Central Washington University
ScholarWorks@CWU

All Graduate Projects | Graduate Student Projects

Spring 2004

Approaching Equity: Strategies for Working with Hispanic Students in the Middle School Health Science Classroom

Heather L. Jones
Central Washington University

Follow this and additional works at: https://digitalcommons.cwu.edu/graduate_projects

 Part of the Bilingual, Multilingual, and Multicultural Education Commons, Curriculum and Instruction Commons, and the Disability and Equity in Education Commons

Recommended Citation

Jones, Heather L., "Approaching Equity: Strategies for Working with Hispanic Students in the Middle School Health Science Classroom" (2004). *All Graduate Projects*. 844.
https://digitalcommons.cwu.edu/graduate_projects/844

This Graduate Project is brought to you for free and open access by the Graduate Student Projects at ScholarWorks@CWU. It has been accepted for inclusion in All Graduate Projects by an authorized administrator of ScholarWorks@CWU. For more information, please contact scholarworks@cwu.edu.

ABSTRACT

APPROACHING EQUITY: STRATEGIES FOR WORKING WITH HISPANIC STUDENTS IN THE MIDDLE SCHOOL HEALTH SCIENCE CLASSROOM

by

Heather L. Jones

April, 2004

This project provides middle school science teachers with practical classroom strategies for working with Hispanic students. The strategies are built upon national and state recommendations as well as other expert opinions which can be found in the Review of Literature. The strategies align with the Essential Academic Learning Requirements for Washington state. For each strategy, a rationale is provided based on the literature review. In addition, each strategy includes a detailed explanation, along with specific examples. The strategies themselves address environmental, communicative, pedagogical, as well as assessment considerations. Recommendations for implementation are also discussed.

TABLE OF CONTENTS

Chapter One

Introduction

Overview

Since its inception, the United States has been a nation of immigrants. Coming from all four corners of the earth to join the native inhabitants of the land, its citizenry has embodied diverse languages and cultures. For decades Lady Liberty has "lift[ed] her lamp beside the golden door" of opportunity, lighting the way for "[the] tired, [the] poor, [the] huddled masses yearning to breathe free" (Lazarus, 1883/2003). Her lamp has promised "world-wide welcome" to all who traverse land and sea to cross freedom's portal in search of a better life (Lazarus). That search begins in the classroom, where learning and achievement provide the foundation upon which to build future employment opportunities (Fashola, Slavin, Calderon, & Duran, 1997).

Yet far from embracing the diverse languages and cultures that comprise the United States, our educational system has marginalized and disenfranchised many of its clients (Multi-Ethnic Think Tank [METT], 2001). Those who do not or cannot readily assimilate into the mainstream culture are left on the educational sidelines, watching the competitors on the field. Some grow so weary in waiting that in frustration, they walk away from the field; many times unnoticed. In walking away, these students not only cut short educational opportunities, but economic potential as well, which in turn profoundly affects the economy, and society as a whole (National Clearinghouse for Bilingual Education [NCBE], 1999).

Statistically speaking, Hispanic students have been affected most by the inequities that exist in many of the classrooms around the country. Nationwide, the dropout rate for Anglo students has averaged around 10%. For African-American students, the rate climbs to 11%. For Hispanic students, the rate jumps to a whopping 37% (United States Department of Education [USDOE], 2000). Though high school completion rates for most ethnic groups have risen over the past few decades, the rate for Hispanic students has slowly declined (Fashola et al., 1997). In addition, Hispanic students continue to score lower in reading and mathematics than Anglo students on the National Assessment of Educational Progress (Weiner, Funkhouser, & Leighton). Ultimately, fewer Hispanic students enter and complete college than members of any other group (USDOE, 2000).

In Washington State, the statistics reflect national trends. Hispanic students graduate at a rate of 66.1%, as compared to 80.7% of their Anglo peers (Bylsma & Ireland, 2002). Scores from the 2001 Washington Assessment of Student Learning show that 40.4% of Hispanic students met standard in reading, compared to 72.1% of Anglos. In addition, 20.0% of Hispanic students met standard in math, compared to 49.0% of Anglos. Although Hispanic and Anglo students alike have made significant gains in WASL scores since it began in 1997, the gap between groups has persisted (METT, 2001), presenting a significant challenge to educators, parents, community members, and government officials.

The challenge can no longer go unanswered. The Hispanic population is the fastest growing population in the nation, particularly in western states (Therrien & Ramirez, 2000). In Washington State, the Hispanic population has grown by 225% since 1986 (METT, 2001); it is expected that by the year 2020, Hispanic students will make up

20% of the population in our nation's schools (Weiner, et al., 2000), and that by 2025, they will comprise 25% of the student population (USDOE, 2000). In light of the growing need, both national and state reform measures have been aimed at leveling the educational playing field, in an attempt to make academic opportunity truly accessible to all students (Equity in Education Task Force [EETF], 2000a; METT, 2001; USDOE, 2002). Despite the moral and legislative mandates, however, change has been slow. Issues of culture and language continue to provide opportunities for students, educators, and community members to connect in transformative ways, as both learn from each other (Howard, 1999).

One of the richest opportunities for that exchange exists in science, which has a unique language of its own (Fradd & Lee, 1995), and traditionally, has disenfranchised Hispanic students more than any other group (Mason & Barba, 1992). Though the need for science curricula designed to meet the needs of English Language Learners has been felt for some time, there persists a lack of research-based materials available to teachers and districts (Fradd, Lee, Sutman, & Saxton, 2001). In communicating the focus of my Master's project with Dr. Richard Gomez, Director of Migrant and Bilingual Education Programs for the state of Washington, he expressed that he was "heartened," stating that "it is an area of research still underdeveloped" (personal communication, May 1, 2002).

Purpose of the Project

The purpose of this project is to develop a handbook of strategies that will support Hispanic students in middle school Health Science, which in turn will create a more equitable, culturally inclusive learning experience for all students. The strategies will address environmental, communicative, pedagogical, as well as assessment

considerations. For each suggested strategy, a sample of the strategy as applied to middle school Health Science will also be included, providing other middle school Health Science teachers with ideas that may be readily implemented in their own classrooms.

Definition of Terms

Academic Development

"Includes all work in language arts, mathematics, the sciences, and social studies for each grade level, Grades K-12 and beyond" (Collier, 1995, p. 2).

Cognitive Development

Growth or progression in the processes of acquiring knowledge, including the use of reasoning, intuition, or perception (Microsoft Network, 2003).

Cultural Competence

"Cultural competence consists of developing the ability and willingness to interact respectfully and effectively with individuals and groups, acknowledging the common and different elements of our cultural identities. Cultural competence is a process that promotes development of skills, beliefs, attitudes, habits, behaviors, and policies which enable individuals and groups to interact appropriately, showing that we accept and value others even when we may disagree with them" (University of San Diego, 1996, p. 2).

Culturally Inclusive

"A philosophy, point of view, or way of thinking and doing that is grounded in the valuing of cultural diversity" (METT, 2001, p. 11).

Culturally Relevant Science

(a) "Employs materials based on the culture and history of minority or ethnic groups to illustrate scientific principles and the methodology of science already in the

school's curriculum" (Marinez & Ortiz DeMontellano, 1988, p.1). (b) "The recogn[ition] of cultural perspectives and contributions so that through example and instruction, the contributions of all groups to science will be understood and valued" (National Science Foundation [as cited in Fradd, et al., 2001, p. 2]).

Educational Equity

(a) "A condition where every student receives everything that he or she needs to experience successful learning; a condition where all students receive equal learning opportunities" (METT, 2001, p. 11). (b) "The outcome of fundamental laws and policies which, when enforced, should guarantee the fair treatment and equitable access to resources and programs for all students as well as outreach for parental involvement. Furthermore, educators must create an environment which supports the positive self-esteem needed to enable each student to make a productive contribution to his or her school, community, country and world" (EETF, 2000a, para. 1).

English Language Learner (ELL)

(a) A student for whom English is not his or her native language, and for whom the probability of academic success in English-only classrooms is below peers with English language background. The term English Language Learner will replace the term Limited English Proficient (LEP) (Iowa Department of Education [IDOE], 2003). (b) "Children and adults who are learning English as a second or additional language. This term may apply to learners across various levels of proficiency in English. ELLs may also be referred to as non-English speaking (NES), limited English proficient (LEP), and a non-native speaker (NNS)" (Echevarria, Vogt, and Short, 2000, p. 198).

English as a Second Language (ESL)

"Used to refer to programs and classes to teach students English as a second (additional) language" (Echevarria, et al., 2000, p. 198).

Health Science

A semester-long course taught at Morgan Middle School in Ellensburg, Washington, devoted to basic principles of cellular biology and sexual health. Units of study include: microscopes, cells, genetics, Evolution, HIV/AIDS, and media effect on health.

Hispanic

(a) "A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race" (Grieco & Cassidy, 2000, p. 2). (b) "The terms 'Hispanic' and 'Latino' are used interchangeably to identify persons of Mexican, Puerto Rican, Cuban, Central and South American, Dominican, Spanish, and other Hispanic descent; they may be of any race" (National Council of La Raza [NCLR], 2002, p. 1). (c) "Latino students are highly diverse; it is inappropriate to make generalizations about students from Mexican-American, Puerto Rican, Cuban, or South American backgrounds, whose families have been in the United States for hundreds of years and those whose families arrived a month ago, those who have entered the growing Latino middle class, and those who are struggling in poverty, and so on. Nevertheless, it is worthwhile to consider the characteristics of Latino students as a whole" (Fashola, et al., 1997, p. 1).

Inquiry

"Posing a problem, generating solutions to the problem, testing for solutions by gathering and organizing information, and drawing conclusions about the solution to the problem" (NCBE, 1992, p. 3).

Language Acquisition

The processes and components that are involved in learning and using a language. Four components interact and affect language development for any language learner: sociocultural processes, as well as linguistic, academic, and cognitive development (Collier, 1995).

Linguistic Development

"Consist[s] of the subconscious aspects of language development..., as well as the...conscious, formal teaching of language in school, and acquisition of the written system of language" (Collier, 1995, p. 2).

Limited English Proficient (LEP)

(a) "A term used to refer to a student with restricted understanding or use of written and spoken English; a learner who is still developing competence in using English" (Echevarria et al., 2000, p. 199). (b) The term English Language Learner (ELL) will replace the term Limited English Proficient (LEP) (IDOE, 2003).

Science

(a) "An interpretive process of making sense of experiences in terms of extant knowledge" (Tobin [as cited in Gallard, 1992], p. 2). (b) "A meaning-making experience about the biophysical environment" (NCBE, 1992, p. 1).

Science Literacy

"A scientifically literate person is one who is aware that science, mathematics, and technology are interdependent human enterprises with strengths and limitations; understands key concepts and principles of science; is familiar with the natural world and recognizes both its diversity and unity; and uses scientific knowledge and scientific ways of thinking for individual and social purposes" (American Association for the Advancement of Science [AAAS], 1989, xvii).

Sheltered Instruction (SI)

"An approach to teaching that extends the time students have for receiving English language support while they learn content subjects. Teachers scaffold instruction to aid student comprehension of content topics and objectives by adjusting their speech and instructional tasks, and by providing appropriate background information and experiences" (Echevarria, et al., 2000, p. 200).

Sociocultural Processes

Affecting and being affected by language, cognitive, and academic development, sociocultural processes are "all of the surrounding social and cultural processes occurring through everyday life within the student's past, present, and future in all contexts—home, school, community, and the broader society" (Collier, 1995, p. 2).

Scope of the Project

This project aims to create a handbook of strategies that will support Hispanic students in the middle school Health Science classroom. In compiling such a handbook, many strands must be identified, grasped, and interwoven to create a product that will address the needs of Hispanic students, some of whom are English Language Learners, in

the context of a science classroom at the middle school level. To be considered are: guiding principles in the education of Hispanic students, guiding principles in the education of English Language Learners, and guiding principles in the teaching of Science.

The literature review that follows (Chapter Two) explores all three areas, and provides a synthesis that weaves the individual strands of study into a cohesive whole. Chapter Three delineates the procedures used to create the handbook. Chapter Four is the inclusion of the handbook itself. Chapter Five concludes the project with an overall summary and recommendations.

Chapter Two

Review of Literature

Introduction

Though the Hispanic population in the United States has steadily grown throughout the years, many places around the country have too few English Language Learners to justify bilingual programs to meet existing needs (Fashola, et al., 1997). English as a Second Language (ESL) classes may exist to some degree, but many are ill-equipped, and due to limited time, resources, and energies of the *one* person that runs them, aren't designed to meet the totality of need that exists for students on the pathway to English language literacy. Moreover, many language learners spend five to seven years developing the levels of proficiency required to function well in content-area classes (Collier, 1995). Our schools simply cannot afford to put students on hold for that long. Clearly, we must move beyond the limitations of language to determine the instructional strategies that will prove most effective for Hispanic students, regardless of language proficiency (Fashola, et al.).

The statistics have been crying out for decades. In light of the growing crisis, studies have been conducted from the White House to the field house to address the general educational needs of Hispanic students (Martinez, Scott, Cranston-Hughes, and Platt,1994; USDOE, 2000). Recommendations and strategies for success are comprehensive and far-reaching, including both elements of classroom pedagogy as well as broader school and community-wide proposals (Weiner, et al., 2000). Beyond generalized goals, strategies for implementing those principals in the area of science

education provide a practical framework from which to build specific unit, lesson, and assessment plans, the content for which are guided by state and national learning objectives (OSPI, 2002). The literature review which follows covers three major strands: (a) Guiding Principles in the Education of Hispanic Students, (b) Guiding Principles in the Education of English Language Learners, and (c) Guiding Principles in the Teaching of Science. The summary at the end of Chapter Two synthesizes the individual strands into a cohesive whole that is used to guide the creation of the handbook that follows.

Strand One: Guiding Principles in the Education of Hispanic Students

To understand the depth of the issues that surround the education of Hispanic students, several layers of concern must be considered: (a) National Recommendations, (b) State Recommendations, and (c) Other Expert Recommendations. A summary of the related issues can be found at the end of the section.

Part One: National Recommendations

The Hispanic Dropout Project. In 1995 the United States Secretary of Education, Richard Riley, under the guidance of the Clinton administration, commissioned *The Hispanic Dropout Project (HDP)*. The goal of the project was to "shed light on the national crisis, to produce concrete analyses and syntheses, and to recommend actions that can be taken at all levels in order to reduce the nation's dropout rate of Hispanic youth" (NCBE, 1999, p. 2). To disseminate those syntheses and recommendations, the National Clearinghouse for Bilingual Education produced a series of monographs detailing the findings of the HDP. In *Transforming Education for Hispanic Youth: Exemplary Practices, Programs, and Schools* (1999), the NCBE outlines

several key guidelines and principles for working with Hispanic students and their families.

According to NCBE (1999), Hispanic students deserve to be treated as important players in the classroom and school. They must be greeted with high expectations, and upheld by personal connections with the school and its staff. Hispanic students and their families must be treated with respect, instead of being cast in the roles of deviant, deficient "pobrecitos" who simply cannot cut the educational mustard. Hispanic students, like all other students, must be given access to curricula that are challenging and relevant. Hispanic students can and will move past the barriers that have held them back if they are guaranteed some critical elements: (a) a staff member who understands the school system, and will take personal responsibility for assisting him or her navigate that system, (b) knowledge of the post-secondary options that are available to them, (c) opportunities to assume important roles in the school community, and (d) access to schools and classrooms that are physically and psycho-socially safe environments in which to learn.

In addition, the NCBE (1999) points out that Hispanic parents are often viewed as being indifferent to their child's education, moving too often, not wanting to learn to speak English, and too uneducated to help their children in the learning process. To the contrary, Hispanic parents *are* interested and want to be involved, but too often find themselves being pushed to the perimeter of the school system due to these perceived deficiencies. The findings of the HDP indicate that including parents of Hispanic students in the educational process is a critical component to building effective schools,

citing the following recommendations for families and schools: (a) Hispanic parents need to advocate for their children, (b) schools need to weave Hispanic parents and families into the school community in meaningful ways, and (c) schools need to help Hispanic parents envision a future for their children, and give them the tools to help students walk the road to that future.

The NCBE (1999) also emphasizes that teachers play a key role in helping Hispanic students overcome the obstacles they face in the educational system, and the world at large. At the core, Hispanic students need teachers to demonstrate an interest in their scholastic success, and encourage them when faced with challenges, both personally and academically. Mutual respect and caring are key in achieving effective relationships with Hispanic students. The HDP lists the following recommendations for teachers of Hispanic students: (a) teach interesting and challenging content, and help them to learn it, (b) communicate high expectations within the context of a respectful, caring relationship, (c) engage parents and community members in the education of Hispanic students, (d) become knowledgeable about effective strategies for working with Hispanic students, and (e) become knowledgeable about ways to communicate with Hispanic parents.

According to NCBE (1999), the most effective schools for Hispanic students are schools in which staff, parents, and community members work together to personalize each student's experience, taking care that no student falls through the cracks. The HDP found five characteristics common to schools that make a difference in the lives of Hispanic students. These schools: (a) have high standards for all students, both academically and behaviorally, (b) communicate these standards clearly and support

students as they strive to meet them, (c) connect students in significant ways to adults, (d) connect students to the future, and (e) provide families with useful and ongoing information about their children, and helping students to plan for the future.

Beyond what happens in classrooms and schools, NCBE (1999) stresses how district and state policies affect the educational lives of Hispanic students. Though it is easy to dismiss larger societal issues as beyond anyone's control, state legislators and district officials must consider their roles in the larger political schemata of schooling for Hispanic students in the United States. In this area, the HDP raises several points of concern, recommending the following actions for districts and states: (a) inform Hispanic students and families of their policies in ways that are easy to understand, (b) analyze their policies, and remove the incentives for schools to ignore students who experience trouble, (c) develop standards for school conditions and class size, so that there are equitable opportunities for all students to learn, (d) ensure that high stakes testing programs give Hispanic students the opportunity to demonstrate content knowledge, rather than English proficiency, (e) design comprehensive dropout prevention strategies that are tied to state standards, (f) evaluate current efforts for efficacy, and continually strive to improve them, (g) provide alternative pathways for students who do not follow the traditional educational road, (h) target resources strategically for the improvement of schools and school facilities, (i) develop better information management systems, (j) recruit people into the field of education who will reflect the diversity of the population(s) served, (k) insist that teachers entering the field are equipped with the knowledge and skills needed to work effectively with diverse student bodies, and (l)

provide ongoing staff development for teachers already working in the field to address the same.

White House strategy session on improving Hispanic student achievement. In response to the findings of the HDP, President Clinton hosted a strategy session to address the outcomes and recommendations of the project, as well as develop national goals that would guide policy and decision-making processes at national, state, and district levels. Published at the end of Clinton's administration, December 2000, the goals are aimed at "ensur[ing] the success of all of America's children" by the year 2010 (USDOE, 2000, Presidential Letter). With guidance and input provided by the President's Advisory Commission on Educational Excellence for Hispanic Students, the Congressional Hispanic Caucus, Latino community-based organizations, and educators from around the nation, five goals were established to address the critical issues highlighted by the HDP.

Goal number one is designed to "ensure that Hispanic American children have access to high quality early childhood education and development programs and enter school prepared to succeed by increasing the Hispanic participation rate in high quality programs by 2020" (USDOE, 2000, p. 9). To be achieved by (a) expanding outreach strategies and encouraging parental involvement, (b) increasing access to quality early childhood education programs, and (c) improving the quality of early education programs.

Goal number two is aimed at "respecting the importance of multilingualism, age-specific learning needs, research-based instructional approaches, and the variety of

developmental levels at which limited English proficient (LEP) children enter school, by 2010 all states and school districts will provide appropriate language instruction to ensure that all students graduate from high school having demonstrated proficiency in English" (USDOE, 2000, p. 13). To be achieved by (a) ensuring appropriate resources and services for LEP students, (b) supporting good teaching, (c) involving the community, and (d) promoting the advantages of bilingualism.

Goal number three is intended to "provide high quality education with appropriate resources and support to ensure equal opportunity for all students in order to eliminate the achievement gap between Hispanic students and other students on appropriate state assessments and other indicators by 2010" (USDOE, 2000, p. 17). To be achieved by (a) pursuing a rigorous curriculum, (b) allocating resources effectively to address the learning needs of Hispanic students, (c) ensuring quality teaching, and (d) involving parents and the community.

Goal number four is intended to "increase the high school completion rate to 90 percent by 2010" (USDOE, 2000, p. 21). To be achieved by (a) building partnerships and community support, (b) reforming the American high school, (c) improving teacher quality, and (d) supporting research to improve teaching and learning.

Goal number five is calculated to "double the percentage of Hispanic Americans who earn Associate's and Bachelor's degrees by 2010" (USDOE, 2000, p. 25). To be achieved by (a) preparing students for college, (b) ensuring college retention, and (c) providing student financial aid.

The No Child Left Behind Act (NCLB). In recognition of the goals established by the Clinton administration, and a desire to move them past the recommendation stage and into the realm of law, George W. Bush signed the "No Child Left Behind Act" on January 8, 2002 (USDOE, 2002). The law is aimed at "providing all children with access to a high-quality education" (USDOE, 2002, p. 1), and includes in its goals: (a) stronger accountability for results, (b) greater flexibility for states, school districts, and schools in the use of federal funds, (c) more choices for parents of children from disadvantaged backgrounds, (d) an emphasis on teaching methods that have been demonstrated to work, (e) increased emphasis on reading, (f) enhancing the quality of our nation's teachers, and (g) ensuring that all children in America's schools learn English.

With special provisions for migrant and LEP students, NCLB aims to provide the best education possible for all children in our nation's schools (USDOE, 2002). Flexibility at the local level allows educators to make informed decisions about best practices for the student populations they serve. Taking into consideration research that already exists in the field of educating Hispanic youth, it provides a framework for tremendous educational possibilities. Yet those possibilities have potential pitfalls as well, if they are not carried out in a responsible fashion, with an eye towards long-term gains for Hispanic students.

National Council of La Raza. According the National Council of La Raza (2002), there are "land mines" to be aware of in the implementation of NCLB at state and local levels. NCLR cautions that simply raising the bar for scholastic achievement in terms of testing and assessment will not necessarily translate into higher levels of academic

success, *unless* it is also accompanied by: (a) equitable funding of high-poverty schools, (b) access to challenging curricula, (c) alignment of curricula with standards and assessments, (d) qualified teachers, (d) effective parent involvement strategies, (e) supportive school organization and culture, and (f) fair and equitable use of assessments.

NCLR (2002) stresses the need for appropriate assessments with English Language Learners that will measure knowledge of the subject area assessed, rather than proficiency in the use of English. In addition, NCLR recommends using multiple measures of student performance to make high-stakes decisions, rather than allowing the educational fate of students to rest upon scores from a single test, or battery of tests. According to NCLR, unless all of the strategies for success are adequately funded and unilaterally employed in educating Hispanic populations, NCLB may actually serve to place them at further disadvantage educationally. It is up to states, districts, and impassioned teachers to ensure that as policies are implemented to address the mandates of NCLB, they are done in such a way that will truly leave no child behind.

Part Two: State Recommendations

Equity in Education Task Force (EETF). Since the mid-sixties, several policies have been created to encourage equitable learning environments for all students in the state of Washington. In 1993, the Washington State Human Rights Commission, along with the Washington State Superintendent of Public Instruction, joined forces to create the Equity in Education Task Force. The EETF created a set of policies as well as strategies for implementation to ensure that educational opportunities for all students in the state of Washington are truly equitable. It is hoped that as the policies outlined in the

paragraphs to follow are implemented in school districts around the state, local educators will become the agents through which lasting change will be effected.

Goal number one is designed to "eliminate prejudice, bigotry, and discrimination in school districts" (EETF, 2000b, p. 2). To be achieved by (a) holding high expectations for all students, (b) demonstrating dignity and respect in and among students and staff, (c) holding parents, school boards, school staff, students, and other community members accountable for modeling prejudice and bigotry-free behaviors, (d) creating a culturally and linguistically sensitive learning environment, and (e) using instructional materials that represent diverse populations and contributions thereof in a fair manner.

Goal number two is aimed to "improve achievement for all students" (EETF, 2000b, p. 2). To be achieved by (a) identifying and removing barriers to academic achievement, (b) placing special emphasis on removing educational barriers for female students and students of color, (c) holding high expectations for all students by all staff, (d) establishing goals to address academic achievement, parental involvement, low attendance rates, high push-out rates, high drop-out rates, and high teen pregnancy rates, and (e) encouraging and providing access for all students to participate in all academic and athletic programs.

Goal number three seeks to "bring parents and the community into the learning circle" (EETF, 2000b, p. 3). To be achieved by (a) devising hands-on, person-to-person outreach programs emphasizing appropriate, culturally sensitive communication with parents, guardians, and extended family members, (b) providing access to all services, programs, and policy-making activities for all students, parents, guardians, and extended

family members, (c) creating learning communities that welcome all parents, guardians, and extended family members, (d) developing strong parental involvement and empowerment programs, (e) helping to provide needed resources to parents and students by coordinating community-based services and school activities, and (f) attempting to more fully utilize resources in diverse communities to enhance student achievement.

Goal number four is intended to "address racial integration and recognize diversity" (EETF, 2000b, p. 3). To be achieved by (a) developing comprehensive plans to raise the academic achievement levels of children of color, (b) developing and administering comprehensive, ongoing diversity training, (c) implementing voluntary inter-district desegregation and transfer opportunities, (d) forming cooperative inter-governmental relationships to foster housing desegregation, and (e) creating and supporting adequate programs to assist students and parents making transitions to new neighborhoods for desegregation purposes.

Goal number five is meant to "address the language needs of all students" (EETF, 2000b, p. 4). To be achieved by (a) bringing students to full English proficiency, (b) recruiting staff who speak the languages spoken by members of the student body and parents, (c) communicating in appropriate and effective ways with members of the diverse communities they serve, and (d) accommodating students and staff who use sign language, Braille, and other tools available to people with disabilities.

Goal number six is designed to "ensure equitable distribution of resources to meet student needs" (EETF, 2000b, p. 4). To be achieved by (a) ensuring that all resources received are distributed equitably to all programs within the school, based on student

need, (b) working to expand available resources to address state-wide equity issues, and (c) assuring that budget priorities address issues identified by locally developed equity boards.

Goal number seven seeks to "recruit and provide staff training" (EETF, 2000b, p. 5). To be achieved by (a) devising and implementing preservice program curricula to prepare future teachers to respond to the educational needs of diverse populations, (b) developing and administering comprehensive, ongoing diversity training, (c) encouraging male and female students to enter teaching and coaching fields which are not traditionally pursued by people of their gender.

Multi-Ethnic Think Tank (METT). Growing out of an effort in the late nineties by OSPI to address the chronic achievement gap between white and ethnic minority populations, The Multi-Ethnic Think Tank was formed in 2000 to pursue an equitable and culturally competent education for all students in the state of Washington. The METT is an alliance comprised of African American, American Indian/Alaska Natives, Asian Pacific Islander American, Hispanic, and low socio-economic communities (METT, 2001).

Moving beyond OSPI recommendations for school district administrators and staff, the METT flies in the face of conventional practices, demanding action that will address the academic needs of all students. In calling upon state leaders to make changes to the Washington State Learning Goals, the METT challenges legislators to move the principles of equity from rhetorical speeches and news conferences into budget meetings where changes can begin to take hold. The METT proposes that "nothing short of an

educational paradigm shift from a Euro-centric to a culturally inclusive pedagogy will ensure the success of all students" (METT, 2001, p. 1). To that end, the METT recommends six action steps.

Action step number one calls for "a fifth Washington State learning goal that will require students to 'understand, accept, and demonstrate the value of various cultures and heritages; to become responsible and respectful citizens in multicultural settings; and to use cultural knowledge as a foundation to achieve personal and academic success'" (METT, 2001, p. 5).

Action step number two suggests "infus[ing] multicultural learning goals into [the] four Washington State learning goals" (METT, 2001, p. 5). Under the revised goals, students will be able to: (a) "read with comprehension, write with skill, and communicate effectively and responsibly in a variety of ways *and settings that respect and value the diversity among people"* (METT, p. 5), (b) "know and apply the core concepts and principles of mathematics, social, physical, and life sciences; civics and history; geography; arts; and health and fitness *in ways that are culturally inclusive"* (METT, p. 5), (c) "think analytically, logically, and creatively *in a cross-cultural manner,* and to integrate this diverse experience and knowledge to form reasoned judgments and solve problems" (METT, p. 6), and (d) "understand the importance of work and how performance, effort, decisions, and *effective interpersonal communication with diverse people* directly affect career educational opportunities" (METT, p. 6).

Action step three stresses the importance of policies and practices that "standardize the data collection, categorization, and reporting of racial, ethnic, and low

socio-economic groups" (METT, 2001, p. 6). According to METT, test data should be disaggregated according to race as well as ethnic groups.

Action step four encourages districts to "require that professional development is culturally and linguistically responsive" (METT, 2001, p. 6). It is no longer acceptable for such changes to dwell in the prerogative of educators; change must be mandated and carried out by law makers, educators, and the universities and programs that prepare them.

Action step five strongly suggests that districts "recruit and retain racial and ethnic minority staff" (METT, 2001, p. 7). Equitable learning institutions must recruit and retain staff that reflect the diversity in the student population.

Action step six calls on schools and districts to "provide alternative measuring tools to assess student academic achievement" (METT, 2001, p. 7). Alternative assessments need to be developed and used that will provide appropriate access and measurement of academic competency for all students.

Part Three: Other Expert Recommendations

National and state agencies recognize the need for change in the educational system as it exists today to ensure equity for Hispanic students. Many of the solutions suggested by these agencies are mirrored in the work of other researchers dedicated to bettering the academic lives of Hispanics in the United States. To put a defining point on the work that has been carried out thus far, Fashola, et al. (1997) reiterates that Hispanic children are placed in educational jeopardy when the schools and institutions that serve them "fail to build upon the cultural, personal, and linguistic strengths" that these

students bring with them to school (p. 2). Fashola et al. also states that programs designed to reform an entire school are the most effective, in that they address issues of curriculum, instruction, school organization, as well as assessment. Schools that implement changes in only one, or a few of these areas are not as effective.

Nieto (1999) also emphasizes the importance of educators delving into the lives of students, and using what they find as a basis for guiding instruction along culturally relevant pathways. According to Nieto, "teachers would do well to learn about their [students'] lives outside of school, including their families and cultures, how they see the world, what is important to them, and their values and dreams for the future" (p. 145). That information can then be used to build bridges between students, as well as between students and teachers. Nieto hails that approach above teaching through narrowly defined lenses that dictate or delineate who students are and what they stand for based on race and/or ethnicity. Nieto cautions that teaching through such lenses tends to reinforce stereotypes, rather than break through the barriers that those stereotypes create.

