A MIXED-METHODS STUDY TO UNDERSTAND THE PERCEPTIONS OF HIGH SCHOOL LEADERS ABOUT ENGLISH LANGUAGE LEARNERS (ELLS): THE CASE OF MATHEMATICS

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ABSTRACT

This study discusses the challenges faced by high school leaders in providing an environment that successfully maximizes the learning experiences of English Language Learners (ELL) students. It also focuses on the perceptions of principals and vice-principals concerning the challenges faced by these students in relation to standardized high-stakes tests. In this regard, one of the purposes of this study is to determine how these perceptions are influenced by an understanding of the influences of the diverse linguistic and cultural backgrounds of ELL students on their academic performance in mathematics. Another purpose is to describe pedagogical approaches such as culturally relevant education and ethnomathematics that high school leaders may implement to meet the educational needs of these students in their schools. This study also adds to the existing body of the literature in relation to the perceptions of high school leaders concerning ELL students and provides useful information for decision-makers in the field of teaching English and mathematics to speakers of other languages.

Keywords: English Language Learner; Culturally Relevant Education, High School Leaders; Standardized High-Stakes Tests; Ethnomathematics; Mixed-Methods Study.

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IJSME – International Journal for Studies in Mathematics Education

INTRODUCTION

Many school districts in the United States face the challenge of the growth of English Language Learners (ELL) populations. Demand is growing rapidly for high school leaders who can effectively manage and harness linguistically and culturally diverse schools. As California becomes ever more multicultural, successful leadership will come only to those school leaders who have and understand the skills to respond appropriately to cross-cultural challenges (Scheurich & Skrla, 2003). This trend has a tremendous effect on high schools in California, especially those with higher percentages of ELL students. In this regard, high-school leaders are accountable for the achievement and performance of these students on standardized high-stakes assessments in mathematics. This aspect of leadership is crucial when ELL students are expected to be proficient on the California High School Exit Exam (CAHSEE) and California Standardized Testing (CST) examinations.

This study identifies specific perceptions of school leaders about ELL students as mathematics learners in the nine high schools at Alpha Unified School District (AUSD), a suburban school district near Sacramento in California, which may contribute to the way that these school leaders help ELL students to improve performance in mathematics assessments. The results of this study may be used to inform high school leadership about programs and professional development opportunities to further enhance school leaders' cultural proficiency awareness. An additional benefit could be gained as principals and vice-principals reflect on their own perceptions about their ELL population. In this perspective, these school leaders in California may be able to build on their understanding of the influence of ELL linguistic and cultural backgrounds for increased achievement and performance in school curricular activities, especially in mathematics.

STATEMENT OF THE PROBLEM

School leaders must be committed to the process of continuous examination of their own perceptions and practices as well as their own personal decision making

process in order to assure the success of ELL students in a supportive linguistically and culturally relevant school community (Scheurich & Skrla, 2003). Herrity and Glassman (1999) found that many school leaders are not prepared to deal with the challenges faced by ELL students and the complex issues concerning linguistically and culturally relevant education. Furthermore, Gándara, Maxwell-Jolly and Rumberger (2008) stated that "many administrators lack the skills needed to provide support and guidance for teachers and programs for English [Language] Learners" (p. 13). This means that school leaders are not effectively trained to help their staff make appropriate decisions related to educational planning for ELL students (Herrity & Glassman, 1999).

It is essential to determine the perceptions school leaders hold in regard to ELL students and to determine what factors could be linked to these perceptions, as both influence the school environment, in order to meet the educational needs of these students. It is imperative that effective high school leaders serving ELL students recognize the challenges and opportunities posed by the increasing cultural diversity in their educational institutions. In order to achieve this goal, Suttmiller and González (2006) affirmed that school leaders have to become specialists who identify needs, develop effective programs, and provide leadership for constructively managing educational changes for ELL students. One of these specialties is to define significant school change and instructional reform. Nelson and Sassi (2000) argued that leading instructional change and reform requires that high school leaders also understand the demands of current mathematics standards and assessment programs. They must have a clear vision of classroom instruction and pedagogical strategies that increase student learning in mathematics, especially for ELL students.

Research has shown that school leaders' understanding of and support for high quality mathematics instruction are significantly influenced by their perceptions about the nature of mathematics, teaching, and learning (Nelson, 1999). It has been proposed that high school leaders' content knowledge in mathematics and their perceptions about how the subject is both learned and effectively taught is critical to their effectiveness as school leaders for the improvement of students' achievement, including ELL students (Stein & D'Amico, 2000). Stein and Nelson (2003) affirmed that a strong knowledge of mathematics is the cornerstone for a sound decision

making process. From direct and daily experiences, school leaders have realized that students' future success depends critically on the level of their mathematical, analytical, quantitative, procedural, and statistical skills and abilities that are developed from their learning experiences in mathematics (Nelson & Sassi, 2005). Since mathematics will undoubtedly continue to be an important subject matter in school curriculum, a better understanding of mathematical knowledge and its place in the development of human activities is increasingly necessary for school leaders and teachers. According to Stein and Nelson (2003), this kind of mathematical knowledge is necessary for the practice of instructional leadership that effectively links school leadership to teacher and student learning with subject matter at the core.

PURPOSE OF THE STUDY

The purpose of this study was to capture and describe the perceptions of the school leadership concerning ELL students in nine high schools in a suburban school district near Sacramento in California, specifically concerning the challenges faced by these students in relation to their academic success in mathematics standardized high-stakes tests under No Child Left Behind Act (NCLB, 2001). This study sought to determine how high school leaders' perceptions are influenced by an understanding of the effects of the ethnic cultural background of ELL students on academic performance in mathematics standardized high-stakes tests. In addition, this research sought to develop an understanding of the association between culture and mathematics by the identification of linguistic and cultural backgrounds that may explain differences in student mathematics achievement. In this regard, it was also paramount to understand how school leaders come to entertain alternative viewpoints of their students' linguistic and cultural backgrounds and its influence on standardized mathematics high-stakes tests.

A key point of this study was also related to the focus on culture and its connection to mathematics, which may generate different kinds of school climates that utilize students' existing knowledge in order to better impart mathematical knowledge. According to Rosa and Orey (2007), a sense of connectedness to

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students' linguistic and cultural experiences and mathematics into schools heightens their motivation to learn, leading to an increase in their achievement in mathematics and overall mathematics performance. Finally, it was a goal of this study to develop a series of recommendations for practice that may help high school leaders to successfully meet the specific needs of their ELL population.

RESEARCH PARADIGM

The research paradigm chosen for this mixed-method research was the "dialectical perspective" (Creswell & Plano Clark, 2007, p. 27), which is the application of pragmatism and transformative-emancipatory paradigms to conduct the study. In applying the pragmatism paradigm (Tashakkori & Teddlie, 2009), the researcher combined deductive and inductive approaches by mixing both qualitative and quantitative research methods, which involved different forms of data collection and analysis. The researcher also applied some aspects of the transformative-emancipatory paradigm by placing importance on the challenges faced by ELL students on their achievement on standardized high-stakes assessments in order to promote educational success for this specific group of students (Mertens, 2003).

In this regard, the dialectical perspective gave the researcher the opportunity to integrate theory and practice and helped him to understand the perceptions of high school leaders regarding ELL students. This paradigm allowed the researcher to rethink theory concerning practical ways to minimize challenges faced by ELLs regarding their achievement and performance in standardized mathematics assessments. In the context of this study, the dialectical perspective paradigm is considered as a way to promote social change while creating a space for joint reflection and dynamic interaction among high school leaders in AUSD.

THEORETICAL FRAMEWORK

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The findings of this study were examined using Culturally Relevant Education (CRE) Theory. Since the cultural aspects of ethnomathematics (D'Ambrosio, 1990) are interrelated to culturally relevant education (Ladson Billings, 1995), the findings of this study were also framed by applying these theoretical approaches. Nieto (2000) affirmed that CRE was developed out of concern for the serious academic achievement gap experienced by low-income students, students of color, and students from linguistically and culturally diverse environments.

