

# NOTICIAS de TODOS

News from TODOS: Mathematics for All

Spring 2006

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*The mission of TODOS: Mathematics for ALL is to advocate for an equitable and high quality mathematics education for all students, in particular Latino/Hispanic students, by advancing the professional growth and equity awareness of educators.*

## Notes from the Field

**Larry Lesser and Matthew Winsor**

### “Emerging Strategies to Address Needs on the Border”

The University of Texas at El Paso (UTEP) is nearing the end of its 4<sup>th</sup> year of a 5-year \$29-million, NSF-funded Mathematics Science Partnership grant (EHR 0227124) to improve mathematics (and science) education in the region. One of the major activities has been the development of Research Pedagogical Laboratories (RPLs) in which UTEP teams of faculty and students form research and professional development partnerships with various schools in the county. Rather than impose a preset research agenda, UTEP faculty have generally let the focus of the research and/or intervention emerge from discussions with school faculty. In this article, all school and teacher names are pseudonyms and the first person pronoun refers to the first author in the middle school RPL discussion and to the second author in the high school RPL discussion. All schools mentioned have a Latino population ranging from 90%-99%. In addition, a significant percentage of the students at these schools were identified as economically disadvantaged and/or as English Language Learners.

### Middle School RPL Experiences

Starting in 2004, with RPL co-director Sally Blake and the assistance of several grant-supported UTEP students, including undergraduate Paulette Adams and graduate students Solanja Perez and Nabil Ghariani, I met with teachers at Jackson Middle School, which was high-need (e.g., low passing rate on state high-stakes Texas Assessment of Knowledge and Skills test) and with whom UTEP already had a relationship. Responding to the teachers' consensus request to find ways to make the mathematics classroom culture more motivating, we implemented a multi-pronged strategy that included conducting professional development workshops, initiating a math newsletter (including photos of students recognized as “mathletes of the month”), posting classroom posters (e.g., Latina/o mathematical scientists from the SACNAS Biography Project, <http://64.171.10.183/biography/listsscscientist.asp>), and debuting Pi Day (e.g., Lesser 2004) with the school. The Pi Day grade-level assemblies, which earned media coverage in a city-wide magazine, included cheerleaders performing math cheers, recognition of the math club, pi songs, principal's address, recognition of student winners of Pi Day contests, and a homegrown math video including students! Each teacher also received a Spanish-English mathematical dictionary (Pagni and Castellanos, 2004).

Obviously, it's hard to state what successes are due to our work at the school since many components were involved in the project and the school implements its own changes as well, but there are encouraging signs. Jackson Middle School was one of a very select group of El Paso schools that received “Gold Performance Acknowledgment” for its improvement in math TAKS scores from 2004 to 2005 – a top quartile improvement among schools with similar demographics. Also, we saw a significant increase in scores on the Middle School Self-Efficacy Inventory, with

*(Lesser, Winsor, continued on page 2)*

(Lesser, Winsor, continued)



UTEP faculty and students and Jackson MS teachers sing pi songs at Pi Day assembly in Jackson gym.

the 2-tailed, paired t-test  $t(236) = -3.562, p < .001$ . The MSSSES (validated in Fouad et al. 1997) consists of two sections of Likert-scale items that address students' confidence in their current abilities in math and science, and their future goals in math and science. Students' self-efficacy is their judgments of what they have the capability to do with whatever skills they have. Researchers such as Albert Bandura have found self-efficacy to be a significant determinant of performance independent of underlying skills because students with high self-efficacy are more likely to attempt a task with great effort and persistence. The importance of this research is underscored by the significant correlation we found at Jackson Middle School between TAKS and self-efficacy scores ( $r = .215, n = 406, p < .001$ ) and by the sobering trend (observed not only at Jackson) that TAKS and self-efficacy scores declined from 6<sup>th</sup> to 7<sup>th</sup> grade and from 7<sup>th</sup> to 8<sup>th</sup> grade. Further research and interventions are needed. Meanwhile, the Pi Day banner still hangs prominently from the Jackson gym rafters, hopefully helping us communicate that success in math is just as possible, important, and cool as those athletic championships.