In her work with three generations of Hispanic families, Villanueva (1996) found that one of the keys to promoting academic success for Hispanic students is linking them with a "mediator" in the school who can help them to navigate the school system. Though many Hispanic students are able to function in the day-to-day routines of school life, many also lack knowledge about college preparatory courses, paperwork to be filed for financial aid and college applications, which puts them at a distinct disadvantage in terms of continuing education and future career opportunities. Coupled with Fashola et al.'s findings (1997) that high school is too late to begin these kinds of interventions, it

becomes clear that individualized attention is needed at the middle school level, where the opportunity to change the course of a student's educational life is greater.

Beyond the need for mediation, Villanueva's research (1996) highlights an important perspective from parents in the Latino community. Although Hispanic parents desire for their children to become fully functional in North American society, it is equally important to them that their children remain firmly grounded in native culture, language, and tradition. In that sense, home for Hispanic students remains a family-centered environment that seeks to preserve all three; and rightfully so. Villanueva encourages educators to forge a new kind of relationship with Hispanic parents; one that becomes a conversation that allows educators to glean from Hispanic culture and bring it into the classroom, rather than lecturing parents about what they need to do at home to support what is happening at school.

Tan (2002) presents compelling information from the perspective of Hispanic students, and their perceptions about the need for multiculturalism in schools. According to Tan, students who sense that their teachers respect diversity and value the cultures of others perform better in school, and are less likely to drop out than students in classrooms where multiculturalism is not a priority. In Tan's study, Hispanic students defined multiculturalism in their own terms, citing the importance of teachers who: (a) use examples from Hispanic culture to help them learn, (b) include elements of Hispanic culture in lessons ("I learn about my culture and my people in class") (Tan, p. 22), (c) respect the Spanish language and Hispanic culture, and (d) facilitate positive relationships, "getting along" with Hispanic students (Tan, p. 23). Hispanic students

defined multicultural schools as: (a) schools that facilitate positive relations between Hispanic students, and those of other cultures, and (b) treat Hispanic culture with respect. Key to Hispanic students feeling positive and secure in their learning environment are respect, understanding of, and inclusion of diverse cultures in classroom, social, and school-wide activities and interactions.

Martinez, et al. (1994) go on to highlight the importance of sparking the culture-school connection at an early age. In their work with migrant families and children, Martinez et al. found that self-esteem for these students begins to take a sharp decline around grade eight, and often hits the lowest point in grade nine, when most migrant students drop out of school. This is particularly telling in light of the fact that these same children listed agricultural work as their second to last choice for future vocation. Having witnessed the struggles and tragedies of parents who work countless hours but can never get ahead, these students want better for themselves, but often times due to circumstances well beyond their control, find themselves lagging years behind their peers in school. In frustration, these migrant students walk out on school, and tragically, also walk out on the opportunity to live a different vocational future than their parents.

Summary

Clearly the issue of creating equitable learning opportunities for Hispanic students in North American schools is complicated. There are several layers of concern, and areas to be addressed to ensure a system that is truly supportive, providing the same opportunities for Hispanic students to succeed as are provided to students from mainstream cultures. The most effective programs for Hispanic students incorporate

multicultural philosophies in three expanding arenas: classroom pedagogy, school-wide reform, and community connections.

Classroom pedagogy. At the classroom level, it is imperative for teachers to hold high expectations for Hispanic students, treating them as important members of the school whose language and culture are of value, and not deficiencies to be overcome. To work effectively with Hispanic students, teachers must find ways to make personal connections with them, and when necessary, help them to navigate unfamiliar school systems and practices. In making that connection with students, teachers should seek to glean important information and nuances of Hispanic culture that can be incorporated into classroom lessons and activities. For Hispanic students to feel valued and respected, it is important for them to learn about the roles people from their own culture have played in shaping the world today. It is equally important for Hispanic students to be taught using examples from their own culture. Establishing and maintaining positive, interactive relationships with Hispanic parents provides continued opportunity for teachers to learn about and incorporate Hispanic culture into daily classroom life.

School-wide reform. At the school-wide level, key changes in attitude and approach can translate into major gains for the Hispanic students and families they serve. It is crucial that schools foster and maintain an educational environment that is free of prejudice, bigotry, and racism. In order for students to learn, they must be assured a physically and psycho-socially safe environment. For families to become involved, they must feel that they are welcome, and not looked down upon. To that end, it is also important for schools to recruit staff members who reflect the diversity in the student

population, and provide inservice opportunities for teachers aimed at developing skills in working with diverse populations. Schools need to find meaningful ways to draw Hispanic parents into the educational circle, and build upon the strengths they provide.

Moreover, schools need to help families to envision a future for their children, while providing the guidance necessary to help them and their children navigate the road that will take them there. Additionally, schools and districts need to provide information about policies and students progress in formats that are easily understood, and when necessary, in the parents' native language. It is imperative for schools to provide effective resources for English Language Learners that are adequately funded and appropriately staffed, which seek to bring them to full English proficiency, and to ensure that high-stakes assessments provide valid measures of what students know and are able to do.

Community connections. At the community level, it is vital for Hispanic students and families to become connected to it, and involved in it. Teachers and other school staff can provide tremendous opportunity for those connections to occur. Effective programs link Hispanic students with mentors in the community who can provide academic support in the form of tutoring, personal support in the form of encouragement, and vocational support in the form of helping to guide them through college preparatory requirements. If possible, connecting Hispanic students with Hispanic professionals is a powerful form of modeling that can have lasting impact in terms of hope for the future, as well as inspiration when times get tough on the road to the future.

Strand Two: Guiding Principles in the Education of English Language Learners

Collier (1995) describes second language acquisition as a complex process that involves the interplay of four key components: sociocultural processes, as well as linguistic, academic, and cognitive development. To educate language learners effectively, all parts have to be addressed in order to create a cohesive environment in which language learners can bathe. Collier stresses that to develop one component while ignoring other components may adversely affect not only language acquisition, but overall growth and success for the second language learner. These four components are discussed in depth in the sections that follow. A summary of related issues can be found at the end of the section.

Part One: Sociocultural Processes

At the heart of Collier's (1995) model lie sociocultural processes, which affect, and are affected by linguistic, cognitive, and academic development. Collier stresses the importance of educators and administrators addressing and seeking to eliminate: factors that create social and psychological distance between groups; prejudice and discrimination; and the unspoken, unwritten effects of assimilationist attitudes. Combined with these concepts, Collier advocates for the implementation of interactive, inquiry-based, thematic learning that is based in multiple cultures to create a supportive school environment that allows *all* aspects of second language learners' education to thrive.

Crystal (2000) goes on to emphasize the importance of diversity in terms of language within a society. Biologically speaking, diversity is synonymous with strength.

Crystal contends that linguistically speaking, the same is true; the strength and adaptive abilities of any society that lasts are built on that same diversity. To disallow diversity is to weaken the social structures that define and are defined by it. Moreover, Crystal explains that language is an expression of identity; that it provides security and status for its users.

That security, according to Krashen and Terrel (1983) is an important piece for teachers to consider in creating environments that are conducive to learning. According to Krashen and Terrel, if a learner feels anxious or defensive in his or her surroundings, he or she often will put up a barrier, which impedes the exchange of information, and the process of learning as a whole. If, on the other hand, a student is relaxed, and feels confident, that barrier is lowered, creating optimal opportunity for learning to take place.

Lucas, Henze, and Donato's 1990 longitudinal study delineates qualities of schools most effective in working with language minority students. At the top of Lucas et al.'s list of characteristics common to successful schools is the notion of value and status being given to minority language students' native language and culture. Cummins (1986) supports Lucas et al.'s findings, explaining that the number one priority of schools that seek to empower language minority students should be to integrate home language and culture into the curriculum. Cummins emphasizes that such inclusions directly affect language minority students' self-esteem, attitude, and well-being, which in turn directly affects second language learning and subsequent academic success.

Part Two: Linguistic, Academic, and Cognitive Development

Collier's (1995) research demonstrates that English Language Learners thrive linguistically, academically, and cognitively when they are able to partake in learning experiences that are based in native language. Collier strongly advocates for bilingual programs in schools in which native English speakers, as well as English Language Learners learn in the same classrooms, using both English and the second language on equal terms. Collier also insists that language skills be taught through cognitively demanding content, rather than through discrete, sequenced grammatical building blocks.

Recognizing that bilingual program models are not widely supported in schools around the nation that have multitudes of English Language Learners at various levels, Chamot and O'Malley (1994), as well as Echevarria et al. (2000) designed frameworks for teaching and learning that address the needs of these ELLs in mainstream classrooms. Chamot and O'Malley as well as Echevarria et al.'s frameworks seek to develop cognitive and language skills via rigorous academic content that is sheltered for ELLs, rather than content that is oversimplified or watered down, in accordance with Collier's (1995) research. Through sheltered instruction, mainstream teachers support ELLs in their acquisition of academic content, while at the same time helping them to further develop language skills.

Chamot and O'Malley (1994) contend that teachers must focus on the type of teaching they are doing, and adjust instruction accordingly. Declarative knowledge is best taught by engaging students' prior experiences with the topic, identifying what they know and constantly comparing it with what they are learning. Elaboration becomes a

key by which new connections are made, and content is learned. Conversely, Chamot and O'Malley purport that procedural knowledge is best taught by engaging in meaningful practice of the knowledge or skills to be learned. Chamot and O'Malley also articulate that active learning, teaching technical vocabulary, consideration of learning style, engaging students in overviews, using a variety of questioning techniques, frequent monitoring, use of graphic organizers, teaching students to use a variety of resources, as well as specific teaching of learning strategies are important elements that should form the foundation of content-based instruction for ELLs.

In addition, Chamot and O'Malley (1994) express the importance of specifically teaching academic language skills in the areas of reading, writing, listening, and speaking as they naturally fit in the content areas to be taught through modeling, and providing opportunities for students to engage in all four aspects of language. In addition to academic language skills, Chamot and O'Malley advise the specific teaching of learning strategies that fall into three categories: metacognitive strategies, such as previewing, skimming, planning, selective attention, self-management, monitoring comprehension, monitoring production, and self-assessment; cognitive strategies, such as resourcing, grouping, note-taking, elaboration, summarizing, deduction/induction, imagery, and making inferences; as well as social/affective strategies, such as questioning for clarification, cooperation, and self-talk. For each lesson, Chamot and O'Malley advise teachers to develop content, language, and strategy objectives.

Echevarria et al. (2000) further developed Chamot and O'Malley's (1995) ideas, combining them with ESL standards and classroom research to produce specific

protocols for sheltered instruction. The focus is on making content comprehensible: easily understood and synthesized in meaningful ways to create lasting learning experiences for ELLs. Echevarria et al. focus the protocols in three key areas: preparation, instruction, and assessment. In the area of instruction, protocols are designed to develop effectiveness in regard to background building, comprehensible input, strategy instruction, interaction, practice/application, and lesson delivery.

According to Echevarria et al. (2000), a well-prepared sheltered lesson includes both content and language objectives that are specifically spelled out for students orally, and in writing, making sure that the objectives or age appropriate, and build necessary background for students. In addition, supplementary materials such as manipulatives, realia, other visuals, multimedia resources, and demonstrations are used to a great extent. Adaptations are made to the content, so that the information is accessible for ELLs using graphic organizers, adapted text, outlines, leveled study guides, and taped text. To be fully prepared, a sheltered lesson engages students in meaningful activities that connect to students' everyday lives.

To effectively build background, Echevarria et al. (2000) state that concepts must link to students' personal and cultural background, bridging prior knowledge with new concepts. Key vocabulary must also be emphasized through the explicit teaching of key terms, as well as academic terms, making sure that vocabulary is contextualized. Specific strategies include the creation of personal dictionaries and word walls, creating concept definition maps, using cloze sentence activities, and word sort activities.

To provide input for ELL's that is comprehensible, Echevarria et al. (2000) recommend that teachers enunciate clearly, use simplified sentence structures, speak slowly as needed, avoid jargon and idioms, use gestures to reinforce speech, use realia to demonstrate word meanings, and provide models for students to follow. In addition, Echevarria et al. advise that instructions be given in a simple, step-by-step format, and use a variety of techniques to help make concepts clear.

Another indicator of effective instruction according the Echevarria et al. (2000) is the specific teaching and use of strategies. Metacognitive strategies include clarifying purposes for learning, monitoring one's own comprehension, and taking corrective action when understanding fails. Cognitive strategies include mental of physical manipulation of the material to be learned. Social/affective strategies include questioning for clarification and co-operation. Other general strategies include the use of mnemonics, reahearsal strategies (flashcards, outlines, notetaking), graphic organizers, and comprehension strategies (prediction, self-questioning, monitoring, determining importance, summarizing). In addition, Echevarria et al. encourage the use of verbal scaffolding (paraphrasing, restating student answers to model correct English, and think alouds), as well as procedural scaffolding (following the model teach, model, practice, apply). Finally, as an indication of strategy use, Echevarria et al. encourage teachers to use a variety of questioning types that span areas of comprehension, application, analysis, synthesis, and evaluation.

According to Echevarria et al. (2000), another indicator of effective instruction for ELL's is interaction. Teachers must provide frequent opportunities for students to

interact with the teacher, and each other to promote practice of the target language. Teachers are encouraged to use grouping configurations that support content and language objectives, including heterogeneous as well as homogeneous groupings that span the range from individuas, to partners, to triads, to small group, to whole class instruction, taking care to use variety that will sustain student interest. Teachers are also encouraged to provide ample wait time with questions, and to avoid filling the intermittent silences with "helpful" interruptions. As available, teachers should also provide ample opportunity for ELL's to clarify concepts in their native language.

A further indicator of effective instruction, according to Echevarria et al. (2000), is the opportunity afforded students to practice and apply the content. Echevarria et al. recommend that teachers use plenty of hands-on materials and manipulatives for practice, breaking the lesson into short, small increments. For new learning, teachers should provide many opportunities for consecutive practice, and for old learning, to provide practice that spans a bit of time. In addition, Echevarria et al. advise teachers to be sure to integrate all aspects of language into lessons, including reading, writing, listening, and speaking. As a final indicator of instruction, Echevarria et al. content that lesson delivery must support content and language objectives, with students being engaged at least 90 to 100% of the time, with pacing that is appropriate for student proficiency levels.

As a final consideration, Echevarria et al. (2000) discuss review and assessment. Echevarria et al. suggest that teachers provide a comprehensive review of key vocabulary and concepts, provide regular feedback on student progress, and conduct assessment

throughout the lesson to insure that students understand what they are supposed to be learning.

Summary

Effective instruction for English Language Learners is a complex interplay of sociocultural, cognitive, academic, and linguistic considerations. To address the sociocultural needs of ELLs, teachers must first and foremost provide a safe learning environment for all students: one that embraces language diversity, gives status to minority language, incorporates home language and culture into the curriculum, and seeks to reduce the distance between sociolinguistic groups.

In addition, effective instruction for ELLs must help them to develop cognitively, academically, and linguistically. To meet these needs for ELLs, teachers must seek to teach students language through relevant content that connects to their own lives by building background with students, and creating bridges between what they know, and what they will come to know. In the process, teachers must adapt speech and content to student proficiency levels, reinforcing language learning through the use of realia, manipulatives, and other visuals. Teachers also must support student learning via appropriate scaffolding of content, with comprehensive review of key vocabulary, content, and language objectives, all the while assessing for understanding along the way, and providing frequent and appropriate feedback to guide students along in the process. In addition, teachers need to provide frequent opportunities for students to interact using all four branches of language: speaking, writing, listening, and reading. The teaching of

specific strategies assists students in mastering not only the aspects of language development, but the complex nuances of schooling in general.

Strand Three: Guiding Principles in the Teaching of Science

To fully understand the standards that guide science education in the United States, two layers need to be considered : (a) National Recommendations, and (b) State Recommendations. A summary of the related issues can be found at the end of the section.

Part One: National Recommendations

In the mid-eighties, a team of scientists, mathematicians, engineers, and educators from around the country came together to discuss the future of America, and its dependency upon the principles of science, mathematics, and technology. Under the guidance of the American Association for the Advancement of Science (AAAS), the group took on the task of defining the understandings and modes of thinking that a scientifically literate person should possess in order to become a productive member of society, able to make informed decisions about issues of national and global import. Known as *Project 2061*, members of the group studied, debated, and finally settled upon threshold levels of knowledge in the areas of science, math, and technology; episodes and periods in history as related to science; and habits of mind essential for science literacy. The recommendations set forth by the members of Project 2061 stress that science literacy is for *all* Americans, not just a privileged few; regardless of social circumstances or career aspirations (AAAS, 1989).

Project 2061 stresses that schools do not need to be asked to cover more content, but to teach *less*, with depth and relevancy. According the members of the group, a spiral curriculum in which concepts are built upon gradually, and revisited often is far more effective than one in which too many concepts are introduced too quickly to be adequately assimilated. The group established five criteria to use when deciding the relative value of a particular concept or theme in science: (a) utility in long-term employment and decision-making capacity, (b) propensity to contribute to socially responsible decision-making skills, (c) intrinsic value of the knowledge itself, (d) philosophical value of the knowledge itself, and (e) contribution to childhood enrichment (AAAS, 1989).

Using those guidelines, Project 2061 set forth key principles in the areas of science, math, and technology to be incorporated into science curricula around the nation. Those general goals were later refined and expanded into *Benchmarks for Science Literacy* (AAAS, 1993). The benchmarks are divided into 12 distinct areas, each corresponding to a chapter that lays out background information, as well as benchmarks for learning at four levels: kindergarten through second grade, third through fifth grades, sixth through eighth grades, and ninth through twelfth grades.

The topics of chapters one through three deal with the nature of science, mathematics, and technology, and include: (Chap. 1) the nature of science, including (a) the scientific worldview, (b) scientific inquiry, and (c) the scientific enterprise; (Chap. 2) the nature of mathematics, including (a) patterns and relationships, (b) mathematics, science, and technology, and (c) mathematical inquiry; and (Chap. 3) the nature of

technology, including (a) technology and science, (b) design and systems, (c) issues in technology (AAAS, 1993).

The topics of chapters four through nine cover basic knowledge about the world in the areas of science, mathematics, and technology, and include: (Chap. 4) the physical setting, including (a) the universe, (b) the earth, (c) processes that shape the earth, (d) structure of matter, (e) energy transformation, (f) motion, and (g) forces of nature; (Chap. 5) the living environment, including (a) diversity of life, (b) heredity, (c) cells, (d) interdependence of life, (e) flow of matter and energy, and (f) evolution of life; (Chap. 6) the human organism, including (a) human identity, (b) human development, (c) basic functions, (d) learning, (e) physical health, and (f) mental health; (Chap. 7) human society, including (a) cultural effects on behavior, (b) group behavior, (c) social change, (d) social trade-offs, (e) political and economic systems, (f) social conflict, and (g) global interdependence; (Chap. 8) the designed world, including (a) agriculture, (b) materials and manufacturing, (c) energy sources and use, (d) communication, (e) information processing, and (f) health technology; and (Chap. 9) the mathematical world, including (a) numbers, (b) symbolic relationships, (c) shapes, (d) uncertainty, (e) reasoning (AAAS, 1993).

The topics of chapters ten through twelve present knowledge that all people should have in regards to the history of science, as well as the habits of mind that will keep the endeavor ever-growing, including: (Chap. 10) historical perspectives, including (a) displacing earth from the center of the universe, (b) uniting the heavens and earth, (c) relating matter, energy, time, and space, (d) extending time, (e) moving the continents, (f)

understanding fire, (g) splitting the atom, (h) explaining the diversity of life, (i) discovering germs, and (j) harnessing power; (Chap. 11) common themes, including (a) systems, (b) models, (c) constancy and change, and (d) scale; and (Chap. 12) habits of mind, including (a) values and attitudes, (b) computation and estimation, (c) manipulation and observation, (d) communication skills, and (e) critical response skills (AAAS, 1993).

Project 2061 also made several recommendations in regard to the way in which science is taught, stressing the importance of inquiry as an authentic, effective learning modality for students building science literacy. Several ideals were outlined in the final chapter of *Science For All Americans:* (a) learning does not necessarily result from teaching, (b) students' existing ideas affect what they learn, (c) learning should progress from concrete experiences to the abstract, (d) people only learn proficiency by practice, (e) effective learning requires appropriate feedback at appropriate times, (f) teacher expectations affect student performance, (g) teaching should be consistent with the nature of inquiry, (h) science teaching should reflect scientific values, (i) science teaching ought to counteract learning anxieties, and (j) effective teaching takes its time (AAAS, 1989).

According to Project 2061, the elements of inquiry include: (a) beginning with questions about nature, (b) involving students in active learning, (c) focusing on the collection and appropriate use of evidence, (d) incorporating historical perspectives, (e) insisting on clear oral and written communication, (f) using a collaborative approach, (g) making sure that conclusions derive from discovered evidence, and (h) placing less stress on memorizing technical vocabulary (AAAS, 1989). In addition, important scientific values include: (a) welcoming and fostering curiosity, (b) rewarding creativity, (c)

promoting questioning and intellectual honesty, (d) steering clear dogmatism, and (d) encouraging aesthetic aspects of science (AAAS, 1989). Moreover, the tools that should be used to neutralize learning anxieties include: (a) creating positive experiences and building upon success, (b) making available multiple experiences in using scientific tools, (c) supporting the roles of women and minorities in science, and (d) highlighting and incorporating group learning (AAAS, 1989). Recommendations from Project 2061 have become the guiding philosophy upon which states have built their own learning requirements in the area of science.

Part Two: State Recommendations

Essential Academic Learning Requirements: Science. In accordance with the recommendations set forth by AAAS, and in conjunction with state efforts to define what students in Washington should know and be able to do, the Commission on Student Learning established Essential Academic Learning Requirements (EALR's) in the area of science. The science EALR's delineate both concepts and principles in which students should be proficient, setting specific benchmarks at three levels: (a) what students should know and be able to do by grade five, (b) what students should know and be able to do by grade eight, and (c) what students should know and be able to do by grade ten (OSPI, 2002).

Goal number one in the area of science states, "The student understands and uses scientific concepts and principles" (OSPI, 2002, p. 44). To demonstrate proficiency in meeting that standard, the student will: (a) use properties of substances, materials, objects, and living things to identify, describe, and classify them; (b) recognize the parts,

structure, and organization of systems and their interconnectedness; and (c) understand how interactions in and amongst systems are related to changes in matter and energy (OSPI, 2002).

Goal number two in the area of science states, "The student knows and applies the skills and processes of science and technology" (OSPI, 2002, p. 44). To demonstrate proficiency in meeting the standard, the student will: (a) develop skills needed to conduct scientific inquiry, and (b) apply skills and knowledge in the area of science to solve problems (OSPI 2002).

Goal number three in the area of science states, "The student understands the nature and contexts of science and technology" (OSPI, 2002, p. 44). To demonstrate proficiency in meeting the standard, the student will: (a) be aware of the character of scientific inquiry, and (b) know that science and technology are carried out by humans, and are related to society and the workplace (OSPI, 2002).

Essential Academic Learning Requirements: Health. The Commission on Student Learning also established learning goals for students in the State of Washington in the area of health and fitness. Principles in the health and fitness benchmarks are built partially upon the recommendations of AAAS, as well as a recognition of the importance of health on students' ability to succeed in school, life, and in future employment (OSPI, 2002). The health and fitness EALR's delineate both concepts and principles in which students should be proficient, setting specific benchmarks at three levels: (a) what students should know and be able to do by grade five, (b) what students should know and

be able to do by grade eight, and (c) what students should know and be able to do by the end of high school (OSPI, 2002).

Goal number one in the area of health and fitness states, "The student acquires the knowledge and skills necessary to maintain an active life: movement, physical fitness, and nutrition" (OSPI, 2002, p. 88). To demonstrate proficiency in meeting that standard, the student will: (a) develop basic and advanced movement skills as appropriate; (b) engage in a variety of physical activities in a safe manner; (c) understand what comprises physical fitness, developing fitness goals and ways to track those goals; and (d) understand the relationship between nutrition, physical performance, and body composition (OSPI, 2002).

Goal number two in the area of health and fitness states, "The student acquires the knowledge and skills necessary to maintain a healthy life: recognize patterns of growth and development, reduce health risks, and live safely" (OSPI, 2002, p. 88). To demonstrate proficiency in meeting the standard, the student will: (a) understand patterns of growth and development, (b) learn how to control and prevent disease, and (c) build skills to live safely and reduce health risks (OSPI, 2002).

Goal number three in the area of health and fitness states, "The student analyzes and evaluates the impact of real-life influences on health" (OSPI, 2002, p. 88). To demonstrate proficiency in meeting the standard, the student will: (a) learn how variables in the environment affect health, such as air, water, noise, and chemicals; (b) gather and analyze health information; (c) promote health and safety in social situations; and (d) understand how decision-making can be influenced by emotions (OSPI, 2002).

Goal number four in the area of health and fitness states, "The student effectively analyzes health and safety information to develop health and fitness plans based on life goals" (OSPI, 2002, p. 88). To demonstrate proficiency in meeting the standard, the student will: (a) analyze safety and health information, and (b) design a monitored health and fitness plan (OSPI, 2002).

Summary

Educating students for science literacy involves many levels of engagement, from interacting with the natural world, to drawing conclusions about the natural world that will inform decisions made at personal, community, and global levels. According to experts around the nation, the *process* of science is just as important as the *content* of science. Rather than using content as a vehicle through which concepts are driven into the minds of students by drill and practice, the process of science is a vehicle through which content may be explored, understood, and assimilated in meaningful ways across a variety of contexts. Though specific conceptual goals are outlined at national and state levels, the push is for science education to "take it's time," helping students to make the connections that will have lasting impact.

The Strands Interwoven: A Summary

The principles that prove to be effective in working with Hispanic students dovetail with the principles of sound science teaching, providing tremendous opportunity to shift the educational tide in a direction that will ebb in the lives of all students (AAAS, 1989; Fradd et al, 2001; Gallard, 1992; Mason and Barba, 1992; OSPI, 2002). In viewing science through a multicultural lens, it becomes clear that effective science teaching and

affirming practices for Hispanic students and English Language Learners are mutually inclusive, rather than mutually exclusive endeavors. To create equitable learning opportunities for Hispanic students in science, several aspects must be considered: (a) Environment, (b) Content, (c) Materials, (d) Pedagogy, and (e) Connection.

Environment

As is true for all students, Hispanic students must attend science classes that are safe places for them both physically and psychosocially (Collier, 1995; Fradd & Lee, 1995; NCBE 1999). That translates into an environment that is free from bigotry and racism, combined with teacher and peer attitudes that welcome and value Hispanic language and culture (EETF 2000a; Tan, 2002). As has been the case for Anglo students for decades in the North American school system, Hispanic students must be greeted with images of their own people in science classrooms, textbooks, and other learning resources (Gallard, 1992).

Discussions and small group work must take place within the context of a science classroom that welcomes Hispanic students to share from their own cultural experience (NCBE, 1992). Narrative writing assignments can be used as a means of engaging students in personal story-telling that will provide teachers and fellow students alike the opportunity to draw out and glean from the cultural capital that Hispanic students bring with them to the classroom (Menchaca, 2001).

In a perfect world, different science classes would be offered to accommodate students at varying levels of English language acquisition, taught by teachers proficient in both Spanish and English (Gallard, 1992). Since that is not the case in the area of science

in most schools around the country, teachers must allow Hispanic students who are still developing English language proficiency to continue using Spanish in the course of learning content (Echevarria et al., 2000; Gallard). In addition, science teachers must give Hispanic students the opportunity to represent their understanding of concepts in a variety of ways (Fradd et al., 2001; Mason & Barba, 1992).

Content

In the same way that Anglo students are given the opportunity to learn science in contexts that are familiar, so too must Hispanic students in science be granted the same opportunity, engaging in curriculum that is inclusive of their people, history, and contributions (Gallard, 1992; Marinez & Ortiz DeMontellano, 1988; Mason & Barba, 1992; Menchaca, 2001). Only the most relevant and important science content should be included (AAAS, 1989; Fradd & Lee, 1995; Mason & Barba; NCBE, 1992), with a focus on practical application of that content to everyday life (Echevarria et. al, 2000; Fradd & Lee). In addition, teachers should use real objects, pictures, and other visual aids to reinforce both language and content (Echevarria et al., 2000; NCBE, 1992).

Barba (1998) highlights the importance of including scientists from multiple and varied backgrounds in the science curriculum. Barba suggests including culturally diverse scientists in each unit of study, posting bulletin boards that feature "scientists of the week," inviting culturally diverse scientists into the classroom, and assigning students to research the lives and works of culturally diverse scientists and their contributions. In that way curricular materials that may be unduly Eurocentric may be broadened to create

a more realistic picture for students about who can be involved and successful in the field of science.

Materials

For Hispanic students that are in the process of learning English as a second language, content should be simplified, using language and sentence structures that introduce no more than 12 new words per lesson (NCBE, 1992). Effective science classes must also have curricular materials available in both Spanish and English, including books and tapes in both languages (Fradd & Lee, 1995; Mason & Barba, 1992). Hispanic students should also be provided multiple opportunities to come in contact with content, using tools such as unit introductions, reviews, study guides, and supplemental materials (Echevarria, et al., 2000).

Pedagogy

One of the most effective pedagogical practices for science teachers to use in working with Hispanic students is cooperative group learning activities (Fradd & Lee, 1995; Mason & Barba, 1992). Gallard (1992) argues that homogeneous groupings should be used to allow English language learners to negotiate the meaning of content in their own native language, while NCBE (1992) advocates for heterogeneous groupings, citing the opportunity it allows for students at various levels to interact and assist one another in the learning process. Echevarria et al. (2000) suggest that both grouping configurations can be used effectively at different times, depending on the learning objectives. Cooperative learning modalities also lend themselves well to the process of inquiry (AAAS, 1989), which in turn provides continued opportunity for Hispanic students to

draw meaning from experience, developing understanding of the content (Fradd & Lee; Mason & Barba; NCBE, 1992).

Science teachers must also take care to reinforce content through the use of questioning techniques, being sure to repeat and paraphrase often (Echevarria et al., 2000; NCBE, 1992). In addition, NCBE (1992) suggests that science teachers involve students in three levels of interaction with content: teacher demonstrations, group investigations, and individual investigations. In that way students are provided multiple opportunities to engage with content, gradually building confidence and understanding. Along the way, narrative and expository writing assignments provide opportunity to develop understanding of science concepts (Fradd et al., 2001).