Gay (2000) stated that CRE uses the cultural knowledge, prior experiences, frames of reference, and learning styles of ethnically and linguistically diverse students to make learning more relevant and effective with the objective of strengthening student connectedness with schools and as consequence reducing behavior problems and enhancing learning. Schools can benefit from being culturally relevant by contextualizing instruction and schooling practices while maintaining academic rigor in order to help ELL students to achieve their academic potential (Ladson-Billings, 1995). In order to achieve this goal, it is necessary to implement culturally relevant pedagogy into the school curriculum because it helps to develop students' intellectual, social, emotional, and political learning by using their cultural referents to impart knowledge, skills, and attitudes (Ladson-Billings, 1994). Moreover, Ogbu and Simons (1998) argued that a culturally relevant pedagogy provides ways for students to maintain cultural identity while succeeding academically.

According to this context, Rosa and Orey (2007) stated that one approach to culturally relevant pedagogy is to apply ethnomathematical perspective into the mathematics curriculum. Ethnomathematics studies the cultural aspects of mathematics. It presents mathematical concepts of the school curriculum for a way in which concepts are related to the students' cultural backgrounds (D'Ambrosio, 1990), thereby enhancing students' abilities to make meaningful connections and deepening their understandings of mathematics. In so doing, there is a need to examine the embeddedness of mathematics in culture. Working towards those goals means it is necessary to draw from a body of literature that takes on the ELL students' cultural root of knowledge production into the mathematics curriculum in order to make school mathematics more relevant and meaningful to this school population and promote the overall quality of their education.

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In this study, the theoretical framework worked as a lens that helped the researcher to filter the input and develop a defensible interpretation of the collected qualitative and quantitative data. In order to elaborate research questions related to the perceptions of high school leaders in relation to ELL students, it was necessary to identify the theoretical framework to enable to his world-view explicit as well as to provide the tools in terms of concepts and models for structuring this investigation. In this regard, this theoretical framework helped the researcher to make sense of both qualitative and quantitative data by providing some coherent explanation for why high school leaders stated their point of view about ELL students in their responses during interview and survey. This approach helped the researcher to move the research beyond the realm of the descriptive into the realm of the explanatory data.

According to Anfara and Mertz (2006), since researchers bring to the research process biases, frames, beliefs, and experiences that bound and color their perspectives, the researcher chose this framework to afford clarity in design, data collection, and analysis in this mixed-methods study. This was particularly important and helpful to provide a road map for data collection and analysis. In this context, the researcher had a clearly defined and detailed strategy for analytically viewing the data.

REVIEW OF RELATED LITERATURE

One of the challenges faced by the educational system in the United States is the growing number of students from linguistic and cultural diverse backgrounds (Obiakor & Utley, 1997) coupled with an increasing number of ELL students with comparatively low academic performance in standardized high-stakes testing. Gándara, Maxwell-Jolly, and Benavídez (2007) affirmed that statewide measures of achievement indicated that ELL students in Californian schools are not performing well. They also stated that the performance of these students in mathematics is far below basic when compared to their English-speaking peers. In comparison to ELL students, almost twice as many English fluent students pass the mathematics section of the high school exit exam and almost three times as many English fluent students score at basic or above in Geometry (CDE, 2009). Therefore, both cultural and

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linguistic diversity draw increased attention by many educators and researchers as areas identified as having connections to failed educational systems. Consequently, there is an emergent sense of urgency to resolve this inability to effectively educate all students. According to Valencia, Valenzuela, Sloan, and Foley (2001), the inability of the educational system to teach minority students such as ELL population is of great concern because they are the fastest growing segment of the student population in the United States.

In particular, the role played by school leaders is of vital importance for ELL students because school leaders influence the learning experience outcomes for these students as well as their transformation into active and empowered members of society (Fullan, 2001). Furthermore, school leaders need to understand the complex relations of ELL students' cultural and linguistic backgrounds to school performance and achievement in mathematics. In this regard, it is crucial that these leaders become sensitive to the multicultural needs of their students (Cummins, 2000). In order to grow as educators and culturally relevant leaders, school leaders also need to recognize and address any preconceived notions that they might hold about students' linguistic and cultural backgrounds. In this context, school leaders are faced with the challenge of providing opportunities for ELL students to learn and perform at the same rate of achievement as mainstream students. School leadership is the key to the overall successful academic performance of ELL students (August & Hakuta, 1997).

Two decades earlier, Cárdenas and Cárdenas (1977) stated that ELL students frequently experience failure and frustration as a result of negative societal perceptions about their academic abilities, achievement, and successes. These perceptions create an environment of neglect and low expectation in relation to this student population. According to McCormick (2001), school leaders' perceptions serve as one tool to guide school leaders in order to provide different paths that ensure the academic success of all students. In this perspective, Bandura (1997) stated that school leaders might use their own perceptions as a judgment of their capabilities to structure a particular course of action in order to produce desired outcomes. This may inhibit "capababilities needed to succeed in particular achievement situations" (Bandura, 1997, p. 64) for school leaders, thus limiting the

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possibilities of success for a specific subgroup of students such as ELL students. VanTassel-Baska and Baska (2004) agreed with this point of view by affirming that "perceptions can be powerful drivers of behavior" (p. 7). For example, school leaders' perceptions about significant differences in students' achievement frequently appear between groups of students of different races because students' performance is often compared among all the different student subgroups. One of the distorted perceptions about this issue was pointed out by Bainbridge and Lasley II (2000), who stated a mistaken perception, held by some high school leaders, that minority students' achievement gap is related to their skin color and linguistic and cultural backgrounds.

Nevertheless, ELL students cannot be perceived as a monolithic group. Some of them bring experience in academic subjects in other languages to the classroom and need help translating that knowledge into English. Other students bring little academic preparation and come to the classroom years behind their peers. Some have a beginning knowledge of English while others have almost none (NCELA, 2007). Like other groups of students, ELL students bring a range of individual experiences to school that may affect how quickly they learn the English language. The findings of the NYIC (2008) report showed that ELL students "come from a variety of backgrounds with a diversity of skills and needs that will impact the type of programs and services they need" (p. 5). Meeting the needs of these students is a challenging task because instruction needs to be designed to help them to grow in both academic content knowledge and English language skills. This complexity has always been the case, but increased pressure from No Child Left Behind Act (NCLB, 2001) has put schools and school districts in the United States under the microscope. ELL students often fall behind their peers in mathematics achievement assessments. In this regard, Fry (2008) stated that, in the United States, in the five states with large ELL population, the proportion of ELL students scoring at or above the proficient level on state mathematics tests is often below the proportion of black students scoring at this level of proficiency. As Fry (2008) argued, ELL students "are much less likely than white students to score at or above the proficiency level in mathematics" (p. III) on standardized tests. In agreement with this perspective, Gutiérrez (2008) stated that discrepancies in scores on standardized tests mirror disparities in opportunities and life chances that ELL students experience in their daily lives.

In accordance with the California Department of Education (CDE, 2009), in 2008, California's Standardized Test (CST) results indicated that approximately 89% of all students tested in grades 9-11 scored below proficiency in Algebra I. In this same year, approximately 98% of all ELL students in these same grades scored below proficiency level in Algebra I. In 2008, 40% of all students in California failed the mathematics portion of the CAHSEE while 64% of all ELL students did not pass this portion of the CAHSEE. A passing score required on the CAHSEE is a tool used in California State's accountability report as a necessary component for students to receive a high school diploma. According to Gándara, Maxwell-Jolly, and Benavídez (2007), ELL students are not performing well because they "must master at least two basic bodies of knowledge, English, more specifically the academic English of the classroom and of texts, and disciplinary content material such as history, social studies, science, mathematics, and literature" (p. 4). Gándara et al (2007) affirmed that this mastery is a daunting task for school leaders, who have to provide ELL students access opportunities to a rigorous academic curriculum.

Culturally Relevant Education (CRE) is an educational approach that may provide ELL students' access to a rigorous academic curriculum. It also values the cultural experiences and knowledge of all students regardless of whether they are represented by dominant or non-dominant cultural backgrounds. Klotz (2006) defined CRE as an educational system "that honors, respects, and values diversity in theory and in practice and where teaching and learning are made relevant and meaningful to students of various cultures" (p. 11). This is a system that educates all students by incorporating their diverse emotional, social, cognitive, linguistic and cultural experiences into a successful teaching-learning environment. CRE also empowers all students intellectually, socially, emotionally, and politically by using cultural referents to include student knowledge, skills, and attitudes within the pedagogical work in schools (Ladson-Billings, 1994). It combines an examination of the cultural and socioeconomic influences on teaching and learning. According to Rosa (2010), CRE includes knowledge along with a commitment to the challenging of social injustices and reflections upon educational challenges by identifying obvious and subtle individual, institutional, linguistic, and cultural actions that perpetuate social structures.