### High School RPL Experiences

One challenge El Paso teachers face is how to teach mathematics to English Language Learners (ELL). The challenge becomes more stressful as pressure is placed on teachers to prepare ELL students to take and pass the Texas Assessment of Knowledge and Skills (TAKS). Even though many mathematics teachers here speak Spanish, the challenge to teach ELL student mathematics is overwhelming. As a result of this necessity to mathematically educate ELL students, I have

established an RPL at two local high schools. At East High School, I met with the two teachers who exclusively teach ELLs to identify the teachers' needs. The first teacher, Sylvia, teaches all the ELL students that have been in the U.S. for less than a year. One of Sylvia's main concerns was helping students learn the vocabulary of mathematics in English. Sylvia expressed the frustration of trying to create vocabulary activities when she was trained as a mathematics teacher and not an English teacher. As a result of Sylvia's concerns, we have worked on finding and testing vocabulary activities that would help the ELL students acquire the language of mathematics in English. One such activity called "word squares" can be found in Quinn & Malloy (1992).

The other teacher, Ramon, with whom I also work at East High School has different needs – he teaches second-year ELLs. Most of Ramon's students are starting to become proficient in English, and are having a hard time solving word problems in English. To address Ramon's challenge, we have examined literature on decoding mathematics problems. We found activities (e.g., see Braselton & Decker, 1994) that help students learn how to read math texts. Ramon and I have found that the mathematics reading activities, even though not written specifically for ELL students, can be adapted to satisfy their needs.

We have found that one challenge with the RPLs is getting participants. The other RPL (Southeast High School) has the same challenge as East High School. The difference is that teachers at Southeast High School are already required to participate in several programs and in-service meetings, making them unwilling to take further time to examine their own teaching. When I correspond with teachers at Southeast High

(Lesser, Winsor, continued on page 3)

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(Lesser, Winsor, continued)

School, they all admit that they have difficulty teaching ELL students mathematics, but that they do not have time to learn how. It is evident that changing the mathematics education of ELL students may be a long process. Fortunately, teachers like Sylvia and Ramon are taking a chance and working to improve instruction.

**Lawrence M. Lesser**, [lesser@utep.edu](mailto:lesser@utep.edu), is an associate professor of mathematics education at the University of Texas at El Paso, El Paso, TX, 79968. His teaching experience also includes two recent years as a high school math department chair. Dr. Lesser's interest in motivating students has led him to explore connecting mathematics with diverse areas such as culture, music, and social justice.

**Matthew Winsor**, [mwinsor@utep.edu](mailto:mwinsor@utep.edu), is an assistant professor of mathematics education at the University of Texas at El Paso. He is interested in teachers' mathematical knowledge and how it affects their ability to teach mathematics in a conceptual manner. He is also interested in finding effective ways to help ELL students learn mathematics.

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## President's Corner



Miriam Leiva

## Celebración de TODOS

By Miriam A. Leiva, President

TODOS has much to celebrate this spring and we plan to do just that at the national meetings in St. Louis in April. In this column you will find more information about the national gathering as well as information on a new initiative that was funded recently by the National Education Association, NEA.

### The NEA Initiative:

We have recently received a generous grant from the National Education Association that focuses on TODOS Projects that address Closing the Achievement Gap. Under the leadership of the Research and Publications Committee Chairman, Rick Kitchen, we are bringing together scholars and researchers to plan, develop, and publish the first TODOS Journal. Kitchen will serve as the Journal Editor with Associate Editor Ed Silver. We are grateful to the NEA for their support and to NEA's Dr. Andrea Prejean, Senior Professional Associate of Science and Mathematics for Student Achievement. You will be hearing more about these efforts over the next year as TODOS presentations and other programs are directed to inform the community-at-large on current research and practices that address students' achievement.

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TODOS will also launch a new group to link and support members who have questions or information to assist our teachers with teaching and learning issues.

