Capitalizing on English Language Learners' Funds of Knowledge to Increase Achievement in Math and Science: An Equity Pedagogy

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Abstract

The population in the United States has increased in diversity in the last few decades. The result of this increase has been the fact that there were about 5 million English language learners (ELLs) in the public schools in 2002, which was an estimated 10% of the total school enrollment. As a result, educators must address the needs of culturally and linguistically diverse students (CLD) and at the same time comply with the accountability system in place at this time. To address the needs, educators can provide equity pedagogy which capitalizes on their students' cultural funds of knowledge that they bring to the classroom to increase achievement of math and science. Thus, this funds of knowledge approach can be a solution to closing the achievement gap between ELLs and non-ELLs. Accordingly, studies cited on this paper have shown that incorporating students' funds of knowledge can be beneficial in attaining student success. Using this approach, administrators and teachers can then be responsible for bringing about the needed change that will assist culturally and linguistically diverse students in being equipped with the necessary mathematical and scientific content knowledge.

Introduction

The population in the United States has increased in diversity in the last few decades. There were about 5 million English language learners (ELLs) in the public schools in 2002, which was an estimated 10% of the total school enrollment. ELLs who were Spanish-speaking comprised 80% of those students (Martiniello, 2009). Furthermore, Araujo (2009) reports that by the year 2007, there were about 33 million people in the United States who were born in another country or who were not U.S. natural citizens. Consequently, this boost in immigration has resulted in an increase of children whose first language is not English (Minami & Ovando, 2004). However, this paper will only address English language learners (ELLs) who live on the Texas side of the Texas-Mexico border and whose first language is Spanish. To address, then, the needs of these students, Texas educators must address the needs of culturally and linguistically diverse students (CLD), and at the same time comply with the accountability system in place at this time.

This accountability system includes the Texas Assessment of Knowledge and Skills (TAKS). The TAKS is a state exam which assesses basic skills in the content-areas. TAKS disaggregates data based on subgroups to ensure all of them are being served equitably. One of the subgroups is labeled LEP (Limited English Proficient); the term LEP has been recently replaced with the ELL term. Thus, the scores provided in this section will be of the LEP subgroup. According to the Texas Education Agency (2010), these are the following percentages of ELLs and non-ELLs who met the 5th grade math standards in the 2009-2010 school year: 83% of ELL students met the math

standards, compared to 93% of non-ELL students who met the standards. Likewise, only 20% of fifth-graders identified as ELL students passed the state science assessment, while 48% of the 5th grade non-ELL students passed. At 8th grade, the cumulative ELL percentage of students meeting standards was 65%, while 89% of the non-ELLs met standards. In the 8th grade science TAKS, 39% of the ELLs met standards, whereas 81% of the non-ELLs met it (Texas Education Agency, 2010). Please note that these percentages do not include the Texas Projection Measure (TPM), 1st year and 2nd year ELL monitored students, nor the ESL or bilingual student subgroup. These results, thus, strongly attest to the fact that ELL students have been less successful than their non-ELL counterparts in meeting achievement standards in math and science.

In order to increase scores in math and science assessments, educators must incorporate equity pedagogy that will address the learning needs of ELLs. "Equity pedagogy exists when teachers use techniques and methods that facilitate the academic achievement of students from diverse racial, ethnic, and social-class groups" (Banks, 2004, p.5). One such equity pedagogy method that educators can employ is through capitalizing on their students' cultural "funds of knowledge" (Moll & Gonzalez, 2004) that they bring to the classroom to increase achievement of math and science. This funds of knowledge approach, consequently, can be one solution to closing the achievement gap between ELLs and non-ELLs. Greenberg; Velez-Ibanez and Greenberg (as cited in Moll & Gonzalez, 2004) have mentioned that funds of knowledge refers to bodies of knowledge and strategies, such as skills, ideas, abilities, and practices that are necessary for the functioning and improvement of a household. Moll, Amanti, Neff, and Gonzalez (as cited in Moll & Gonzalez, 2004) state that the funds of knowledge approach provides teachers with theoretical and methodological knowledge to address diversity in their classrooms through a process of familiarizing themselves with the cultural lives of their students. Accordingly, the purpose of this paper will be to: discuss the methods used to train teachers to retrieve funds of knowledge from the students' home; and to discuss math and science funds of knowledge studies and examples from extant literature, including our personal experience as linguistically diverse students and as educators.