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CRE instills ethics of care, respect, and responsibility in the "professionals who serve culturally and linguistically diverse students" (Klingner, Artiles, Kozleski, Harry, Zion, Tate, Duran, & Riley, 2005, p. 8) such as school leaders, teachers, and staff. In this regard, CRE creates and implements spaces for school leaders' and teachers' reflection, inquiry, and mutual support around issues of linguistic and cultural differences. According to Beauboeuf-Lafontant (1999), these spaces encourage school leaders and teachers to understand and respect individual differences and strive for high educational standards and levels of achievement for all students. In so doing, an important change in mathematical instruction needs to take place to accommodate continuous and ongoing change in the demographics of students in mathematics classrooms in California. It is necessary to integrate a culturally relevant curriculum into the existing mathematics curriculum. Torres-Velasquez and Lobo (2004) affirmed that this perspective is an essential component of culturally relevant education because it proposes that teachers contextualize mathematics learning by relating mathematical content to students' linguistic, cultural, and real-life experiences. According to Rosa and Orey (2007), an ethnomathematics approach to the mathematics curriculum is the pedagogical vehicle for achieving such a goal.

The field of ethnomathematics links students' diverse ways of knowing, learning, and culturally embedded knowledge to academic mathematics. It explores academic and culturally ways to provide more inclusive developmental programs for the diverse populations served at educational institutions (D'Ambrosio, 1990). Ethnomathematics is a program that includes cultural relevance and builds curricula around the local interests, language, and culture of the learners (Rosa, 2005). Teaching mathematics through cultural relevance and personal experiences helps students to know more about reality, culture, society, and environmental issues by providing them with mathematics content and approaches that enable them to successfully master academic mathematics.

Classrooms and learning environments cannot be isolated from the communities in which they are embedded because they are part of a community with defined cultural practices, which use a cultural context focused on school mathematics and the effect of cultural factors on teaching and learning academic mathematics. In this regard, Bandeira and Lucena (2004) and Lean (1994) identified

cultural mathematics and its acquisition in traditional school settings. Borba (1993) stated that classrooms might be considered environments that facilitate pedagogical practices, which are developed by using an ethnomathematical approach. Moreover, Eglash (1997) and Rosa and Orey (2007) argued that including cultural aspects in the curriculum have long-term benefits for mathematics learners. This means that cultural aspects contribute to recognizing mathematics as part of daily life, enhancing the students' ability to make meaningful connections, and deepening their understanding of mathematics. In this regard, Chieus (2004) affirmed that the pedagogical work towards an ethnomathematics perspective allows for a broader analysis of the school context in which pedagogical practices transcend the classroom environment because these practices embrace the sociocultural context of the students. Damazio (2004) agreed with this perspective by suggesting that pedagogical elements necessary to develop the mathematics curriculum are found in the school community.

Adam, Alangui, and Barton (2003) and Rosa and Orey (2003) stated that a culturally relevant mathematics curriculum based on an ethnomathematical perspective infuses the students' cultural backgrounds in the learning environment in a holistic manner. One possibility for an ethnomathematical curriculum may be labeled as mathematics in a meaningful context in which students are given opportunities to relate their new learning experiences to knowledge and skills they have previously learned. According to Bandeira and Lucena (2004), mathematical curriculum conceived in an ethnomathematical perspective helps to develop mathematical concepts and practices that originate in students' culture by linking them to academic mathematics. The understanding of conventional mathematics then feeds back and contributes to a broader understanding of culturally based mathematical principles. The work of Lipka (2002) in Alaska is an example of this type of approach to curriculum innovation. It is assumed that a curriculum of this nature motivates students to recognize mathematics as part of their everyday life and enhances their ability to make meaningful mathematical connections by deepening their understanding of all forms of mathematics.

According to this context, it is necessary that school leaders develop a different approach to mathematics instruction that empowers students to understand

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mathematical power more critically by considering the effects of culture on mathematical knowledge and work with them to uncover the distorted and hidden history of the mathematical knowledge. According to Rosa (2000), this methodology is essential in developing the curricular practice of ethnomathematics and culturally relevant education through the investigation of the cultural aspects of mathematics and an elaboration upon mathematics curricula that considers the contributions of people from other cultures. In so doing, students' knowledge of mathematics becomes enabled and enriched.

RESEARCH QUESTIONS

In this study, the following research questions provided a guideline for the investigation of school leaders' perceptions concerning ELL students:

1. What are the general perceptions of high school principals and vice-principals in relation to their ELL population?

2. What are the perceptions of high school principals and vice-principals about ELL students' cultural backgrounds as challenges to their academic performance on mathematics standardized high-stakes tests?

3. What are the perceptions of both high school principals and vice-principals in relation to the association between mathematics and culture?

4. What are the perceptions of high school principals and vice-principals about ELL students' linguistic background as challenges to their academic mathematical achievement?

5. What are the high school principals and vice-principals perceptions of ELL students' performance on standardized high-stakes tests in mathematics?

METHODOLOGY

A mixed-methods approach was used in this study to "build on the synergy and strength that exists between quantitative and qualitative research methods in order to understand a phenomenon more fully than is possible using either quantitative or qualitative methods alone" (Gay, Miles & Airasian, 2006, p. 490). According to Patton (2002), researchers use mixed-methods "to be responsive to the nuances of particular empirical questions and the idiosyncrasies of specific stakeholder needs" (p. 585). In other words, it is not enough to simply collect and analyze quantitative and qualitative data because they need to be mixed so that together they form a more complete picture of the problem under study than they do when standing alone.

Research Design

This study combined quantitative and qualitative methods (QUAN + QUAL) in order to capitalize on the strengths of each approach. Greene, Caracelli, and Graham (1989) and Creswell (2002) stated that a mixed-methods design provides a comprehensive answer to each research question of the study and argued that a research design that integrates different methods is likely to produce better results in terms of quality and scope. By mixing the datasets, the researcher was able to provide a better understanding of the problem under study than if either dataset had been used alone.

Accordingly, the researcher applied qualitative techniques of data analysis to support conclusions reached through quantitative data analysis in relation to the perceptions of high school leaders concerning ELL students. The use of both kinds of data allowed the researcher to gain a deeper understanding of the problem under study. Furthermore, conclusions obtained from analysis of the quantitative data were further supported and enhanced through thick descriptions (Geertz, 1973) of some aspects of the qualitative data obtained from the open-ended interview and survey questions. In other words, the thick description provided a detailed analysis of the researcher's interpretation of the quantitative data in the context of the study as well as a thorough accounting of the methods and procedures followed during and after data collection.

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Context of the Study

The population of this study was comprised of principals and vice-principals in nine high schools in AUSD, which is a suburban school district near Sacramento, California. In the 2007-2008 school year 4,455 (9.4%) of the 47,400 enrolled students were ELL students. In addition, 52.6% these ELL students spoke Spanish. The most spoken languages in AUSD were Spanish, Russian, Ukrainian, Rumanian, and Farsi (CDE, 2009).

It is important to note that during the 2007-2008 school year, according to the California Department of Education (CDE, 2009), the percentage of ELL students in the nine high schools of the AUSD selected for this study ranged from 0.7% to 22.3%. In this same school year, 618 of the 13,188 students enrolled in these nine high schools were ELL students, representing 4.7% of the total of the high school student population. For ELL students, the most spoken languages in these nine high schools were Spanish, Russian, Ukrainian, Rumanian, Farsi, Korean, Punjab, Hmong, and Filipino. The Spanish language was spoken by 46.5% of ELL students.

Sources of Data

The procedure chosen for this mixed-methods study was designed to use data collected through interviews, surveys, open-ended questions, and ELL students' performance on CST and CAHSEE as well as demographic data about these students, principals, and vice-principals. The data was collected from September 28 to October 30 of the 2009-2010 school year. The population selected to be part of this study was composed of high school leaders consisting of 9 principals and 25 vice-principals in AUSD. However, after several contacts through emails and mails, only six principals and 20 vice-principals agreed to participate in the data collection process. Of the 26 respondents, 14 (53.85%) were male and 12 (46.15%) were female. Of the 26 participants, 20 (76.92%) participants reported that their ethnicity is White, 2 (7.69%) reported that their ethnicity is African-American, 2 (7.69%) reported that their ethnicity is Hispanic/Latino; 1 (3.85%) reported their ethnicity as multicultural, and 1 (3.85%) did not respond to the question.