### **The Celebration in St. Louis:**

The 2006 national meetings of NCSM, NCTM, and TODOS will take place in St. Louis during the week of April 24-29. The Educators of Native American Students, EONAS, a TODOS group, will also sponsor various events during the week. Highlights of the programs include the following:

### **TODOS Business Meeting and a Birthday Party:**

*Wednesday April 26: 2:15 PM - 4 PM, Washington C Room, Convention Center.* This year marks the third anniversary of the founding of TODOS. In 2003, ten founding members met and officially formed TODOS. At the Member's Business meeting, the founding members will be recognized. They are:

Cindy Chapman  
Gilbert Cuevas  
José Franco  
Miriam Leiva  
Eleanor Linn  
Robert McDonald  
Yuria Orihuela  
Lawrence Orihuela  
Nora Ramírez  
Jeanne Ramos

These individuals have served in various leadership positions in the organization, including the first TODOS Board of Directors. Since then other leaders have also assumed leadership positions, and beginning in April, we will have elected officers and a new board. These founding members, as well as the outgoing board, will be recognized at the TODOS Business Meeting. At the conclusion of the meeting we will have a birthday celebration, courtesy of SRA.

At this Member's meeting there will be other recognitions as well including the following:

### **The Iris Carl Leadership and Equity Award:**

This award is made by TODOS with support from CASIO, Inc. The selection committee, led

by Gil Cuevas, solicited nominations and will make the 2006 award to recognize an individual who has made significant contributions to the quality of mathematics education provided to underserved students, in particular to Latino/Hispanic students. It was given for the first time in 2005 to Iris Carl *In Memoriam*.

### **Duke Energy Foundation:**

Four TODOS members will receive travel scholarships to cover expenses to attend the meetings in St. Louis. They are:

Justin E. Bright, Wingate, NC  
Christina Gonzalez, Chicago, IL  
Lisa Mesple', Berthoud, CO  
Cecilia Nevarez, Van Nuys, CA

On hand to greet the award recipients will be Shirley Frye, Chair of the Awards Committee and Hilary S. Davidson, Director of Corporate Community Relations for the Duke Energy Foundation. In turn, TODOS will present the foundation with a Founding Sponsor Plaque for being the first organization to give us start-up funds to get our organization going in 2003. Other individuals and corporate sponsors will also be recognized for their contributions to TODOS in 2005-06.

### **NCSM Conference Within a Conference:**

Monday April 24-26. Once again TODOS has organized a CWAC and Carol Edwards, Conferences Committee Chair, has compiled a program that highlights all NCSM sessions presented by TODOS members and all those addressing equity issues of interest to our members. Visit our website for the program.

### **Educators of Native American Students, EONAS:**

Thursday-Friday, April 27-28. TODOS advocates for ALL students including Native American Students. EONAS, under the leadership of Rich Sgarlotti, is dedicated to improving mathematics education for Native Americans and has planned two events for NCTM. First, they will have a session on Thursday April 27, 2 PM, entitled, *Successful Instructional Strategies for Native American Students*, Convention Center. They will gather for dinner and reception on Friday, April 28, 6:30 PM: West Room. Holiday Inn across the

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(Leiva, continued)

street from the Convention Center. For more information write to Rich Sgarlotti, richs@hvl.bia.edu, by Wednesday April 26.

### **The Annual TODOS Houghton Mifflin Reception:**

*Thursday, April 27 from 6 – 8 PM, Majestic Ballroom, Renaissance Grand Hotel.*

This event is usually referred to as the *best reception* at the annual meetings, and it will give all of us a chance to visit and enjoy the camaraderie.