Funds of Knowledge

Ferreiro (as cited in Moll & Gonzalez, 2004) states that schools who service diverse students are to be provided with "didactic" tools, which do not rely on rote instruction, rather rely on pedagogical strategies. To learn about their students' lives, educators and researchers visit students' homes for the purpose of establishing social relationships with family members that facilitate the documentation of their information. Teachers and researchers work together in study groups to make sense of the data gathered and its implications for instructional purposes (Moll & Gonzalez, 2004).

Moll and Gonzalez (2004) describe the origins of the funds of knowledge approach. In the beginning, graduate students and researchers collected the data in the students' homes and teachers were then involved in the development of classroom practices after receiving the data from the researchers. Eventually, the study would bring on a change since teachers were now involved in every aspect of the study, which included the collection and analyses of data. Moll and Gonzalez then proceeded to describe how funds of knowledge was collected and analyzed. Furthermore, teachers who wanted to learn about their students' homes took a graduate course in which they were trained and presented with the theoretical framework of this approach. More recently, though, the funds of knowledge project has revamped the way they undertake the study.

Currently, researchers first visit schools to describe the details of the study and the benefits of studying students' homes (Moll & Gonzalez, 2004). Teachers volunteer to take part in the study. The researchers do not randomly select teachers since they argue that it could result in resistance. After teachers learn of the details and benefits, the researchers begin to introduce ethnography. They introduce this anthropological perspective through the use of ethnographic literature. Additionally, teachers get involved in interviewing each other to practice before going out in the field. Discussions are held in order to emphasize the "nonjudgmental stance to the fieldwork they will be conducting," (Moll & Gonzalez, 2004, p.702). Teachers are urged to pay careful attention to detail when they commence their studies in the homes. Moll and Gonzalez comment that teachers are advised to observe the neighborhoods as they drive so that they can identify funds of knowledge, e.g. fixed up cars, gardening, or murals. During the early phases of training, the teachers are presented with two videos-- one of them is about a yard sale and the other deals with a backyard workshop. Consequently, the yard sale video leads to a discussion of what is being sold, interactions amongst siblings, and the possible uses of two languages-- English and Spanish. The backyard workshop depicts a father and son making a barbeque grill, which is filled with mathematical concepts ranging from measurements to geometry. The last aspect of the study involves the researchers stressing the importance of "asking respectful questions…. [t]he ethnographic interview is vital in building relationships between households and schools, and between parents and teachers" (Moll & Gonzalez, 2004, p.703).

Moll and Gonzalez (2004) include excerpts from field narratives in order for the reader to experience first-hand what type of information these teachers came across as they visited their Mexican-American students' homes. Funds of knowledge were apparent in the excerpts ranging from construction of things around the house to mechanics outside in the backyard repairing electronic appliances and to knowing the value and importance of certain jobs the students' family members had. Thus, there was a plethora of knowledge these families had that teachers could expand on back in the classroom. For example, the construction could be used for a math lesson. The repairing of electronic appliances could be tied to science since there is a process to fix that device. Besides these things, visiting students' households enables teachers to understand the social networks families have as well as the use of their first language (Moll & Gonzalez, 2004).