Criteria for Selecting the Population

Purposeful sampling, a non-random method of sampling whereby the researcher selects information-rich cases for study, was selected as the sampling method for this study. Information-rich cases are those that allow the researcher to learn a great deal about issues of central importance to the purpose of this study (Patton, 1990). Since, the purpose of this study was to capture and describe the perceptions of high school leaders in AUSD concerning challenges faced by ELL students and their success in standardized high-stakes tests under NCLB, purposeful sampling allowed the researcher to come to a stronger understanding about the results from this study by focusing in depth on understanding these perceptions. It is better to focus on a small number of carefully selected participants rather than gather standardized information from a large and statistically significant sample (Patton, 2001). This means that in-depth information gathered from:

> *(…) a small number of people can be very valuable, especially if the cases are information-rich. What should happen is that purposeful samples be judged based on the purpose and rationale of each study and the sampling strategy used to achieve the study's purpose. The validity, meaningfulness, and insights generated from qualitative inquiry have more to do with the information-richness of the cases selected and the observational/analytical capabilities of the researcher than with sample size (Patton, 1990, p. 184-185).*

In this study, the researcher applied this sampling approach because it has "particular features or characteristics which enabled detailed exploration and understanding of the central theme or puzzles which the researcher wishes to study" (Ritchie, Lewis, & Elam, 2003, p. 78).

In the process of sampling selection, the researcher also applied criterion sampling to select subjects who met the predetermined criterion of importance. In this study, the applied criterion was the selection of high school principals and vice-principals in AUSD. According to Patton (2002), criterion sampling is useful for identifying and understanding perceptions that are information-rich because it provides an important qualitative component to quantitative data by identifying themes that have emerged from the open-ended interview and survey questions. Patton (1990) also stated that the purposeful and criterion methods of sampling are strong approaches that assure the quality and integrity of the study.

Instrumentation

The following instruments were developed in order to collect both qualitative and quantitative data for this study:

Semi-Structured Interview

In this study, the interview questions were designed to elicit a broad range of detailed responses, lending depth to the information that principals furnished in their interview. In this approach, the interview questions were asked in an open-ended fashion to ensure neutrality, to avoid leading the participants, and to "minimize the imposition of predetermined responses when gathering data" (Patton, 1990, p. 295). A semi-structured interview guide with 24 open-ended questions was developed to collect qualitative data. This approach allowed for an efficient and comprehensive interviewing of the participants regarding specific issues concerning ELL students.

Sample of Interview Questions

- What is the difference in performance on standardized tests between your non-ELL students and ELL students? Why do you think this is so?

- What role does English language proficiency play in learning mathematics for your ELL students?

- What are the challenges your ELL students face in their performance on mathematics standardized high-stakes tests, which can be attributed to their cultural background?

Survey

In this study, a survey was elaborated using 30 four-point Likert scale questions (quantitative data) and 10 open-ended questions (qualitative data). The open-ended questions gave respondents an opportunity to add a detailed narrative regarding their perceptions of ELL students.

Sample of Survey Questions

- The cultural background of ELL students does not influence their performance in mathematics standardized high-stakes tests.

    1. Strongly Disagree (   )   2. Disagree (   )   3. Agree (   )   4. Strongly agree (   )

    If so, could you please describe how?

    If not, could you please, explain why?

- ELL students can achieve high academic standards in mathematics.

    1. Strongly Disagree (   )   2. Disagree (   )   3. Agree (   )   4. Strongly agree (   )

    If so, please list the factors that contribute toward this achievement.

    If not, please list the factors that contribute for their non-achievement.

- Due to their ethnic cultural background, ELL students are frequently unable to demonstrate their content-area knowledge in mathematics high-stakes standardized tests.

    1. Strongly Disagree (   )   2. Disagree (   )   3. Agree (   )   4. Strongly agree (   )

    If so, could you please describe how?

    If not, could you please, explain why?

Reliability

Reliability refers to a measure of the consistency of an assessment instrument (Krathwohl, 1998). In other words, reliability is used to gauge whether the same results would be obtained if this study were to be replicated. In this study, the researcher assessed the degree to which the survey possessed internal consistency. Because the pilot test for the survey was not administered, the researcher established the degree of internal reliability of the survey instrument through the application of split-half reliability methodology. According to Bryman and Cramer

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(2005), when the researcher applies "split-half reliability, items are divided into two groups and the relationship between the respondents' scores for the two halves are computed" (p. 77). Split-half design creates two comparable survey administrations because the items are split into two surveys that are equivalent in content and difficulty. The scores for each half of the survey are then compared to one another. If the survey is consistent, it leads the researcher to believe that it is most likely measuring the same thing.

In this study, the reliability of the survey was determined by correlating both its odd and even portions. It was assumed that the two portions of the survey were equally worded and the words and reading difficulty were as similar as possible in both its versions. This information served as a guideline to calculate the correlation between both halves of the survey by using the *Pearson Product Moment Correlation Coefficient*, which is a statistical measure of the degree of correlation between the two halves of the survey instrument. Pelosi, Sandifer, and Sekaran (2001) stated that correlation coefficients range from -1 to 1, with larger values indicating high relationships. In this study, the *Pearson Product Moment Correlation Coefficient* was 0.966, which means that the correlation between both halves of the survey is 96.6%, which is considered reliable because it demonstrates a good correlation between both parts of the survey instrument.

However, the split-half method holds a limitation because reliability of the instrument is based on just half of the items of the survey, not on the items of the total survey. The restriction of the number of items may lead to the underestimation of the reliability of the instrument. This means that split-half correlation must be adjusted for survey length. In so doing, the researcher also used the *Spearman-Brown* split-half reliability coefficient, which is a form of the split-halves reliability measure used to correct a correlation between the two-halves of the survey. When applied, it involves doubling the two halves to the full number of items, thus giving a reliability estimate for the number of items in the original test. This formula predicts what the full-survey reliability would be, based on half-test correlations. The values of the *Spearman-Brown* formula also range from -1 to 1. In this study, the *Spearman-Brown Coefficient* was 0.983, which means that the reliability of the entire survey is 98.3%. According to Garson (2009), a common rule of thumb for the *Spearman-*

Brown split-half reliability coefficient is 0.80 or higher for adequate reliability and 0.90 or higher for good reliability. In this regard, the survey instrument used in this study is considered reliable.

Data Collection

The qualitative data were collected by using face to face semi-structured interviews conducted with six principals of the nine high schools at AUSD. Each interview lasted 40-50 minutes and occurred once for each participant. Qualitative data were collected from 24 open-ended interview and 10 open-ended online survey questions. Responses to interview and survey open-ended questions were used to identify relevant themes that emerged from the answers and to identify patterns that existed across the responses of these principals and vice-principals.

The quantitative data were collected by using a 4-point Likert scale format, principals and vice-principals responded to 30 questions focusing on their perceptions in relation to ELL students. Quantitative data of the survey were obtained from these items. The survey was designed for participants to take between 15 and 20 minutes and surveying occurred only once for each participant. Data were collected on ELL students' performance in the mathematics portion of the CST and CAHSEE. School demographic data for ELL students, principals, and vice-principals were also collected from the California Department of Education website.

On September 29, 2009, an online survey was sent electronically to nine principals and 25 vice-principals in the nine high schools in the AUSD through their school district email addresses. By the end date for completing the survey, October 12, 2009, a combined total of 26 principals and vice-principals had completed and returned the survey for a total response rate of 76.47%, which fell within the guidelines suggested by the literature related to survey response rate (Gay & Airasian, 2003) that considers a response rate of 70% recommended and acceptable.

Data Analysis

In this study, qualitative data analysis consisted of an examination of principals' answers to open-ended interview questions as well as principals' and vice-principals' responses to open-ended survey questions. Quantitative data analysis consisted of examining the principals' and vice-principals' answers to the 4-point Likert scale survey questions. It also included ELL students' performance data and demographic data on principals, vice-principals, and ELL students. In order to analyze de data, the researcher used "concurrent data analysis" (Cresswell & Plano Clark, 2007, p. 136) in which both qualitative and quantitative data merged after they were analyzed separately in order to provide a comprehensive analysis of the research questions.