TODOS members enjoy the 2005 TODOS Houghton Mifflin Reception in the Anaheim NCTM meeting

### **NCTM TODOS Program:**

Saturday April 29 from 8 AM to 1:30 PM. NCTM President Cathy Seeley invited TODOS to organize a part of the national program in St. Louis. The first ever NCTM TODOS Strand will be part of the regular NCTM program with speakers were selected by our Conferences and Programs Committees. In addition, several TODOS leaders will be featured speakers at NCTM including Cathy Seeley, NCTM President; Skip Fennell, NCTM President Elect; Jim Rubillo, NCTM Executive Director; and these TODOS leaders: Mary Altieri, Jose Franco, Susie Håkansson, Miriam Leiva, and Ed Silver. This year also marks the first time that selected TODOS speakers will receive support from the TODOS Speaker Fund, made possible by a gift from Houghton Mifflin.

**We look forward to seeing you in St. Louis and to actively involve you in TODOS activities, programs, and committees. Write (maleiva@carolina.rr.com) and tell me what areas interest you. Adelante TODOS!**

## **Culturas a Nuestro Rededor: Enseñando la Matemáticas para el Mundo**

Milton Rosa  
Encina High School – Sacramento – California  
[milrosa@hotmail.com](mailto:milrosa@hotmail.com)

### **Introducción**

Soy un profesor brasileño, que aleccioné matemáticas en escuelas particulares y públicas, en Brasil, de 1988 a 1999. De Septiembre 1999 a Julio 2002, participé de un programa de intercambio, para profesores de matemáticas, patrocinado por el gobierno californiano. El principal objetivo de este programa es el intercambio cultural entre profesores de diferentes países, alumnos americanos y de otras nacionalidades. Creo ser importante delinear las principales características de la escuela en la cual alecciono. Esta escuela de enseñanza media, localizada en Sacramento, en California, a pesar de ser una escuela pequeña, con aproximadamente 800 alumnos, posee una enorme diversidad cultural. En esta escuela existen representantes de 60 países diferentes y que hablan 35 idiomas. De acuerdo con los datos del año lectivo 2004-2005, la población escolar es compuesta por los siguientes grupos étnicos: *Afro-americanos*: 25.2%, *Indígenas americanos*: 2.2%, *Asiáticos*: 3.7%, *Filipinos*: 2.0%, *Hispanico o Latinos*: 28.8%, *Habitantes de las islas del Océano Pacífico*: 1.6% y *Blancos* (no-hispanicos o latinos): 36.5%. Cerca de 23% de los alumnos aún están aprendiendo el idioma inglés, en diferentes fases de adquisición y en diferentes niveles de fluencia, en este idioma.

Es en este contexto que yo alecciono pre-álgebra, álgebra y geometría para alumnos inmigrantes. Mis alumnos son provenientes de México, Honduras, Nicaragua, Guatemala, El Salvador, Panamá, Colombia, Brasil, Argentina, Mongolia, Bielorrusia, Moldavia, Venezuela, Rusia, Ucrania, Jordania, India, Filipinas, Tailandia, Corea del Sur y China. Ellos hablan 10 diferentes idiomas. El español es el idioma hablado por aproximadamente 50% de mis alumnos.

Mis aulas son llamadas de SDAIE (“Specially Designed Academic Instruction in English”) o Instrucciones Académicas Especialmente Delineadas en Inglés. Este tipo de aula es una metodología utilizada para la instrucción en matemáticas, de acuerdo con el nivel de fluencia de inglés de los alumnos, que tienen como

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(Rosa, continuado)

objetivo ministrar aulas de matemáticas con el mismo rigor académico disponible a los alumnos de las aulas regulares.

La comunicación, en las aulas de matemáticas, tiene el potencial de facilitar el entendimiento y posibilitar el desenvolvimiento de la adquisición de nuevos conceptos. Pero, como la enseñanza en matemáticas es ministrada en inglés, los alumnos que están aprendiendo el idioma están en desventaja con relación al aprendizaje en matemáticas. En esta perspectiva, la utilización de pistas contextualizadoras, de la expresión corporal, de la gesticulación, el uso frecuente de materiales visuales en asociación con el vocabulario matemático y la definición de los términos matemáticos que contengan significados

### Contextualización

La contextualización de actividades para la introducción de un concepto matemático nuevo es un aspecto importante del trabajo con los alumnos que no dominan el inglés. A través de la contextualización, los alumnos pueden relacionar la nueva información con conocimientos que ellos adquirieron previamente. Esta relación puede ser realizada con la utilización de: palabras asociadas, material concreto y manipulable, figuras, diseños y materiales visuales.

