DOCUMENT RESUME

ED 451 009 RC 022 867

AUTHOR Telese, James A.; Ramirez, Reynaldo, Jr.
TITLE Mexican American Students' Perception of Discursive Practices in Mathematics and Science Classrooms.
SPONS AGENCY National Science Foundation, Arlington, VA.
PUB DATE 2001-02-22
NOTE 24p.; Paper presented at the Annual Meeting of the National Association for Bilingual Education (Phoenix, AZ, February 22, 2001).
CONTRACT HRD-9353644
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Classroom Communication; Classroom Environment; *Enrichment Activities; Females; *Hispanic American Students; *Language Dominance; Males; Mathematics Education; Mexican American Education; *Mexican Americans; Science Education; Secondary Education; Secondary School Students; Sex Differences; Student Attitudes; *Student Experience; Summer Programs
IDENTIFIERS Texas

ABSTRACT

A study examined English-dominant and Spanish-dominant students' perceptions of opportunities to communicate in science and mathematics classrooms. A survey was administered to 207 Mexican American secondary students who attended a summer enrichment program in mathematics and science at a university on the Texas-Mexico border. The students were typically of high ability and had voluntarily enrolled in the summer program. Primary language was English for 128 students and Spanish for 79 students. Among other areas, the survey examined the frequency of various communication activities in science and mathematics classrooms. These activities included explaining one's thinking, giving oral reports, discussing "current" events, sharing ideas and asking questions, working with others, and writing reports. Two-way analyses of variance were conducted with gender and primary language as independent variables. Results indicate that female students with Spanish as their primary language perceived opportunities to communicate at frequencies nearly equal to those of male and female English-dominant students. Male students with Spanish as their primary language reported the lowest frequencies of participation in classroom discourse in either mathematics or science classes. (Contains 25 references.) (SV)

Running head: Perception of Discursive Practices in Mathematics Classrooms

Mexican American Students' Perception of Discursive Practices In Mathematics and Science Classrooms

James A. Telese
The University of Texas at Brownsville
School of Education
80 Fort Brown
Brownsville, TX 78520

(956) 982-0201
jtelese@utb1.utb.edu

and

Reynaldo Ramirez, Jr.
The University of Texas at Brownsville
School of Education
80 Fort Brown
Brownsville, TX 78520

(956) 982-0201
reyr@utb1.utb.edu

Paper presented at the annual meeting of the National Association of Bilingual Educators, February 22, 2001, Phoenix, AZ

Abstract

A survey was administered to 207 Mexican American students who attended a summer enrichment program at a university located on the Texas-Mexico border. The purpose of the survey was to gain students' perception of opportunities for discourse in their mathematics and classes. A fine-grained analysis was conducted on individual items relating to discursive instructional practices. Two-way Analysis of Variances were conducted with Gender and Primary language as independent variables. The study found that female students with Spanish as a primary language perceived opportunities to communicate at a level nearly equal to male or female students with English as a primary language, and male students with Spanish as a primary language reported the lowest frequency to participate in classroom discourse in either mathematics or science classes.

Introduction

There is a growing interest in the instructional practices experienced by language minority students, in particular, students with a Latino/a heritage. Moschkeovich (1999) contends that an empirical research base is needed to guide the design of classroom mathematics instruction for language minority student populations. One area of interest is the level of discourse that occurs in mathematics and science classrooms. Discursive practices allow teachers and students to socially construct mathematics classrooms in order to promote understanding (Atweh, Bleicher, & Cooper, 1995). Language is both an organizer of knowledge and a tool for reasoning. Early studies have indicated that a certain level of linguistic proficiency seems necessary for academic achievement (Cummins, 1984). Since language is viewed as a vehicle for organizing and developing reasoning, it becomes important to determine the degree to which language is used for this purpose in teaching language minority learners.

Both language and non-language minority students are often placed in the same classroom, especially in schools along the Texas-Mexico border. Researchers (e. g., MacGregor & Price, 1999; Mestre, 1988) have found that both monolingual and bilingual students may demonstrate poor academic performance in mathematics as a result of low levels of academic language proficiency, which implies that both categories of students may benefit from an enhanced opportunity to communicate and practice academic language skills. Communication is defined as discourse, both oral and written, that allows students to present ideas and completed tasks. The use of both the language of the child, where students establish meaning through a combination of personal experiences and cultural tradition (Pirie, 1998), and the language of mathematics as taught in the classroom are important components for communication in mathematics or science classrooms.