For example, in Stage 1, the researcher conducted separate initial data analysis for each of the qualitative and the quantitative databases, which included coding, theme development, and the interrelationship of analysis of qualitative data and descriptive analysis of quantitative data. Next, in Stage 2, the researcher merged the two sets of data and used the triangulation design for a complete picture of the study. Triangulation design is one of the approaches used for concurrent data analysis, and it was used for the data analysis in this study because it gave equal priority to quantitative and qualitative data analysis.
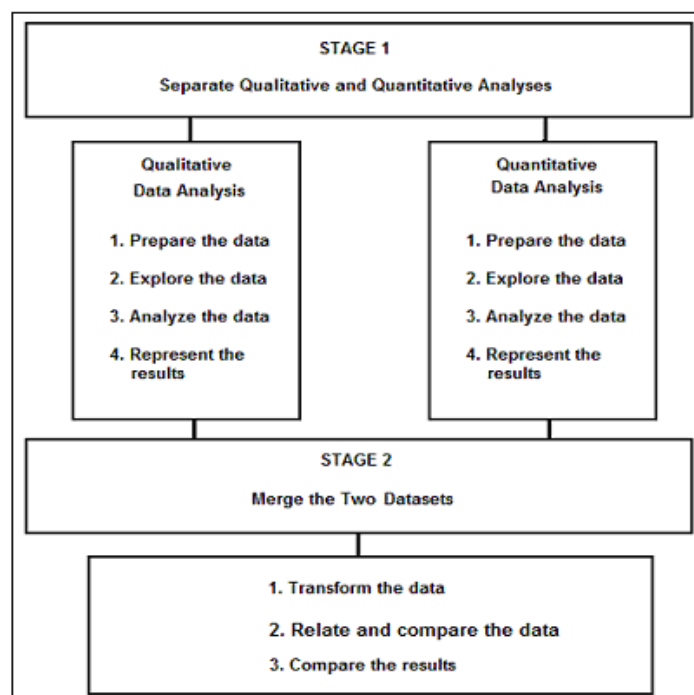

Figure 1: Concurrent Data Analysis
Source: Diagram Adapted from Cresswell and Plano Clark (2007, p. 127)

Patton (2002) advocated for the use of triangulation by stating that triangulation strengthens a study by combining different methods, which includes both quantitative and qualitative research approaches. In this study, both quantitative and qualitative data were collected and given equal emphasis, which allowed the researcher to combine the strengths of each form of data. In so doing, data were merged and the results of analyses were used simultaneously to understand the research questions through the comparison of findings from the quantitative and qualitative analyses in order to elaborate valid and well-substantiated conclusions about the problem under study.
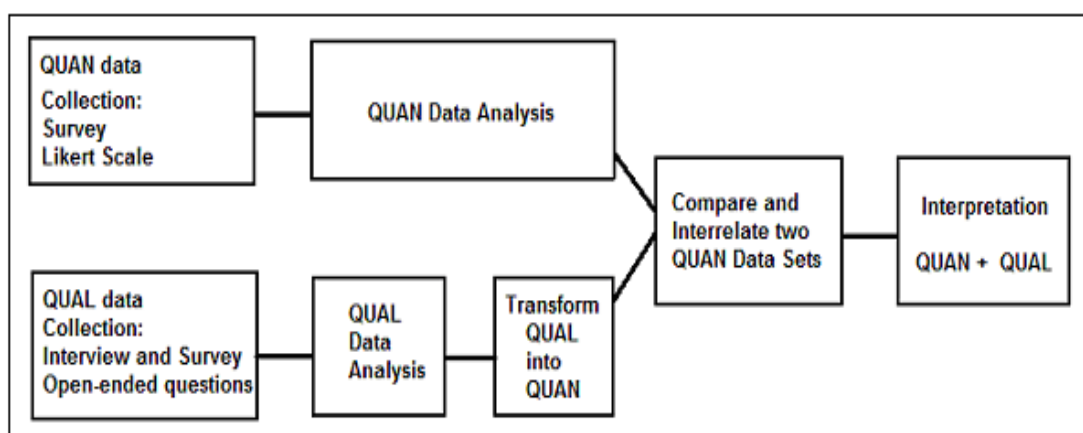

Figure 2: Data Transformation Model of the Triangulation Design
Source: Triangulation Design (Creswell & Plato, 2007, p. 63)

On the other hand, the researcher transformed qualitative data into quantitative data, which allowed him to mix data during the analysis stage in order to facilitate the comparison, interrelation, and further analysis of the two sets of data. The transformation of data included counting codes and counting themes by using the procedure described by Cresswell and Plano Clark (2007, p. 138):

1. Qualitative data were analyzed for themes.

2. The number of occurrences of themes was counted and computed.

3. These numbers were entered into SPSS (Statistical Package of the Social Sciences) to generate data reports.

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4. A table, which is a matrix with data transformation, was generated to portray the results in order to compare *quantitized* qualitative data with the quantitative data.

The analysis of interview transcripts and survey was based on an inductive approach geared to identifying patterns in the data by means of thematic codes. According to Patton (1990), inductive analysis means that the patterns, themes, and categories of analysis come from the data; they emerge out of the data rather than being imposed on them prior to data collection and analysis. Data were analyzed using the constant comparative method whereby line, sentence, and paragraph segments of the transcribed interviews and surveys were reviewed to decide what codes fit the concepts suggested by the data. Each code was constantly compared to all other codes to identify similarities, differences, and general patterns.

In sum, data were reduced and analyzed by means of thematic codes and concepts in a three-level process. Themes gradually emerged as a result of the combined process of becoming intimate with the data, making logical associations with the interview questions, and considering what was learned during the initial review of the literature. At successive stages, themes moved from a low level of abstraction to become major, overarching themes rooted in the concrete evidence provided by the data.

Inductive Analysis

Inductive analysis proceeds from the specific to the general. Understandings are generated by starting with specific elements and finding connections among them. To argue inductively is to begin with particular pieces of evidence and then pull them together into a meaningful whole. In this study, the researcher used inductive analysis for both open-ended interview questions and open-ended survey questions. In this regard, the researcher read the data looking for trends and patterns in order to identify themes to better understand the data within the confines of a thematic analysis. Next, the researcher coded the data using a numbering system based on similar categories and topics that emerged from the data as they aligned with the research questions. Each topic addressed in the data had a number assigned to it. After coding the data, the researcher spent some time describing the nine high-

school settings, the six principals who agreed to participate in the study, themes that emerged from qualitative data and categories that surfaced in the data analysis.

Next, the researcher classified all data related to the thematic pattern and related sub-themes. Following the coding, descriptions, and categorizing, the researcher represented findings by way of a narrative. A narrative analysis of the data collected painted a portrait of the perceptions of the high school leaders in relation to ELL students. This included direct citations from participants and a comparison of results from the study, literature review, and theories on this topic. Finally, the researcher derived thematic categories that emerged from the qualitative data, which were consistent with the literature review in order to describe the topic under study. This helped the researcher to explain the meaning of the information that was gathered in order to increase knowledge about the perceptions of high school leaders concerning ELL students. In order to assure the readers' understanding of the transferability of the results, thick description was also used in the data analysis.

In so doing, the responses to the 24 open-ended interview questions and 10 open-ended survey questions were categorized based on emergent sub-themes.

Sub-themes	Interviews	Surveys	Total
Professional Development	17	13	30
Training	21	18	29
Staff Development	10	11	21
Instruction	25	26	51
Best Practices	21	14	35
Strategies	14	21	35
Differentiation	20	22	42
Curriculum	31	20	51
Standard-based Instruction	15	14	29
Standardized tests	21	16	37
Mathematics is universal	15	18	33
Same Procedures	10	12	22
Same Numbers	11	10	21
Cultures	44	35	79
Cultural background	24	18	42
Culturally	22	11	33

Table 2: Sub-themes that emerged from open-ended questions from the interviews and surveys

The sub-themes that emerged from these two sources of qualitative data represented a rich description of how high principals and vice-principals perceive ELL students in their high schools were organized into thematic categories. Once these themes were identified, interview transcripts and responses to survey open-ended questions were again reviewed to code statements belonging to these themes. In so doing, the researcher immersed in those data, explored many potential categorizations of meaning suggested by the data, and then revisited the processes to ensure the validity of this categorization.