Cuando el contexto sea creado, el aprendizaje experimental es esencial, pues los alumnos deben tornarse activamente envueltos en el proceso de enseñanza-aprendizaje. Así, la incorporación de actividades kinestésicas, durante la contextualización, es un aspecto importante de este proceso, pues el movimiento físico puede redireccionar la energía que causa comportamiento no adecuado en energía creativa.

### Un Ejemplo de Contextualización: La Actividad del Mapa para SDAIE Pre-Álgebra

- Introducción

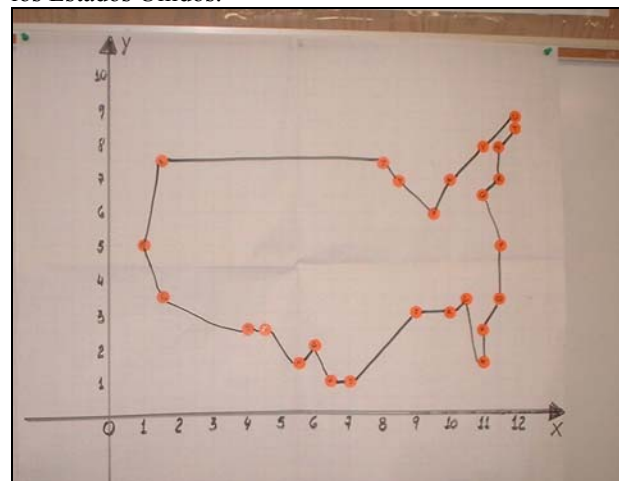
En esta actividad interdisciplinaria, los alumnos irán explorar conceptos matemáticos que los capacitarán a percibir las conexiones entre la matemáticas y la geografía a través de la utilización de material visual, manipulable y concreto. Trabajando en parejas, los alumnos irán a discutir, comentar, explicar y escribir sobre la matemáticas y la geografía, compartiendo ideas, opiniones y justificando el pensamiento y raciocinio matemático.

- Preparación

El sistema de coordenadas cartesianas debe ser previamente elaborado en forma de póster. El póster debe ser colocado en la sala de aula, en un local que sea visible por todos los alumnos. En este póster, los alumnos irán a representar gráficamente los puntos o pares ordenados  $(x, y)$  que les sean fornecidos.

- Descripción

Para la realización de esta actividad, los alumnos recibirán una hoja que contiene una lista con los puntos a ser representados en el plano cartesiano. Esta hoja también contiene instrucciones específicas para la realización de la actividad, bien como, una hoja de papel cuadriculado para que ellos diseñen los propios gráficos. Cada alumno recibirá puntos de la lista y también adhesivos en forma de punto para que los mismos los representen en el sistema de coordenadas diseñado en el póster. Después que todos los puntos sean representados, los alumnos conectarán los puntos con segmentos de rectas para formar el mapa de los Estados Unidos.



Posteriormente, cada alumno recibirá una segunda hoja para responder, en parejas, cuestiones relacionadas con los gráficos que ellos diseñaron. Algunas de las cuestiones que pueden ser colocadas:

- 1) ¿Cuál es la capital de California? Da las coordenadas aproximadas del punto que representa la capital de California.
- 2) Diseña California en el mapa.
- 3) ¿Cuál es la capital de los Estados Unidos? Da las coordenadas aproximadas del punto que representa la capital de los Estados Unidos.
- 4) ¿Cuál es el nombre de la ciudad donde tú vives? Localízala en el mapa y da las coordenadas aproximadas de la ciudad donde tú vives.