Connection

To make science content relevant and applicable to the lives of Hispanic students, science teachers must find ways to extend learning beyond the classroom (AAAS, 1989; NCBE, 1992). The most effective programs expose students to extra-curricular science activities on college campuses and connect them with Hispanic scientists working in the real world (Sorge, Newsom, & Haggerty, 2000). For Hispanic students desiring to pursue careers in science, teachers must also be willing to providing guidance in the form of high school course planning, as well as assistance with college application and financial aid processes (Sorge et al., 2000; Villanueva, 1996).

This chapter has provided a literature review that addresses the three strands to consider when constructing a middle school science classroom that will support Hispanic students. Chapter Three will provide the background and procedures of the study.

Chapter Three

Procedures of the Project

Introduction

The purpose of this project is to create a handbook of strategies that will support Hispanic students in middle school Health Science classrooms, in turn creating a more equitable, culturally inclusive learning experience for all students. Chapter Three provides detailed information on the research and development of those strategies, as well as the procedures used to develop the subsequent handbook.

Background

The sliding schedule that determines a teacher's net worth in the eyes of the state has long been an incentive for educators to procure a master's degree. Though that lure had been in place for me as a teacher for several years, it wasn't enough for me to pursue something as involved as obtaining a graduate degree. After moving to Ellensburg and learning of the self-directed nature of Central Washington University's M.Ed. program, I knew that it would definitely take more than a pay raise to get me involved in pursuing an advanced degree; I knew that I needed some direction before I could steer a course of study in the way it should go.

In waiting and teaching for a few years in the district, some concerns began to present themselves, both in and out of my classroom. I began to take note of the social schism that seemed to exist between Anglo students and Hispanic students in my middle school, wondering where it stemmed from, and how it could be addressed. In the course

of thought and some study on the matter, the issues loomed larger than anything I could effectively address as an individual teacher.

As I began to ponder things a bit more, however, I began to look more closely at the happenings in my own classroom. I noticed a marked difference in the performance of my Hispanic students, and that of my Anglo students. As I looked more closely at my Hispanic students, I saw wide varieties of socio-economic levels, language proficiencies, and overall classroom participation. I knew there had to be something I was missing. As a result, I began to consider how the things that took place in my classroom on a daily basis, both socially and pedagogically, might impact the experiences of my Hispanic students. That became my locus of interest, and spurred me on to pursue graduate coursework.

From the beginning of my course of study, I knew that I wanted to do a project, rather than a thesis. I was anxious to dive into the issues, find some practical solutions, and apply those solutions to my own classroom. I also knew that I wanted my project, whatever it turned out to be, to be something that other teachers could use in their own classrooms as well. In researching state and nation-wide statistics about the growing Hispanic population, in talking with other teachers in and out of district, and in looking around my own classroom, I knew that I was onto a pressing topic; one that would become a growing focus of concern for years to come. I also knew that I didn't want to wait around for legislation to push me into action; I knew that I wanted to be proactive. My Hispanic students deserved action; *all* of my students deserved action.

As I began to work my way through classes, and started the initial literature review, I began to understand the enormity of the issues I was attempting to deal with. I started to uncover everything from microcosmal classroom concerns (such as how student seating arrangements are configured) to macrocosmal societal issues (such as bigotry and prejudice), and everything in between. The challenge came in trying to sort it all out, and to figure out what kinds of macrocosmal solutions could be applied in the microcosmic scale of my own classroom. To be considered were strategies for working with Hispanic students, many of whom are also English Language Learners, as well as elements of purposeful science instruction. Could they be interwoven in an effective manner?

As a result of my initial research, I began to see that both areas dovetailed beautifully, and mutually reinforced one another; I knew that the strategies I developed as applied to my own classroom would prove beneficial for *all* of my students, not just my Hispanic students. Yet my Hispanic students remained as the focus of study. At that point I was still unsure as to how the project itself would take shape, as there seemed to be so many directions it could go. After much thought, and many discarded ideas, I settled on the notion of creating a handbook of strategies for working with Hispanic students in middle school Health Science, with an eye toward developing specific examples of the strategies themselves.

In the process of reading and synthesizing, I came to realize that I already used some of the strategies described in my own classroom. For example: in Strand One and Strand Two from the literature review, a key consideration for teachers and other school

staff is the status that minority languages receive in the educational environment. Already I had begun to post major bulletin board items, labels, and explanations of scientific models in both English and Spanish. As an educator, but more so as a person, I understood intuitively how important it is to be validated by language at school in order to feel like a contributing part of that school. I had been posting the labels for over a year before I came across research studies to back up what I was doing. My changed interactions with Hispanic students and parents who expressed to me their appreciation for the inclusion convinced me that the studies were going to prove an effective guide in my journey. I became eager to find out what else I could do that would support my Hispanic students, and help to create cultural equity for all students.

Procedures

When I began my official course of study in the summer of 2002, I began the literature review process using the electronic databases available to students at Central Washington University. At the outset of the research process, I relied heavily on ERIC (Educational Resources Information Center) search engines, and uncovered a plethora of generalized information about the achievement gap between Hispanic and Anglo students, as well as a variety of case studies regarding the nation-wide Hispanic drop-out rate. Some of the key words included in my search included: Hispanic students, science, health science, life science, equity, multicultural education, and achievement. Through the ERIC database, I was able to access many useful journal articles and digests.

From those articles and digests I was able to glean ideas for more specific avenues of review, particularly other websites to access for further studies and information. I

found the CREDE (Center for Research on Education, Diversity, and Excellence), NABE (National Association for Bilingual Education), NCELA (National Clearinghouse for English Language Acquisition), TESOL (Teachers of English to Speakers of Other Languages) websites to be particularly helpful in tracking down specific articles and information as related to Hispanic students in general, as well as Hispanic students in science. Combined with my college background in science, nine years of teaching experience, AAAS (American Academy for the Advancement of Science) resources, and Washington State Science EALR's (Essential Academic Learning Requirements), I had a great deal of information at my fingertips; the challenge came in synthesizing it all!

In addition to the on-line and printed resources, many of the classes in my course of study provided direct perspective on many facets of the issues my project centered around. Of particular impact were my classes on Intercultural Education, Linguistic Diversity, and Sheltered Instruction. Creative Teaching and Educational Games helped to stretch my out-of-the-box thinking, which can be a challenge to those of us who are concrete-sequentials. From assignments and projects in each of these classes, I was able to apply concepts that are reflected in the handbook.

In the process of thinking through all the various aspects of equity and how it could be built into an individual classroom, it became clear to me that there was a tremendous variety of ideas to develop and include. Rather than focus on one or two ideas, it made sense to include an array of ideas, knowing that different teachers with different styles would key in on and use different strategies than others. Combined with

my excitement over all the possibilities, it became clear that I needed to incorporate as many strategies as I found useful.

After spending some time developing the strategies as they would play out in my own classroom, the number of strategies began to grow; so much so, that it became necessary to divide the overall list of strategies into categories. The list of categories changed a few times as new strategies were added, some were dropped, and some were further developed. I anticipate that there will be many more strategies to come, which will not make it into the handbook for this particular project. It is my hope to continually develop the strategies, and perhaps one day publish them in a book of some kind. As my classroom experience continues to inform the strategies, and as the strategies continue to inform my classroom practice, it is my hope that my publishing dream will become a possibility.

As a classroom teacher, it was also apparent to me that in order for the strategies to be useful for other teachers, they would need to be more than just a bunch of good ideas. They would need to be based on solid research, and explained thoroughly. Beyond that, the strategies would also need to include examples specific to a science classroom. With those ideas in mind, I chose to develop the handbook in two parts: part one, which includes a matrix showing the research upon which the strategies were built; and part two, which includes the strategies themselves, along with examples.

This chapter has provided a description of the procedures used to develop the project. Chapter Four will be an inclusion of the project itself: a handbook of strategies that will support Hispanic students in the middle school Health Science classroom.

Chapter Four

The Project

Introduction

Chapter Four includes: (a) the Matrix of Solutions synthesized from Chapter Two, and (b) the Handbook of Strategies that represent the application of those solutions to the middle school Health Science classroom.

Matrix of Solutions

The Matrix of Solutions is a synthesis of the suggestions proffered by experts in the field of education to address the needs of Hispanic students, some of whom are English Language Learners, as well as those of Health Science students. Those suggestions are synthesized into a table that highlights the solutions, as well as the major strands and parts of those strands from Chapter Two that the solutions have been pulled from. The suggested solutions from Chapter Two encompass many broad areas of focus, including state and district points of concern. Many of the suggested solutions may also be applied at the classroom level. Given the sheer enormity of creating a handbook that would address all three levels of concern, the Matrix of Solutions developed for Chapter Four focuses on strategies that can be readily implemented at the classroom level. Solutions that extend beyond the classroom will be briefly addressed in the Recommendations section of Chapter Five.

Handbook of Strategies

The Handbook of Strategies is an application of the themes included in the Matrix of Solutions. Each strategy includes a rationale based on the Matrix of Solutions, an

explanation of the strategy itself, as well as an example of the strategy as applied in the middle school Health Science classroom.

CHAPTER FOUR: THE PROJECT

STRATEGIES FOR WORKING WITH HISPANIC STUDENTS IN THE MIDDLE SCHOOL HEALTH SCIENCE CLASSROOM: A HANDBOOK

Table of Contents

Dear Practitioners,

This handbook was designed with you in mind—the professional educator seeking to provide equitable learning experiences for your Hispanic students. The Handbook contains a myriad of strategies aimed at building that equity into your very own classroom. The Handbook addresses environmental, communicative, pedagogical and assessment concerns, providing explanations and practical examples for each included strategy. Though these strategies may be effective for all students, research indicates that these strategies are effective specifically for Hispanic students.

The strategies themselves are built upon research as well as classroom experience. For each strategy, you will find a rationale based on the research. The highlights of the research have been included in a prelude to The Handbook, the Matrix of Solutions. The Matrix of Solutions lists the suggested solutions to needs of Hispanic students, as well as the strands and parts of research those suggestions were taken from.

***Strand One** from the research deals with **Guiding Principles in the Education of Hispanic Students. Part One** of Strand One deals with national recommendations, including: the Hispanic Dropout Project, White House Strategy Sessions, No Child Left Behind, and the National Council of La Raza. **Part Two** of Strand One deals with state recommendations, including: the Equity in Education Task Force and the Multi-Ethnic Think Tank. **Part Three** of Strand One deals with other expert recommendations, including the works of: Nieto, Villanueva, Tan, and Martinez, et al.*

***Strand Two** from the research deals with **Guiding Principles in the Education of English Language Learners. Part One** from Strand Two deals with sociocultural processes, including the works of: Collier, Crystal, Krashen and Terrel, and Lucas, et al. **Part Two** from Strand Two deals with linguistic, academic, and cognitive development, including the works of: Collier, Chamot and O'Malley, and Echevarria, et al.*

***Strand Three** from the research deals with **Guiding Principles in the Teaching of Science. Part One** from Strand Three deals with national recommendations from AAAS. **Part Two** from Strand Three deals with state recommendations, including the EALR's in both Science as well as Health.*

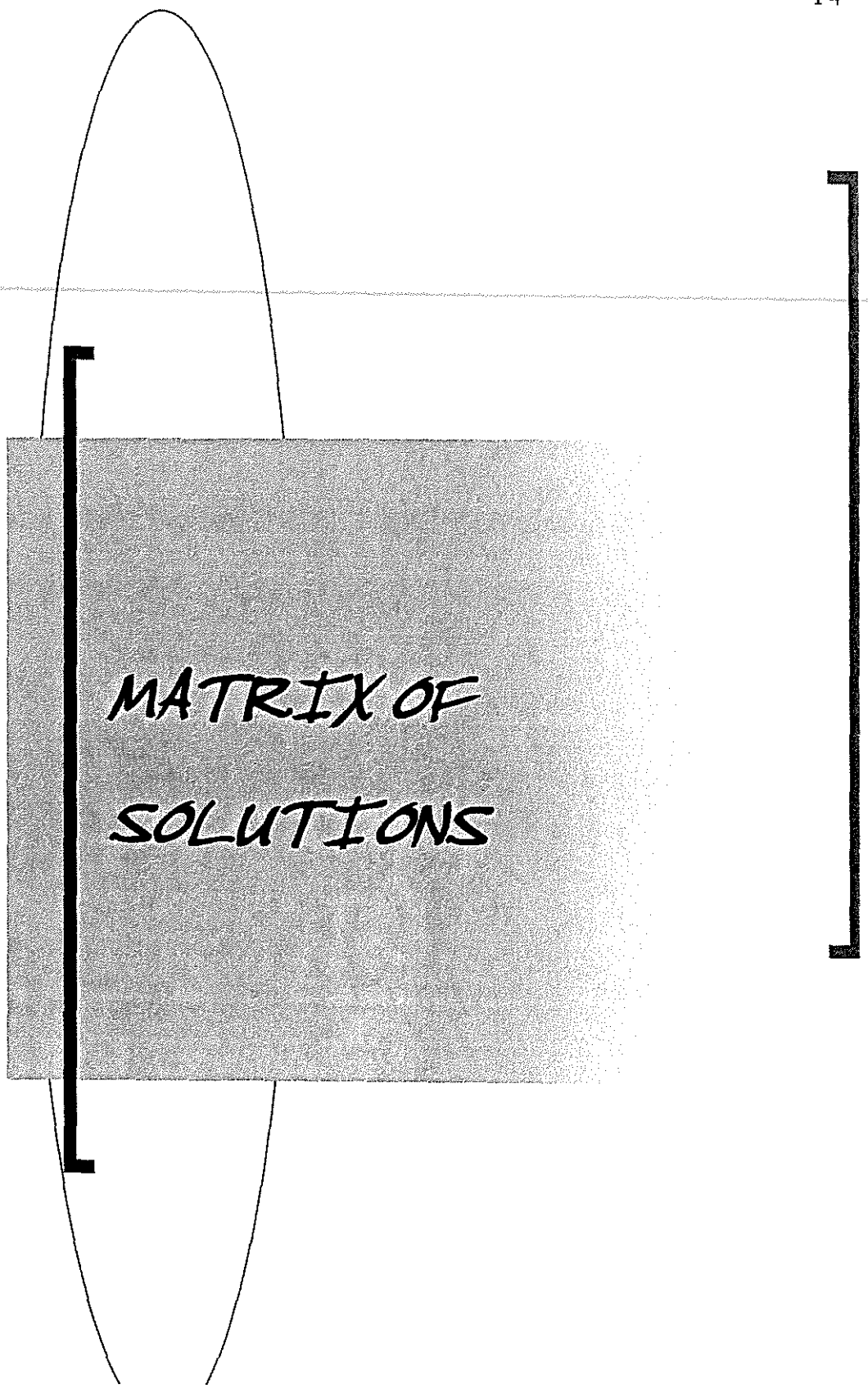
The strands and parts are listed for each suggested solution in the Matrix of Solutions. The Appendix includes a checklist that details which agency, policy, researcher, or collaborative group recommends implementation of said solutions.

It is my hope that this handbook will be of assistance to you, the educator, and that in turn, your Hispanic students—in fact, all your students—may enjoy more equitable experiences in the classroom.

Sincerely.

Heather L. Jones
Science Teacher
Ellensburg, WA

Please note: A signature was redacted from this page due to security concerns.


MATRIX OF
SOLUTIONS

MATRIX OF SOLUTIONS

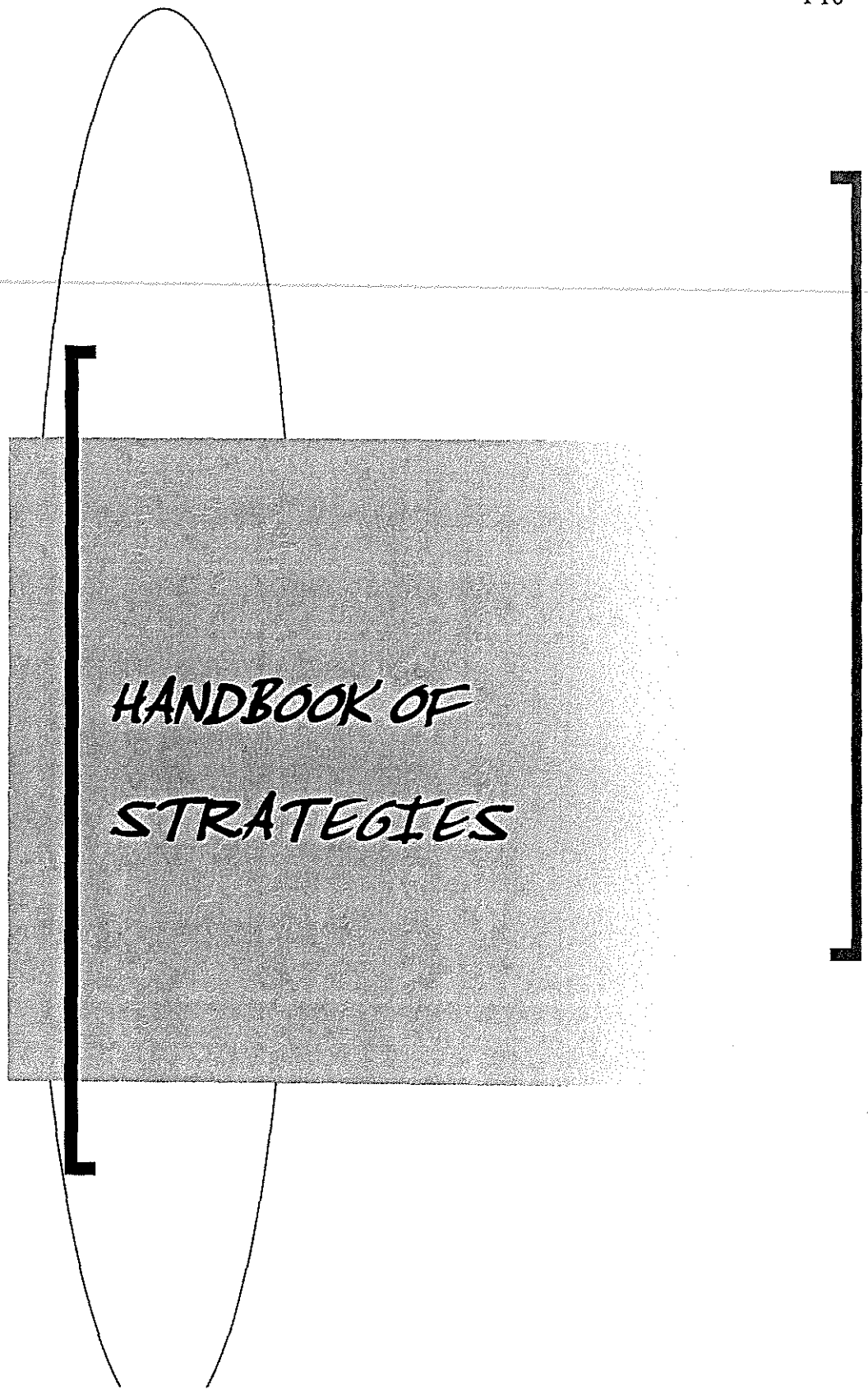
SUGGESTED SOLUTION	STRAND/PART
Accommodate parents in need of special services to communicate	S1P2
Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Allow students to clarify concepts in native language	S2P1, S2P2
Base learning experiences in native language	S1P1, S2P1
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Communicate in linguistically/culturally appropriate and effective ways	S1P1, S1P2
Create a culturally and linguistically sensitive environment	S1P1, S1P2

Demonstrate interest in students	S1P1, S1P3, S2P1
Develop content, language, and strategy objectives for lessons	S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Eliminate prejudice, bigotry, and racism	S1P2, S2P1
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Enunciate clearly, speak slowly	S2P1, S2P2
Focus on collection and appropriate use of evidence	S3P1
Guide students through the educational system	S1P1, S1P3
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Help students and parents envision a future for themselves	S1P1, S1P3
Implement interactive, inquiry based curriculum	S2P1, S3P1, S3P2
Incorporate historical perspectives	S3P1
Involve parents in the educational process	S1P1, S1P2
Maintain high expectations	S1P1, S1P2, S3P1
Make available multiple experiences using scientific tools	S3P1

Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Make personal connections with students	S1P1, S1P3, S2P1, S2P2
Monitor student progress frequently, and provide feedback	S2P1, S2P2, S3P1
Prepare students for college	S1P1
Promote questioning and intellectual honesty	S3P1
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Provide ample wait time when asking questions	S2P1, S2P2
Provide a psychologically safe environment for students	S1P1, S2P1
Provide models for students to follow	S2P1, S2P2
Provide useful, ongoing feedback about student progress	S1P1, S2P1, S2P2, S3P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1
Reward creativity	S3P1
Specifically teach learning strategies	S2P1, S2P2
Start with questions about nature	S3P1
Support the roles of women and minorities in science	S3P1

Teach and emphasize key vocabulary	S2P1, S2P2
Teach: *Cells*	S3P1, S3P2
Teach: *Common Themes*	S3P1, S3P2
Teach :*Development of Health Plans Based on Life Goals*	S3P2
Teach: *Diversity of Life*	S3P1, S3P2
Teach: *Evolution*	S3P1, S3P2
Teach: *Flow of Matter and Energy*	S3P1, S3P2
Teach from concrete to the abstract	S2P2, S3P1
Teach: *Habits of Mind*	S3P1, S3P2
Teach: *Heredity*	S3P1, S3P2
Teach: *Interdependence of Life*	S3P1, S3P2
Teach: *Knowledge and Skills to Maintain a Healthy Lifestyle*	*S3P2*
Teach less, with more depth	S3P1
Teach relevant curriculum	S1P1, S2P1, S3P1
Teach students to use a variety of resources	S2P1, S2P2
Teach: *The Nature of Science*	S3P1, S3P2

Teach: *The Nature of Technology*	S3P1, S3P2
Teach things that are useful for employment/decision-making	S3P1
Teach things that contribute to socially responsible decision-making	S3P1
Teach things that enrich the child	S3P1
Teach things that have intrinsic value	S3P1
Teach things that have philosophical value	S3P1
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use examples from Hispanic culture to help students learn	S1P3, S2P1, S3P1
Use gestures to reinforce speech	S2P1, S2P2
Use grouping configurations that support content and language objectives	S2P1, S2P2, S3P1
Use materials that represent diverse populations and their contributions	S1P2, S2P1, S3P1
Use multiple assessments to make high-stakes decisions	S1P1, S1P2
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2
Welcome and foster curiosity	S3P1


HANDBOOK OF
STRATEGIES

HANDBOOK OF STRATEGIES

- Environmental Strategies
- Communicative Strategies
- Pedagogical Strategies
- Assessment Strategies

ENVIRONMENTAL STRATEGIES

*Classroom Arrangement

*Dual Language Postings

*Diversity Bulletin Board

*Stellar Scientists

Classroom Arrangement

RATIONALE

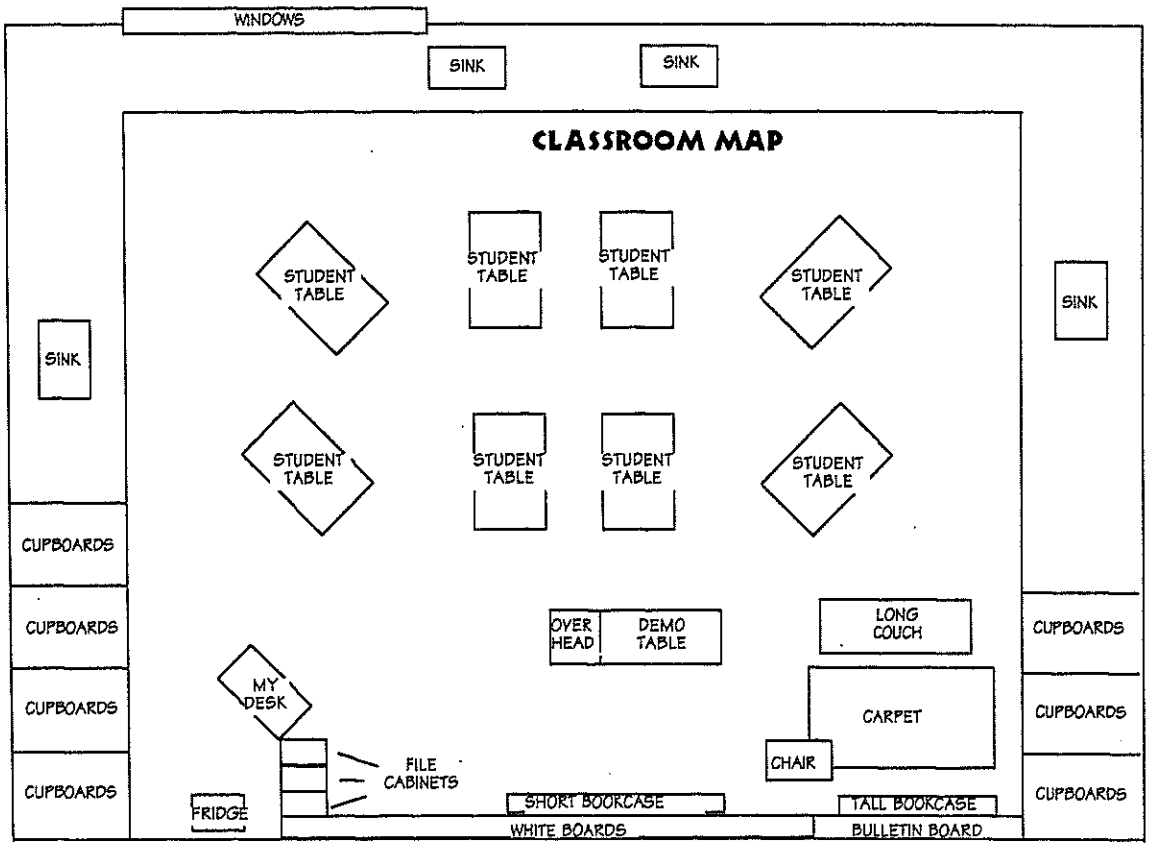
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Implement interactive, inquiry based curriculum	S2P1, S3P1, S3P2
Make available multiple experiences using scientific tools	S3P1
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Teach things that are useful for employment/decision-making	S3P1
Use grouping configurations that support content and language objectives	S2P1, S2P2, S3P1

EXPLANATION

The way a classroom is arranged can have a huge impact on the way students interact and learn. In order to support students in the scientific process, collaboration and interaction are a must. To allow for that collaboration and interaction, the classroom should be arranged in such a way that students may work in a variety of grouping configurations: individually, with a partner, and in larger groups. Consider an arrangement where students have lab space to work with partners during equipment-intensive lab activities, such as microscopy. In addition, consider options for how students may effectively work in larger groups, and/or as individuals.

EXAMPLE:

In the following classroom map, students are seated in tables of four, allowing for individual and/or group work. Lab counters around the perimeter of the room allow for partnerships and/or equipment-intensive lab work.



Dual Language Postings

RATIONALE

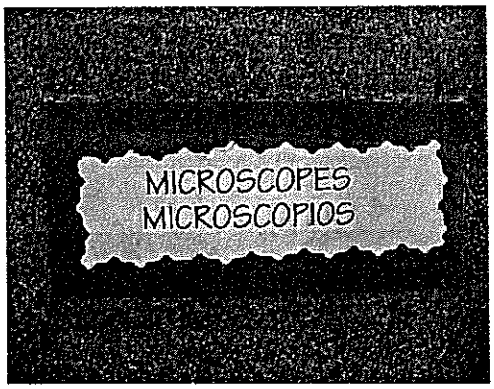
Adapt curricular materials as necessary for ELLS	S2P1, S2P2
Allow students to clarify concepts in native language	S2P1, S2P2
Base learning experiences in native language	S1P1, S2P1
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Create a culturally and linguistically sensitive environment	S1P2, S2P1
Demonstrate interest in students	S1P1, S1P3, S2P1
Eliminate prejudice, bigotry, and racism	S1P2, S2P1
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Make personal connections with students	S1P1, S1P3, S2P1, S2P2
Provide a psychologically safe environment for students	S1P1, S2P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1
Support the roles of women and minorities in science	S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1

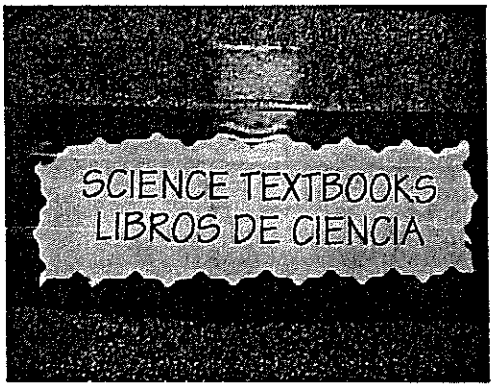
EXPLANATION

Dual language postings are postings of labels, general classroom information, and explanations of scientific models in both English and Spanish. The postings are in plain view for both English-dominant and Spanish-dominant learners to see, glean from, and learn.