Qualitative Measure	Thematic Categories				
	Professional Development	Instruction	Curriculum	Universality of Mathematics	Cultural Perceptions
Interviews Open-ended Questions	48	80	67	36	90
Surveys Open-ended Questions	42	83	50	40	64
Total	90	163	117	76	154

Table 3: Thematic Categories

Based on the qualitative data gathered from the interview and survey open-ended questions, five qualitative themes were identified. These themes were Professional Development, Instruction, Curriculum, Universality of Mathematics, and Cultural Perceptions. The qualitative analysis of this data was conducted by applying an inductive approach, which provided a thick description of school leaders' perceptions concerning their ELL students and helped the researcher to address the research questions.

Design Validity

In this study, both interviews with open-ended questions and surveys with both 4-point Likert scale questions and open-ended questions served as data collection. In this perspective, triangulation was applied because is a method of cross-checking data from multiple sources to search for regularities in the research data. Gall, Gall, and Borg (2007) stated that qualitative inquiry uses triangulation to address the accuracy of data because its purpose in qualitative resource is to increase the credibility and transferability of results. On the other hand, Creswell (2002) stated

that triangulation is typically a strategy for improving the validity and reliability of the study. In so doing, the researcher used triangulation in order to ensure validity and reduce the risk of biased and limiting conclusions of this study by using two different sources for data collection.

In this study, greater credibility is apparent in the findings to the extent that the results from both qualitative and quantitative data converged and indicated the same results. Data were collected and analyzed as part of an effort to provide readers with sufficient information about its methodology so that they may be able to make their own judgments and draw their own conclusions about its transferability. However, the researcher does not claim that the results of this study necessarily apply to other similar situations. Readers need to look at their own situation and decide about the relevance of these results to their studies.

FINDINGS AND DISCUSSIONS

In this study, the analysis of the data revealed that quantitative and qualitative findings complemented each other when the research questions were addressed and analyzed.

Research Question 1

What are the general perceptions of high school principals and vice-principals in relation to their ELL population?

If school leaders know about their students' languages and cultural backgrounds, the better they are able to interpret their behavior and attempts at communication (Scheurich & Skrla, 2003). The data revealed that school leaders in AUSD possess some knowledge about the diversity of their students but that they need to learn about the linguistic and cultural backgrounds of their ELL students in order to value the cultural perspectives and languages these students bring to schools. 25 (96.15%) school leaders believe that ELL students need to maintain their cultural background while becoming acclimated to the mainstream culture

(Correlation is significant at 0.01 level (2 tailed) - Spearman's rho coefficient = 0.928, p = 0.000, N = 26). In this perspective, one school leader affirmed, "We need to encourage ELL students to enter mainstream culture without losing their own identity." Knowledge of students' linguistic and cultural backgrounds may help school leaders to examine their own leadership practices and become more sensitive in providing diverse learning experiences by improving instructional pedagogies and methodologies for students that result in improving instruction for all students, and especially ELL students (Scheurich & Skrla, 2003).The qualitative open-ended interview questions and open-ended survey questions show that school leaders expressed an interest in knowing and embracing students' cultural differences in order to provide better services to this school population. One school leader stated, "I acquire knowledge about ELL students' cultural backgrounds through experience, observations, academic readings, and professional development opportunities."

High expectations are critical for students' achievement and should permeate the school climate regardless of the students' cultural, linguistic, or socioeconomic backgrounds (Haberman, 1994). Agreeing with this perspective, Minicucci and Olsen (1992) stated that culturally relevant school leaders advocate for higher expectations for ELL students. In this study, the common theme among participants was that they recognize the need to hold the same high expectations and standards for their ELL students as for the other student subgroups in their schools. In so doing, the quantitative data revealed that 25 (95.15%) school leaders believe that ELL students are able to achieve high academic standards in mathematics. The qualitative data support this belief by showing that leaders have high expectations for ELL students and that their expectations are not limited by ELL students' cultural orientations. In this regard, one school leader stated, "I believe that students, independent of their cultural background, can be successful in mathematics."

On the other hand, professional development is one highly effective systemic approach to supporting ELL students because it can fuse knowledge of cultural differences, standard-based instruction, instructional strategies, and curriculum knowledge providing teachers with culturally relevant pedagogy (Zepeda, 2008). The quantitative data revealed that 18 (69.23%) out of 26 school leaders believe that as instructional leaders, they need to make sure that all ELL students are provided with

a challenging mathematics curriculum that is equivalent to that of native-English speakers. In their opinion, ELL students can reach this goal by following the school district curriculum and by using adopted standards-based textbooks. In this regard, one school leader stated, "ELL students are provided with materials that are the same difficulty but easier to understand." Another school leader affirmed, "We schedule students in mathematics classes based on their achievement. Unfortunately, many ELL students are usually starting in mathematics classes that are of the lower level based on their achievement in middle school." In other words, these school leaders believed that since ELL students receive the same amount of instruction and have access to the same instructional materials and curriculum, they are not disadvantaged in their learning process. This means that their mathematical learning is adequate to their educational needs.

Research Question 2

What are the perceptions of high school principals and vice-principals about ELL students' cultural backgrounds as challenges to their academic performance on mathematics standardized high-stakes tests?

Even though culture is embedded in mathematics (D'Ambrosio, 1990), most school leaders in this study were not aware of its influence in the learning of this subject. As a result, they may fail to see culture explicitly as it relates to the teaching of the school curricula, especially in mathematics. This finding is supported by the qualitative data from open-ended interview questions and open-ended survey questions, which revealed that the majority of school leaders believe that the cultural background of ELL students does not influence their performance on standardized assessments. In so doing, the data revealed that some school leaders do not seem to be aware of the impact of ELL students' cultural backgrounds on their performance on standardized tests. The quantitative data showed that 16 (61.54%) school leaders believe that culture does not play an important role in the academic success of ELL students in mathematics. The qualitative data helped the researcher to understand the context of this result. For example, one school leader stated that "The performance of ELL students in standardized assessments is more about their

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attitude towards mathematics than the influence that their cultural background has on the mathematics teaching-learning process" while another school leader affirmed, "I do not really have a sense of what the cultural connection would be to mathematics." In general, school leaders in this study did not believe that it is important to use culturally specific contexts in teaching and learning mathematics, which is the opposite of including relevant examples from students' own culture and exposing them to a variety of cultural contexts (Pease-Alvarez, Espinoza, & Garcia, 1991). Precisely because culture is what people take for granted, the majority of the school leaders at AUSD may often be unaware of the norms and expectations that govern their behavior until those norms are not followed by someone who is unfamiliar with their culture (D'Ambrosio, 1990).

The review of literature suggests that mathematics is learned differently in other cultures. The appropriate use of mathematical activities related to the culture of ELL students is an important tool for extending understanding and providing real-world associations for the learning mathematical content (Rosa, 2010). It is necessary that school leaders in the nine high schools at AUSD develop an understanding of the influence of culture in the process of teaching and learning mathematics as related to the achievement of ELL students on standardized assessments in mathematics. The reflection on their understanding of ELL students' culture and the comprehension of these influences might help them restructure their leadership styles.

Research Question 3

What are the perceptions of both high school principals and vice-principals in relation to the association between mathematics and culture?

Dossey (1992) asserted that mathematicians do not agree on the nature of mathematics, debating whether or not it is bound by culture (internalists) or culture-free (externalists). Internalists such as D'Ambrosio (1990) believe mathematics is a cultural product, developed as a result of various activities such as counting, locating, measuring, designing, and playing.

Other mathematicians such as Kline (1980) are externalists because they believe mathematics activity is culture free. Thus, they do not believe in the connection between mathematics and culture. The majority of the school leaders in this study possessed an externalist view of mathematics, which means they perceive mathematics as culture-free and some of them possessed an internalist view of mathematics because they perceive mathematics as a cultural product. In so doing, the data showed that the majority of the school leaders have had limited experience concerning the relationship between mathematics and culture. The quantitative data revealed that 15 (57.6%) school leaders do not believe that there is a relationship between mathematics and culture. Even though 10 (38.46%) school leaders believe that there is a relationship between mathematics and culture, they are not really sure how it occurs. One school leader stated, "I have limited experiences with how culture ties with the mathematics curriculum." The majority of these school leaders have the perception that students see numbers differently and believe that mathematical symbols and signs are slightly different in other cultures. For example, one school leader affirmed, "Mathematics has different importance and historical background in different cultures." However, that leader believes that an emphasis needs to be placed on the cultural and linguistic backgrounds of ELL students as a resource for curricular activities in their learning of mathematics.