Language in mathematics education has been given attention in the literature; however, the attention has now shifted from the study of text to the study of language as part of social practices, (i.e., shifting from language to discourse [Sierpinska, 1998]). Teachers provide social situations where communication, as an expression of thought, can take place through discursive practices such as whole-class discussions, small group collaborative problem solving, and written drafts (Wood, 1995). There have been studies that have examined language minority learners' understanding of word problems, comprehension of written mathematical texts, or vocabulary development (Dale & Cuevas, 1987; MacGregor & Moore, 1992; Olivares, 1996); few studies have examined language minority secondary students' classroom experiences related to various forms of discursive practices in mathematics and science classrooms.

In this study we sought to determine the mathematics and science learning opportunities as reported by language and non-language minority students. The study sought to answer two questions: (a) What are the differences between language and non-language minority students' perceptions of opportunities to communicate in mathematics classrooms?

Conceptual Framework

The National Council of Teachers of Mathematics [NCTM] (1989) believes that students from diverse backgrounds have been traditionally underrepresented within mathematics, science, and technology careers. A pedagogical reform has developed in order to allow greater access to mathematics learning by all students. The reform pedagogy includes strategies, such as student participation in discussions, debates, and the expression of thoughts in oral arguments. Writing is also viewed as a tool of learning and connecting ideas in the reform curriculum. Hence, a climate for discourse should be established in order to foster communication in the mathematics classroom (NCTM, 1991).

Although the mathematics achievement of Latino students has shown improvement, achievement levels are still below that of non-minority students (Silver, Strutchens, & Zawojewski, 1997). In school mathematics, minority students have shown improvement in their ability to perform computations; however, their performance at the higher levels of cognitive ability, such as applying knowledge, reasoning, and problem solving need improvement (Ortiz-Franco, 1999). A recent study conducted by Telese (1999), in a school district with predominantly Latino/a students, found that mathematics instruction was presented in such a way that did not foster higher-order thinking skills. Instruction was teacher-centered and discourse between the teachers and students and among students was held to a minimum. Associated with this finding, it was determined that students held very unfavorable attitudes towards mathematics.

Higher-order thinking is an essential component to mathematics and science classroom rooms (Kulm, 1990). Buchanan and Helman (1993) suggest that classroom discourse is a mechanism to assist in the promotion of mathematical ideas. The expression of higher-order thinking is fostered through a mathematics language register, which is taught in school as a separate register. A new language is introduced when mathematics teachers present a new topic, which includes new terms, symbols, and definitions. Meaning for mathematical objects, such as expressions, words, formulas, and diagrams, is developed when these features become a part of discourse shared with other students (Sierpinska, 1998). Discourse can be fostered through the use of the learners' everyday language, which can be capitalized upon to create a mathematized-situation where mathematical relations are made more relevant (Ron, 1999). This implies that students should have the opportunity to communicate mathematics and science issues and topics in the classroom, which facilitates conceptual development.

Concept development tends to occur more easily in classrooms that have students who are proficient in the language of instruction. The language diversity of students tends to increase the complexity of language used in instruction. As a result, the teacher must recognize the complexity in order to provide comprehensible input (Garrison & Mora, 1999). Through classroom discourse, students are better able to develop conceptual understandings (Cobb, Wood, & Yackel, 1993). Writing plays a role in the development of mental functions when students describe how a problem was solved (Sierpinska, 1998). As mathematics and science classrooms become increasingly diverse in the language background of students, it becomes important to include students in communication activities.

Other features that foster successful classrooms for Latino/a students include collaborative learning. Lossey (1995) concludes that collaborative learning enhances classroom interaction. Concrete experiences also play an important role in conceptual development. Martorella (1986) suggests that students are continually sorting, relating, and extending conceptual categories. Hence, when ideas are shared, explained, and evaluated by others, concepts have a greater chance of being placed into appropriated categories in the minds of students.

Researchers have documented that gender differences exist related to mathematics achievement (e.g., Oakes, 1990). One factor that has contributed to the under representation of women in mathematics and science related fields is limited involvement in learning opportunities. This affects attitude and achievement in mathematics and science classes (Oakes, 1990). Women have had inadequate participation in mathematics courses in the past. Catsambis (1994) found that Latina students were least likely to aspire to careers in mathematics. Other findings indicated that female students were less likely to ask questions in class, had less

confidence in their ability than male students, and that White female and Latina students had a lower self-concept of their mathematics performance (Catsambis, 1994). Although classroom discourse was not a variable in the Catsambis's (1994) study, the results would suggest that female students participated less in classroom discourse.