The funds of knowledge approach, as we have seen, emphasizes that students possess valuable knowledge that comes from their home. There are teachers, however, who hold a deficit thinking view of culturally and linguistic diverse students (CLD). This negative thinking affects ELL students because teachers are likely to view CLD students and families as having "deficits rather than strengths" (Araujo, 2009). What many teachers fail to see is that "[m]any students use the lessons taught at home to navigate the school system" (Araujo, 2009, p.118). Patterson and Baldwin (as cited in Moll & Gonzalez, 2004) posit that the socialization that takes place between educators and family members helps teachers in getting to know their students better, and because it happens in another environment aside from school, it helps teachers view students differently. Students are no longer viewed as lacking skills and knowledge, but are seen as individuals who bring funds of knowledge to the classroom (Moll & Gonzalez, 2004).

Culturally relevant pedagogy and culturally responsive pedagogy.

By recognizing that their students bring funds of knowledge to school, teachers can provide equity pedagogy in content areas, such as math and science. During our review of extant literature, we came across two instructional methods that address diverse students' needs: culturally relevant

pedagogy (CRP) and culturally responsive pedagogy. According to Ladson-Billings (as cited in Leonard, Napp, & Adeleke, 2009), CRP is defined as "a pedagogy of opposition not unlike critical pedagogy but specifically committed to collective, not merely individual, empowerment" (p. 160). Dutro, Kazemi, Balf, and Lin (as cited in Leonard, Napp, & Adeleke, 2009) explained that by using this tool, educators will tap into the cultures, languages, and experiences that their students bring to help bolster academic achievement for ELLs. According to Martin (as cited in Leonard, Napp, & Adeleke), in order to be successful, educators must incorporate the experiences of ELLs into their classroom instruction. Ladson-Billings asserts that students must learn beyond functional literacy in mathematics or computational skills (Leonard, Napp, & Adeleke, 2009) and learn critical literacy within the scope of mathematics. Gustein posits that critical literacy allows students to review, analyze, and take action in situations that occur in their community or world around them (Leonard, Napp, & Adeleke, 2009).

CRP also assists to develop cultural competence. According to Ladson Billings (as cited in Leonard, Napp, & Adeleke, 2009) cultural competence is the "ability to function effectively in one's culture of origin". Ladson-Billings; Morrison (as cited in Leonard, Napp, and Adeleke, 2009) state that teachers can support the students' cultural competence by validating the students' first language and culture as funds of knowledge. Tate (as cited in Leonard, Napp, & Adeleke, 2009) comments that CRP lessons help develop critical consciousness. According to Ladson-Billings, critical consciousness refers to being aware of the politics involved in an issue or problem in society and having the capacity to question the status quo to bring about change (Leonard, Napp, & Adeleke, 2009). In this process, students become producers of knowledge instead of only consumers of knowledge (Leonard, Napp, & Adeleke, 2009). Therefore, according to Ladson-Billings (as cited in Leonard, Napp, & Adeleke, 2009), CRP assists in bringing about academic success, cultural competence, and critical consciousness.

According to Gay (2000), culturally responsive instruction requires educators to be knowledgeable of students' culture and values, e.g. different ethnic groups favor cooperative settings rather than individualism. Additionally, Gay conjectures that when teachers become aware of students' culture, they are able to know how students are expected to interact with adults. For example, some ethnic groups consider it disrespectful when a child looks at adults straight in the eye. By becoming acquainted with students' culture, teachers can also learn about gender roles in various ethnic groups and use this knowledge to increase equity in the classroom (Gay, 2000). Gay further posits that another requirement of culturally responsive teaching is to become aware of details of certain ethnic groups. "Too many teachers and teacher educators think that their subjects (particularly math and science) and cultural diversity are incompatible, or that combining them is too much of a conceptual and substantive stretch for their subjects to maintain disciplinary integrity" (Gay, 2000, p.107). Therefore, Gay argues, culturally responsive teaching requires not only to use multicultural instructional strategies but to also incorporate multicultural content in the subject areas. Furthermore, teachers should be knowledgeable of various ethnic groups' contributions. Gay comments that "this can be accomplished, in part, by all prospective teachers taking courses on the contributions of ethnic groups to the content areas that they will teach and on multicultural education" (Gay, 2000, p.108). Both pedagogies--culturally relevant and culturally responsive--bank and utilize students' cultures, value the knowledge they bring to school from the home, and empower them.