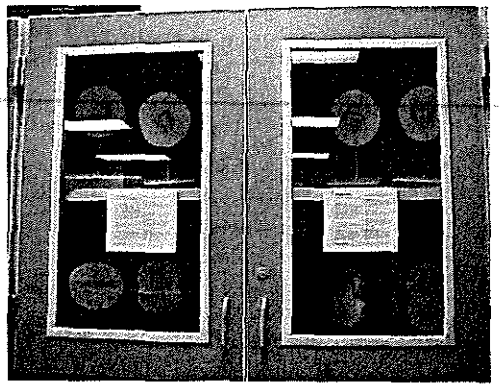
EXAMPLES

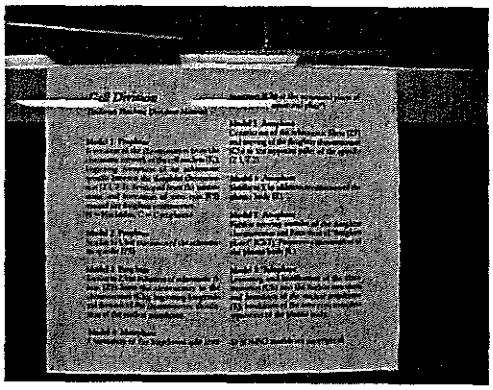
In my classroom, various pieces of scientific equipment, as well as general classroom supplies are stored away in drawers and cupboards. I post labels for those items in both English and

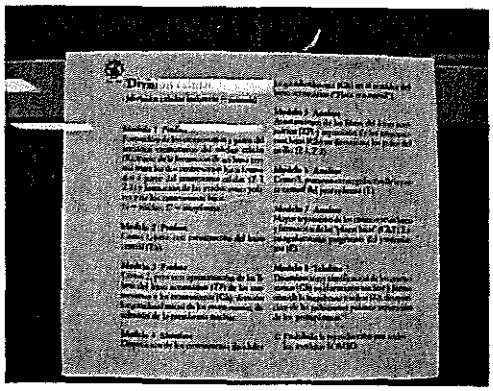




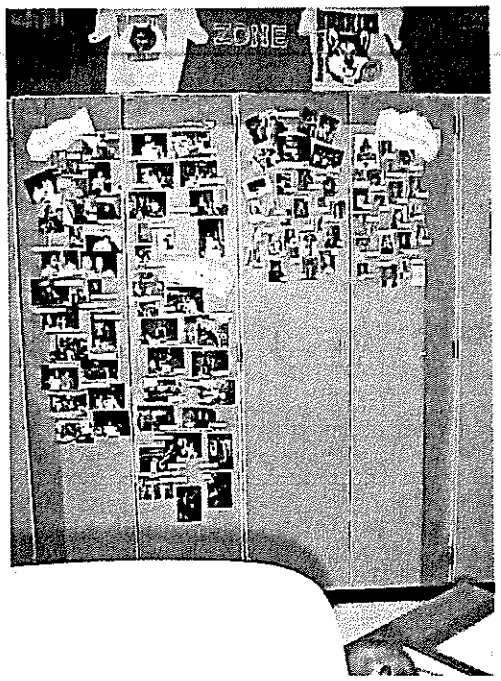
In addition, my classroom contains cupboards with glass doors. In those cupboards, I display various scientific models, as well as explanations of those models in both English and Spanish:







Finally, in my classroom I display a large collection of pictures. The pictures include family, friends, as well as students. The labels for the picture display are posted in Spanish only. This effectively puts Spanish-dominant students in the role of expert, as they help English-dominant students understand what is written:



Diversity Bulletin Board

RATIONALE

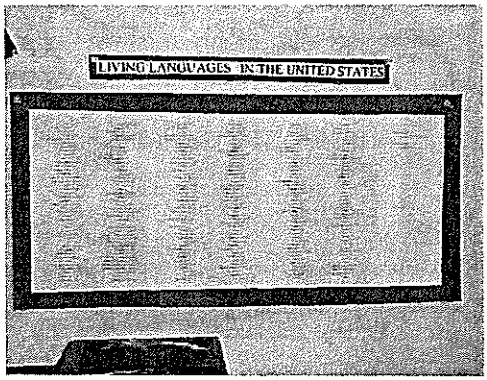
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Create a culturally and linguistically sensitive environment	S1P2, S2P1
Demonstrate interest in students	S1P1, S1P3, S2P1
Eliminate prejudice, bigotry, and racism	S1P2, S2P1
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Make personal connections with students	S1P1, S1P3, S2P1, S2P2
Provide a psychologically safe environment for students	S1P1, S2P1
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1

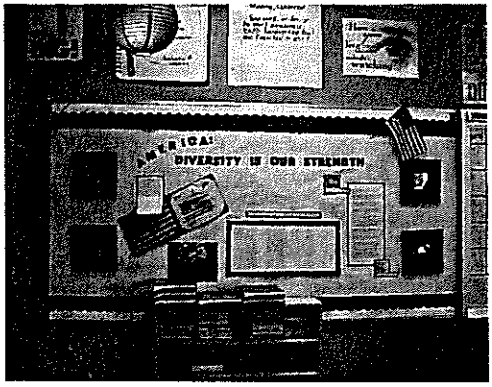
EXPLANATION

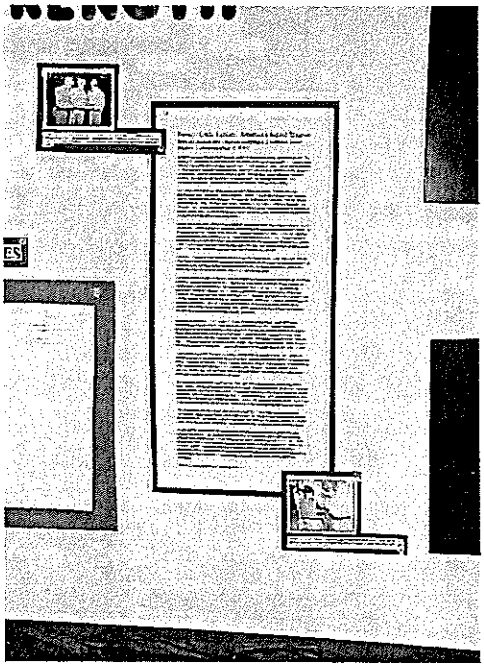
Many students, especially those in smaller rural communities, have not been exposed to the great wide world that exists beyond the walls of the school, or the boundaries of their city or state. Helping students to get a taste for the diversity that exists in the United States can go a long way towards promoting understanding in and amongst groups. In addition, it can provide a springboard for discussion as students make discoveries and ask specific questions about the ideas and/or information that a diversity bulletin board is comprised of.

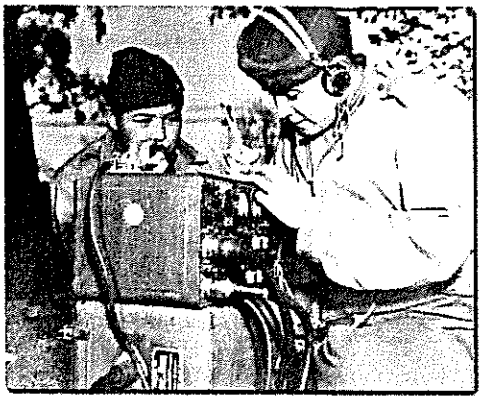
EXAMPLE

A diversity bulletin board can take many forms. The one I chose to develop focuses on language diversity in the United States. I compiled information from the 1990 Census, as well as www.ethnologue.com to create a list of all the languages spoken in the United States, and the approximate number of speakers for each language. In addition, I included a short piece on the Navajo Code Talkers, and their contribution to WWII efforts. The bulletin board as it appears in my classroom is pictured below. The "Living Language" text, and Navajo Code Talker exposition can be found on the pages that follow.









Navajo Code Talkers, America's Secret Weapon

How the Navajo and Choctaw Languages Scrambled Secret Military Communications in WWII

Please note: Content on this page was redacted due to copyright concerns.

Please note: Content on this page was redacted due to copyright concerns.

From: http://www.johnshepler.com/articles/codetalkers.html

Please note: Content on this page was redacted due to copyright concerns.

Please note: Content on this page was redacted due to copyright concerns.

Please note: Content on this page was redacted due to copyright concerns.

Please note: Content on this page was redacted due to copyright concerns.

Stellar Scientists

RATIONALE

Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Create a culturally and linguistically sensitive environment	S1P2, S2P1
Eliminate prejudice, bigotry, and racism	S1P2, S2P1
Help students and parents envision a future for themselves	S1P1, S1P3
Incorporate historical perspectives	S3P1
Provide a psychologically safe environment for students	S1P1, S2P1
Support the roles of women and minorities in science	S3P1
Teach: *Common Themes*	S3P1, S3P2
Teach: *The Nature of Science*	S3P1, S3P2
Teach things that enrich the child	S3P1
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use materials that represent diverse populations and their contributions	S1P2, S2P1, S3P1

EXPLANATION

At the beginning of the semester, I assign students the task of drawing a scientist, complete with tools that the scientist uses. Those drawings are then compiled into a bulletin board, and students analyze the group of drawings, identifying stereotypes and myths they hold about scientists and the work that they do.

For the remainder of the semester, I introduce students to a new "Stellar Scientist" each Monday. I choose scientists that may not be as well knows as Albert Einstein or Louis Pasteur. I try to choose a balance between male and female scientists, as well as scientists that represent a broad range of ethnicities and fields of expertise. As a class, we discuss the work of the scientist, how it contributes to society, and the path the scientist took to become successful in his or her field. We also revisit the "scientist stereotypes" identified at the beginning of the semester, comparing them with what we know about the "Stellar Scientist" of the week.

For each scientist, I track down information from books as well as the internet to compile a brief biography. I paste the biography and a picture of the scientist onto a colorful piece of construction paper, and laminate it. As each scientist is introduced, the biography is posted in a "Stellar Scientist" display that grows each week. By the end of the semester, students have been introduced to at least 15 scientists, and are able to see a visual reminder about the scientists each day. Should I miss a week, the students want to know what happened!

To select scientists, I consult a variety of resources, including a multicultural insert from our Glencoe textbook series; a couple of books on female scientists, including *Women Scientists* by N.J. Veglahn, and *Women of Science,* by G. Kass-Simon; and a list compiled by Robertta Barba in *Science In the Multicultural Classroom.* I have also come across new scientists while researching referenced scientists on the internet. Barba's (1998) compiled list and a classroom example can be found on the pages that follow.

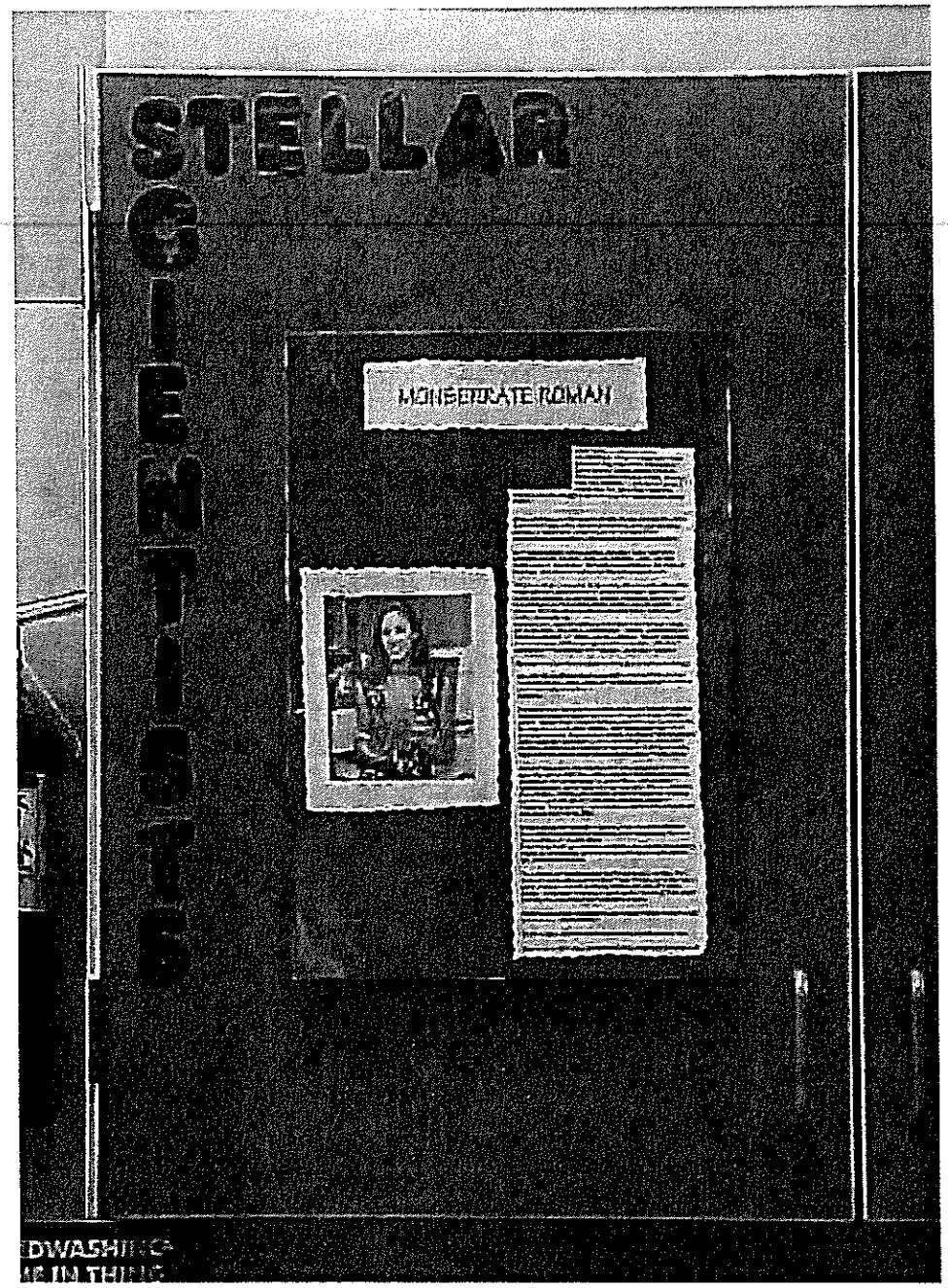
TABLE 3.1 .. Culturally Diverse Scientists

Please note: Content on this page was redacted due to copyright concerns.

TABLE 3.1 Continued

Please note: Content on this page was redacted due to copyright concerns.

EXAMPLE



COMMUNICATIVE STRATEGIES

*Student Information Sheet

*Dual Language Letters

*Parental Perusal

*Classroom Website

*Science Autobiography

*Surveys and Interviews

*Give It A Try!

Student Information Sheet

RATIONALE

Accommodate parents in need of special services to communicate	S1P2
Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Communicate in linguistically/culturally appropriate and effective ways	S1P1, S1P2
Create a culturally and linguistically sensitive environment	S1P2, S2P1
Demonstrate interest in students	S1P1, S1P3, S2P1
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Involve parents in the educational process	S1P1, S1P2
Make personal connections with students	S1P1, S1P3, S2P1, S2P2
Provide a psychologically safe environment for students	S1P1, S2P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1

EXPLANATION

The Student Information Sheet is a way to make an initial connection with students from the first day of class. It provides information about the students personally, including important information about the language(s) spoken at home. That kind of information may or may not be available to teachers at the beginning of a term, or in an easily accessible format. It give teachers a heads up about what kinds of accomodations students may need, including adapted materials, or native language materials. It also provides information about language(s) in which the parents are most comfortable communicating.

EXAMPLE

Student Information Sheet

THIS INFORMATION IS ONLY FOR MISS JONES

PERIOD ☐

Name _____
LAST FIRST

What first name do you use? _____

Home phone number ☐☐☐ – ☐☐☐☐

Dad's work/cell phone: ☐☐☐ – ☐☐☐☐

Mom's work/cell phone: ☐☐☐ – ☐☐☐☐

Who is usually at home after 6pm? _____

What language is spoken at home most of the time? _____

Si sus padres necesitan, yo tengo cartas con información importante sobre esta clase en Español. Escribame una nota en el espacio abajo si quiere que yo doy esos papeles a tú.

Parents' e-mail address(es)_____

Tell me one unique thing about yourself (hobby, interest, trait, places you've been, etc.) that will help me get to know you, which I am eager to do!_____

_____

Tell me one unusual fact about yourself_____

_____

Tell me one thing you look forward to learning in this class, and one thing you may be concerned about._____

_____

_____

Let me know if you have any special needs that I should be aware of (for example, needing to sit near the front of the class due to vision or hearing difficulties)...

Dual Language Letters

RATIONALE

Accommodate parents in need of special services to communicate	S1P2
Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Communicate in linguistically/culturally appropriate and effective ways	S1P1, S1P2
Develop student understanding in all four areas of language	S2P1, S2P2
Guide students through the educational system	S1P1, S1P3
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Involve parents in the educational process	S1P1, S1P2
Maintain high expectations	S1P1, S1P2, S3P1
Provide a psychologically safe environment for students	S1P1, S2P1
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

EXPLANATION

For parents who don't speak English fluently, becoming involved in a meaningful way in their child's education can prove to be a challenge. Offering informational letters that go home to parents in both English and Spanish can provide that critical link between what those parents need to know, and any gaps that may be left by relying solely on the student for translation. This helps those parents to know that you are concerned about meeting the needs of their children, and are interested in drawing them into the learning circle. In addition, it helps them to know what to expect as the semester progresses. Dual language letters also help to reinforce language learning for both students and parents alike.

Don't assume, however, that parents of Hispanic children don't speak English. Dual language letters should only be provided to those students who indicate a need on the Student Information Sheet, or for any parents that you discover along the way who may be in need.

EXAMPLE

Examples of dual language letters can be found on the pages to follow. The second example is a complete description of the expectations I have for students in regards to classroom conduct. It also describes the course syllabus, and grading procedures. The first example is a letter that describes for parents the journal system that is used in my class, and how parents will use it as a means of communicating with me throughout the semester. The examples are shown in English first, then in Spanish.

September 6, 2003

Dear Parents and Guardians:

I am writing to let you know about one form of communication that your student and I will be using to let you know how things are going for them in this class. I believe this system is similar to ones that have been used by your child's former science teachers, and will serve not only to help you stay abreast of what is happening in class, but also to reinforce your child's learning as they discuss lessons and units they have experienced with you.

Every three to four weeks, your child will bring home their science journal, along with an updated sheet entitled "Parental Perusal." On that sheet, your child will have listed all the assignments up to that point, as well as the points possible, and points earned for each. They will take you through their science journal, and show you the assignments. Talk with them about what they have been learning, and ask them any questions you may have.

Your child will also have an updated progress report at the times they are required to show you their journals. Take a look at their progress report, and compare that with what they have written on their "Parental Perusal" sheets. They should be the same. You may discover together that your child has assignments in their journals that are missing, incomplete, or haven't been turned in yet. Encourage them to take care of those assignments as soon as possible, and to arrange for make-up time with me if necessary.

Once you've had a chance to look all this over and discuss it with your child, sign their progress report, and the second page of the "Parental Perusal" sheet. Acquiring your signature on both of these documents are assignments for your child to complete that count towards the journal portion of their science grade.

It is my hope that this form of communication will help you and your child in understanding their progress in this class. Let me know if you have any questions or concerns now, or at any point along the way!

Sincerely,

Miss Jones

El 6 de Septiembre, 2003

Estimados Padres y Tutores:

Escribo para que usted sepa acera de una forma de comunicación que su estudiante y yo estaremos utilizando para que usted sepa como can las cosas para ellos en esta clase. Creo que este sistema es semejante a unos que han sido utilizados por los maestros anteriores de ciencia, y servirán no solo para ayudarlo a saber que sucede en la clase, pero para reforzar también el aprendizaje de su hijo/a cuando ellos discuten con usted las clases y que ellos han experimentado.

Cada tres o cuatro semanas, su hijo/a traerá a la casa su diario de ciencia, junto con una hoja actualizada que se llama "Parental Perusal." En esa hoja, su niño habrá puesto todas las tareas hasta ese punto, los puntos posibles, y los puntos que gano para cada tarea. Ellos le mostraran su diario de ciencia, y las tareas. Hable con ellos acerca de lo que ellos han estado aprendiendo, y hágalos la cualquier pregunta que tiene.

Su niño tendrá también un informede progreso actualizado en las veces que ellos tienen que mostrarle sus diarios. Eche une mirada a su informede progreso, y compare que con lo que ellos han escrito en su hoja "Parental Perusal." Ellos deben ser lo mismo. Usted puede descubrir que su niño tiene tareas en sus diarios que estar perdidas incompletos, o que no han estado entregadas todavía. Alentelos a recuperar esas tareas lo mas pronto posible, y para hablar conmigo si es necesario tener tiempo extra para recuperar.

Ya que usted ha tenido una oportunidad de mirar todo esto discutir lo con sus niño, firma su informede progreso, y la segunda pagina del "Parental Perusal." Adquirir su firma en ambos de estos documentos es la tarea de su niño para que pueda completar la porción del diario de su calificación de la clase de ciencias.

Es mi esperanza que esta forma de comunicación ayudara a usted y a comprensión de su progreso en esta clase. Avíseme si usted tiene cualquier pregunta o preocupación ahora, o en cualquier punto en camino.

Atentamente,

Señorita Jones

MISS JONES AND YOU
A PARTNERSHIP IN POLICY

Welcome to science in room 85! I am looking forward to the coming semester with much anticipation, as we explore together the basic concepts surrounding living creatures and health of those living things. This course will cover life processes, cells, DNA and heredity, HIV/AIDS, drugs/alcohol/tobacco, and the effects of media on health. I have planned a rich semester for us all, which includes lots of hands-on experiences and laboratory work, in addition to homework and other daily activities.

In order for us to work together safely and effectively, there are some guidelines that each of us must live by as we learn together in this class. Please go over the following expectations with your parents or guardians. When all of you are comfortable with the guidelines that have been established, sign in the designated blanks at the end of this contract and return to me. *Note: You must return this contract signed before you participate in any labs.*

ACT RESPONSIBLY

-Complete and turn in all assigned work *on time.* Late work receives HALF CREDIT.
-When you are absent, it is YOUR RESPONSIBILITY to come talk to me or a classmate to find out what you missed. You will have as many days as you were absent to make up work for full credit.
-Equipment is not to be used or taken without permission from me. Equipment will be handled with care, and all breakage should be reported to me for safe cleanup and assessment of necessary fines.
-All lab safety rules as given throughout the course will be followed completely. Scuffling, shoving, squirting water, etc. will result in lab priveleges being revoked for a period of time deemed right by me.
-Conserve lab materials and supplies. RECYCLE WHENEVER POSSIBLE!
-All lab counters, sinks, and tables are to be clean at the end of lab, and all equipment put back in its proper place. All of this of course, before anyone will be excused from class.

BE PREPARED

-Bring necessary supplies to class EVERY DAY. For this class you will need: a three-ring binder, loose notebook paper, pencils and pens, colored pencils, and a ruler.
- BE IN YOUR SEAT AND READY TO LEARN WHEN THE BELL RINGS. You will be assigned a seat at the beginning of the semester. This will be your seat until they are re-assigned. If for any reason you are not able to make it to class on time, and you do not have a note excusing you, you will be marked tardy.

TREAT EVERYONE COURTEOUSLY.

-You will follow common rules of courtesy and remain quiet and in your assigned seat during class discussion. Please raise your hand to ask or give information. When another student or myself has the floor, you need to listen quietly and attentively.
-Lab partners may discuss work quietly with each other during lab exercises. Keep in mind however that all work is to be written in your own words and reflect your own thinking processes! *Copied work receives no credit.*
-ABSOLUTELY NO PROFANITY OR PUTDOWNS WILL BE TOLERATED.
-The bell is my signal, not yours. I will excuse you at the appropriate time.

GIVE IT YOUR BEST SHOT! (No explanation necessary)

So far, so good, right? Just a few more bits of information you probably are wondering about. Each day when you come in to class, there will be a warm-up on the overhead for you to work on. You should get to class as soon as you can, and get started on the day's warm up so that you can be sure to finish by the time I am through taking attendance. Warm-ups will be recorded in a warm up book that will be issued at the beginning of the semester.

After you successfully complete a short lab safety mini-course and quiz, as well as return this signed contract, you will be allowed to work in the lab. As mentioned above, this privelege can be revoked for a variety of unsafe and/or unethical lab habits. *This may sound good to you at first, but it also means that you won't receive credit for the lab/s you miss...*

Which brings me to the subject I am sure is absolutely *burning* in the back of your mind--grades. It is not difficult to do well in this class, *if* you complete all of your work with an honest effort. Everyone can learn an A! Your grade will be comprised of 4 components:

33 % HOMEWORK. Homework is assigned 2-3 times per week, and stamped the day it is due. The stamp indicates to me that the work was completed on time, and may earn full credit. Papers turned in late will not have a stamp, and will only receive half credit. *You will need to see me in order to make up any lab work missed.* All assignments are given at the beginning of each week; each Monday you will record them on an orange assignment sheet.

32 % LABS/PROJECTS. Labs are an integral part of this course, and absolutely essential to your learning. Labs are carefully selected and run in order to help you grasp what might otherwise be difficult content to understand. You will need to take your time on labs, and be sure to complete them to the fullest extent.

30% QUIZZES/TESTS. Quizzes and tests will always be announced, usually one week in advance for tests. I reserve the right to give a pop quiz if the situation warrants it. Quizzes and tests will usually be given on Fridays.

5% JOURNAL. Your journal will be a separate 3 ring binder that you keep for this class in particular. In your journal, you will keep your warm-up book, lab contract, assignment sheets, notes, homework, labs, quizzes, and tests. It is absolutely essential to keep your journal neat and organized. Journals will be checked periodically during the semester. You will also take them home every few weeks to show your parents your progress in this class.

EXTRA CREDIT. I don't believe in emergency extra credit! There will be a few opportunities to earn extra credit, but only after ALL homework and labs have been completed.

GRADING SCALE:

A = 93% AND UP	B- = 80-82%	D+ = 68-69%
A- = 90-92%	C+ = 78-79%	D = 63-67%
B+ = 88-89%	C = 73-77%	D- = 60-62%
B = 83-87%	C- = 70-72%	F = BELOW 60%

Hopefully this gives you a better idea of what is expected in this class. I am looking forward to a rewarding and enriching semester with you! Remember that science isn't the killer it's always cracked up to be. And who knows? You may even end up liking it! You and your parents will need to sign in the appropriate places on the next page. I will keep that sheet on file for reference.

Parents and guardians: thank you for taking the time to go over this contract with your student. I am sure with these expectations being made clear at the start, we will be able to have a smooth, productive semester. If you have any questions regarding this contract, or your student's progress in my class, please feel free to call me here at Morgan, 925-8200. If I am not immediately available, I will return your call as soon as possible. I am always on the lookout for guest speakers and rubber gloves! If you are interested, or know of any good opportunities, don't hesitate to let me know.

I UNDERSTAND AND AGREE TO ABIDE BY THE EXPECTATIONS AS OUTLINED ON THE PREVIOUS PAGE.

_____	_____
Science student signature	*Parent/guardian signature*
_____	_____
Date	*Date*

La Señorita Jones y Tu
Una sociedad mutual de responsabilidades por cumplir

Bienvenido a la clase de Ciencias en el salón 85. Tengo grandes expectativas en el semestre por venir, a medida que juntos exploremos los conceptos básicos alrededor de los seres vivos y su salud. Este curso cubre el proceso de vida y los conceptos de células, DNA y factor hereditario; (Virus de Inmunodeficiencia Humano VIH y SIDA. Drogas, alcohol, tabaco y los efectos de estos medios para la salud. He planeado un semestre rico en conocimientos para todos nosotros el cual incluye experimentos de laboratorio y practicas, adicionando a esto reportes de conocimiento y otras actividades diarias.

Para poder obtener lo mejor de esta clase y que juntos trabajemos con seguridad y efectividad, hay ciertas guías de trabajo que tanto ustedes como yo debemos de seguir y cumplir para un mejor aprendizaje. Por favor revisa con tus padres o tutores las expectativas descritas en este contrato. Cuando ustedes y sus padres hayan entendido estas guías pre-establecidas como requerimiento para la clase de Ciencias por favor firmar en las líneas en blanco al final de este contrato y me lo regresan. *Nota: Ustedes deben de regresar este contrato firmado antes de participar en cualquier laboratorio.*

ACTUAR RESPONSABLEMENTE:

*Completar y regresar todos los reportes de conocimiento y trabajos a tiempo. Reportes que sean entregados tardíamente recibirán solamente la mitad de la nota.
*Cuando tu tengas que faltar a clase por cualquier motivo es TU RESPONSABILIDAD venir y hablar conmigo o con algún compañero de clase para desatracarte del tema visto durante tu ausencia en clase. Tu tendrás los mismos días de ausencia para recuperar tu nota y obtener el crédito completo. Por ejemplo si faltaste 2 días de clase, tendrás 2 días de recuperación para que puedes ganar tu crédito completo.
*El equipo de laboratorio no puede ser usado fuera del colegio sin mi permiso. Todo equipo e implemento de laboratorio debe de ser manipulado con cuidado si alguno se quiebra esto debe de ser reportado y de ello me tengo que dar cuenta para poder limpiar bajo medidas de seguridad y calcular las multas por los danos.
*Todas las reglas de seguridad en el laboratorio se deben de tener en cuenta durante el curso y deben cumplirse completamente. Cualquier daño, juego, juego a empujones, tirarse agua y otras actividades de juego, burla o indisciplina tendrán como consecuencia la negación de los privilegios de laboratorio por un periodo de tiempo estimado por mi. Mantener en complete orden y limpieza todo material de laboratorio FAVOR RECICLAR MIENTRAS SE PUEDA.
*Todos las mesas de laboratorio, lavaderos, fregaderos y demás equipo deben estar completamente limpios y en sus respectivos lugares.

ESTAR PREPARADO

*Traer los útiles que se necesitan para esta clase TODOS LOS DIAS. Para seta clase tu necesitas: un folder de tres anillos, hojas para el folder, lapices, plumas o boligrafos, lapices de colores, y una regla.
*Estar listo y en tu silla previamente asignada cuando suene el timbre. A ti se te asignara una silla al principio del semestre. Esta será tu silla hasta que se te especifique otra diferente. Si por alguna razón no llegas a tiempo para la clase y no tienes una excusa del motivo por el cual llegas tarde, se reportara como llegada tarde a clase.

TRATAR A CADA COMPANERO CORTESMENTE
*Seguirás las reglas comunes ya establecidas para todos y te mantendrás quieto y en silencio en tu silla que fue asignada previamente, durante discusiones en clase. Por favor levanta tu mano para preguntar o participar en clase.
*Cuando otro estudiante o yo estemos a cargo de la clase necesitaras escuchar reposadamente y prestar mucha atención.
*Compañeros de grupo para trabajos asignados de laboratorio podrán discutir pausadamente entre si, durante los ejercicios de laboratorio. Sin embargo debe de tenerse en cuenta que todo trabajo debe pasarse por escrito, en tus propias palabras y reflejar tu proceso de análisis.
*Trabajos copiados a otros no recibirán nota-crédito.
*NO SE TOLERARA EN LO ABSOLUTO NINGUN ACTO OBSCENO O DE CRITICA DESTRUCTIVA HACIA LOS COMPANEROS.
*El timbre es señal para mi y no para ustedes, yo los dejare salir en el momento oportuno.

DA LO MEJOR QUE PUEDAS PARA ESTA CLASE. (No se necesitan explicaciones).

Hasta ahora vamos bien verdad? Tengo mas información para darte y que posiblemente tu te debes de estar preguntando. Cada dia de clase se colocara en el proyector un "recorderis de calentamiento" o repaso para empezar el trabajo del dia. Deberas estar en clase a tiempo y empezar con el repaso de tal manera que termines en el momento que yo termine de tomar asistencia a clase. Los "recorderis de calentamiento" estan registrados en el libro de repaso que sera entregado al comienzo del semestre.

Después de haber completado satisfactoriamente un incurso y quiz en cuanto a medidas de seguridad en el laboratorio y entregado este contrato firmado se te permitirá entonces trabajar en el laboratorio. Como se menciono anteriormente este privilegio puede ser negado o revocado si se observan hábitos de laboratorio inseguros y faltos de ética. Esto te puede parecer o sonar bueno al principio pero también quiere decir que no recibirás ningún crédito o nota por los reportes de laboratorio no entregados.