The literature points out the important role that discourse plays in the development of higher order thinking. It is through the shared knowledge expressed during class discussions, writing, and collaborative activities that increase the potential for student learning of mathematics or science. With an increase in the opportunity for language minority students to gain deeper understanding of concepts through discourse, there is an increase in the potential for language minority students to enter the career pipeline in mathematics.

Methods and Procedures

A summer enrichment program for minority students was held at a university located on the Texas-Mexico border, and served as a source of data. The program was designed for middle and secondary school students to provide advanced academic preparation in mathematics and science for students interested in pursuing pre-engineering, science, mathematics, and technology careers. The main emphasis of the program was to recruit economically disadvantaged students with a strong desire to succeed in math and science.

Instrumentation. A self-reported survey was designed to gauge several mathematics and science instructional features experienced by the students. The survey had five areas, which addressed activities in both mathematics and science classes. The categories were: a) frequency of instructional activities; b) preparedness for careers in science, math, or engineering; c) the role of other individuals, such as counselors, teachers, and parents; d) frequency of the use of various tools in mathematics class, such as graphing calculators, Computer Based Laboratories,

data collection; and e) frequency of the use of various tools in science classes. The survey was pilot-tested at a middle school with 120 students. The heterogeneous group of students in the pilot study consisted of students with a wide range of experiences from special education students to accelerated students. The results of the field test indicated that the items were comprehensible to the students.

The implemented survey provided a rich source of data, but for the purpose of this paper, only the items related to classroom communication will be discussed. The first section of the survey consisted of 12 items related to the frequency of various activities in mathematics and science classes. A Likert scale was used where "one" indicated never, "two" indicated that the activity was experienced a few times a year, "three" indicated that the activity was encountered every few weeks, "four" meant once a week, and "five" represented the activity was encountered in almost all lessons. From the 12 items related to classroom activities, a communication variable was derived by summing the ratings for communication activities in both mathematics and science classes. This variable consisted of six items, such as "giving oral reports," and "explain my thinking." A third item, "work with others," was considered a discursive practice since learners have the opportunity to communicate during the activity. The maximum value was 30 if the students believed that the activities occurred in almost all of the lessons. The minimum value was five if the students felt that the activities never occurred.

Sample. The survey was administered to 207 participants in the summer program held at the university. The students were from various school districts in the region. The sample consisted of a predominantly Latino/a population, approximately 98%. The other 2% consisted of African American or White students. The students were typically of high ability and were academically on grade level. They were also either bilingual or monolingual in either Spanish or

English, and voluntarily enrolled in the summer program. The number of students who reported English as their primary language totaled 128 students, whereas 79 students reported Spanish as their primary language. The gender breakdown consisted of 117 female students and 90 male students. Within the English as a primary language category there were 55 male and 73 female students. The gender breakdown included 35 male students and 44 female students within the Spanish as the primary language category.

Results

The sum of the five items related to communication activities were used to create the variables, Communication in Mathematics. A univariate two-way ANOVA was conducted on Communication in Mathematics using Gender and Language as main factors. The result showed no significant difference between students who reported English as their first language and those who said Spanish was their first language. However, the interaction effect, Gender * Language, approached significance with an $\underline{F}(1, 203) = 3.83$, $\underline{p} = 0.052$. Figure 1 illustrates the interaction. The response "Yes" indicates English is the primary language and "No" indicates Spanish as the primary language of the respondents. Males, who reported English as their first language communicated with a greater frequency in mathematics class than males who reported Spanish as their primary language. However, females with Spanish as a primary language reported a greater frequency of communicating in mathematics class than females with English as a primary language and males of either category.

Insert Figure 1

About here.

In order to obtain a fine-grain analysis, the types of communicative activities that occurred in mathematics classes were examined using two-way ANOVAs for each of the six statements that constituted the derived variables. Table 1 presents the mean responses for each of the six statements.

Insert Table 1
About here.

Male students with Spanish as a primary language had the lowest means. Female students with Spanish as a primary language indicated nearly an equal frequency of explaining their thinking as either Male/Female students with English as a primary language.