Mathematics and Funds of Knowledge

Developing CRP or providing a culturally responsive classroom does have some challenges for teachers. The difficulties can be attributed to a resistance to change in what constitutes mathematics (Civil, 1994). Currently, the accountability system drives educators to teach in a certain manner, in order for students to pass the state exams. In addition, school policy has a tremendous influence over instructional practices. Teachers feel pressured by the administrators and the school district to ensure that their students will pass these tests (Leonard, Napp, Adeleke, 2009). Thus, the focal point in education is to make sure that the students pass their state exams and not necessarily to learn or to provide the best pedagogy to develop each student.

Although educators have these demands placed on them by school policy and the accountability system, they must provide students with the most effective pedagogical practices to develop learning, in particular for ELLs. Using funds of knowledge, as has been discussed above, to teach mathematics can be instrumental to attain academic success. Moll, Amanti, Neff, and Gonzalez (as cited in Moll and Gonzalez, 2004) state that the variety of topic selections can be chosen from the funds of knowledge that students bring to mathematics class, such as farming, animal husbandry, construction, business, finance, and trade. The families' job histories provide an immense store of funds of knowledge. Also, the type of jobs in a certain geographical area is connected to the area's political economy. For the Southwest, this may include jobs in mining, metallurgy, ethnobotany, ranching, and transborder enterprises (Moll & Gonzalez, 2004). These can provide a basis from which educators can create math lessons to provide relevance to students. It is important, therefore, for educators to have this background knowledge so they can help students understand the concepts. Also, teachers can use funds of knowledge and students' prior knowledge to tie together comprehension and learning. For example, students may bring knowledge of other types of food or candy from Mexico or another country. A teacher can create a series of interdisciplinary lessons centered on the topic of candy production. Additionally, students can study math concepts, such as mean, median, and mode in relation to such production. Another example is work done by an educator named Hilda Gonzalez Le Denmat. She developed lessons on the topic of construction of structures. According to Moll and Greenberg (as cited in Moll & Gonzalez, 2004), she incorporated reading, writing, and math activities connected to such construction. Further, Ayers, Fonseca, Andrede, and Civil stated that students worked on research projects and built a variety of structures (Moll & Gonzalez, 2004).

Another project initiated by a fifth grade teacher was to develop some lessons around games. The topic of games was an avenue to explore the mathematical ideas that children possessed. The students reacted very favorably to this topic. One of the goals that the fifth grade teacher had was to have students become involved in mathematics by providing the opportunities to discuss open-ended problems. It was important, in this instance, to take into account the funds of knowledge that students brought from home. The students and teacher brainstormed the game topic. Students were also asked to interview family members about which games they played as a child. Students played games which included math concepts for the purpose of analyzing them. This was to increase their ideas about games and would later help them with the creation of their own game. Moreover, students became aware of problems-solving strategies, which were tied to lessons that they previously had. In conducting these lessons, students had to resolve real problems. They had to finish the construction of their games. In the process, students had to work in groups, test their game, and make necessary changes. In addition, students used math when they measured to make the board and the items that were placed on the board (Civil, 1994).

While students developed their games, it was important to discuss issues that would arise and problem-solve together to bring about a solution. Alro and Skovsmose (as cited in Thornton, 2006) asserted that the role of language in math is very important. The dialogues occurring in the classroom can improve learning. According to Zevenbergen (as cited in Thornton, 2006), the math content area has a vast amount of vocabulary terms. She further explained that language is a type of cultural capital that students must learn, especially those students from diverse populations. This is why it is important to use the students' funds of knowledge in the math classroom and provide opportunities to learn the language of math using a variety of activities. For example, Presmeg recommends (as cited in Thornton, 2006) using semiotic chains, first in which student instruction and learning interface with funds of knowledge, then to an activity that puts into practice the funds of knowledge, followed with a model of the activity using a mathematical concept, and lastly applying it to an abstract mathematical problem. Presmeg believes these steps assist in scaffolding mathematical lessons (Thornton, 2006).