Esto me lleva a explicarte las notas que muy seguramente estarás pensando como serán. No es difícil hacer un buen trabajo en esta clase, si tu completas cada actividad a tiempo y pones todo tu esfuerzo en ella y la realices con honestidad. TODOS pueden aprender una A! Tu nota se compone de cuatro porcentajes:

33% Reporte de conocimientos: estos serán asignados de 2 a 3 veces por semana y se colocara un sello el día que deben ser entregados. El sello me indica que el reporte fue entregado a tiempo y puede ganar toda la nota crédito. Los reportes entregados tardíamente no tendrán sello y solamente recibirán ½ crédito. Necesitaras hablar conmigo para así reponer cualquier trabajo de laboratorio faltante. Todos los trabajos serán asignados al privilegio de cada semana; cada lunes los escribirán en la hoja de color naranja designada para los reportes de conocimiento.

32% Proyectos de laboratorio. Los laboratorios hacen parte integral de este curso y son absolutamente necesarios para tu aprendizaje. Los laboratorios han sido seleccionados cuidadosamente y se llevaran a cabo para ayudarle a entender lo que de otra manera seria difícil de entender en alguna lección. Necesitas tomarte tu tiempo en las experiencias del laboratorio y estar seguros de completarlos sin faltar ninguno de sus puntos.

30% en Quites. Los quites y exámenes (tesas) serán anunciados usualmente una semana antes. Yo me reservo el derecho de hacer un examen sorpresa si la situación me lleva a realizarlo. Los exámenes y quistes usualmente se harán los viernes.

5% El diario. Tu diario será un fólder de 3 argollas que tu mantendrás para esta clase en particular. En tu diario mantendrás el libro de repaso, el contrato del laboratorio; reportes de conocimiento, notas, reporte de laboratorios, quistes y exámenes. Es absolutamente necesario mantener tu diario en complete orden y limpieza.
Los diarios se revisaran periódicamente durante el semestre. También los puedes llevar a casa a menudo para que le muestres a tus padres el progreso en esta clase.

CREDITO NOTA - EXTRA
Yo no estoy de acuerdo en la nota – credito de emergencia. Habran algunas oportunidades para ganar extra –creditos pero solamente despues de que todos los reportes de conocimiento y laboratorio hayan sido completados.

ESCALA DE NOTA

A+ = 100.1 % y mas	A = 93-100%	A - = 90 – 92 %
B+ = 88-89%	B = 83-87%	B- = 80-81%
C+ = 78-79%	C = 73-77%	C- = 70-71%
D+ = 68-69%	D = 63-67%	D- = 60-61%
F = Por debajo del 60%		

Espero que esto te de una mejor idea de lo que se espera en esta clase. Espero tengamos un semestre rico en experiencias de aprendizaje, recuerda que la materia de Ciencias no es un tormento, pero puede llegar a serlo sino cumples con tus reportes. Y quien sabe? A lo mejor termina gustándote! Tu y tus padres necesitan firmar en los sitios apropiados. Yo mantendré esa hoja conmigo como referencia.

Padres y Tutores:
Gracias por tomasen el tiempo de leer y revisar este contrato con el estudiante. Estoy completamente segura que habiendo explicado claramente lo que se espera de sus hijos desde el comienzo del semestre, este será muy productivo y sin problemas. Si usted tiene alguna pregunta respecto a este contrato por favor tómese la libertad y el tiempo para llamarme a la escuela Mogan al # 925 – 8200. Si yo no estoy disponible inmediatamente yo le devolvere su llamada tan pronto como sea possible. Yo siempre estoy buscando por personas que quieran venir a dictar una conferencia con respecto a los temas de clase y laboratorio. Si usted esta interesado en esto o conoce de alguna oportunidad de aprendizaje para esta material, por favor hagamelo saber.

YO ENTIENDO Y ESTOY DE ACUERDO PARA PERMANECER BAJO LAS EXPECTATIVAS DE ESTE CONTRATO CLARAMENTE EXPLICADAS EN LAS PAGINAS ANTERIORES.

_____ _____
Firma del estudiante de Ciencias Fecha

_____ _____
Firma del Padre o Tutor Fecha

Parental Perusal

RATIONALE

Accommodate parents in need of special services to communicate	S1P2
Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Communicate in linguistically/culturally appropriate and effective way	S1P1, S1P2
Develop student understanding in all four areas of language	S2P1, S2P2
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Involve parents in the educational process	S1P1, S1P2
Provide a psychologically safe environment for students	S1P1, S2P1
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

EXPLANATION

Parental Perusal is a system of communication between students, parents, and myself. For Parental Perusal, students keep a running list of assignments, filing them in order as they are returned, and recording scores. Every three to four weeks, students take their science journals home, and share with parents about what they have been learning. Parents "peruse" the journal, and discuss assignments and grades with their children. Parents then write a comment either to their son/daughter or myself about in response. If needed, parents can write to me in Spanish, and I will write back in Spanish.

EXAMPLE

PARENTAL PERUSAL

This check off sheet is for you to use to go through your science journal with your parents. On it, you will list the assignments we have done throughout the semester, and how you have done on each assignment. Show your parents your assignments, and talk with them about what you are doing/learning in class. Have them make comments in the space provided, and sign that they have seen your journal and progress report. Completing this task counts towards the journal portion of your grade, in addition to helping you communicate with your parents about how you are doing and why...something I'm *sure* you're *all* eager to do!

ASSIGNMENT	PTS POSSIBLE	PTS EARNED	GRADE
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14			

PARENTAL PERUSAL #1

I have seen my child's science journal and current progress report. I have spoken with him/her about his/her assignments, as well as his/her grade. If I have any questions, I will call you at Morgan.

Comments:

PARENT SIGNATURE _____ DATE _____

PARENTAL PERUSAL #2

I have seen my child's science journal and current progress report. I have spoken with him/her about his/her assignments, as well as his/her grade. If I have any questions, I will call you at Morgan.

Comments:

PARENT SIGNATURE _____ DATE _____

PARENTAL PERUSAL #3

I have seen my child's science journal and current progress report. I have spoken with him/her about his/her assignments, as well as his/her grade. If I have any questions, I will call you at Morgan.

Comments:

PARENT SIGNATURE _____ DATE _____

Classroom Website

RATIONALE

Guide students through the educational system	S1P1, S1P3
Involve parents in the educational process	S1P1, S1P2
Maintain high expectations	S1P1, S1P2, S3P1
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1
Specifically teach learning strategies	S2P1, S2P2
Teach things that are useful for employment/decision-making	S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1

EXPLANATION

Classroom websites can take on many forms. I have chosen to keep my website mostly informational, with a few extra items of interest for students and parents: classroom expectations in English and Spanish, the course syllabus, student projects, cool links, a weekly schedule of events and homework, as well as an e-mail link to contact me for more information. Parents appreciate being able to stay in touch with what's going on at school, while students enjoy seeing pictures of themselves and their projects on the world wide web!

EXAMPLE

My classroom website can be found at:

http://wonders.eburg.wednet.edu/institute/hjones

LEARNING COMES ALIVE IN ROOM 85...

Come on in and take a closer look...

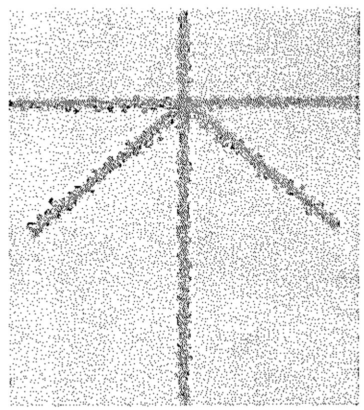
We are excited to have you stop by for a brief look into what we're doing. On any given day, you might find 7th graders critiquing each others' work in writing groups, or preparing poetry to send to our troops fighting overseas. You may find 8th graders impressing one another with 3-D cell models, debating the finer points of Evolutionary theory, or spooling DNA from salmon sperm.

Health Science

Language Arts

HEALTH SCIENCE

Expectations



This Week In Health Science

Syllabus

Cool Links

Student Projects

Home

Contact Miss Jones

Back

THIS WEEK IN HEALTH SCIENCE

DATE	IN-CLASS ACTIVITY	HOMEWORK	DATE DUE
Mar 15	Lecture: Cell Processes	Read p. 78-81 Crossword Review	Mar 16
Mar 16	Review, make notecard for Quiz	Study, make notecard for quiz	Mar 18
Mar 17	LAB: Seeing Respiration	See above	Mar 18
Mar 18	Quiz: Cell Transport, Cell Processes, Organic Compounds	---	---
Mar 19	Journal Check #2 Progress Reports	Get progress report signed, and perusal #2 with comments	Mar 29

CELL PROJECTS

Please note: Content on this page was redacted due to FERPA concerns.

Science Autobiography

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Demonstrate interest in students	S1P1, S1P3, S2P1
Develop student understanding in all four areas of language	S2P1, S2P2
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Make personal connections with students	S1P1, S1P3, S2P1, S2P2

EXPLANATION

The Science Autobiography is an assignment that is approached after students have already had a chance to explore what science is, and to dispell some of the myths and stereotypes that exist about scientists. For the autobiography, I explain the assignment, and share several of my own science experiences. To give students ideas, I share school as well as non-school experiences, both positive and negative. We talk about how each one is related to science, and what I learned as a result of each experience.

From that point, students brainstorm ideas of their own, and choose five from the list to develop into an autobiography. It is a unique opportunity to learn about students' lives and experiences they have had. It also helps students to stretch their thinking about what science *is*, taking it out of the box so to speak, and making connections that haven't been made before between what students learn at school, and what they experience in the real world. In the process of brainstorming and writing the autobiography, students also practice critical language skills.

EXAMPLE:

SCIENCE AUTOBIOGRAPHY

For this assignment, you need to reflect back on, and write about your experiences with science. These can be school experiences, or other experiences you have had--whatever seems to fall under the heading of "science." You will need to think about your ideas as to what science *is*, so that you can write about the experiences you have had with it throughout your lifetime.

For some of you, these may be positive experiences. For others, they may be negative. Most will probably remember some combination of the two extremes. As you write, take your readers back to your earliest experiences with science, leading up to your most recent ones. You can write about classes, teachers, ideas, events, feelings...whatever seems pertinent in conveying your experience with science.

You'll probably want to sketch out some of your ideas before you attempt a first or final draft. Feel free to draw upon your classmates to help you remember details you may have forgotten from a particular class, or experience you may have shared. *Finished autobiographies should be at least 5 paragraphs long.* Good luck! I look forward to hearing what you have to share...

Surveys and Interviews

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Implement interactive, inquiry based curriculum	S2P1, S3P1, S3P2
Involve parents in the educational process	S1P1, S1P2
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Teach: *Common Themes*	S3P1, S3P2
Teach from concrete to the abstract	S2P2, S3P1
Teach students to use a variety of resources	S2P1, S2P2

EXPLANATION

Over the course of the semester, students are assigned tasks that designed to help them communicate with their parents and other adults in their lives about scientific concepts. Some assignments ask students to survey a variety of adults for a variety of answers, while other assignments focus on a single adult, with more in-depth investigation. The feedback from surveys and interviews are then used as a basis of study to bring out a particular concept or theme.

EXAMPLES

Survey ten adults to find out what they believe to be the greatest contribution of science to the world. Record their answers onto a sheet of paper, along with their names and ages...

Survey ten adults to find out their definition of science. Record their answers onto a sheet of paper, along with their names and ages...

Survey ten people to find out what they believe to be the greatest advantage of abstinence. Ask them to elaborate by citing at least one or two ways to demonstrate love without having sex. Record their answers onto a sheet of paper...

Give It A Try!

RATIONALE

Accommodate parents in need of special services to communicate	S1P2
Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Communicate in linguistically/culturally appropriate and effective ways	S1P1, S1P2
Demonstrate interest in students	S1P1, S1P3, S2P1
Eliminate prejudice, bigotry, and racism	S1P2, S2P1
Enunciate clearly, speak slowly	S2P1, S2P2
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Involve parents in the educational process	S1P1, S1P2
Make personal connections with students	S1P1, S1P3, S2P1, S2P2
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Provide a psychologically safe environment for students	S1P1, S2P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1

Support the roles of women and minorities in science	S3P1
Teach students to use a variety of resources	S2P1, S2P2
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2
Welcome and foster curiosity	S3P1

EXPLANATION

This particular strategy isn't complicated; in a phrase, give it a try! *Try* communicating in Spanish with students who would benefit from it. Your language skills may be very limited, as are mine. Consider taking a refresher course to brush up on the basics. Or if time and resources don't allow for that, work with the Spanish teacher in your school to learn basic pronunciation, and a few simple words or phrases. The effort you put in will be well worth the payoff in terms of connecting with students, and creating a culturally inclusive learning environment.

Your efforts on behalf of your students will also make a huge impact with parents, who will appreciate whatever you do to include them and their children to make them feel like a part of the school. Spanish-dominant students and parents aren't looking for perfection in your communication with them... simply a demonstrated interest. It will be a stretch to step out of your comfort zone, make mistakes, and at times perhaps sound a bit silly. In those times, you can better empathize with what ELLs experience on a day to day basis while at school.

EXAMPLE

Examples of this strategy vary from day to day, student to student, parent to parent. For a quick start, consult the chart on the following pages, which gives Spanish translations for simple words and phrases.

School ***Escuela***	Saturday ***Sabodo***	Book ***Libro***	Flag ***Bandera***	Lunch ***Almuerzo***
Room ***Cuarto***	Sunday ***Domingo***	Binder/Folder ***Carpeta***	Ruler ***Regla***	Red ***Rojo***
Class ***Clase***	January ***Enero***	Homework ***Tarea***	Bathroom ***Bano***	Orange ***Naranja***
Teacher ***Maestra/o***	February ***Febrero***	Pencil ***Lapiz***	Cafeteria ***Cafeteria***	Yellow ***Amarillo***
Mister ***Senor***	March ***Marzo***	Pen ***Pluma***	Library ***Biblioteca***	Green ***Verde***
Mrs. ***Senora***	April ***Abril***	Paper ***Papel***	Left ***Izquierda***	Blue ***Azul***
Miss ***Senorita***	May ***Mayo***	Crayon ***Creyone***	Right ***Derecha***	Purple ***Morado***
Welcome ***Bienvenidos***	June ***Juno***	Marker ***Rotulador***	Front ***Frente***	Black ***Negro***
Date ***Fecha***	July ***Julio***	Scissors ***Tijeras***	Back ***Detras***	Brown ***Marron***
Day ***Dia***	August ***Agosto***	Table **Mesa**	Math ***Matematicas***	White ***Blanco***
Hour ***Hora***	September ***Septiembre***	Game ***Juego***	Reading ***Leer***	Gray ***Gris***
Week ***Semana***	October ***Octubre***	Desk ***Escritorio***	Writing ***Escribir***	First name ***Nombre***
Weekend ***Fin de semana***	November ***Noviembre***	Door ***Puerta***	Science ***Ciencia***	Last name ***Apellido***
Monday ***Lunes***	December ***Diciembre***	Window ***Ventana***	Social Studies ***Estudios sociales***	Mother ***Madre***
Tuesday ***Martes***	Winter ***Invierno***	Chair ***Silla***	PE ***Educacion fisica***	Father ***Padre***
Wednesday ***Miercoles***	Spring ***Primavera***	Time ***Tiempo***	Music ***Musica***	Sister ***Hermana***
Thursday ***Jueves***	Summer ***Verano***	Year ***Ano***	Art ***Arte***	Brother ***Hermano***
Friday ***Viernes***	Fall ***Otono***	2004 ***Mil novecientos y cuatro***		Grandma/pa ***Abuela/o***

1 ***uno***	Read	Close (verb)	Excellent
2 ***dos***	**Lea**	***Cierre***	***Excelente***
3 ***tres***			
4 ***quatro***	Write	Teach me	Pleasure to meet you
5 ***cinco***	**Escriba**	***Ensename***	***Con mucho gusto***
6 ***seis***			
7 ***siete***	Answer	Go to…	I don't understand
8 ***ocho***	**Me contesta**	***Va a***	***No comprendo***
9 ***nueve***			
10 ***diez***	Add	How are you?	Do you have questions?
11 ***once***	***Suma***	***Como estas?***	***Tiene preguntas?***
12 ***doce***			
13 ***trece***	Subtract	Good morning	Quiet down
14 ***catorce***	***Resta***	***Buenos dias***	***Silencio, por favor***
15 ***quince***			
16 ***diez y seis***	Minus	Good afternoon	It's time for…
17 ***diez y siete***	***Menos***	***Buenas tardes***	***Es tiempo para...***
18 ***diez y ocho***			
19 ***diez y nueve***	Number	Good evening	What is your name?
20 ***veinte***	***Numero***	***Buenas noches***	***Como se llama***
21 ***veinte y uno***			
22 ***veinte y dos***	Color (verb)	Hello	Line up
23 ***veinte y tres***	**Colorea**	***Hola***	***Forme una fila***
24 ***veinte y cuatro***			
25 ***veinte y cinco***	Paste (verb)	Goodbye	Walk, don't run
26 ***veinte y seis***	***Pega***	***Adios***	***Camina, no corra***
27 ***veinte y siete***			
28 ***veinte y ocho***	Trace (verb)	Slower	Until tomorrow
29 ***veinte y nueve***	***Sigue las linea***	***Mas despacio***	***Hasta manana***
30 ***treinta***			
40 ***cuarenta***	Take out your..	Please	Until I see you again
50 ***cincuenta***	***Saque tu…***	***Por favor***	***Hasta la vista***
60 ***sesenta***			
70 ***setenta***	Put away your..	Thank you	It's time to clean up
80 ***ochenta***	***Guarda tu***	***Gracias***	***Es tiempo de limpiar***
90 ***noventa***			
100 ***cien***	Listen	You're welcome	
1,000 ***mil***	***Escuche***	***De nada***	
10,000 ***diez mil***			
	Look	Good	
	Mire	***Bien***	
	Come here		
	Venga aqui		
	Sit down		
	Sientate		
	Stand up		
	Levantate		
	Open (verb)		
	Abre		

PEDAGOGICAL STRATEGIES

ORGANIZATION

*Expectations
*Assignment Calendars
*Journals

PRESENTATION

*Learning Cycle
*Adapted Text
*Dual Language Materials
*Graphic Organizers
*Supplementary Materials
*Modeling
*Interactive Experiences

MOTIVATION

*Brainaerobics
*Freaky Fridays
*Homework Coupons

STRATEGIES CONTINUED

REVIEW

*Warm-Ups
*Text Reviews
*Concentration
*Study Guides
*Practice Tests

Expectations

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Guide students through the educational system	S1P1, S1P3
Involve parents in the educational process	S1P1, S1P2
Maintain high expectations	S1P1, S1P2, S3P1
Prepare students for college	S1P1
Teach things that are useful for employment/decision-making	S3P1

EXPLANATION

At the beginning of the year, I explicitly explain to students and parents what my expectations are in terms of classroom behavior, homework completion, laboratory participation, absences, grading, etc. I go over the expectations with students orally, providing examples of each point. In addition, I provide students and parents both with a written copy that stays in the students' journals for reference. Parents and students both are required to sign it as a contract of sorts, agreeing to abide by the expectations. Both signatures are required before students are allowed to engage in any laboratories or investigations. In that way I can be sure that students, parents, and myself are on the same page from the outset of our learning time together.

For parents who are in need, I provide copies of the expectations pages in Spanish. Both the English and Spanish versions have been included as examples in the Communicative Strategies section, *Dual Language Letters*.

Assignment Calendar

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Guide students through the educational system	S1P1, S1P3
Maintain high expectations	S1P1, S1P2, S3P1
Prepare students for college	S1P1
Provide models for students to follow	S2P1, S2P2
Teach: *Habits of Mind*	S3P1, S3P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use gestures to reinforce speech	S2P1, S2P2

EXPLANATION

The Assignment Calendar is an organizational tool that I use with students on a weekly, sometimes daily basis. At the beginning of each week, a calendar of the week's in class activities, homework, and due dates are posted on the white board. Each Monday, students' first task is to take out their assignment calendar, and copy the entire week's schedule as I go over it with them orally. Students are required to check the assignment calendar each evening for homework assignments and due dates. Students keep an entire month on one calendar, and then turn it in for points when the next month begins.

The assignment calendar not only allows students to keep track of class activities and homework assignments, it allows them to plan ahead for things like projects and exams. In addition, it allows them to know what they need to make up when they have been absent. Should a student lose their calendar, they can consult the classroom calendar, or look it up on the classroom website.

EXAMPLE:

MORGAN MIDDLE SCHOOL
ASSIGNMENT SHEET

DATE	IN-CLASS ACTIVITY	HOMEWORK	DATE DUE

Journals

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Guide students through the educational system	S1P1, S1P3
Involve parents in the educational process	S1P1, S1P2
Maintain high expectations	S1P1, S1P2, S3P1
Prepare students for college	S1P1
Provide models for students to follow	S2P1, S2P2
Provide verbal and procedural scaffolding	S2P1, S2P2
Specifically teach learning strategies	S2P1, S2P2
Teach things that are useful for employment/decision-making	S3P1
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1

EXPLANATION

In my class, as well as every other science class at Morgan, students maintain a journal (3-ring binder) that is strictly for science. Students are not required to bring texts back and forth to class each day, but they are required to bring their journal each day. In the journal, students keep all homework, laboratory work, quizzes, warm-ups, expectations, and notes, in an orderly fashion.

At the end of each unit, I prepare an overhead with an updated assignment list that matches the table of contents students keep in their journal. As papers are returned that day, students record their scores for each assignment, and file the papers in the same order that they are listed in the table of contents. Students also receive a progress report

that day, and are expected to record the grade for each assignment, which is listed on the progress report. At that point, students can check with me if they have any questions about their progress report, or pick up extra copies of assignments they may need. I keep extra copies in a file box on the back counter of the classroom, and each assignment is in the folder with the same name used on the progress report and table of contents.

Once students have filed all of their papers, recorded scores and grades, and have arranged everything neatly, they trade journals with someone else at their table, and grade that person's journal using a rubric I developed. It takes some time to stress with students the importance of being thorough, accurate, and honest in their assessments of each other's work. But they do get the hang of it, and it proves to be an efficient way to return papers, help students keep them organized, and assess progress all at the same time.

Once the classroom journal check has been completed, students take their journals home to show to their parents and/or guardians. Parents/guardians are required to make comments about what they find in the journal. Comments may be directed to students, or to me. The goal is for students and parents to have a tool for communicating about what is going on at school. The classroom journal check as well as the parental journal check comprise 50% each of a student's overall journal grade.

EXAMPLE

The first table of contents page, and journal comment page are included as part of the Communicative Strategies section under *Parental Perusal*. The rubric for classroom journal checks can be found on the next page.

JOURNAL CHECK #_____

TRADE JOURNALS WITH SOMEONE AT YOUR TABLE. USE THE RUBRIC BELOW TO ASSESS THAT PERSON'S JOURNAL... BE HONEST!

WHOSE JOURNAL IS IT? _____ PER _____

ASSESSED BY_____

Is their warm up book easily accessible? (2 pts) _____

Is their assignment calendar in the very front of their journal? (2 pts) _____

Is their assignment calendar up to date? (4 pts) _____

Is their expectations page behind the assignment calendar? (2 pts) _____

Is each column of the Table of Contents filled out? (4 pts) _____

Are all of their papers filed in the order listed on the T of C? (5 pts) _____

Are all notes together in their own section? (2 pts) _____

Rate the general neatness of the journal. (5 pts=perfect, 1 pt=messy!) _____

TOTAL SCORE _____

Learning Cycle

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Demonstrate interest in students	S1P1, S1P3, S2P1
Develop content, language, and strategy objectives for lessons	S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Make available multiple experiences using scientific tools	S3P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Provide models for students to follow	S2P1, S2P2
Provide verbal and procedural scaffolding	S2P1, S2P2
Start with questions about nature	S3P1
Teach from concrete to the abstract	S2P2, S3P1
Teach relevant curriculum	S1P1, S2P1, S3P1

Teach students to use a variety of resources	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use grouping configurations that support content and language objectives	S2P1, S2P2, S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

EXPLANATION

By the process of trial and error, I've come to develop a cycle by which I like to guide students through a unit of learning. Initially, I try to access students' ideas about a particular topic before we dive into it head on. Many teachers use a K-W-L chart of some type, which works well. In my science class, I use the idea of a K-W-L chart to have students do a pre-write about the topic at hand. For the pre-write, I post a series of basic questions for students to consider and write about, as well as giving them an opportunity to tell me anything they know that I didn't ask about specifically. I always look for a way to have students try to relate the topic to their own lives. This gives me a quick look into what the students are familiar with on a basic level, as well as misconceptions that may exist. In addition, it gives students an opportunity to access what they know, so that they can build bridges between what they already know, and what they will come to know.

From that point, I usually try to provide some background on the topic for students, and provide a frame of reference for what we're going to study, and how. I like to discuss with students the basic course of the unit, anticipating any projects that may be a part of the unit. This gives students the opportunity to ask big questions about what we're going to study, so that we're all aware of where we're going, how we're going to get there. This puts students at ease.

From there, we dive into various literacy events, including laboratory experiences, group discussions and poster sessions, surveys, debates, lectures, text reviews, demonstrations, etc. These activities begin at a basic level, and delve deeper into the topic each time. Connection and relevance to students' everyday lives are essential for success!

EXAMPLE:

By the time they get to my class, most students have used a microscope before, although not all. I place a microscope on the demonstration table, and ask students to do some writing about it. I ask them to write about what the microscope is used for, how it is used, what can be seen through it, and anything else they may know about it. Once students have had a chance to finish writing, I give each lab table a few minutes to share their answers in a round-robin format. From that point we discuss the questions as a class.

Then I distribute a diagram of a microscope to students, and allow them to work together at their tables to fill in as many names of the parts as they can remember. Once each table is complete, we work together as a class to fill in as many names as can be remembered.

The following day, we elaborate on the previous day's knowledge base through a lecture, although not the typical type of lecture! For lectures in my class, I prepare a page or two of notes in simple sentences, phrases, and/or paragraphs with key words missing along the way. I then incorporate that text into a Power Point presentation, and use the animation tools to insert the missing words into the text one by one. For the lecture, I project the presentation onto the screen, and as a class we discuss the content, and fill in the missing words as they appear. In the lecture, parts of the microscope are verified, handling of a microscope is discussed, along with focusing technique, magnification calculation, and cleanup procedures.

For homework, students are asked to read the section from the text that discusses the same concepts, and complete a review. The review requires students to use information from both the lecture and the book. The following day, we discuss and correct the homework, in review for the first laboratory experience.

The initial microscope lab provides students the opportunity to work with a lab partner to focus and draw several specimens in both low and high power. Students are required to sketch the specimens, label the specimens, and calculate the total magnification. For day two of the lab, students are required to bring a non-toxic sample from home to look at under the microscope. Students focus, draw, and label their own specimen, as well as their lab partner's. There are usually a wide variety of specimens brought in, and most partnerships get excited about showing the rest of the class the specimens on the video microscope.

That evening's homework is a basic review of metric measurement, introducing students to the concept of a micrometer. The following day, we discuss the relationship between millimeters and micrometers, and then practice measuring on a microscope in micrometers. For the lab, students measure the diameter of the microscope's field of view, the size of a salt grain, and the width of their own hair. Students compare the width of their own hair with that of their classmates, noting similarities and differences.

The skills gleaned in the previous activities are then applied in the next unit, which incorporates the characteristics of life with microscopy. In that unit, students investigate microlife from pondwater samples, continuing to apply drawing, micrometer measurement, and magnification calculation skills. Those skills are applied in a subsequent lab in which students investigate daphnia, and again when students study plant and animal cells.

Adapted Text

RATIONALE

Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Develop content, language, and strategy objectives for lessons	S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Enunciate clearly, speak slowly	S2P1, S2P2
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Prepare students for college	S1P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Teach and emphasize key vocabulary	S2P1, S2P2
Teach: *Cells*	S3P1, S3P2
Teach: *Diversity of Life*	S3P1, S3P2
Teach: *Evolution*	S3P1, S3P2
Teach: *Flow of Matter and Energy*	S3P1, S3P2
Teach: *Heredity*	S3P1, S3P2

Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use examples from Hispanic culture to help students learn	S1P3, S2P1, S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

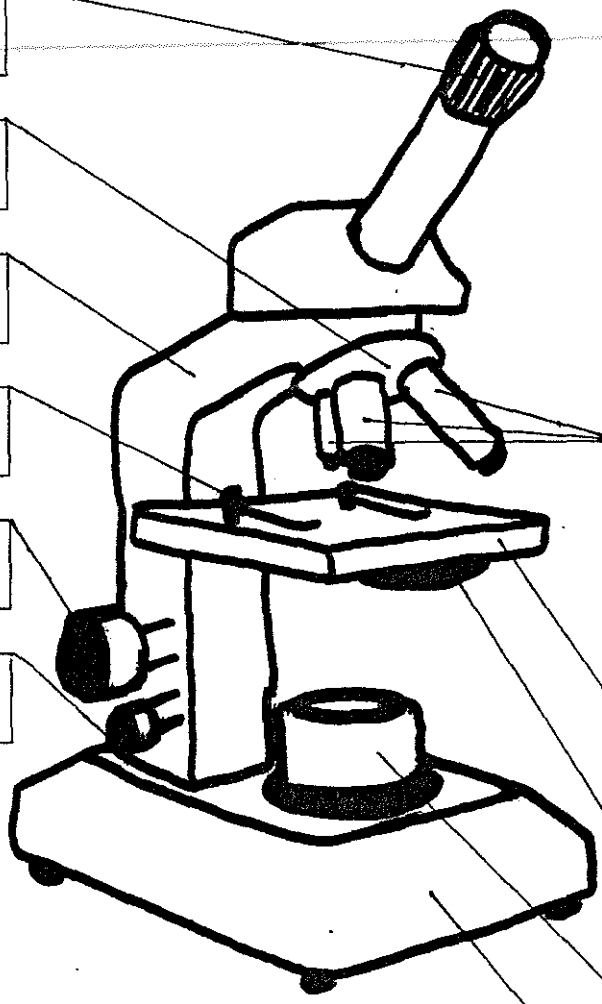
EXPLANATION

As briefly explained in the *Learning Cycle* section, I use lectures in my classroom as a means of providing background information for students on a particular topic. The lecture serves as a form of adapted text, highlighting the main ideas from the text in a format that uses simplified sentence structure, and an interactive platform.

For the lectures, I provide students with a page or two of notes, which are pre-written in short sentences and paragraphs. The sentences and paragraphs have key words missing. Sometimes there are graphics that accompany the lecture as well, some of which are built into the pages I provide for students. To prepare the lecture, I import the text of the notes into a Power Point presentation, and fill in the words one at a time using various animation tools. To conduct the lecture, I load the presentation onto a laptop with a projector, so that it can be displayed on the overhead screen. As the lecture proceeds, we discuss each point, and I drop in the words one by one with a click of the mouse. Students are responsible for filling in the words on their own papers.

