em>soda</em></td>
<td></td>
<td><em>no</em></td>
<td><em>malos</em></td>
</tr>
<tr>
<td></td>
<td>cachucha</td>
<td><em>frutas</em></td>
<td></td>
<td><em>podemos</em></td>
<td><em>vacaciones</em></td>
</tr>
<tr>
<td></td>
<td>traje de baño</td>
<td><em>hamburguesa</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>El Octubre</td>
<td>Pantalones</td>
<td><em>helado</em></td>
<td><em>pequeño frío</em></td>
<td><em>Halloween</em></td>
<td><em>frio</em></td>
</tr>
<tr>
<td></td>
<td>blusa</td>
<td><em>hamburguesa</em></td>
<td><em>feliz</em></td>
<td><em>días de frío</em></td>
<td><em>gustar</em></td>
</tr>
<tr>
<td></td>
<td>gorra</td>
<td><em>candy</em></td>
<td></td>
<td><em>brisa</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>suéter-bufanda</td>
<td><em>chocolate</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>camisetas</td>
<td><em>pizza</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>zapatos</td>
<td><em>frijoles</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>botas</td>
<td><em>helado</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>guantes</td>
<td><em>helado</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>El Invierno</td>
<td>Shorts</td>
<td><em>mucho frío</em></td>
<td><em>fleca por la brisa</em></td>
<td><em>Snowmen</em></td>
<td><em>frío</em></td>
</tr>
<tr>
<td></td>
<td>camisetas</td>
<td><em>gato</em></td>
<td></td>
<td><em>patinar</em></td>
<td><em>gustar</em></td>
</tr>
<tr>
<td></td>
<td>botas</td>
<td><em>perro</em></td>
<td></td>
<td><em>Navidad</em></td>
<td></td>
</tr>
</tbody>
</table>

**Seasons Chart**
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Moll, Luis C. (Spr 1986). *Writing As Communication: Creating Strategic Learning Environments for*