Personal experience with funds of knowledge as a math educator.

As a contributor to this article and an educator, I would like to add a few of my experiences with funds of knowledge. My ELLs are usually eager to share their experiences in the classroom. Students have shared how to make certain Mexican food. They have explained how to make tortillas, flan, enchiladas, Mexican hot chocolate, and others. Students have learned measurement and addition of mixed numbers using this information. Students have made recipe books from recipes that their parents and grandparents use. Students have also shared how their fathers work in construction or do paint jobs. We have incorporated these funds of knowledge to learn area and calculate how much paint would be needed. Lessons of perimeter have also been taught as students share that they helped their dad build a block fence. One student mentioned how her grandmother uses her arm (from the elbow to the end of her longest finger) to measure a yard when she purchases material to make clothes. I have gone to downtown in Laredo, Texas and have seen ladies use this method to estimate the number of yards of fabric before the clerk can assist them. One student shared how his uncle would sell piñatas. With this example, we covered the concept of decimals by simulating the purchase of piñatas and learning to give change. We also learned about estimating the supplies needed to make a certain amount of piñatas. These examples demonstrate in some specific ways to use the funds of knowledge that the students have brought into my classroom.

Science and Funds of Knowledge

Science education researchers posit that the best way to support diverse students is when cultural knowledge and resources are tapped into (Barton & Tan, 2009). Moll, Amanti, Neff, and Gonzalez (2005) offer a plethora of household funds of knowledge that could be utilized in science classrooms: soil and irrigation systems, crop planting, construction, repair of cars and electrical appliances, contemporary medicine, first aid procedures, herbal knowledge, anatomy, folk medicine, and folk cures. Moje et al. (as cited in Ivey and Broaddus, 2007) studied adolescent students who lived in a predominantly Hispanic community; these researchers studied cultural resources available to these students that could assist them in learning scientific content. They found the following themes: funds of knowledge from family, community, peers and popular culture. Specific examples of each category included: geological knowledge from traveling to other countries; protests against constructing a building in a toxic waste site; and Spanish news that discussed scientific topics.

Barton and Tan (2008) studied a 6th grade science classroom in a school whose focus is science and which only served diverse (55% Hispanic and 45% African American) students from low income families (93% of the students received free lunch). In terms of academic success, the school was on the verge of failing based on meeting standards on test scores. These students' teacher was a white male who believed in a learner-centered classroom and utilized instructional strategies that included but were not limited to: discussions, projects, and presentations. He had effective management skills according to the researchers. Barton and Tan describe Mr. M (the teacher's pseudonym given by the authors) as having difficulty entrusting students during lessons since he wanted to stay in control to prevent disorder that could intervene in student learning, but he struggled with listening to his students and building on their schema (background) since there was a tremendous amount of pressure for students to do well on the standardized assessment due to the poor scores the school had received. The authors commented that these issues never became a problem "rather [they become] an artifact of his continual efforts to work towards a more democratic and rigorous science classroom experience for his students" (Barton & Tan, 2008, p.54). The researchers along with the teacher and students designed a unit that incorporated funds of knowledge in learning science.