Students have grown to love this format... I must say that I've never had them get excited about lectures before! Of course, it eases the workload of the student in that they don't have to copy pages of copious notes. Beyond that, however, it frees up some time and mental energy for them to expend discussing the ideas, and interacting with the ideas rather than just copying the words from an overhead screen. Students enjoy having higher-quality graphics built in as well—they are a big improvement over my drawings. To sketch an egg and sperm with an overhead pen is a far cry from seeing an electron microscope picture of hundreds of sperm vying for access to a single egg!

PARTS OF A MICROSCOPE



1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

10 _____

11 _____

PROPER HANDLING OF A MICROSCOPE

1. Always carry a microscope by the _____ and the _____.
2. Hold the microscope _____ your body.

FOCUSING TECHNIQUE

1. Position the microscope _____ the edge of the counter.
2. Be sure that the _____ and the _____ are facing you.
3. Put _____ power into position.
4. Turn the coarse and fine adjustment knobs all the way _____, or _____ you.
5. Put the slide/specimen on the _____.
6. Hold the slide in place using the _____.
7. Look through the _____.
8. To focus in _____ power, turn the *coarse adjustment knob* _____ or away from you _____.
9. Put _____ power into position.
10. To focus in _____ power, turn the *coarse adjustment knob* _____ or away from you _____.
11. Look from the side, and _____move _____ into position. If high power won't fit, go back to _____ and use it instead. _____!
12. To focus in _____ power, turn the *fine adjustment* knob _____ or away from you _____.
13. _____ your specimen, and _____ the total magnification.

CLEAN UP AND STORAGE

1. Put _____ power in position.

2. Remove the _____. _____ and _____ the _____ and _____.

3. _____ the stage if anything is on it.

4. Gently _____ the cord around your hand, and _____ it over the _____. Do not wrap it around the _____!

5. Put the _____ back over the microscope.

6. Put the microscope away in the _____, in its proper place, matching up the _____.

7. Make sure your _____ is in placed under your lab station number, and _____ all of slides, cover slips, and materials that were used for the lab.

8. Be sure that your lab station area is _____ and ready for the next class.

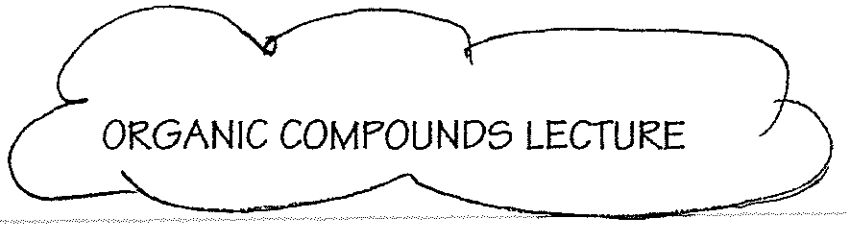
TO CALCULATE MAGNIFICATION

1. Multiply the _____ magnification by the _____ magnification.

2. In low power, the _____magnifies _____, and the _____ magnifies _____, for a total of _____.

3. In medium power, the _____ magnifies _____, and the _____ magnifies _____, for a total of _____.

4. In high power, the _____ magnifies _____, and the _____ magnifies _____, for a total of _____.



ORGANIC COMPOUNDS LECTURE

WHY WE NEED THEM

1. As living things, we need a source of _____.
2. The food we eat comes from _____ and _____ _____.
3. The foods we eat are made of _____: anything that has mass and takes up space.
4. The kind of matter we eat is called _____ matter. Organic matter contains _____.

ORGANIC COMPOUNDS

1. The organic matter we eat comes in the form of three compounds: _____, _____, and _____.
2. _____ are a cell's first source of energy. Examples include _____ and _____. Sugars and starch can be found in: _____, _____, _____, _____, _____, and _____.
3. _____ provide energy when no carbohydrates are available. They also provide a more _____ energy source than carbohydrates. Examples include _____ and _____. Fats and oils can be found in: _____,

_____, _____,

_____, and _____.

4. _____ are used to build and repair cell parts.

_____, _____, _____, and

_____ are examples. Specific examples include:

_____, _____, _____, _____,

_____, _____, _____,

_____, and _____.

RECOMMENDATIONS

1. For a quick burst of energy, eat _____.
2. Carbohydrates that are not used right away get stored as

   _____.
3. Eating a _____ that includes all three

   types of _____

   will provide what your body needs to function properly.
4. Avoid high amounts of _____ in the diet, which can clog

   _____, and damage your _____.

Dual Language Materials

RATIONALE

Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Allow students to clarify concepts in native language	S2P1, S2P2
Base learning experiences in native language	S1P1, S2P1
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Demonstrate interest in students	S1P1, S1P3, S2P1
Develop student understanding in all four areas of language	S2P1, S2P2
Eliminate prejudice, bigotry, and racism	S1P2, S2P1
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Make personal connections with students	S1P1, S1P3, S2P1, S2P2
Provide a psychologically safe environment for students	S1P1, S2P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1

Support the roles of women and minorities in science	S3P1
Teach and emphasize key vocabulary	S2P1, S2P2
Teach students to use a variety of resources	S2P1, S2P2
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Welcome and foster curiosity	S3P1

EXPLANATION:

In my classroom, I have a few key resources for students who grapple with English, and struggle to understand the science content being covered. One simple resource is a Spanish-English dictionary. Another resource that I keep on hand are audiocassettes of the science text in Spanish. The tapes allow students to learn concepts in their own native language, or to clarify those concepts in native language, alongside the English text. In addition, I am working to add to my collection of general interest science books in Spanish, such as the *Eyewitness* series. All of these resources provide extra learning tools for Spanish-dominant students. In addition, they put Spanish-dominant students in the position of being experts when English-dominant students want access to the information in the Spanish resources. It's a powerful phenomena!

EXAMPLES:

In my classroom, I use the VOX Spanish-English dictionary. The ISBN number is 0-8442-7985, and it is available at many bookstores.

I use Glencoe's Life Science Spanish Audiocassettes. The ISBN number is 0-02-827779-1, and must be ordered from Glencoe. Most textbook publishers carry Spanish materials.

The Spanish version of the *Eyewitness* skeleton book I use is a knock-off published by the Santillana Publishing Company. The ISBN number is 84-372-3724-6, and it can be ordered through Amazon.com.

Graphic Organizers

RATIONALE

Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop content, language, and strategy objectives for lessons	S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Specifically teach learning strategies	S2P1, S2P2
Teach and emphasize key vocabulary	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

EXPLANATION:

Graphic Organizers are just that—a way to organize information in a visual format. There are many, many ways to structure graphic organizers, including: sequence chains, cyclical diagrams, mind maps, word webs, Venn diagrams, T-charts, cause and effect diagrams, pyramids, and trees. Graphic organizers can be used to sequence events, develop ideas, analyze ideas, relate concepts, discover relationships, plan projects, and classify information. There are unlimited possibilities for incorporating graphic organizers into everyday learning.

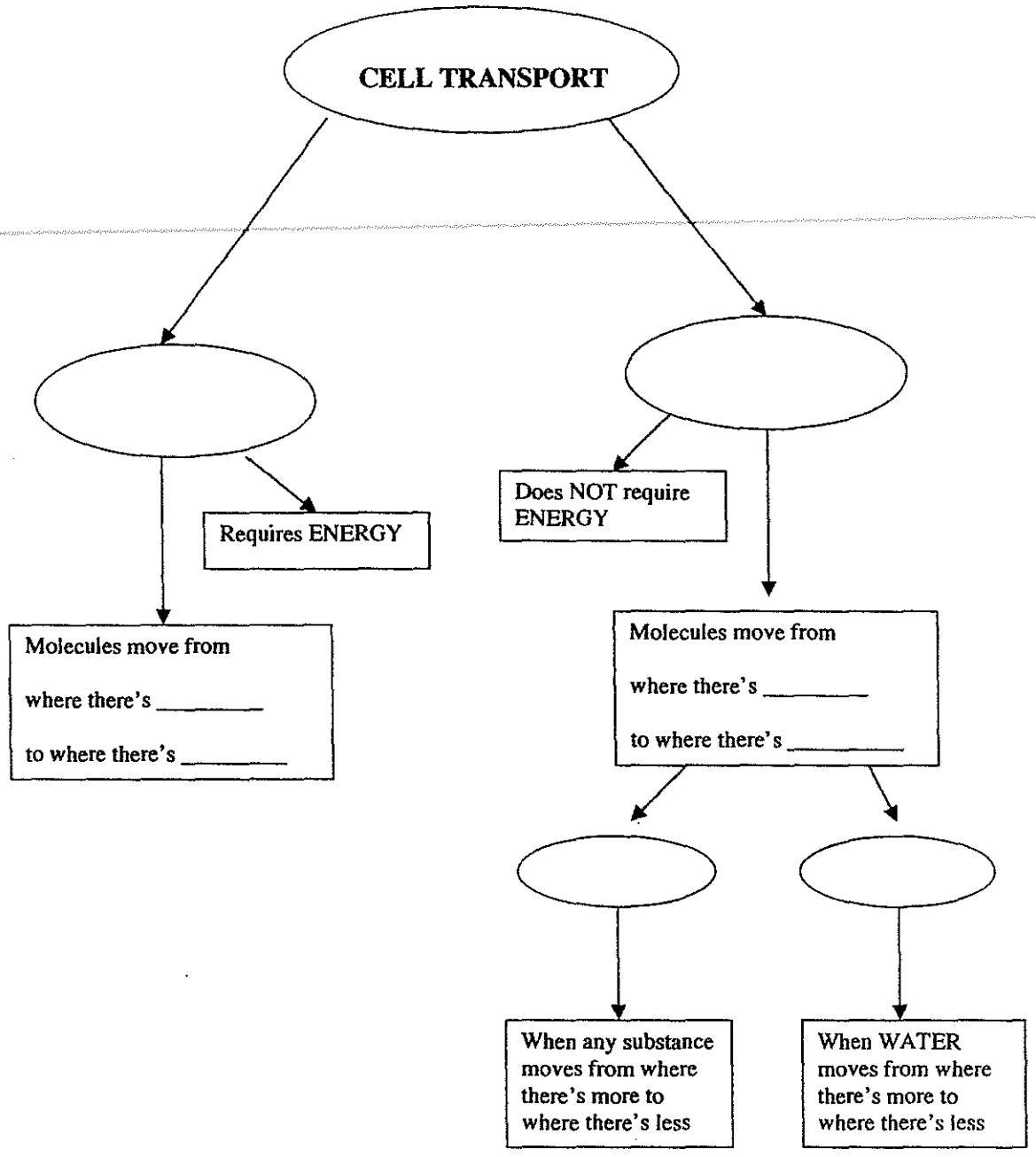
Graphic organizers can be used to present information, help students process information, or even to assess student understanding. They are particularly helpful in that they allow students to interact with information in a different way than just reading, listening, or writing. Students must be able to analyze the concepts, and discover relationships between concepts. The visual nature of graphic organizers provides some of the scaffolding that ELLs need to grasp ideas.

EXAMPLES:

In my classroom, graphic organizers are used in multiple ways, from presentation of information to assessment of student understanding. Some graphic organizers are created by me; others are constructed by students. Some are pre-arranged, and some are spur of the moment.

The first example is a Venn diagram that asks students to show the unique characteristics of plants and animals, as well as the common characteristics of plants and animals. The second example is a classification tree that asks students to differentiate the concepts involved in cell transport.

PLANT/ANIMAL CELL COMPARISON


CELL TRANSPORT
Requires ENERGY
Molecules move from
where there's _____
to where there's _____
Does NOT require ENERGY
Molecules move from
where there's _____
to where there's _____
When any substance moves from where there's more to where there's less
When WATER moves from where there's more to where there's less

Supplementary Materials

RATIONALE

~~Adapt curricular materials as necessary for ELLs~~	~~S2P1, S2P2~~
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop content, language, and strategy objectives for lessons	S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Specifically teach learning strategies	S2P1, S2P2
Teach and emphasize key vocabulary	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

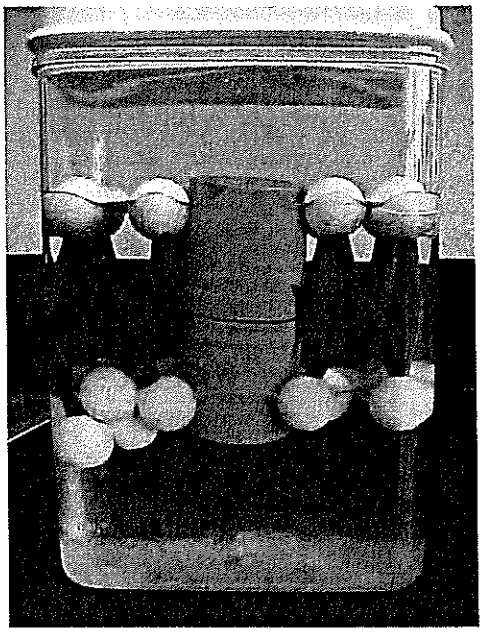
EXPLANATION:

Supplementary Materials are any materials that can be used to aid student understanding, including but not limited to: manipulatives, realia, pictures, overheads, models, graphs, timelines, charts, maps, timelines, bulletin boards, tapes, videos, CD Roms, the internet, demonstrations, lab experiences, related literature, outlines, and models. Supplementary materials provide opportunities for students to interact with the concepts beyond the standard reading of text and answering of questions.

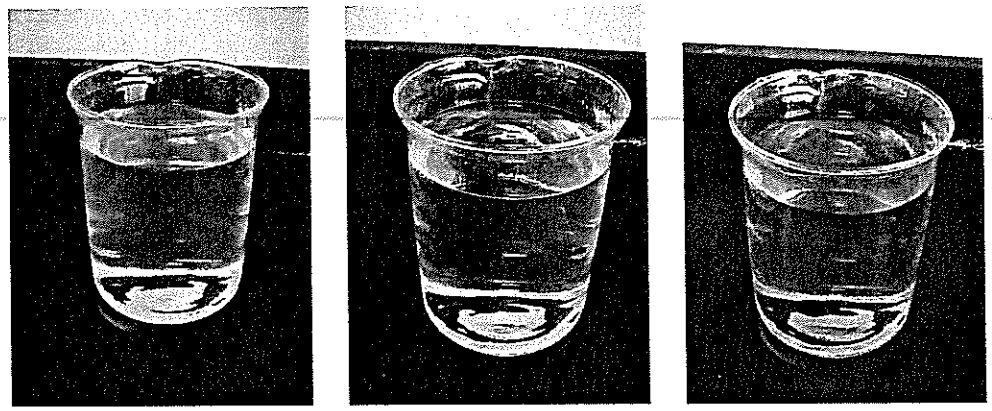
Teachers may well spend their entire career building a supply of supplementary materials that will enhance each lesson. Start with what you have, and build from there! Old calendars are an excellent source of photos, and models can often be made from simple materials available at the grocery store. Many wonderful graphics may also be photocopied from books, or downloaded from the internet.

EXAMPLES:

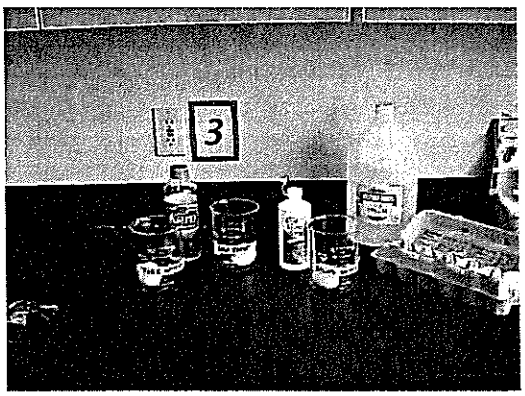
In the unit on cells, there is a section on cell transport, which deals with the structure of the cell membrane, as well as the movement of molecules through the membrane. In a lab experience, students can see the membrane of a cell, but they cannot see the finer structure of a cell membrane, which would require an electron microscope to see. To help students grasp a picture of that detailed structure, I show them a model of a cell membrane:



In addition, to help them understand the diffusion of molecules, we look at a beaker full of water. I drop in a few drops of dye, and then we wait and watch as the molecules diffuse throughout the beaker, eventually reaching equilibrium:



Finally, to demonstrate osmosis, we remove the shells from raw eggs using vinegar. After soaking the eggs in vinegar for 24 hours, the shell will rub off, leaving the egg intact, surrounded by the membrane. We then place those raw eggs with exposed membranes into various solutions: pure water, saline solution, and corn syrup to observe osmosis in action. Students make predictions about what they think will happen, and a few days later, we check on those predictions:



Modeling

RATIONALE

Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Maintain high expectations	S1P1, S1P2, S3P1
Provide models for students to follow	S2P1, S2P2
Provide verbal and procedural scaffolding	S2P1, S2P2
Teach: *Cells*	S3P1, S3P2
Teach :*Development of Health Plans Based on Life Goals*	S3P2
Teach: *Flow of Matter and Energy*	S3P1, S3P2
Teach from concrete to the abstract	S2P2, S3P1
Teach: *Heredity*	S3P1, S3P2
Teach: *Knowledge and Skills to Maintain a Healthy Lifestyle*	*S3P2*
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1

EXPLANATION:

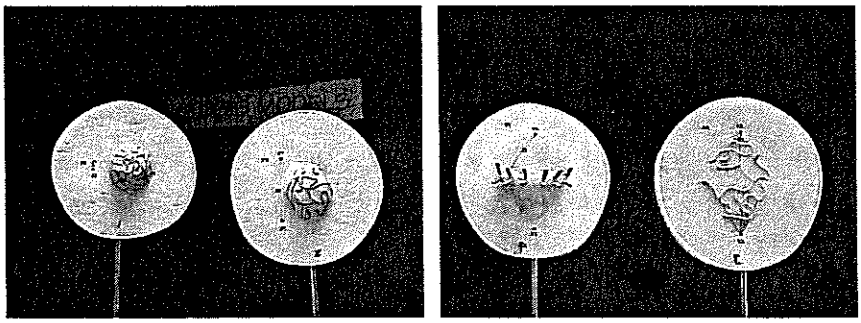
Modeling can take on a variety of forms. On one hand, it may mean providing a conceptual model for students to gain understanding about a topic, such as the cell membrane model. On the other hand, it may also mean providing students with examples for how to carry out and complete an assignment or project. It may also mean having students construct models of their own. Models are powerful in that they help students to visualize what might otherwise be abstract concepts difficult to understand.

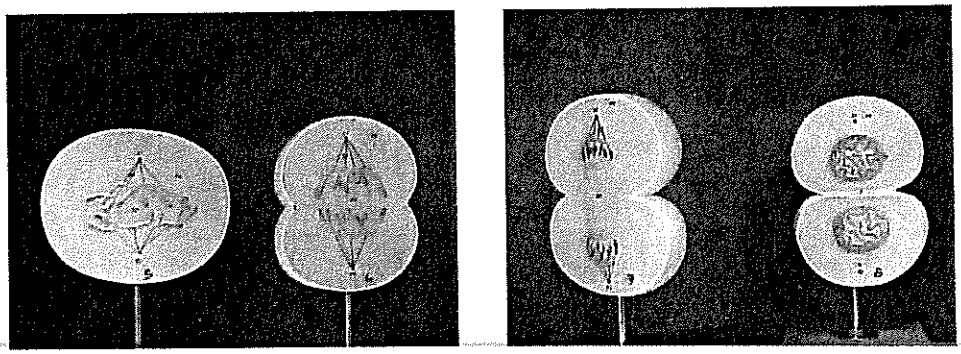
EXAMPLES:

Cellular processes such as respiration and photosynthesis can be difficult for students to grasp. Typically, students are introduced to the notion of a chemical reaction in 8th grade, and spend the rest of their science careers trying to really understand it. Respiration is a critical reaction to understand in life science, yet extremely abstract.

To help students visualize it, I have them build models of the reactants and products of respiration using toothpicks and various forms of candy. We start with the idea that the classroom is a cell, and that their lab tables are the mitochondria (where respiration takes place). From there students build molecules of glucose and oxygen (reactants of respiration), analyze them, then take them apart and use the same materials to build water and carbon dioxide molecules (products of respiration). The leftover toothpicks are then broken to symbolize the release of energy from the reaction that took place.

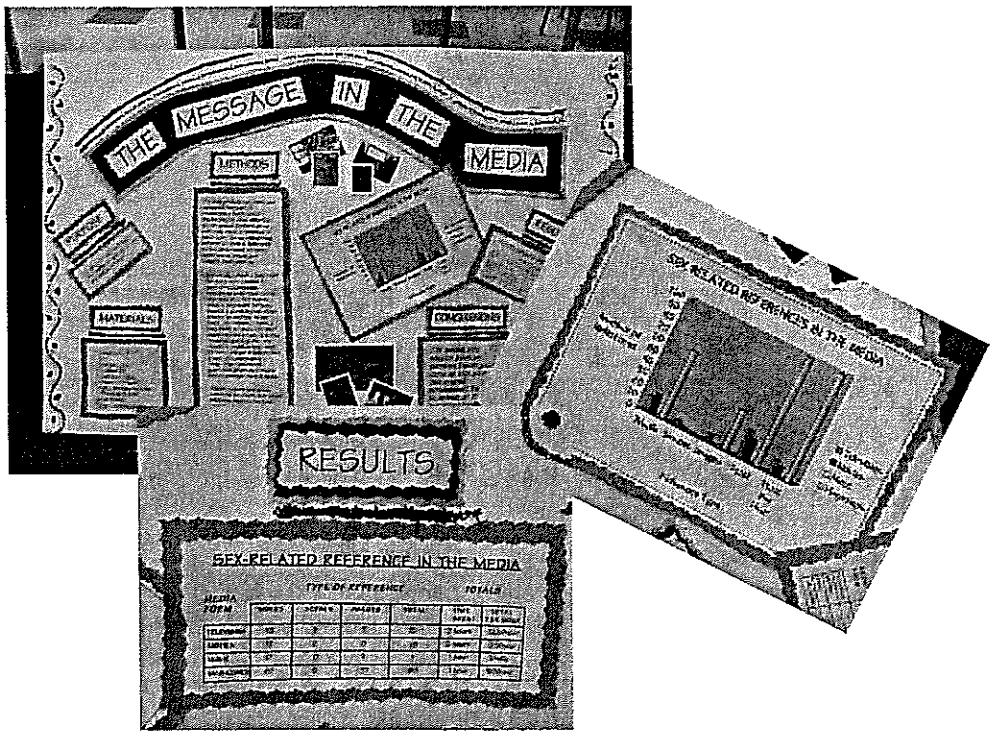
For cellular mitosis, I introduce students to the notion along with a set of models about mitosis:





From there we work together to understand the concept, and students create posters of their own to model the process.

Later on, in the unit on HIV and AIDS, students are assigned the task of carrying out media research, and analyzing the media for messages regarding sex and sexual conduct. Each students partakes of their own media, tracks data, and then combines with others in class to come up with an overall project that demonstrates "the message in the media." Explaining data analysis can be difficult, so I go through lots of examples with students. In addition, I create a model project for them to use as a guideline (although everyone's project will turn out differently based on the media partaken of). I also use prior student projects as models as well:



Interactive Experiences

RATIONALE

Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Develop student understanding in all four areas of language	S2P1, S2P2
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Implement interactive, inquiry based curriculum	S2P1, S3P1, S3P2
Maintain high expectations	S1P1, S1P2, S3P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Reward creativity	S3P1
Teach and emphasize key vocabulary	S2P1, S2P2
Teach: *Cells*	S3P1, S3P2

Teach :*Development of Health Plans Based on Life Goals*	S3P2
Teach: *Diversity of Life*	S3P1, S3P2
Teach: *Evolution*	S3P1, S3P2
Teach: *Flow of Matter and Energy*	S3P1, S3P2
Teach from concrete to the abstract	S2P2, S3P1
Teach: *Habits of Mind*	S3P1, S3P2
Teach: *Heredity*	S3P1, S3P2
Teach: *Interdependence of Life*	S3P1, S3P2
Teach: *Knowledge and Skills to Maintain a Healthy Lifestyle*	S3P2
Teach: *The Nature of Science*	S3P1, S3P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use grouping configurations that support content and language objectives	S2P1, S2P2, S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1
Welcome and foster curiosity	S3P1

EXPLANATION

Interactive experiences can also mean many things, from a laboratory exercise, to a debate, to a jigsaw activity, or any other experience that involves students interacting with each other, materials, and ideas. Interaction is powerful in that it allows students to discuss, clarify, and negotiate meaning. In a small group setting, it also allows students to offer ideas and take part in the learning exchange without the pressure of giving a "wrong answer" in front of the entire class.

EXAMPLES:

Aside from the traditional lab experiences I like to get students talking about ideas as much as possible. One of the best ways I've found to do this I have dubbed a "poster session." In a poster session, each lab group is given a small poster-sized sheet of paper, along with a task. The task usually involves ideas, and making lists of ideas, but with a catch. Each group tries to come up with unique ideas that other groups don't have. Accordingly, the poster session requires some out-of-the-box thinking, and perhaps a few stealth spy sessions. After a given amount of time, each group presents their poster.

While a group is presenting, the other groups listen. If a presenting group gives an answer that is on another group's paper, they must put a check mark next to it. After every group has presented, the group that claims to have the most unique answers must stand up, and share their unique answers again. Another group may challenge an answer's uniqueness, which can get into some interesting debate. All the while communication skills are skyrocketing! Each group received a small prize for participating, but each member of the most creative group (the group with the most unique answers) wins a homework coupon. Needless to say this keeps everyone engaged.

For example, in the unit on HIV and AIDS, one poster session involves listing five advantages of abstinence, and five ways to show love without having sex. When the results of these poster sessions are displayed in the hallway, there are plenty of interested readers!

Brainaerobics

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Focus on collection and appropriate use of evidence	S3P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Reward creativity	S3P1
Teach things that enrich the child	S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1

EXPLANATION

Brainaerobics are just that: aerobics for the brain! Each Friday, I provide students with extra-credit logic problems on a half-sheet of paper. Students have the weekend to consider the problem, and come up with an answer to turn in on Monday.

The problems require students to think outside the box, and to come up with answers that fit the data given. To earn credit, students must attempt an answer that makes sense based on the information given in the problem. Most problems have a "right" answer; however, students need not figure out the "right" answer to get points, as long as their answers make sense. Students love digging into the problems, and enlisting the aid of family members to figure them out. It's a fun way for students to earn extra credit that also stretches their thinking.

Sometimes the students themselves become the source of new and unusual problems. If students take the time to craft a carefully worded problem along with an answer or two that make sense, they may also earn extra credit that way. And come Tuesday, when we discuss the possible answers, everyone is engaged and ready to make their case!

EXAMPLES:

BRAINAEROBICS!

Here are the next couple of problems to exercise your brain with. They may seem easy now, but keep in mind this is just the warm up stage! Think the following two problems through. When you have your best reasonable explanation, write it down in COMPLETE SENTENCES. I am not always looking for the "right" answer, but at the logic behind your answer. Good luck, and happy brainaerobicizing!

PROBLEM THREE. A London cab driver picked up a lady who was a notorious chatterbox. He didn't feel like talking with her the whole time, and so pointed to his mouth and ears to signal that he was a deaf mute. After she got out at her destination, the cabbie pointed to the meter so she could pay what she owed. She paid him, and left. Later she realized that the he could not have been a deaf mute. How did she know?

PROBLEM FOUR. Two grandmasters played five games of chess. Each won the same number of games and lost the same number of games. There were no ties in any of the games. How could this be true?.

BRAINAEROBICS!

Here are the next couple of problems to exercise your brain with. They may seem easy now, but keep in mind this is just the warm up stage! Think the following two problems through. When you have your best reasonable explanation, write it down in COMPLETE SENTENCES. I am not always looking for the "right" answer, but at the logic behind your answer. Good luck, and happy brainaerobicizing!

PROBLEM FIVE. A man stood looking through the window on the sixth floor of an office building in downtown Seattle. Suddenly, he was overcome by an impulse. He opened the window, and leaped through it. It was a sheer drop to the ground below. The man did not use a parachute or land in water or on any special soft surface. Yet he was completely unhurt when he landed. How could this be true?

PROBLEM SIX. Five men were proceeding together down a country path. It began to rain, as it often does in Seattle. Four of the five men quickened their step, and began to walk faster. The fifth man made no effort to move any faster. However, he remained dry while the other four were drenched. They all arrived at their destination together. How could this be true?

BRAINAEROBICS!

Here are the next few problems to exercise your brain with. Think the following two problems through. When you have your best reasonable explanation, write it down on this paper in COMPLETE SENTENCES. I am not always looking for the "right" answer, but for the logic behind your answer. Good luck, and happy brainaerobicising!

PROBLEM TWELVE: A rope ladder 10 feet long is hanging over the side of a ship. The rungs are one foot apart, and the bottom rung is resting on the surface of the water. The tide rises at the rate of 6 inches per hour. When will the first three rungs be covered with water?

PROBLEM THIRTEEN: A lighthouse keeper once took a bath on the top floor of his lighthouse. When he closed the door, he found that it had locked automatically and he couldn't get out. To complicate matters, he couldn't turn off the water, which rose rapidly, threatening to drown him. Suddenly he had an idea that saved his life. What was his idea?

BRAINAEROBICS!

Here are the next few problems to exercise your brain with. Think the following two problems through. When you have your best reasonable explanation, write it down on this paper in COMPLETE SENTENCES. I am not always looking for the "right" answer, but for the logic behind your answer. Good luck, and happy brainaerobicising!

PROBLEM EIGHTEEN: How can you throw a ball so it goes a short distance, comes to a dead stop, reverses its motion, and goes the opposite way? You are not allowed to bounce it off anything, hit it with anything, or tie anything to it.

PROBLEM NINETEEN: A Chicago lawyer and his wife went to Switzerland for a vacation. While they were skiing in the Alps, the wife skidded over a cliff and was killed. Back in Chicago, an airline clerk read about the accident, and immediately called the police. The lawyer was arrested and tried for murder. The clerk did not know the lawyer or the lawyer's wife. Nothing he'd heard or seen made him suspect foul play until he read about the accident in the paper. What tipped him off that made him call the police?

Freaky Fridays

RATIONALE

Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Enunciate clearly, speak slowly	S2P1, S2P2
Focus on collection and appropriate use of evidence	S3P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Provide ample wait time when asking questions	S2P1, S2P2
Provide verbal and procedural scaffolding	S2P1, S2P2
Teach: *Common Themes*	S3P1, S3P2
Teach: *Flow of Matter and Energy*	S3P1, S3P2
Teach from concrete to the abstract	S2P2, S3P1
Teach: *Habits of Mind*	S3P1, S3P2
Teach: *Knowledge and Skills to Maintain a Healthy Lifestyle*	*S3P2*
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use plenty of supplementary materials to aid student understanding	S2P1, S2P2, S3P1

EXPLANATION

On occasional Fridays, I do "Freaky Friday" with my students. For a Freaky Friday, I present students with a concept or idea, along with a problem to be solved as a class using a variety of equipment that I have at my disposal. After I pose the problem, I query students for ideas about how to solve the problem. From that point on, I follow their lead in order to get to the solution. If multiple solutions are suggested, we try each one to see if it will work. If a suggested solution doesn't work, we try to figure out why, and what can be tweaked in order to make it work. Sometimes we work forward through a problem, sometimes we work backward.