The mathematics class two-way ANOVA revealed statistically significant differences for the main factor, Gender, $\underline{F}(1, 201) = 4.81$, $\underline{p} < 0.05$, but not for the main factor Language or the interaction, Language * Gender. Although not statistically significant, female students reported a greater frequency than male students "of explaining their thinking in mathematics class." The main factor, Gender approached significance with an $\underline{F}(1, 201) = 3.74$, $\underline{p} = 0.054$. The interaction was found not to be statistically significant.

For the statement, "Give oral reports in ..." for mathematics and science classes. The two-way ANOVAs for mathematics did not reveal statistical significance. Overall, the frequency of oral reports is low. Female students reported a greater frequency of presenting reports than male students. The means were slightly greater for female students with Spanish as a primary language.

The statements, "Discuss current events in related to mathematics" was examined. The two-way ANOVA revealed no significant differences in either the main factors or the interaction Students with English as a primary language regardless of gender had greater means than students with Spanish as a primary language, also regardless of gender. Female students reported a greater frequency in talking about current events related to mathematics regardless of language background. The female students with Spanish as a primary language did report discussing current events more frequently than males with Spanish as a primary language and both males and females with English as a primary language.

For the statements, "share ideas and ask questions in mathematics class," students with English as a primary language had slightly higher means than students with Spanish as a primary language. The two-way ANOVA did not reveal significant differences in the main factors or the interaction. However, the male students with Spanish as a primary language reported less frequent participation in sharing ideas and asking questions.

In regard to the statement, "Work with others in mathematics," students with English as a primary language reported an equal degree of frequency of working with one another regardless of gender. Similarly, students with Spanish as a primary language reported nearly equal means regardless of gender. The two-way ANOVA for mathematics did not reveal any statistically significant differences in the main factors or with the interaction. For the statement, "Write laboratory reports in ...," the two-way ANOVA for revealed no statistical differences in the means for the main factors.

Discussion and Conclusion

In this section, results for the derived variables will be discussed first, followed by the results for the individual statements comprising the derived variables. Regarding the derived

variable, Communication in Mathematics Class, The students did not participate in discursive practices very often. As a result, they had less of an opportunity to develop a greater understanding of mathematical concepts.

The level of communicative practices in mathematics classes was similar for both language groups. However, of practical significance, female students with Spanish as a primary language generally reported a higher degree of discourse in both mathematics and science classes than any other group. It would be of great interest to determine the factors that encourage this group of students to be more active in communicating in both mathematics class and science class.

One unanticipated result was the finding that male students with Spanish as a first language were generally less active in classroom discourse. The male students with Spanish as a primary language were not fully participating in mathematics classes. This puts them at a greater risk of low performance although the sample in this study was, collectively, a group of motivated, on grade level students. Further study is needed to examine the factors that inhibit participation in discursive practices for male students with Spanish as a primary language.

When the individual practices were examined, the results for, "Explain your thinking" indicated that Female students with Spanish or English as a primary language participated more frequently than students with English as a primary language in communicating what they were thinking in mathematics classes. This finding is not consistent with findings that suggest students who have English language backgrounds are more willing to express their thinking or that girls participate less in mathematics classes. Hence, female students with either primary language tend to take advantage of opportunities to explain their thinking. But in this case,

female students with English as a primary language explained their thinking more often than any other group.

Students gave oral reports infrequently in mathematics class from "never" to a "few times a year." This was one practice both male and female students with Spanish as a first language participated in more frequently than students with English as a primary language, although not at a statistically significantly level. Female students with Spanish as a primary language were found to give reports more often than the other groups. Male students of both language categories rarely provided oral reports and even less rare were reports by female students with English as a primary language.

Although discussing current events in mathematics classes may not be directly connected to topics in the content areas, it was included in the study as a discursive practice because students would have an opportunity to exchange ideas and information. A characteristic of a constructivist classroom would include the teacher's use of primary sources of data for manipulation by students. However, the lack of activity related to discussing current events in mathematics seems to indicate that the teachers are relying on traditional sources of instructional materials such as textbooks or handouts rather than actively involving students in data collected from primary sources.

Sharing ideas and asking questions reportedly occurred at least once a week in mathematics class. Although not a statistically significant level, students with English as a primary language reported doing so more often than students with Spanish as a primary language. However, female students with Spanish as a primary language shared ideas and asked questions nearly as often as female students with English as a primary language.