Along these lines, Barton and Tan conducted a food and nutrition experiment which required the completion of two major and two minor assignments: a nutrition guide, a poster describing a healthy appetizer competition, an explanation of a snack competition, and a healthy appetizer activity sheet. Similarly, Moll (as cited in Moll & Gonzalez, 2004) pointed out that students can learn the chemical make-up of the ingredients and the nutritional value can be analyzed. Barton and Tan found that student participation and their achievement increased during this unit, whereas before students would receive low grades and were less engaged or silent. Mr. M felt that these assignments not only incorporated students' funds of knowledge but they also were rigorous. All the students turned in the two major assignments; this was surprising since many of the students were known to not complete assignments. In one of the lessons, the students had to describe the different parts of a plant. The students were assigned to interview a family member and ask them for their preferred choice of home salad recipe. Once the students brought their recipes back to the classroom, Mr. M asked for them to share it with the class. He selected a few, and these students described the ingredients and amounts, procedures, and the way the recipe was part of their family tradition. Mr. M used a student's home salad as an example of "how to write scientifically and to initiate a discussion on how her salad is a root salad" (Barton & Tan, 2008, p.57). The salad recipe lesson lent itself to further exploration in the topic of plants. For example, students were asked to identify the plant parts of their salad and to categorize the different salad ingredients according to the plant parts.

The final lesson of the nutrition unit involved the making of a healthy appetizer (Barton & Tan, 2010). Students brought different food items including: mangoes, cantaloupes, grilled chicken kebabs, milk and various fruits to make a smoothie. Students' culture and the kind of foods they consume at the home could have been the reason why they chose such food items. The authors comment how students had the opportunity to work with peers when preparing their snack; they visited friends' tables, tasted the appetizers, and discussed the benefits of their healthy appetizer. This lesson proved to be popular campus wide, even teachers and administrators stopped by the classroom to taste the various snacks and talked to students about their creations. Another lesson in Mr. M's class involved the creation of an anti-smoking skit (Barton & Tan, 2010). Community-based funds of knowledge were apparent in the skits since the students' neighborhoods "provided

the plotlines of several skits" (p.47). For example, street culture and the speech students used in their neighborhood were seen in some of the skits. Furthermore, the skits brought forward the opportunity for students to discuss social peer pressure. Barton and Tan point out that Mr. M made sure to remind students of what they had learned regarding the effects of smoking and offered ways for students to defer from falling victims of peer pressure.

All in all, Mr. M utilized instructional strategies that made use of funds of knowledge. His instructional strategies included but were not limited to story-telling, being real, and authentic science-based participation. Barton and Tan (2010) state that through story-telling, Mr. M increased his students' voices by asking students to share their stories and funds of knowledge; the students were able to discuss based on their experiences from the home and their neighborhoods (Barton & Tan, 2010). The authors also comment that students' interest and talent were tapped into when skits and student stories were incorporated into the lessons. One of the other instructional strategies that Mr. M used was a school science club. The school science club encouraged parents to join; in so doing, he "acquainted parents with what their students had been learning in class" (Barton & Tan, 2010, p. 49). Mr. M's lessons demonstrate that there are many ways in which science educators can tap into students' funds of knowledge, just as he did in his class.

Personal experiences as an ELL and with funds of knowledge in science.

As one of the authors of this article, I had similar experiences as an English language learner and with funds of knowledge in science. Both of my parents speak Spanish only. We moved to the United States from Mexico when I was 5 years old. Acquiring the English language was not an easy task; I was learning English at school, but at home I had to speak Spanish. This dichotomy was not difficult to handle. School was the place where I was to learn English, and home was the place where I could speak the language my family spoke. As an elementary student, my first positive experience with science was until I was in the 5th grade. My 5th grade science teacher created a science club in which we did various science activities, including viewing videos related to earth science (e.g. solar system). A couple of years later, in high school, in a health course, a teacher asked us to come up with a skit and present it to class. Coincidentally, the skit was a campaign against smoking, just like Mr. M's lesson described previously. I remember that our group drew from experiences we had encountered in our neighborhoods and the experiences we had had as teenagers involving this issue. We all liked the skit project since we were all able to contribute our community funds of knowledge. By creating a skit based on our community funds of knowledge, we were eager to participate, and we were able to understand the concept since we drew from our own lived experiences.