The concept linked with a particular Freaky Friday usually ties in with where we are in the curriculum, although not always. Sometimes the concepts are brought in from previous classes, or even previous grades, and the ideas are extended to apply in new contexts and situations. Some of the concepts from an initial Freaky Friday are built upon in subsequent Freaky Fridays, and the students are able to draw the parallels to solve the new problem. Sometimes the Freaky Fridays are simply for interest's sake, and draw students into the realm where science reaches beyond the pages of a textbook, and actually becomes...fun!

EXAMPLES:

Collapsing Can

One of the first Freaky Fridays we do is the classic "Collapsing Can" experiment. I show students an empty soda pop can, and present them with the challenge: they must find a way to crush the can without exerting bodily force on the can. No smashing with hands, feet, or forehead. No dropping other objects on it. No hitting it with something else to make it crush. No throwing it against the wall to make it crush. Students must find a way to crush the can using *air.*

Many students recall doing a similar experiment in the previous grade, and are able to come up with some loose ideas about heat and water. As ideas are tossed out, I ask the students who present them to elaborate, questioning them to lead them down a path that will explain *why* they're saying what they're saying. Finally, students agree that we must heat the can in some kind of way, and eventually introduce the heated can to a water environment.

We move on to problem-solving the best way to heat the can, since I don't have bunsen burners in my room. As each idea is suggested, we talk about its practicality, safety, and likelihood to accomplish the job in the allotted time frame. Finally, we settle on a miniature camp burner. I set out to use it, and students stop me citing that I am not properly adorned for working with an open flame. They lead me through tying back my hair, putting on goggles, using tongs to hold the can, proper use and disposal of matches, etc. When I am dressed to their safety satisfaction, we commence to trying out their ideas.

I light the camp burner, and begin to heat the can (it is suggested to put a small amount of water in the bottom of the can, but the experiment will work with or without it). As the can heats, I ask students a series of questions about the air inside the can. Is it heating or cooling? As air heats, does it expand or contract? If the pop can were a closed system, what would eventually happen to it? Since it's not a closed system, where are the expanding molecules going? What happens to the number of molecules inside the can the longer we heat it? Are there relatively more or less? What happens to the pressure as the amount of molecules decreases? Does the pressure increase or decrease?

We discuss all these things as the can is heating. When the students are satisfied that the can has been heated for long enough, I put the can into the container of water (as they have suggested). If students have not specified anything about direction, I put the can into the water right side up, and nothing happens. Then we problem solve why nothing happened. (Putting the can right side up fails to seal off the opening to the can, the air pressure difference is lost, and the can remains intact.) If students instruct me to put the can in upside down, I do so, and when the upside down can hits the surface of the water, it collapses. We discuss the seal that was created by the water, and the pressure difference between the inside of the can, and the ambient environment. Since the pressure inside the can was much lower, the higher pressured air in the surrounding environment pressed in on the can, crushing it from all directions.

Usually students want to see it again, so we follow the procedure again, making any changes that students suggest. I ask students if heating the can for a longer period of time will affect how much the can crushes. Whether the temperature of the water in the container will make a difference, or using a different brand of soda pop can. We spend some time talking about controls and variables, and how to test the effect(s) of each. Of course, being middle school students, they want to see

something bigger and better. We discuss other things we could crush in the same fashion that are bigger than a pop can, and I invite students to bring in other containers they would like to see crushed for extra credit.

Egg In A Bottle

For "Egg in a Bottle," I present students with a similar problem as the collapsing can. Students must come up with a way to get a peeled, hard-boiled egg into an Erlenmeyer flask without exerting bodily force on the egg... no smashing it in, no cutting it up, etc. Students think back to the collapsing can demonstration, and think about the whole notion of air pressure. Pretty quickly they come up with the idea of heating the inside of the flask. Some students suggest putting a few lit matches inside the can, some suggest a small piece of paper. One student this year suggested heating it over the camp stove just like we did for the collapsing can.

At any rate, the inside of the flask must be heated to cause the molecules to expand. After heating, the egg must be placed on top of the flask, effectively creating a seal. Depending on the strength of your heat source on the inside, the egg will "dance" on the lip of the flask as some of the heated molecules continue to escape. Once a seal has been formed and the pressure difference created, the higher pressured air from the ambient environment will push the egg into the flask. Which is as students expect. Then comes their next challenge: getting the egg back out!

Sometimes students suggest heating the flask with the camp stove again to get the molecules expanding, which will push the egg back out. I usually make them think of another way to do it that doesn't involve heat, asking them how we can create higher pressure *inside* the flask so that the egg will be pushed back out. I ask if there are any instrument players in the room, particularly brass. Some hands shoot up, and I ask them to think of how they can relate what the do with their instrument to our need to create air pressure. They always come up with blowing air into the flask. Then one of the students will volunteer to come up and use their skills to blow as much air into the flask as possible, which creates the pressure difference needed to push the egg back out!

Fabulous Fountain

For "Fabulous Fountain," I present students with a large beaker (1500 to 2000ml), as well as a large, 2000 ml Erlenmeyer flask, each of which contain a clear, colorless liquid (about 1400 ml of water + 100 ml sodium hydroxide in the beaker, and about 75 ml of water + 25 ml phenolpthalien in the flask). On the demonstration table I have a rubber stopper that fits the flask that contains a long piece of glass tubing. I also have a ring stand set up so with the beaker sitting on the platform of the ring stand. The ring is adjusted so that when the stopper is in the flask and inverted to rest in the ring, the glass tubing barely brushes the bottom of the beaker below.

I suggest to students that I can take the two colorless liquids and the other materials on the demonstration table to create a colorful fountain using air pressure. Of course they want to know if the beaker and flask contain water, and I shrug my shoulders, stating that we'll have to find that one out later. As soon as I mention air pressure, students jump on the idea of using heat. I ask them how.

The flask reminds them of the previous demonstrations, and they typically suggest heating the flask with the small amount of liquid in it. We commence to heating, and discuss the same cycle of heating, expansion, and escape of molecules, and the subsequent pressure difference that is being created. The rubber stopper then becomes the seal. I insert the rubber stopper snugly into the opening, and invert the flask in the ring stand so that the glass tubing is inserted into the liquid in the beaker. We watch and wait. Eventually the students sitting closest to the apparatus notice the liquid as it begins to travel up the tube. When the liquid gets to the top it begins to shoot, hitting the bottom of the flask (which is now the top of the whole system), spraying in all directions inside the flask. As the liquid from the beaker hits the liquid in the flask, it turns a brilliant shade of fuschia.

The fountain lasts for about 15 or 20 seconds, and towards the end, as the last bit of liquid is being pushed up the tube, it makes a slurping sound like someone who is sucking the last bit of milkshake through a straw. The students love it, of course, and want to know what the liquids were. At that point I let them in on the secret of the two liquids, and remind them about acids and bases, describing the phenolpthalien as a chemical indicator for bases. We discuss how different colored fountains could be created using different indicators.

What's Love Got To Do With It?

This particular Freaky Friday is one of my favorites, and ties directly to the curriculum on HIV and AIDS. As part of that unit, we talk about the advantages of abstinence, and the implications of being sexually active at a young age. As students come into the room, I have a variety of beakers and flasks set up on my demonstration table, each of which are labeled with things like "sex," "selfishness," "commitment," etc. Needless to say, student curiosity is piqued.

For that day's warm-up, I ask students to define love. At first they say it's too hard to do, but I encourage them to try. Then we spend the first 10 or 15 minutes brainstorming definitions. By the time we're finished, we have an overhead completely filled with ideas and definitions ranging from "trust, commitment," and "self-sacrifice," to things like "warm fuzzies" and "kisses." I validate each definition as it is collected and written on the overhead. Before the actual demonstration begins, I discuss with students how limited we are in English because we only have one word for "love," and it can be applied to a husband or wife the same way it is applied to ice cream. I briefly introduce students to the Greek words for love—agape (unconditional, self-sacrificial love), phileo (love for friends, fellow human beings), storgei (love between family members), and eros (romantic love). I ask students which kind of love the media typically associates with love; invariably they respond "eros."

I take it one step further to ask them what the media typically equates with love, and the students begin to pipe up about the "s" word– sex. I ask them if sex and love are the same thing. They respond that it can be, but that it's not always about that. I let them know that very concept is the subject of the Freaky Friday.

With that, I show students a large Bell jar that has a candle affixed to the bottom with melted wax. The jar is labeled "love." I light the candle, and suggest that the flame represents love, burning strong, burning bright. I hold it up for everyone to see, and remark about how beautiful it is. Then I begin to tell a story about two young people, and how one of them wants to have sex, but the other doesn't, and how the one who wants to have sex begins to put pressure on the other one. I ask students to tell me what that person might say to try to put pressure on their partner. Students come up with all kinds of lines and tactics, which are discussed briefly. I ask students about the person who is exerting pressure—who are they chiefly concerned about? Intuitively, students know—themselves.

At that point I pick up a beaker that is labeled "selfishness." In the beaker is a white powder (baking soda). As I spoon some of the white powder into the jar with the lit candle, I repeat back the lines and tactics that students have shared with me. I explain how the pressure begins to wear away at the resolve of the partner's resolve, and that eventually they give in--the couple has sex. I hold up a flask labeled "sex," which contains vinegar, and pour some of the "sex" into the bottom of the jar. After a few seconds the carbon dioxide that is created extinguishes the flame. I show my sadness at the extinguished love, and immediately go for the matches to try relighting the candle. But each time a flame is introduced into the jar in attempt to relight it, the flame is extinguished. I keep trying more and more matches to no avail. Then I ask students if there is anything that can be done to restore the love.

At first they say no, it's too late. Then usually someone pipes up about taking out the sex and the selfishness. I ask them how, and they suggest cleaning out the jar. I go to the sink and rinse the jar, removing the baking soda and vinegar. At that point the candle can be successfully relit.

I ask students if it's possible to just "rinse away" sex. Of course, they respond that it's impossible. We take the time to discuss that a precious thing virginity is, and that it's a gift that can only be given once—a gift that must be considered very carefully, and given to just the right person. However, I stress, if a person has had sex and discovers that it isn't the right thing for them, they can always make a decision to be abstinent from that point forward, and that's what the rinsing represents.

Then I show students another jar with a candle in it labeled "love." I light that flame of love, and tell students that this candle also represents the love between two people. Two people who love each other, respect each other, and are as concerned for the other person's welfare as much of their own. We talk about some of their deeper definitions of love, and come around to the concept of commitment. I hold up a beaker labeled "commitment," which contains a black powder (manganese dioxide). I spoon some of the powder into the jar as I repeat back to students their deeper definitions of love, and ask them about the ultimate commitment—marriage. At that point I hold up another flask labeled "sex," which contains 30% hydrogen peroxide. I add "sex" to the bottom of the jar, and the chemical reaction releases pure oxygen to the flame, causing it to emit smoke, burn brighter,

spark, and crackle. The students love it, of course, and it is a stunning visual example. They beg me to add more sex to the jar, and each time more smoke pours from the top, more sparks fly, and the hotter the jar gets. I walk the jar around the room, and ask student to feel the heat.

We discuss how this time, the sex is something that enhances the love, instead of extinguishing it. It provides an excellent foundation for our further studies on abstinence and decision-making.

Homework Coupons

RATIONALE

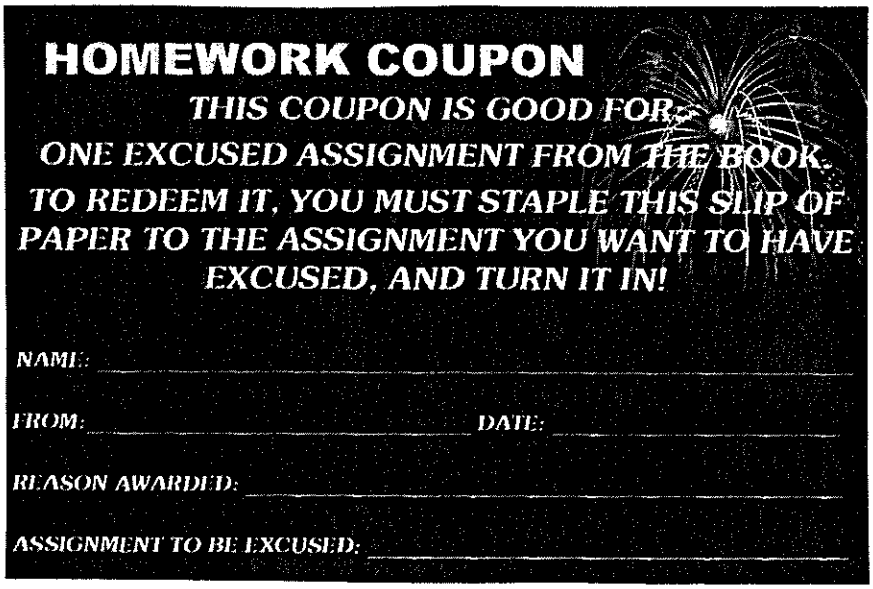
Maintain high expectations	S1P1, S1P2, S3P1
Reward creativity	S3P1
Welcome and foster curiosity	S3P1

EXPLANATION:

In my classroom, I use Homework Coupons as a reward for hard work and/or creativity. Homework coupons are a "free pass" of sorts, excusing students from a book assignment of their choice. A coupon may not be used to excuse a non-book-based homework assignment (such as a survey), laboratory, quiz, test, or project. In order to redeem the coupon, students must staple the coupon to the assignment they want to have excused, and turn it in. Once a coupon has been used, it becomes void.

Should students score particularly well on an exam, they will find a homework coupon stapled to their exam when it is returned. Students may also earn coupons by working as part of a team to come up with the most creative/unique answers during poster sessions, or doing particularly creative work on a project.

EXAMPLE:



Warm-Ups

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Develop student understanding in all four areas of language	S2P1, S2P2
Provide ample wait time when asking questions	S2P1, S2P2
Provide models for students to follow	S2P1, S2P2
Provide useful, ongoing feedback about student progress	S1P1, S2P1, S2P2, S3P1
Provide verbal ad procedural scaffolding	S2P1, S2P2
Teach and emphasize key vocabulary	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1

EXPLANATION

Each day when students come into my classroom, there is a warm-up posted on the overhead. A warm-up is a question that asks students to make predictions about content that is to come, or to review content that has already been covered. Students are required to record each day's warm-up in a book, which is assessed periodically for points. For each warm-up, students must record the warm-up number, the date, the question, and the answer. When I finish taking attendance at the beginning of the period, we discuss the warm-up together as a class. Warm-ups allow students to check their own understanding, as well as providing me with a gauge of the understanding of the class as a whole. In addition, it is a great classroom management tool!

EXAMPLE

Warm-Up #1 9/6/03

Q: Describe one expectation you think I might have for you in this class
A: (Answers will vary)

Warm-Up #10 9/25/03

Q: What characteristics do you think all living things have in common?
A: (Answers will vary)

Warm-Up #15 10/1/03

Q: When first focusing a microscope, what power do you always begin with?
A: Low power

Warm-Up #30 11/1/03

Q: What does DNA stand for?
A: Deoxyribonucleic Acid

Warm-Up #35 11/15/03

Q: What are your ideas so far on the Bone Reconstruction?
A: (Answers will vary)

WARM UPS

HEALTH SCIENCE 03-04

NAME _____

PERIOD _____

Text Reviews

RATIONALE

Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Develop student understanding in all four areas of language	S2P1, S2P2
Provide ample wait time when asking questions	S2P1, S2P2
Teach and emphasize key vocabulary	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1

EXPLANATION:

Text Reviews are just that—review questions/activities from sections of the text. Reviews may take on many forms, from traditional questions and answers, to crossword puzzles, to word searches, scramble activities, and graphic organizers. For reviews, I always like to make the section of the book that the review is from big and bold for students to see. Your creativity can make reviews a fun and effective way to go over material!

EXAMPLES:

The examples on the following pages show just a few forms that text reviews in my class take. The first example is a traditional question and answer. The second is a crossword puzzle.

SECTION 2.4

CELL REVIEW

NAME_____ DATE _____ PER_____

Read p. 45-52. Based on your notes, and what you read there, answer the following questions in complete sentences. Then solve the riddles on the back!

1. What three structures *do all* cells have in common?

2. Describe the two main types of cells.

3. Which type of cell are plant and animal cells?

4. How is cytoplasm different from jello?

5. What two structures does a plant cell have that an animal cell doesn't?

6. What is the major difference between vacuoles in a plant cell and vacuoles in an animal cell?

7. What is the function of a plant cell that contains chloroplasts?

8. How are bacterial cells different from plant and animal cells?

9. Describe how nerve cells and white blood cells are alike, and how they are different.

10. "I'm a real powerhouse,
That's plain to see
I break down food
To release energy."

What am I?

_____

11. " I'm strong and stiff
Getting through me is tough
I'm found only in plants
But I guess that's enough."

What am I?

_____

12. "I'm the brains of the cell
Or so they say
I regulate activities
From day to day."

What am I?

_____

13. "Found only in plant cells
I'm green as can be
I make food for the plant
Using the sun's energy."

What am I?

_____

14. "I'm a series of membranes
Found throughout the cell
I transport proteins
And other things as well."

What am I?

_____

15. "I'm full of holes
Flexible and thin
I control what goes out
And what gets in."

What am I?

_____

16. "Proteins are made here
Even though I'm quite small
I'm found in the cytoplasm
Or attached to ER's walls."

What am I?

_____

17. "I've been called a storage tank
By those with little taste
I'm a sac filled with water,
Food, enzymes, or waste."

What am I?

_____

18. "Since I contain enzymes,
I can digest an injured cell
And break down big molecules
Into smaller ones as well."

What am I?

_____

19. "I am made of DNA,
In the nucleus you'll find me
When chromatin thickens
I am easier to see."

What am I?

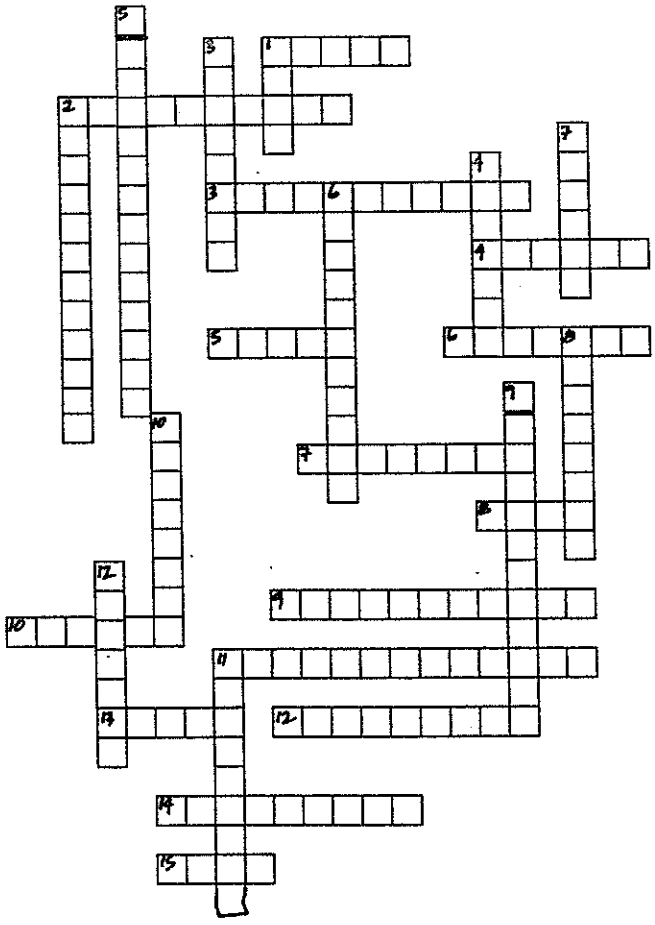
_____

SECTION 3.2

CELL PROCESSES CROSSWORD

NAME_____ DATE _____ PER_____

Read pages 78-81 in your text. Based on your notes, and what you read there, complete the crossword puzzle below. Clues are on the back.



DOWN

1. This product of fermentation is what causes your muscles to burn when overworked
2. This organelle is where respiration takes place in plant and animal cells
3. This type of organism is at the base, or beginning of every food chain
4. This product of fermentation is consumed heavily by students at WSU.
5. This chemical reaction in producers makes glucose that can be used or stored
6. This chemical reaction in producers and consumers releases energy from glucose
7. The reason respiration takes place is so that producers and consumers can get this from glucose
8. In many ways, photosynthesis and respiration are _____ reactions
9. This chemical reaction allows cells to release energy from glucose when oxygen levels are low
10. Respiration _____ energy; photosynthesis stores it
11. Fermentation takes place in this part of a cell
12. The _____ for glucose is $C_6H_{12}O_6$

ACROSS

1. Glucose contains 12 _____ of hydrogen
2. This is the total of all chemical activities that allow a cell to perform all the characteristics of life
3. This green substance can be found in chloroplasts
4. The vital substance we need to breathe in to perform respiration is produced by plants
5. Producers need this vital substance (which makes up 70% of our bodies) in order to perform photosynthesis.
6. This complex molecule is produced during photosynthesis
7. This type of organism feeds on producers
8. When muscles are working hard, this by-product of respiration is released
9. This organelle in a plant cell contains chlorophyll
10. Respiration releases energy; photosynthesis _____ it.
11. We breathe out this product of respiration on a continuous basis
12. A _____ always begins with a producer
13. Producers cannot make glucose at night because this is not present
14. Two or more atoms go together to form these
15. A producer is always at the _____ or beginning of a food chain

Concentration

RATIONALE

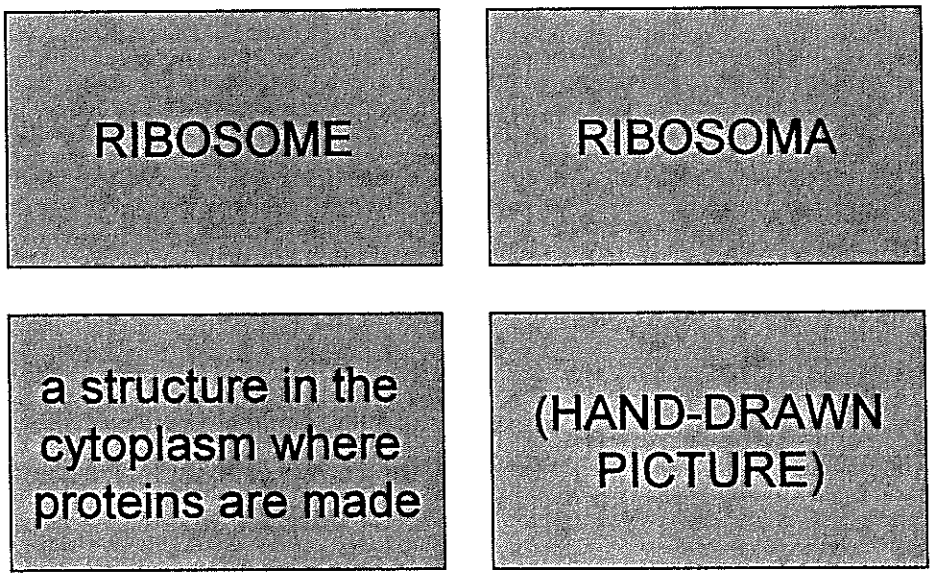
Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Allow students to clarify concepts in native language	S2P1, S2P2
Base learning experiences in native language	S1P1, S2P1
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Build bridges between what students know, and what they are to learn	S2P1, S2P2, S3P1
Build on the cultural, personal, and linguistic strengths of students	S1P3, S2P1, S2P2
Create a culturally and linguistically sensitive environment	S1P1, S1P2
Demonstrate interest in students	S1P1, S1P3, S2P1
Develop student understanding in all four areas of language	S2P1, S2P2
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Give status to minority languages in the classroom	S1P1, S1P3, S2P1
Make personal connections with students	S1P1, S1P3, S2P1, S2P2
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Respect Hispanic students and culture	S1P1, S1P2, S1P3, S2P1
Teach and emphasize key vocabulary	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1

EXPLANATION:

For Concentration, students work in lab groups to create their own sets of concentration cards to review concepts from a particular chapter, or for a particular test. For each concept, students develop four cards that match, as opposed to the traditional two: one card that has the English term/concept, one card that has the Spanish term/concept, one card that has the English definition of the term/concept, and one card that has a picture of the term/concept. Both the English and Spanish terms can be found in the glossary of students textbooks. Many of the terms are cognates, and helps to reinforce the similarities between languages, rather than emphasizing the differences. The review comes not only in playing the game, but in making the cards.

EXAMPLE:

The example below shows a card set for the cell organelle:vacuole.



Study Guides

RATIONALE

Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Guide students through the educational system	S1P1, S1P3
Maintain high expectations	S1P1, S1P2, S3P1
Prepare students for college	S1P1
Provide models for students to follow	S2P1, S2P2
Provide verbal ad procedural scaffolding	S2P1, S2P2
Specifically teach learning strategies	S2P1, S2P2
Teach and emphasize key vocabulary	S2P1, S2P2
Teach students to use a variety of resources	S2P1, S2P2
Teach things that have intrinsic value	S3P1
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1

EXPLANATION:

Before a major exam or quiz in my class, I like to spend some time reviewing the concepts with them. In addition, I make it a policy to publish a study guide for each quiz/exam that explains exactly what will be covered, and what resources to study. In this way there are no surprises for students, and they have a chance to adequately prepare.

EXAMPLE:

EXAM STUDY GUIDE: MICROSCOPES, CHARACTERISTICS OF LIFE

MICROSCOPES

TO STUDY: Microscope Lecture Notes
Section 2.3 from your book

TO KNOW: Parts of a microscope and what they do
How to focus a microscope
How to set up and put away a microscope
Types of microscopes (simple vs. compound)
Microscope inventors and their microscopes
What the lenses of a microscope do to the image viewed
Which power gives the most/least detail
How many micrometers (um) are in a millimeter (mm)
How to measure on a microscope
How to calculate magnification
What the field of view is

CHARACTERISTICS OF LIFE

TO STUDY: Characteristics of Life Lecture
Section 1.1 from your book

TO KNOW: The seven characteristics of life—what they are, what they mean, examples of each
The basic needs of living things

Practice Tests

RATIONALE

Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Engage students in active, meaningful learning experiences	S2P1, S2P2, S3P1
Maintain high expectations	S1P1, S1P2, S3P1
Provide models for students to follow	S2P1, S2P2
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Prepare students for college	S1P1
Provide ample opportunities for students to interact	S2P1, S2P2, S3P1
Specifically teach learning strategies	S2P1, S2P2
Teach and emphasize key vocabulary	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1

EXPLANATION:

Prior to a major exam, I like to provide students with an opportunity to practice test-taking and test-preparation skills. After students have received a study guide, I will assign them to make up their own test questions based on the study guide. I assign a fixed number of questions, with a certain amount coming from each section that will be covered. Students are also required to make a key for their practice test.

In order to make the practice test, students must go back through the material, and focus on the key concepts. I usually ask them to make up some questions that are lower-level questions, and some that are higher-level questions. After students have created the practice test, they trade with someone else from class, and take the other person's test. Once both people have taken the practice test, they sit down together to go over the questions and answers. Sometimes discrepancies arise due to the way a question was worded or interpreted, which provides a valuable discussion of the material.

Students receive credit for making the practice test and key, as well as taking the other person's practice test.

EXAMPLE:

All examples are student-generated.

ASSESSMENT STRATEGIES

*Traditional

*Up and Coming

Traditional

RATIONALE

Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Develop student understanding in all four areas of language	S2P1, S2P2
Guide students through the educational system	S1P1, S1P3
Maintain high expectations	S1P1, S1P2, S3P1
Make elaboration a part of what is being learned	S2P1, S2P2, S3P1
Monitor student progress frequently, and provide feedback	S2P1, S2P2, S3P1
Prepare students for college	S1P1
Teach and emphasize key vocabulary	S2P1, S2P2
Use a spiral curriculum, revisit concepts often	S2P1, S2P2, S3P1
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use multiple assessments to make high-stakes decisions	S1P1, S1P2
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

EXPLANATION:

We are all familiar with more traditional forms of assessment: homework assignments, laboratory exercises, projects, quizzes, and tests. Each provide a snapshot of what a particular student knows and is able to do. Any one assessment in and of itself is but a single brush stroke in an array of colors and textures that make up the student's knowledge.

Various students in our classrooms will respond differently to different types of assessments, and rightfully so. No two students are built exactly the same way, nor do any two students think exactly alike. There must be a variety of assessments used to give all students the opportunity to demonstrate what they know and are able to do. That being said, for each unit, I like to incorporate assessments of all kinds: homework reviews, laboratory exercises, projects, and quizzes/tests.

EXAMPLES:

For the unit on cells, we focus on cell structure and function. In other words, what parts does a cell have, what do they look like, and what do they do? As an introduction, students complete a pre-write on cells, which may include pictures. Students also have an opportunity to look at their own cells through a microscope. We discuss the parts we *can* see with a regular microscope, and move on to the parts we *can't* see with a regular microscope.

For the parts we can't see with a regular microscope, we turn to the book for information and pictures. From there, students work to create a model of a cell, making sure to incorporate all of its parts. Each component of the unit becomes a part of an individual student's overall assessment on cells. Examples of student work pages/project descriptions are on the pages that follow.

Pre-Write, Cells

What are cells?

What are they used for?

What parts do they have?

What do those parts do?

Tell me anything else you may know…

CELL LAB

NAME_____DATE_____PERIOD_____

PLANT CELLS. To see the basic components of plant cells, you will be examining the skin of an onion. To make an onion slide, peel the inner layer from a small piece of onion. Spread this flat in the middle of a slide. Add a drop of water, and cover with a cover slip. Look at your slide on both HIGH and LOW power.

What color are the living cells?_____

Now add a drop of iodine stain at the edge of the cover slip. This will kill the cells, but allow you to see the inner structures more clearly. Look under *LOW* power for the yellowish, round nucleus. Draw a small group of cells, making each cell about 2 cm long. Be sure to draw the CELL WALL and the NUCLEUS, and label them.

Total Magnification _____
Cell size in μm _____

Now turn to *HIGH* power. Look at one cell, and note that it has thickness as well as length and width. Draw a single cell, making it about 5 cm long. Draw and label the CELL WALL, NUCLEUS, CYTOPLASM, AND CELL MEMBRANE.