The practice of working with others on mathematics assignments was included because students who work together have a tendency to communicate and share knowledge. Students reported doing this every few weeks to once a week. Although not statistically significant, in mathematics classes, female students reported working together more often than male students.

Writing reports as a discursive practice rarely occurred as reported by the students. Writing as a method of presenting ideas should be occurring more often in order for the pedagogy to become more aligned with national reform efforts in mathematics instruction. Writing forces students to clarify their thinking in a positive manner.

In summary, female Mexican American students who reported Spanish as a primary language had a tendency to take advantage of the communicative practices in their mathematics. The data revealed that Mexican American male students with Spanish as a primary language reported the least amount of communication. This may be due to the self-reporting nature of the survey, and they may be less likely to be open about what they do in classrooms. This finding warrants further research.

It appears that high schools situated in the lower Rio Grande River Valley of South Texas have encouraged participation of Mexican American, female high school students with Spanish as a primary language in discursive practices in their mathematics and science classes. This is a very positive finding. Previous researchers have found that female students are "left behind" in mathematics and science classes (e.g., Catsambis, 1994). In this study, teachers seemed to include female students in full participation in classroom discourse. In contrast, a disturbing finding was that Mexican American male students with Spanish as a primary language appear to be withdrawn from classroom discourse. Their reported participation in mathematics and science classes was very infrequent. Efforts should be made to determine what factors are

needed to improve their level of participation in classroom discourse and to find ways to include them.

It appears that Mexican American students with English as a primary language participate more often in the academic features of discourse, such as explaining their thinking, and sharing ideas and asking questions. This may be due to the fact that English is usually the prominent language used in schools, even in areas where a bilingual population exists. Students with English as a primary language may be more comfortable at explaining their thinking and sharing ideas than students who are not as fluent in English. This implies that students who do not have good facility with English may not have the opportunity to communicate their knowledge. Hence, they may not be able to develop conceptual understandings, at the same level as students with English as a primary language, through discourse.

It was interesting to find that students with Spanish as a primary language prefer to discuss current events and give oral reports when compared to students with English as a primary language. It appears that students with Spanish as a primary language prefer to discuss issues in general fashion and speak to a class.

Students reported working with others quite frequently. Related to this activity, female students with Spanish as a primary language reported working with others in mathematics and science classes more often than the other groups. This implies that these students are using their verbal and social skills at a greater frequency than other students and perhaps prefer working with others even though they may not have good facility with English.

This study revealed college intending, Mexican American students' perspectives on instructional practices. An instructional profile would include varying levels of opportunities for students to explain their thinking and sharing ideas depending on their language background and

gender. Students often work together in mathematics classrooms of the area. There should be greater use of real time data for manipulation and analysis in mathematics classes that may help to foster greater opportunities for discursive practices.

Further study is needed to examine more deeply the reasons behind why female students participated in communicative practices. Also, additional study is needed to examine the lower participation in communicative practices of male students with Spanish as a primary language. A question that needs to be addressed is why do students with a strong Spanish language background report discussing current events in mathematics and science and to giving oral reports more often than other students. Classroom observations would be needed to assist in answering these questions.

Acknowledgement

The research reported in this paper was funded by the National Science Foundation Grant No. HRD-9353644, Center for Research on Teaching and Learning CERTL III. The opinions expressed in this paper are those of the authors and do not necessarily reflect the views of the National Science Foundation

References

Atweh,, B., Bleicher, R., & Cooper, T. (1998). The construction of the social context of mathematics classrooms: A sociolinguistic analysis. Journal for Research in Mathematics Education, 29(1), 63-82.

Buchanan, K., & Helman, M. (1993). Reforming mathematics instruction for EDL literacy students. Washington, DC: National Clearinghouse for Bilingual Education.

Cummings, J. (1984). Bilingualism and special education: Issues in assessment and pedagogy. Clevedon, England: Multilingual Matters.

Catsambis, S. (1994). The path to math: Gender and Racial-Ethnic differences in mathematics participation from middle to high school. Sociology of Education, 67, 199-215.

Cobb, P., Wood, T., Yackel, E. (1993). Discourse, mathematical thinking and classroom practice. In N. Minick, & C. Stone (Eds.), Contexts for learning: Sociocultural dynamics in children's development (pp. 91-119). New York: Oxford Press.