In college, I took a course with an exceptional professor, whose quick-wit and demanding yet caring teaching methods inspired me to become a science educator. His lessons required us to think critically. If you answered incorrectly, you would not refrain from attempting; instead, you would persist till you got the correct answer. This biology professor would take us out in the "field" every Friday during part of our lab. We would walk around the university naming and describing native and non-native plant and animal species. Many of us had no idea we had such diverse plants and animals in our area. In one of the courses, we would meet at a park that was located on the banks of the river. We had to conduct a study of any aspect of the park. The studies ranged from: counting trees in the area, counting specific plant species, watching birds, and studying a non-native tree that soaked up the water from the river.

In a herpetology course, this same professor required a collection of specimens that we found at our home or in the city. We had an identification book, and he would not tell us the name of the species until we had looked through the identification key. Some students perceived him as being strict when he would do this, but in the end, we all understood that he wanted us to think and to use the skills he had taught us. I took a graduate course with him that dealt with environmental issues in our area. As part of this environmental class, we kayaked the river and came to appreciate it and view it as a beautiful resource rather than just a body of water dividing us from Mexico. I have a fond memory of this professor because he did not teach straight from the textbook; he used student-centered instructional strategies. Furthermore, this biology professor inadvertently tapped into our home and community funds of knowledge and made a lasting impression.

Administrators' and Counselors' Role in Promoting Mathematics and Science

Administrators and counselors could also capitalize on students' funds of knowledge to promote mathematical and scientific achievement. West-Olatunji et al. (2010) studied three counselors that serviced students in a low-income African American school. The authors wanted to explore how these counselors were encouraging or discouraging students from entering the mathematics and science fields. The three participants said that they would utilize hands-on activities, funds of knowledge, and success and motivation (to mention a few of the interventions) to promote science and math with these students. Nevertheless, the researchers stated that the "outcomes of this study suggest that well-intentioned school counselors may contribute to existing social conditions within school by failing to serve as advocates for students" (West-Olatunji et al., 2010). The authors conjectured that school counselors could assist teachers in creating lessons that are culturally responsive and increase diverse student engagement. In the same way, we feel that administrators could also assist educators in creating a classroom that instills equity and makes the most of their students' funds of knowledge by being supportive.

Conclusion and Recommendations

The growth of minority students whose first language is other than English poses an additional responsibility to educators and school administrators. In response to this, educators must make educational decisions that bring about equitable pedagogy. Unfortunately, curriculum materials continue to focus on the White, European culture as the unstated norm. This cultural mismatch affects minority students' learning. In contrast, using funds of knowledge in math and science can help close the achievement gap between White students and ELL students. Educators can provide equity pedagogy by capitalizing on their students' cultural funds of knowledge that they bring to the classroom to increase achievement in math and science. Studies cited on this paper have shown that incorporating students' funds of knowledge is beneficial in attaining student success. Teachers can use funds of knowledge and students' background knowledge to make a connection in their learning. To facilitate teachers in retrieving students' funds of knowledge, the use of a questionnaire at the beginning of the school year would enable teachers to incorporate some of the students' home and community experiences into the lessons.

According to Zevenbergen (as cited in Thornton, 2006) language is a type of cultural capital that students must learn, especially those students from diverse populations. Furthermore, students must be given opportunities to learn the language of math and science through a variety of culture and home-based activities. Dutro, Kazemi, Balf, and Lin (as cited in Leonard, Napp, & Adeleke, 2009) state that culturally relevant pedagogy will allow educators to tap into the cultures,

languages, and experiences that their students bring to help facilitate academic achievement for ELLs (Dutro, Kazemi, Balf, & Lin, 2008). In addition, a culturally responsive classroom, includes student-centered learning in which teachers incorporate students' cultures, and teachers access the knowledge students "bring to school…. to promote student achievement" (Richards, Brown, & Forde, 2006, p.4). Consequently, districts, schools, administrators, and teachers are responsible to bring about the needed change that will assist culturally and linguistically diverse students in being equipped with the necessary mathematical and scientific content knowledge.

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