Total Magnification _____
Cell size in μm _____

ANIMAL CELLS. To see the structures of animal cells, you will be examining your very own cheek cells! Scrape the inside of your cheek gently with a toothpick. Smear the material on a slide, and add a drop of methylene blue. Cover with a cover slide.

Draw a few cheek cells below, as seen under *HIGH* power. Label the NUCLEUS, CYTOPLASM, AND CELL MEMBRANE. Don't forget to label your drawing with the magnification you looked at it under!

Total Magnification _____
Cell size in μm _____

In what ways are the cells you looked at alike? What structures do they have in common?

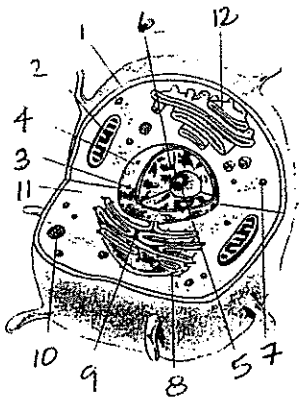
How are plant and animal cells different?

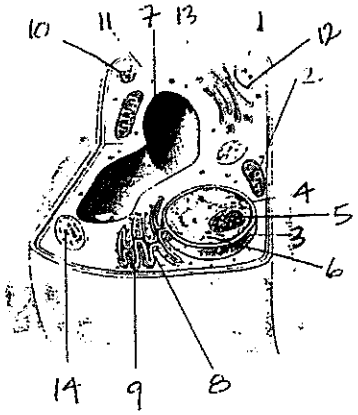
CELL STRUCTURE AND FUNCTION

NAME_____ DATE_____ PER_____

STUDY THE ANIMAL AND PLANT CELL PICUTURED BELOW. NUMBERED ARROWS POINT TO VARIOUS CELL STRUCTURES. IDENTIFY THE STRUCTURES IN THE COLUMN ON THE LEFT; DESCRIBE THEIR FUNCTIONS IN THE COLUMN ON THE RIGHT...

STRUCTURE	FUNCTION
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	





CELL CREATIVE PROJECT

Over the course of the next week or so, you and the partner of your choice will be busting your brains to create a three-dimensional model of a cell. Your models may take any form you wish--from food, to clay, to wood, to plastic, to arts and crafts--whatever you feel most adept at working with. The goal is to build a model of a cell that ACCURATELY represents all of the parts of a real cell. Of course your models will be several hundred, or even several thousand times the size of most cells.

You may choose to do a plant or an animal cell, as long as you include the proper parts in each. Your cell model must include:

1. Cell membrane
2. Cytoplasm
3. Nucleus
4. DNA inside the nucleus
5. Nuclear Membrane
6. Endoplasmic Reticulum
7. Ribosomes
8. Golgi Bodies
9. Mitochondria
10. Vacuoles
11. Lysosome
12. Nucleolus

If you are doing a plant cell, you will also need to include the cell wall and chloroplasts.

Starting on THURSDAY, OCTOBER 16, you will present your cell model to the class, along with your partner (if you choose to work with one). You will explain your model to the class, and why you chose to use what you used to represent each cell part. After you finish your presentation, you will need to turn in a written explanation of your model, and why you used what you used to represent each cell part. The goal is for you to be thinking about what the cell parts look like and do, and to represent them as accurately as possible in your model. Best wishes, fellow scientists!

IMPORTANT: IT IS ABSOLUTELY ESSENTIAL THAT YOU LET YOUR PARENTS KNOW ABOUT THIS ASSIGNMENT TONIGHT, SO THAT THEY ARE AWARE OF ANY SHOPPING THAT YOU MAY NEED TO DO TO GET STARTED WITH IT...

*** If you have a creative idea for a cell project that is not a model, talk to me--the possibilities are endless!**********

CELL PROJECT GRADING RUBRIC

NAME(S)_____DATE_____
_____PER_____

MODEL

Cell part accurately displayed; are relative size and shape of those in real cells — Cell parts displayed, but not accurately; resemble real cell parts somewhat, or not at all

NUCLEUS	5	4	3	2	1	0
NUCLEAR MEMBRANE	5	4	3	2	1	0
DNA INSIDE NUCLEUS	5	4	3	2	1	0
CYTOPLASM	5	4	3	2	1	0
CELL MEMBRANE	5	4	3	2	1	0
ENDOPLASMIC RETICULUM	5	4	3	2	1	0
RIBOSOMES	5	4	3	2	1	0
GOLGI BODIES	5	4	3	2	1	0
MITOCHONDRIA	5	4	3	2	1	0
VACUOLES	5	4	3	2	1	0
LYSOSOMES	5	4	3	2	1	0
NUCLEOLUS	5	4	3	2	1	0

Wow! What a great idea! — This is a typical cell

CREATIVITY 10 9 8 7 6 5 4 3 2 1

You spent a lot of time on this — Did you do this last night?

QUALITY 10 9 8 7 6 5 4 3 2 1

PRESENTATION

You are ready to present! — You need another day to prepare

POISE 5 4 3 2 1

You can say all the parts properly — You are stumbling over your words

PREPARATION 10 9 8 7 6 5 4 3 2 1

We can hear you loud and clear — What did you say?

VOICE 5 4 3 2 1

WRITTEN SUMMARY

Includes all twelve cell parts — Includes some cell parts; not complete

THOROUGHNESS 10 9 8 7 6 5 4 3 2 1 0

Explains why certain materials used — No justification given for materials used

RATIONALE 10 9 8 7 6 5 4 3 2 1 0

TOTAL /120=

Up and Coming

RATIONALE

Adapt curricular materials as necessary for ELLs	S2P1, S2P2
Align curriculum with standards/assessments	S1P1, S2P1, S3P1, S3P2
Bring all students to full English proficiency	S1P1, S1P2, S2P1, S2P2
Create a culturally and linguistically sensitive environment	S1P1, S1P2
Demonstrate interest in students	S1P1, S1P3, S2P1
Develop student understanding in all four areas of language	S2P1, S2P2
Eliminate prejudice, bigotry, and racism	S1P2, S2P1
Engage in meaningful practice of the content to be learned	S2P1, S2P2, S3P1
Focus on collection and appropriate use of evidence	S3P1
Maintain high expectations	S1P1, S1P2, S3P1
Provide a psychologically safe environment for students	S1P1, S2P1
Provide verbal and procedural scaffolding	S2P1, S2P2
Support the roles of women and minorities in science	S3P1
Teach and emphasize key vocabulary	S2P1, S2P2
Use a variety of questioning techniques	S2P1, S2P2, S3P1
Use multiple assessments to make high-stakes decisions	S1P1, S1P2
Use simplified sentence structure as necessary; avoid jargon	S2P1, S2P2

EXPLANATION:

In recent months, Washington State has published "English Language Development" documents for grades K-12. These documents (called "ELD's) highlight what students at beginning, advanced beginning, intermediate, advanced, and transitional levels of second language proficiency should be able to do in the communication domains: listening/speaking, reading, and writing. This publication is an exciting one because it provides a roadmap for mainstream teachers to know what their ELL students should be expected to do and accomplish within content areas.

No longer will teachers have to wonder about assessments they give to ELL students. Based on the language proficiency level provided by the building ESL teacher/coordinator, the classroom teacher can quickly access the communication skills that their ELL students should possess, and coordinate that with the content EALR's to create appropriate assessments.

As this is a relatively new document, most districts have yet to come up with protocols to effectively implement the ELD's. Check with your district's ESL coordinator/curriculum specialist to find out more. The ELD's can be accessed online through OSPI at:

http://www.k12.wa.us/MigrantBilingual/ELD.aspx

EXAMPLE:

For a middle school student at the beginning level of second language proficiency, understanding of English is limited. Communication is basic, and consists mostly of imitating others' speech. A student at this level may only read short phrases, and comprehend vocabulary only when it is highly contextualized. A student at this level can draw, label, write familiar words, make lists, and complete graphic organizers. Spellings will most likely be invented (OSPI, 2003).

It would be inappropriate to assess a student at this level via traditional homework assignments that require heavy reading and extended questions, as would quizzes and tests. This student may be best assessed by having him or her draw and label a picture, or fill in a graphic organizer.

For a student at the intermediate level, speech patterns are more complex, but may still involve inconsistent use of grammar and syntax; sentences will most likely remain simple. Reading becomes more advanced as decoding skills increase, and other context clues are used to build meaning into text. This student may write simple sentences and paragraphs, with increasing awareness of grammar and syntax. This student can tell the difference between writing for different purposes, and can support main ideas with details (OSPI, 2003).

For a student at this level, traditional assessments with simplified sentence structure may be appropriate. As decoding and making meaning requires such an expenditure of energy, it may also be appropriate to limit the items on more traditional forms of assessment. Focus on the key ideas, and develop understanding in those areas, assessing accordingly.

A student at the transitional level has met the criteria for exiting ESL classes. Listening, speaking, reading, and writing skills are advanced, with minor lapses characteristic of second language learners (OSPI). These students may be able to keep pace with native English speakers, though bear in mind that they are still in the process of acquiring complete fluency in the second language. As their skills increase, so do the skills of their classmates. Fluency becomes an ever-moving target that is difficult to reach (Thomas, as cited in Collier, 1995). Be forgiving of minor language errors, and re-direct in an affirming way.

References

Barba, R.L. (1998). *Science in the multicultural classroom: a guide to teaching and learning.* Needham Heights, MA: Allyn & Bacon.

Collier, V.P. (1995). Acquiring a second language for school [Electronic Version]. *Directions in Language & Education, 1*(4), 1-8. Retrieved July 22, 2003, from http://www.ncela.gwu.edu/ncpubs/directions/04.htm

Glencoe/McGraw Hill. (n.d.). *Life Science: Spanish Audiocassette Package* (Cassette Recording No. 0-02-827779-1). New York: Glencoe/McGraw Hill.

Kass-Simon, G., & Farnes, P. (Eds.). (1990). *Women of Science: Righting the Record.* Indianapolis: Indiana University Press.

NTC Publishing Group. (Eds.). (1994). *Vox Compact Spanish and English Dictionary,* (2nd ed.). Chicago: NTC Publishing Group.

Office of the Superintendent of Public Instruction. (2003). *English Language Development Standards, Grades 6-8.* Retrieved March 23, 2004, from http://www.k12.wa.us/MigrantBilingual/pubdocs/ELD/6-8PROFICIENCYLEVELS-12-08.doc

Parker, S. (1991). *Esqueletos.* Madrid: Santiallana.

Shepler, J. (1993). *Navajo Code Talkers, America's Secret Weapon.* Retrieved July 24, 2003, from http://www.johnshepler.com/articles/codetalkers/html

SIL International. (2003). *Languages of USA.* (Retrieved July 23, 2003, from http://www.ethnologue.com/show_country.asp?name=USA

U.S. Bureau of the Census. (1990). *Detailed Language Spoken at Home and Ability to Speak English for Persons 5 Years and Over.* Retrieved July 23, 2003, from http://www.census.gov/population/socdemo/language/table5.txt

Veglahn, N. (1991). *American Profiles: Women Scientists.* New York: Facts on File.

APPENDIX

This appendix details the suggestions from the Matrix of Solutions, as well as the governing body, agency, or researcher that suggested it. The appendix includes three tables, each of which correspond to a specific strand of research.

The first table corresponds to ***Strand One: Guiding Principles in the Education of Hispanic Student***s. HDP refers to the Hispanic Dropout Project; WHSS refers to the White House Strategy Session; NCLB refers to No Child Left Behind; NCLR refers to National Council of LaRaza; EETF refers to Equity in Education Task Force; METT refers to the Multi-Ethnic Think Tank; and OER refers to Other Expert Recommendations, including the works of Nieto, Villanueva, Tan, and Martinez, et al.

The second table corresponds to ***Strand Two: Guiding Principles in the Education of English Language Learner***s. ECH refers to Echevarria, et al., C & O refers to Chamot and O'Malley, and OER refers to Other Expert Recommendations, including the works of Collier, Crystal, Krashen and Terrel, and Lucas, et al.

The third table corresponds to ***Strand Three: Guiding Principles in the Teaching of Science***. AAAS refers to the American Academy for the Advancement of Science, and OSPI refers to the Office of the Superintendent of Public Instruction (the EALRs).

SUGGESTED SOLUTIONS	HDP	WHSS	NCLB	NCLR	EETF	METT	OER
Accommodate parents in need of special services to communicate	X				X	X	X
Align curriculum with standards/assessments	X	X	X	X		X	
Allow students to clarify concepts in native language		X					
Base learning experiences in native language		X					
Bring all students to full English proficiency		X	X				
Build bridges between what students know, and what they are to learn						X	X
Build on the cultural, personal, and linguistic strengths of students					X	X	X
Communicate in linguistically/culturally appropriate and effective ways	X				X	X	X
Create a culturally and linguistically sensitive environment	X				X	X	X
Demonstrate interest in students	X						X
Eliminate prejudice, bigotry, and racism	X				X	X	X
Focus on collection and appropriate use of evidence						X	
Guide students through the educational system	X	X					X
Give status to minority languages in the classroom							X
Help students and parents envision a future for themselves	X						X
Incorporate historical perspectives					X	X	X
Involve parents in the educational process	X	X		X	X		
Maintain high expectations	X	X	X		X	X	
Make personal connections with students	X						X
Monitor student progress frequently, and provide feedback	X			X			
Prepare students for college	X	X					X
Promote questioning and intellectural honesty						X	
Provide a psychologically safe environment for students	X			X	X	X	X
Provide useful, ongoing feedback about student progress	X			X			
Respect Hispanic students and culture	X				X	X	X
Support the roles of women and minorities in science					X	X	
Teach relevant curriculum	X	X		X	X		X
Teach things that are useful for employment/decision-making						X	
Teach things that contribute to socially responisble decision-making						X	
Use examples from Hispanic culture to help students learn					X		X
Use materials that represent diverse populations and their contributions					X	X	
Use multiple assessments to make high-stakes decisions	X	X		X		X	

SUGGESTED SOLUTIONS	ECH	C&O	OER
Adapt curricular materials as necessary for ELLs	X	X	
Align curriculum with standards/assessments	X	X	
Allow students to clarify concepts in native language	X		
Base learning experiences in native language			X
Bring all students to full English proficiency	X	X	X
Build bridges between what students know, and what they are to learn	X	X	X
Build on the cultural, personal, and linguistic strengths of students	X	X	X
Communicate in linguistically/culturally appropriate and effective ways			X
Create a culturally and linguistically sensitive environment	X		X
Demonstrate interest in students	X		
Develop content, language, and strategy objectives for lessons	X	X	
Develop student understanding in all four areas of language	X	X	
Eliminate prejudice, bigotry, and racism			X
Engage in meaningful practice of the content to be learned	X	X	
Engage students in active, meaningful learning experiences	X	X	X
Enunciate clearly, speak slowly	X		
Focus on collection and appropriate use of evidence		X	X
Guide students through the educational system	X	X	
Give status to minority languages in the classroom			X
Help students and parents envision a future for themselves			X
Implement interactive, inquiry based curriculum	X	X	X
Incorporate historical perspectives			X
Maintain high expectations	X	X	X
Make available multiple experiences using scientific tools	X	X	
Make elaboration a part of what is being learned	X	X	
Make personal connections with students	X		X
Monitor student progress frequently, and provide feedback	X		X
Provide ample opportunities for students to interact	X		X
Provide ample wait time when asking questions	X		
Provide a psychologically safe environment for students			X
Provide models for students to follow	X		
Provide useful, ongoing feedback about student progress	X	X	
Provide verbal and procedural scaffolding	X	X	
Respect Hispanic students and culture			X
Reward creativity			X
Specifically teach learning strategies	X	X	
Teach and emphasize key vocabulary	X	X	
Teach from concrete to the abstract	X	X	
Teach less, with more depth	X	X	X
Teach relevant curriculum	X	X	X
Teach students to use a variety of resources	X	X	
Use a spiral curriculum, revisit concepts often	X	X	
Use a variety of questioning techniques	X	X	
Use gestures to reinforce speech	X	X	
Use grouping configurations that support content and language objectives	X	X	
Use materials that represent diverse populations and their contributions			X
Use multiple assessments to make high-stakes decisions	X	X	
Use plenty of supplementary materials to aid student understanding	X	X	
Use simplified sentence structure as necessary; avoid jargon	X	X	

SUGGESTED SOLUTIONS	AAAS	OSPI
Align curriculum with standards/assessments	X	X
Engage in meaningful practice of the content to be learned	X	
Engage students in active, meaningful learning experiences	X	
Focus on collection and appropriate use of evidence	X	X
Implement interactive, inquiry based curriculum	X	X
Incorporate historical perspectives	X	
Maintain high expectations	X	X
Make available multiple experiences using scientific tools	X	
Make personal connections with students	X	
Monitor student progress frequently, and provide feedback	X	
Promote questioning and intellectual honesty	X	X
Provide ample opportunities for students to interact	X	
Provide useful, ongoing feedback about student progress	X	
Reward creativity	X	
Start with questions about nature	X	
Support the roles of women and minorities in science	X	
Teach: *Cells*	X	X
Teach: *Common Themes*	X	X
Teach :*Development of Health Plans Based on Life Goals*		X
Teach: *Diversity of Life*	X	X
Teach*: Evolution*		X
Teach*: Flow of Matter and Energy*	X	X
Teach from concrete to the abstract	X	
Teach*: Habits of Mind*	X	X
Teach*: Heredity*	X	X
Teach*: Interdependence of Life*	X	X
Teach*: Knowledge and Skills to Maintain a Healthy Lifestyle*		X
Teach less, with more depth	X	
Teach relevant curriculum	X	
Teach: *The Nature of Science*	X	
Teach: *The Nature of Technology*	X	
Teach things that are useful for employment/decision-making	X	
Teach things that contribute to socially responisble decision-making	X	
Teach things that enrich the child	X	
Teach things that have intrinsic value	X	
Teach things that have philosophical value	X	
Use a spiral curriculum, revisit concepts often	X	
Use a variety of questioning techniques	X	
Use grouping configurations that support content and language objectives	X	
Welcome and foster curiosity	X	

Chapter Five

Summary, Conclusions, and Recommendations

Summary

Certainly the challenge of creating equity for Hispanic students in the middle school Health Science classroom is a large one, with many factors to be considered: classroom pedagogy, school-wide reform, and community connections. This project focused on practical strategies that could be used at the classroom level to help create more equitable learning opportunities for all students. The strategies included environmental, communicative, pedagogical, as well as assessment considerations.

The combined strategies aim to build equity for Hispanic students into the middle school health science classroom. They are focused on maintaining high expectations, valuing the Spanish language, making connections with students, respecting Hispanic culture, and communicating in appropriate ways with Hispanic parents. In addition, the strategies strive to help Hispanic students navigate the school system through the teaching of specific organizational and learning strategies. Finally, the strategies aim to provide appropriate presentation and assessment ideas for teachers to build into their repertoire.

Conclusions

Throughout the process of researching and writing this project, I came to understand the enormity of any task that claims to create equity for learners of any racial or ethnic origin. Part of the complexity lies in the fact that groups of people cannot be classified and labeled in neat little packages. Each person is a unique individual with

unique thoughts, goals, and ways of approaching life and learning. So although the developed strategies are based on extensive research and recommendations by parties concerned about the educational crisis that involves Hispanic students, they cannot be considered a cure-all. No set of strategies ever could be.

For example, the task of eliminating prejudice, bigotry, and racism is nearly impossible. As long as there are people in the world, there will be impressions and judgments about those who fall into the category of "other." Until interactions and experiences with "other" people come in to mediate those impressions and judgments, change cannot occur; and even then they may not have a lasting impact. As a teacher, however, what I *can* do is model respectful interactions with people from all ethnic backgrounds. What I *can* do is incorporate diverse languages and people into the everyday ecology of the classroom to create an opportunity for exchange to take place. What I *can* do is address instances of overt and covert prejudices as they arise within the classroom, and turn them into teachable moments. What I *can* do is put forth the effort it takes to communicate in appropriate ways with students and parents, showing them that they are worth the extra mile I have to walk to do so.

I have come to believe that the heart of effectively implementing any strategy or program that seeks to better the educational experiences of Hispanic students must begin with compassion: a heart that is willing to see the need, and be moved to do something about it. It must be accompanied by connection: the desire to put forth the effort it takes to relate with Hispanic students in meaningful ways. And it must be carried out with commitment: the drive to create new and varied learning experiences that will make a difference in the lives of Hispanic students. I believe that any educator who has these

qualities has already begun to consider what their Hispanic students may need; the strategies in this project's handbook will simply assist them in the journey.

Recommendations

Within the educational arena, attitudes towards Hispanic students and the way they should be educated vary greatly. Some teachers, administrators, parents, and students adopt an assimilationist attitude, believing that educational equity means educational sameness. These individuals embody and portray the "sink or swim" mentality, and often have a difficult time accepting or supporting any changes that would enrich and equalize the educational experiences of Hispanic students. On the other hand, there are teachers, administrators, parents, and students who recognize the need for change, and are willing to do something about it.

I believe that any teacher's challenge who seeks to implement change comes in reading that attitude continuum within the school, and addressing the needs accordingly within that framework. Mandated, top-down programs rarely effect lasting change within a system. Telling teachers how to do their jobs better rarely garners a listening ear, much less a transformed approach. In order to begin building equity into the school, I suggest that a teacher start with his or her own classroom. As those changes begin to have an impact on students, word will get out. Those who wish to remain in their familiar, isolated, pedagogical world will; those who have the true heart of an educator will seek that teacher out to discover just what it is that he or she is doing that's making a difference. As the saying goes, "slow and steady wins the race."

Teachers who desire to positively impact the lives of their Hispanic students have to start by taking a look at themselves, and what occurs within the context of their own

classroom. From there, they can look for what seems to be the most pressing need—is it communication with students and parents? Is it motivation? Is it the social climate of the classroom? Target the need, and look for strategies to address that need. For example, dual language postings can have a tremendous impact on classroom climate. At a base level, they communicate respect for the Spanish language. Moreover, they communicate to all students that there is *value* in that language, and the people who speak it. Dual language postings don't require a huge amount of effort, yet have a tremendous payoff. I suggest that a teacher start with that strategy, and then move on to incorporate more targeted strategies at a reasonable pace.

In addition, I believe that teachers must address issues of prejudice and educational injustice as they arise within the school. Off-handed, off-color comments from students or staff provide teachable moments to ask pointed questions that may cause that person to think about what it is that they have said. Your question(s) may change that person's thinking, and they may not; but assuredly silence never will. Be willing to take that risk.

Of course, no teacher is an island; he or she lives, breathes, and works in an environment that extends well beyond the classroom. Likewise, students live, breathe, and learn in many contexts outside the classroom's walls. Now and in the years to come, issues of language and culture will continue to provide opportunities for students, educators, and community members to connect in meaningful ways. It is my hope that all the players involved will jump into the game, rather than waiting on the sidelines for the "other guy" to make the first move. Or even worse still, for federal and state mandates to force them into sudden-death action.

Educators and administrators everywhere must ask themselves what kind of future they wish to see for their students and society at large, and as a result, what kind player they will become to achieve those goals. In light of such far-reaching needs, it is tempting to give up, recognizing the sheer impossibility of fixing the entire system. Yet as those needs present themselves on a daily basis in my classroom, inaction ceases to be an option. As President Bush and Governor Locke attempt to legislate change from the top down, it is my goal to effect change from the bottom up—extending from the classroom, to the school, to the district and community; perhaps even the world. To that end, I plan one day to present the strategies presented in this project in workshop settings to gain feedback that may further inform the strategies as implemented in the classroom. Specifically, I would seek feedback regarding how the strategies work for teachers in other classrooms, as well as how the overall handbook could be improved to better meet those needs.

References

American Association for the Advancement of Science. (1989). *Science for all Americans: A project 2061 report on literacy goals in science, mathematics, and technology.* Washington, D.C.: Author.

American Association for the Advancement of Science. (1993). *Benchmarks for science literacy.* New York: Oxford University Press.

Barba, R. L. (1998). *Science in the multicultural classroom: A guide to teaching and learning.* Needham Heights, MA: Allyn & Bacon.

Bylsma, P., & Ireland, L. (2002). *Graduation and dropout statistics for Washington's counties, districts, and schools: Final report for school year 2000-2001* (OSPI Publication No. 02-0018). Olympia, WA: Office of the Superintendent of Public Instruction.

Chamot, A. U., & O'Malley, J. M. (1994). *The CALLA handbook: Implementing cognitive academic language learning approach.* United States: Addison-Wesley.

Collier, V.P. (1995). Acquiring a second language for school [Electronic version]. *Directions in Language & Education, 1*(4), 1-8. Retrieved July 22, 2003, from http://www.ncela.gwu.edu/ncpubs/directions/04.htm

Cummins, J. (1986). Empowering minority students: A framework for intervention. *Harvard Educational Review, 56* (1), 18-36.

Crystal, D. (2000). *Language death.* Cabmbridge: Cambridge University Press.

Echevarria, J., Vogt, M., & Short, D.J. (2000). *Making content comprehensible for English language learners.* Needham Heights, MI: Allyn & Bacon.

Equity in Education Task Force. (2000a). *Equity in education joint policy* [Brochure]. Olympia, WA: T. Bergeson, P. Pulfer, & L. Carpenter.

Equity in Education Task Force. (2000b). *Equity in education: Recommendations for implementation.* Retrieved January 22, 2003, from http://www.k12.wa.us/equity/POLREC2K0.asp

Fashola, O. S., Slavin, R. E., Calderon, M., & Duran, R. (1997). Effective programs for Latino students in elementary and middle schools. In *The Hispanic Dropout Project* (chap. 2). Retrieved January 22, 2003, from http://www.ncela.gwu.edu/miscpubs/hdp/2/index.htm

Fradd, S. H., & Lee, O. (1995). Science for all: A promise or a pipe dream for bilingual students? *The Bilingual Research Journal, 19*(2), 261-278.

Fradd, S. H., Lee, O., Sutman, F. X., & Saxton, M. K. (2001). Promoting science literacy with English language learners through instructional materials development: A case study. *The Bilingual Research Journal, (25)*4, 479-501.

Gallard, A. J. (1992, March). Creating a multicultural learning environment in science classrooms. *Equity Resource Guide.* Retrieved January 22, 2003, from http://www.enc.org/topics/equity/articles/document.shtm?input=ACQ-111327-1327

Grieco, E. M., & Cassidy, R. C. (2000). *Overview of race and Hispanic Origin: March 2000* (USCB Publication No. C2KBR/01-1). Washington, D.C.: U.S. Census Bureau.

Howard, G. (1999). *We can't teach what we don't know: White teachers, multiracial schools.* New York: Teacher's College Press.

Iowa Department of Education. (2003). *English Language Learners.* Retrieved March 4, 2003, from http://www.state.ia.us/educate/ecese/is/ell/

Krashen, S., & Terrell, T. (1983). *The natural approach: Language acquisition in the classroom.* Oxford: Pergamon.

Lazarus, E. *The new colossus.* (1883). Retrieved March 1, 2003, from http://www.poetry-archive.com/l/the_new_colossus.html

Lucas, T., Henze, R., & Donato, R. (1990). Promoting the success of Latino language-minority students: An exploratory study of six high schools. *Harvard Educational Review, 60* (3), 315-340.

Marinez, D. I., Ortiz De Mentellano, B. (1988). *Improving the science and mathematic achievement of Mexican American students through culturally relevant science.* Washington, D.C.: U.S. Department of Education. (ERIC Document Reproduction Service No. ED296819)

Martinez, Y. G., Scott, J. Jr., Cranston-Hughes, A., & Platt, J. S. (1994). Voices from the field: Interviews with students from migrant farmworker families. *Journal of Educational Issues of Language Minority Students, 14,* 338-348.

Mason, C. L., & Barba, R. H. (1992, May). Equal opportunity science: We need to adapt if students are to achieve. *The Science Teacher,* 22-27.

Menchaca, V. D. (2001). Providing a culturally relevant curriculum for Hispanic children. *Multicultural Education, (8)*3, 18-20.

Microsoft Network. (2003). *Encarta Online Dictionary.* Retrieved August 12, 2003 from http://encarta.msn.com/encnet/features/dictionary/DictionaryResults.aspx?search=cognitive

Multi-Ethnic Think Tank. (2001). *Call to action: Mandating an equitable and culturally competent education for all students in Washington state.* Olympia, WA: Office of the Superintendent of Public Instruction.

National Clearinghouse for Bilingual Education. (1999, January). *Transforming education for Hispanic youth: Exemplary practices, programs, and schools* (Issue Brief No. 12). Madison, WI: A. Turnbaugh-Lockwood & W. G. Secada.

National Clearinghouse for Bilingual Education. (1992, Summer). *Teaching science to English language learners, Grades 4-8* (Issue Brief No. 11). Washington, D.C.: A. K. Fathman, M. E. Quinn, & C. Kessler.

National Council of La Raza. (2002, July). *The no child left behind act: Implications for local educators and advocates for Latino students, families, and communities* (Issue Brief No. 8). Annapolis, MD: R. Gonzalez.

Nieto, S. (1999). *The light in their eyes: Creating multicultural learning communities.* New York: Teacher's College Press.

Office of the Superintendent of Public Instruction. (2002). *Essential academic learning requirements* (OSPI Publication No. A51002). Olympia, WA: Author.

Sorge, C., Newsom, H. E., & Hagerty, J. J. (2000). Fun is not enough: Attitudes of Hispanic middle school students toward science and scientists. *Hispanic Journal of Behavioral Sciences, 22*(3), 332-345.

Tan, G. (2002). The need for multiculturalism in the classroom as perceived by Mexican American schoolchildren. *Multicultural Education, 9*(3), 21-24.

Therrien, M., & Ramirez, R. (2000). *The Hispanic population in the United States: Population characteristic, March 2000* (USCB Publication No. P20-535). Washington, D.C.: U. S. Census Bureau.

University of San Diego (1996). *Creating cultural competence.* Retrieved October 18, 2003, from http://www.sandiego.edu/diversity/cc.html

U.S. Department of Education. (2000). *Report on the White House strategy session on improving Hispanic student achievement.* Washington, D.C.: U.S. Government Printing Office.

U.S. Department of Education. (2002). *No child left behind: A desktop reference.* Retrieved January 22, 2003 from http://www.ed.gov/offices/OESE/

Villanueva, I. (1996). Change in the educational life of Chicano families across three generations. *Education and Urban Society, 29*(1), 13-34.

Weiner, L., Funkhouser, J., & Leighton, M. (2000). *Helping Hispanic students reach high academic standards: An idea book.* Washington, D.C.: U.S. Government Printing Office.