Dale, T., & Cuevas, G. (1987). Integrating language and mathematics learning. In J. Crandall (Ed.), ESL through content area instruction: Mathematics, Science, and Social Studies (pp. 9-54). Englewood Cliffs, NJ: Prentice Hall.

Garrison, L., & Mora, J. (1999). Adapting mathematics instruction for English-language learners: The language-concept connection. In L. Ortiz Franco, N. Hernandez, & Y. Cruz (Eds.), Changing the faces of mathematics: Perspectives on Latinos (pp. 35-48). Reston , VA: National Council of Teachers of Mathematics.

Kulm, G. (Ed.) (1990). Assessing higher order thinking in mathematics. Washington, D. C.: American Association for the Advancement of Science.

Lossey, K. (1995). Mexican American students and classroom interaction: An overview and critique. Review of Educational Research, 65(3), 283-318.

MacGregor, M., & Moore, R. (1992). Teaching mathematics in the multicultural classroom. Melbourne, Victoria, Australia: University of Melbourne Institute of Education.

MacGregor, M., & Price, E. (1999). An exploration of aspects of language proficiency and algebra learning. Journal for Research in Mathematics Education, 30(4), 449-467.

Martorella, P. (1986). Teaching concepts. In J. Cooper (Ed.), Classroom teaching skills, (3rd ed., pp. 181-223). Lexington, MA: D. C. Heath & Company.

Mestre, J. (1988). The role of language comprehension in mathematics in mathematics and problem solving. In R. R. Cocking & J. P. Mestre (Eds.), Linguistic and cultural influences on learning mathematics (pp. 210-220). Hillsdale, NJ: Erlbaum.

Moschkovich, J. (1999). Understanding the needs of Latino students in reform-oriented mathematics classrooms. In L. Ortiz Franco, N. Hernandez, & Y. Cruz (Eds.), Changing the faces of mathematics: Perspectives on Latinos (pp. 5-12). Reston, VA: National Council of Teachers of Mathematics.

National Council of Teachers of Mathematics (1989). Curriculum and evaluation standards for school mathematics. Reston, VA: Author.

National Council of Teachers of Mathematics (1991). Professional standards for teaching school mathematics. Reston, VA: Author.

Oakes, J. 1990. Opportunities, achievement, and choice: Women and minorities students in science and mathematics. Review of Research in Education, 16, 153-222.

Olivares, R. (1996). Communication in mathematics for students with limited English proficiency. In P. Elliot (Ed.), Communication in mathematics, K-12 and Beyond (pp. 219-230). Reston, VA: National Council of Teachers of Mathematics.

Ortiz-Franco, L. (1999). Latinos, Income, and mathematics achievement: Beating the odds. In L. Ortiz Franco, N. Hernandez, & Y. Cruz (Eds.), Changing the faces of mathematics: Perspectives on Latinos (pp. 13-20). Reston, VA: National Council of Teachers of Mathematics.

Pririe, S. (1998). Crossing the gulf between thought and symbol: Language as (slippery) stepping stones. In H. Steinbring, M. Bartolini Bussi, & A. Sierpinska (Eds.), Language and communication in the mathematics classroom (pp. 7-29). Reston, VA: National Council of Teachers of Mathematics.

Ron, P. (1999). Spanish-English language issues in the mathematics classrooms. In L. Ortiz Franco, N. Hernandez, & Y. Cruz (Eds.), Changing the faces of mathematics: Perspectives on Latinos (pp. 23-34). Reston, VA: National Council of Teachers of Mathematics.

Sierpinska, A. (1998). Three epistemologies, three views of classroom communication: Constructivisim, sociocultural approaches, interactionism. In H. Steinbring, M. Bartolini Bussi, & A. Sierpinska (Eds.), Language and communication in the mathematics classroom (pp. 30-62). Reston, VA: National Council of Teachers of Mathematics.

Silver, E., Strutchens, M., & Zawojewski, J. (1997). NAEP findings regarding Race/Ethnicity and Gender: Affective issues, mathematics performance and instructional context. In P. Kenney, & E. Silver, (Eds.), Results from the Sixth mathematics assessment of the National Assessment of Educational Progress (pp. 33-60). Reston, VA: National Council of

Teachers of Mathematics.

Telese, J. (1999). Mexican American High School students' perceptions of mathematics and mathematics teaching. Hispanic Journal of Behavioral Sciences, 21(2), 154-170.