Research Question 4

What are the perceptions of high school principals and vice-principals about ELL students' linguistic background as challenges to their academic mathematical achievement?

According to the school leaders in this study, language is an important factor that influences the performance of ELL students in mathematics. In the context of this finding, the review of the literature confirms this perception (Perkins & Flores, 2002; Rosa & Orey, 2009). For example, Valverde (1984) noted that differences in English and Spanish contributed to Hispanic students' poor performance and involvement in mathematics. In so doing, the results of this study revealed that 22 (84.61%) of the school leaders believed that the gaps in the performance of ELL students were partly

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due to the influence of language, as opposed to cultural factors, on standardized mathematics assessments. The qualitative data from open-ended interview questions and open-ended survey questions showed that school leaders believe that English proficiency plays an important role in the learning of mathematics for ELL students. In their opinion, most mathematics classes rely heavily on English language as the base for instruction. In the school leaders' opinion, ELL students need to understand the academic language of mathematics as well as its terminology and vocabulary. One school leader stated, "As ELL students move to higher level mathematics classes, they start to deal with more abstract concepts, which deal with terminology. If they do not understand the terminology, they cannot understand what is being taught."

In this regard, the majority of the school leaders in this study perceived language as an important factor that influences ELL students' performance in mathematics instruction and assessments. In their opinions, some of the language factors that influence mathematics performance are difficult vocabulary and words with mathematical meanings different from their everyday meanings (Perkins & Flores, 2002; Rosa & Orey, 2007). For example, in relation to word problems, the quantitative and qualitative data show that the school leaders believed one of the difficulties associated with the above problems is that they are either set in artificial contexts or lack context altogether (Rosa & Orey, 2007), which in the leaders' opinions, may create confusion, even for native English speakers. This means that, school leaders believe that ELL students are unable to demonstrate their content knowledge in mathematics high-stakes tests. They believe that these students need a modified curriculum to improve their achievement in mathematics due to the influence of their linguistic background on these tests (Correlation is significant at 0.01 level (2 tailed) - Spearman's rho coefficient = 0.909, $p = 0.000$, N = 25). They also believe that preparation of lessons and curriculum modification are factors that help ELL students to learn to succeed on standardized tests. In so doing, these school leaders stated that this kind of students need more language support than modified curriculum. For example, one school leader stated, "I believe that adjusting teaching language strategies and styles would be more effective and maintain universality and equality of instruction."

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In this context, both qualitative and quantitative data showed that these school leaders believe that linguistic background of ELL students can act as a barrier to their performance on mathematics assessments. In their opinion, one of the challenges faced by ELL students with regard to performance on standardized mathematics assessments is related to the ability to understand the questions as well as the ability to comprehend the abstract mathematical concepts they have to learn. According to the majority of school leaders, it is necessary to enhance standards-based curriculum to address these mathematical issues.

Research Question 5

What *are the high school principals and vice-principals perceptions of ELL students' performance on standardized high-stakes tests in mathematics?*

The No Child Left Behind (NCLB) Act of 2001 requires that all students, including ELL students, reach high standards by demonstrating proficiency in English language arts and mathematics by 2014. Schools and school districts must help ELL students and other student subgroups make continuous progress toward this goal. Through the mandates, NCLB establishes high expectations for all students and seeks to reduce the achievement gap between advantaged and disadvantaged students. In this context, school leaders in the nine high schools at AUSD are also facing such challenges.

According to Abedi and Dietel (2004), the above are worthy goals because they require extraordinary improvement in students' learning. However, the researchers also stated that the challenges for ELL students are especially difficult, involving both educational and technical issues. The results of this study showed that twenty-two (84.61%) out of 26 school leaders agree with the premise that standardized tests are difficult for ELL students. They believe that most of ELL students try harder academically than their non-ELL students counterparts and put extraordinary effort into trying to do their best in high-stakes standardized assessments. One school leader affirmed, "I find several ELL students who work hard, if not even harder, yet they are far behind so it is a challenge for them to keep up to the standards the state has set." Along these lines, another school leader

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stated, "I have seen ELL kids work harder because they know there is a language barrier to overcome."

According to the quantitative data, 15 school leaders (57.69%) do not feel that they are prepared to address the specific needs of their ELLs. The qualitative data showed that, in this study, school leaders face challenges in their roles as instructional leaders in meeting the needs of their ELL students as well as in promoting their success. One school leader affirmed:

Principals and vice-principals are not well prepared to deal with the challenges faced by ELL students such as the need to provide time, resources, funding, and growth opportunities that help teachers to be well prepared to assist their ELL students to perform and achieve in mathematics and other school subjects.

The qualitative data also revealed that these school leaders believe that they must provide professional development opportunities for their teachers to help them to better understand how ELL students learn as well as providing time for staff members who are experienced in working with ELL students to have open and honest dialogue and share their successful experiences with other staff members in their school sites.

IMPLICATIONS OF THE STUDY

This study has important implications for schools with ELL students. These implications both incorporate and integrate diverse ways of knowing, understanding, and representing information for school leaders, teachers, and students. This is especially important when instruction and learning take place in an environment that both encourages multicultural viewpoints and allows for the inclusion of knowledge that is relevant to students. If school leaders and teachers are provided with professional development that helps them to develop a learning environment that is relevant to and reflective of students' social, cultural, and linguistic experiences, then they are able to act as guides, mediators, consultants, instructors, and advocates for students; helping to effectively connect their community-based knowledge to classroom learning experiences.

Along these lines, school leaders and teachers are also able to nurture and support students' competence in both home and school environments (Ladson-Billings, 1995). This perspective helps school leaders and teachers to use students' cultural experiences as a foundation upon which to develop knowledge and skills. Content learned in this way is more significant to the students and facilitates the transfer of what is learned in school to real-life situations (Padrón, Waxman, & Rivera, 2002).

According to this context, three of these implications are:

1) *The need to provide opportunities for school leaders to reflect on their personal and professional leadership practices.*

In order to carry out effective leadership practices for ELL students, school leaders need to be given more opportunities to reflect on their own leadership practices, and consequently more opportunities to learn how to structure a school environment conducive to equity-based learning. In this study, the participants expressed the dilemmas and challenges experienced by committed educators who face an increasing number of ELL students in their schools. An important implication is that school leaders need to articulate their concerns about how to deal with students who are still in the process of acquiring the academic language. In so doing, they need to find time to reflect and educate themselves so they can respond to the demands of effectively serving linguistically and culturally diverse student populations. By reflecting on their leadership practices, high school leaders in this study have the opportunity to build awareness of school climate, press for the use of or pay close attention to effective teaching strategies for ELL students, and recognize the value of the mathematics curriculum, instruction and assessments that reflect the specific needs of their students.

Through this process, school leaders may improve their students' acquisition and the retention of new knowledge by connecting students' previous knowledge base to academic goals. This means that getting to know students and the school community culture and realities is imperative. In so doing, school leaders may improve both their own and their students' self-confidence by understanding existing knowledge and context. By doing this, school leaders may increase the transfer of

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school-taught knowledge to home and real-life situations. They may enhance student knowledge and the value of linguistic and cultural backgrounds as well as the learning of how to become full participants in the mainstream culture. These opportunities must be built into each high school planned activity and may be determined by the overall philosophy of school leaders in relation to diversity and multiculturalism.

2) *The need for consistency in the implementation of culturally and linguistically relevant curriculum and instruction.*

Not all participants in this study viewed themselves as well trained in strategies that effectively help them to serve their ELL population. To make a decision about how to modify pedagogies in response to the needs of ELL students, equal support must be given to both leaders and teachers so they gain increased and effective research-based instructional practices for ELL students. The consensus and research related to best practices has stated that curriculum, assessments, and instruction need to be meaningful and relevant to all students as well as appropriate to individual language and cultural backgrounds (Cummins, 2001; D'Ambrosio, 1993; Nieto, 1999; Rosa & Orey, 2007a). These best practices and strategies range from the simple use of visual representations such as a vocabulary wall activity (Orey, 2009), scaffolding, graphic organizers, and differentiating instruction to the Sheltered Instruction Observation Protocol (SIOP) model. An implementation of these pedagogical practices aims mainly to help ELL students in developing their cultural identity and encourages them to strive for academic excellence and outstanding participation. Although school leaders in this study believe that professional development helps them and their instructional staff to improve their leadership and teaching practices, the lack of consistency in the implementation of the teaching and learning strategies in their schools does not contribute to an effective outcome of those strategies.

One of the most important implications of this study is that professional developments of educators who serve ELL students need to be seriously addressed in order to improve their education and reduce the academic gap among other student subgroups. The results of this study show that participants want more information and educational experiences related to ELL students, time for training

and planning, and opportunities to collaborate and learn from different sources. Research has shown that professional development is more successful when it aims to enhance and expand the repertoire of leadership skills and instructional strategies of both school leaders and teachers rather than radically alter them (Gersten, Woodward, & Morvant, 1992; Richardson, 1990; Zepeda, 2008). Finally, participants in this study who recognize their own strengths and weaknesses and the need specific professional opportunities demonstrated the first step towards the improvement of their leadership and teaching practices in regards to meeting the needs of the diverse population they serve.

3) *The need to make connections between culture and mathematics.*

Reflection on the social, cultural, and political dimensions of mathematics offers an important perspective for a dynamic and globalized modern society, which recognizes that all cultures and all people develop unique methods and explanations that allow them to understand, act, and transform their own reality. In this regard, Ethnomathematics is the study of mathematical ideas developed by different sociocultural groups and offers a contextualization of the curriculum that contributes to the elaboration of pedagogical practices in multicultural classrooms (Rosa & Orey, 2007b). An ethnomathematics-based program helps school leaders and teachers to understand and accept the cultural roots of their students by valuing their mathematical ideas, practices, and previous knowledge as well as recognizing the applications of academic mathematics. Teaching mathematics through an ethnomathematical perspective reminds school leaders and teachers that information may be meaningless unless it is embedded in an appropriate cultural and contextual understanding. One of the most important implications of this study is to explore different methods of organizing mathematical ideas, practices, previous knowledge, and problem solving in the mathematics curriculum. In this regard, ethnomathematics explores how different cultures organize and classify mathematical knowledge. On the other hand, D'Ambrosio (2001) and Rosa and Orey (2003) stated that ethnomathematics program also supports the learning of academic mathematics because individuals from minority groups such as ELL students need to have equal access and be knowledgeable about the mathematics of the dominant culture.

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Another important implication is that ethnomathematics as pedagogical action demonstrates that mathematics is contextualized and grounded in the needs and expectations of the community that utilizes it. Along this line, the goal of ethnomathematics is to contribute both to the understanding of culture and the understanding of mathematics but mainly to the relationship between the two. Educating students mathematically consists of much more than just teaching them mathematical concepts. Instead, this kind of teaching is much more difficult to do, and the problems and issues are much more challenging because it requires a fundamental awareness of the values that underlie mathematics and recognition of the complexity of educating students about these values. Bishop (1991) affirmed that is not enough to teach students mathematics; it is necessary to educate them about mathematics, to educate them through mathematics, and to educate them with mathematics. This means that ethnomathematics draws from the cultural experiences and practices of individual students, their communities, and the society at large and uses them all as vehicles to not only make mathematics learning more meaningful but, more importantly, to provide students with the insights of mathematical knowledge as embedded in their social and cultural environment.

The main implication for school leaders in this study is that they have to consider student linguistic and cultural backgrounds in designing and selecting school activities by incorporating ethnomathematics into mathematics curriculum. With the increased growth of a diverse student population in the nine high schools at AUSD, the school curricula need to reflect on the intrinsic and cultural learning of all students. This means that school leaders and teachers must be prepared to address students' linguistic and cultural backgrounds in the mathematics classrooms. According to D'Ambrosio and Rosa (2008), this inclusion improves students' academic achievement, helps move classrooms towards an equitable learning environment, helps students to form positive beliefs about mathematics, integrates mathematics with other disciplines, and promotes mathematical understanding.

RECOMMENDATIONS

In order for high schools to function as effective educational environments, the leadership must play an important role in bringing together the diversity that exists in these schools. In this regard, it is recommended that continued cultural proficiency training coupled with specific subject area training be made available to the staff. In this regard, if school leaders and teachers see the value of cultural diversity, they may discover and create ways to build bridges to their students. Therefore, in order to encourage the value of diversity, school leaders need to develop a sense of diversity within a school community by valuing the differences, which are manifest in students' lives and to use those differences as the basis for school teaching-learning process.

This study has demonstrated that there is much more to be explored and researched if school leaders are to look into the impact of culture and language has on mathematics learning. Since the researcher was only interested in finding the perceptions of 6 principals and 20 vice-principals in the nine highs school in one school district setting near Sacramento in California, further research should include school leaders of elementary and middle schools in other schools at AUSD as well as in other school districts in California.

The researcher also recommends that leadership practices specific to the improvement of achievement for ELL students in suburban as well as in urban and rural settings should be investigated in more detail. Further studies need to look into whether and how cultural differences rooted in primary schools may contribute towards secondary school performance. Ethnic differences may bring about cultural differences in terms of language, practices, rituals, attitudes, values, beliefs, and perceptions. Perhaps these factors give rise to equally diverse ways of teaching and learning of mathematics, and consequently might result in differences in mathematics achievement.

FINAL CONSIDERATIONS

The challenges of the new millennium and the increased accountability it demands requires a different kind of leadership that enables school leaders to serve

their students more effectively. In addition to administrative knowledge and skills, Sergiovanni and Starrat (1998) affirmed that leadership development tends to be shaped by a set of "beliefs, opinion, values, and attitudes which provide a foundation of practice" (p. 133). This set of personal educational values and beliefs has become to be known as an "educational platform" (p. 133), which guides school leaders' actions and decision-making. In this context, Sergiovanni and Starrat (2001) stated, "educators carry on their work, make decisions, and plan instruction based on their educational platform" (p. 70). Therefore, school leaders need to develop their educational platform and engage in reflection, both of which are essential to their leadership practice. Similarly, researchers have recognized that reflecting on or pondering an ideal, issue, perception, belief, or problem leads school leaders to an enhanced educational practice (Airasian & Gullickson, 1997). Since professional reflection constitutes a valued strategy for enhancing professional practice, school leaders must create opportunities to reflect upon their own leadership practices in order to understand, critique, and modify it. Airasian and Gullickson (1997) affirmed that "reflection is a central process of constructing knowledge and developing professionally" (p. 219).

In addition, a deep understanding of both culture and its connection to mathematics is an important source of knowledge for school leaders to reflect upon in order to modify and transform their leadership practices. In this regard, if school leaders in this study are to facilitate successful learning opportunities for all students, they must know their students, their cultural roots, linguistic backgrounds, previous experiences, and their students' perceptions about the world. Rosa (2010) stated that this also includes knowing ELL students' linguistic backgrounds and cultural values that may influence performance on standardized high-stakes assessments. In this context, knowing each student's cultural and linguistic background is essential for providing successful learning opportunities for all students, including ELL students. Professional development about understanding their students' cultural and linguistic differences may help school leaders to facilitate, structure, and validate successful learning for students through a variety of strategies and practices that best fit their specific needs.

For ELL students to reach their full potential, instruction should be provided in ways that promote the acquisition of increasingly complex mathematical knowledge and language skills in a social climate that fosters collaboration and positive interactions among students, school leaders and teachers. Such classrooms are inclusive in their emphasis on high standards, expectations, and outcomes for all students (Lipman, 1995). Important features of such settings include high expectations, and exposure to academically rich curricula, materials, resources, and approaches that are culturally and linguistically relevant to the ELL students' needs in order to enhance mathematical learning and achievement. In addition to using effective methods and materials, Garcia and Dominquez (1997) argued that school leaders and teachers need to develop clear understandings of the culturally and linguistically diverse backgrounds of their students.

In conclusion, school leaders and teachers who understand their students' linguistic and cultural differences strive for intentional variety in instruction, curriculum, and assessments that lead to an improvement in the learning of mathematics. School leaders play a key role in encouraging and supporting appropriate professional development experiences and best pedagogical practices for themselves and for all teachers and students in their schools. In this regard, professional development that addresses students' linguistic and cultural differences is strongly recommended. It is the researcher's hope that this study adds to the existing body of the literature in relation to the perceptions of high school leaders concerning ELLs and provides useful information for decision-makers in the field of teaching English and mathematics to speakers of other languages.

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