Wood, T. (1995). From alternative epistemologies to practice in education: Rethinking what it means to teach and learn. In L. Steffe & J. Gale (Eds.), Constructivism in Education (pp. 331-340). Hillsdale, NJ: Lawrence Erlbaum Associates.

Table 1

Item Mean Responses

Statement	Primary Language English	Gender	Math		
			Mean	N	SD
Explain your thinking when answering questions	Yes	Male	4.06	54	1.24
		Female	4.21	73	1.28
	No	Male	3.47	34	1.28
		Female	4.11	44	1.11
Give oral reports in	Yes	Male	1.71	55	0.88
		Female	1.64	73	0.86
	No	Male	1.77	35	0.84
		Female	2.00	43	1.04
Discuss 'current' events in ...	Yes	Male	2.78	54	1.33
		Female	3.11	73	1.33
	No	Male	2.89	35	1.37
		Female	3.18	44	1.28
Share ideas and ask questions in	Yes	Male	4.19	54	1.13
		Female	4.22	73	1.26
	No	Male	3.71	35	1.43
		Female	4.18	44	1.17
Work with others in	Yes	Male	4.37	54	0.90
		Female	4.30	73	1.19
	No	Male	3.77	35	1.40
		Female	4.05	44	1.17
Write reports in...	Yes	Male	1.96	54	1.24
		Female	1.52	73	0.97
	No	Male	1.71	35	1.10
		Female	1.91	44	1.25

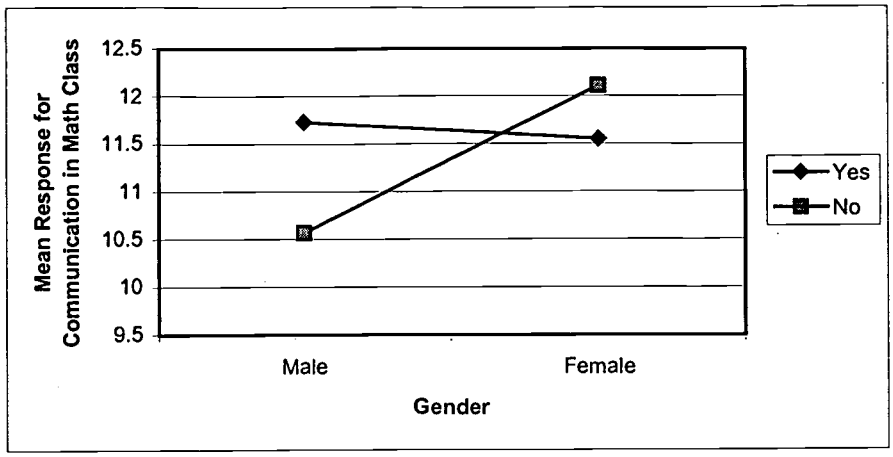

Figure 1. Interaction Graph for Communication in Mathematics Class.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)
ERIC REPRODUCTION RELEASE

I. Document Identification:

Title: Mexican American Students; Perception of Discursive Practices in Mathematics and Science Classrooms.

Author: James A. Telese and Reynaldo Ramirez, Jr.

Corporate Source:

Publication Date: March 2001

II. Reproduction Release:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, Resources in Education (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please check one of the following three options and sign the release form.

XXX Level 1 - Permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g. electronic) and paper copy.

Level 2A - Permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only.

Level 2B - Permitting reproduction and dissemination in microfiche only.

Documents will be processed as indicated provided reproduction quality permits. If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

Sign Here: "I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than

RC022867

ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries."

Signature:
Printed Name:
James Telesc
Reynaldo Ramirez, Jr.

Position:
Associate Professor of Mathematics Education
Assistant Professor of Secondary & Science Education

Organization:
University of Texas at Brownsville
University of Texas at Brownsville

Address:
80 Fort Brown
Brownsville, TX 78520

Telephone No:
(956) 548-8702
(956) 982-0201

Date:
April 12, 2001

III. Document Availability Information (from Non-ERIC Source):

If permission to reproduce is not granted to ERIC, or, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:

Address:

Price per copy: Quantity price:

IV. Referral of ERIC to Copyright/Reproduction Rights Holder:

If the right to grant this reproduction release is held by someone other than the addressee, please complete the following:

Name:

Address:

V. Attach this form to the document being submitted and send both to:

Velma Mitchell, Acquisitions Coordinator