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### Conclusión

Así siendo, como parte integrante de este contexto socio-cultural, conviene resaltar que, tradicionalmente, las salas de aulas de matemáticas, o cualquier otro ambiente escolar, reflejan la cultura dominante. Considerando esta perspectiva, un currículum matemático que sea culturalmente sensible es un proceso de afirmación y reconocimiento de la diversidad existente en las escuelas, pues es un currículum predominantemente inclusivo. En estos términos, es un currículum que crea un ambiente escolar que refleja el respeto por diferentes culturas mientras mantiene el respeto por la cultura común en la cual los alumnos están inseridos. Es también, un currículum transformador y responsable que procura atender las necesidades de los alumnos inmigrantes con el objetivo de transformarlos en ciudadanos totalmente actuantes en la sociedad de la cual ellos escogieron participar.

Para finalizar, me gustaría de aprovechar esta oportunidad para expresar mi gratitud al cuerpo docente, cuerpo discente, al personal administrativo y demás funcionarios de la escuela en la cual alecciono, pues ha sido un honor poder participar, actuar y compartir, todos estos años, con todos los envueltos en este proceso educacional. ¡Muchas Gracias!

**Milton Rosa** es brasileño y maestro en educación por la California State University, Sacramento (CSUS), en el área de currículo e instrucción, en matemáticas. El campo de investigación del Prof. Milton Rosa es la etnomatemáticas, el modelación matemática y la educación multicultural. Prof. Milton Rosa alecciona matemáticas para alumnos inmigrantes, en Encina High School, con visto de trabajo patrocinado por la San Juan Unified School District.

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## Professional Development Schools Improve and Enhance the Mathematical Learning for English Learners

Yolanda De La Cruz  
Arizona State University

This paper presents a brief overview of a \$9.9 million Title II grant to improve K-8 underserved areas in education in Arizona

through distance-learning courses. Many teachers from these schools do not have a strong understanding of standards-based mathematics. Their understanding of mathematics is not as strong as needed to significantly increase historically low student achievement. These school districts serve mostly high-poverty, English Language Learner students. The grant supports a community partnership, entitled "Professional Development School Teacher Education Network of Excellence Through Technology" (PDS TENET) offering distance-learning at the graduate-level. The instruction is delivered to partner district teachers via distance technology. The important features of the PDS TENET courses include 80% content and 20% pedagogy with hands-on coursework that is accessible and practical to teachers. The grant provides tuition and cost support for classroom application.

A critical feature of the grant is to offer high-quality lessons and materials developed by a team consisting of a classroom teacher and a professor for teachers from rural areas that include Native American and Latino students. The purpose of the course is to provide teachers with meaningful experiences that are easily translated into the classroom. We have found that teachers are using the course materials as they themselves learn new math concepts. They have reported that activities they're learning help them to know how to stimulate their students' thinking and that they are more successful expanding their students' mathematical knowledge

Teachers in the PDS TENET program can select courses from three content areas of math, science and reading, for primary, middle school or high school. For example, the primary math course covers content from the Arizona Academic Standards and Performance Objectives that addresses how to collect and display data, starting with the various types of graphs that exist and how to choose the appropriate graph for each type of data. Exploitations involving line plots, pictographs, tally charts, and bar graphs are specific content areas covered under the major area of Data Analysis.

Teachers participate in lessons that include using the vocabulary and math concepts for each standard. They are encouraged to try the activities in their own classrooms.

(De La Cruz, *continued on page 8*)

*(De La Cruz, continued)*

Here are some comments teachers made regarding the activities they have used in their classrooms:

During the past class the one thing that I learned was how easy a math class can be used with any ability level and English learning becomes part of the math lesson. I am currently going into graphing and now have all these wonderful ideas in which I can bring my students' culture into the lessons. Instead of graphing how many different hair colors are in our room, (the whole population is Native American, hence there would be only dark brown on our graph). We can graph what tribes the students come from, or what village they live in.

I found it easy to include their culture by graphing their villages (the different types of homes they live in), favorite parts of their rodeo, their favorite traditional dance and food. I also have started to include the math terminology in their native tongue as well as in English on the math word wall.

Our math activities usually follow up with writing activities that give our students the opportunity to express themselves in writing and elaborate their choices in the graphs. Some students favor Saturdays because they have "carne azada" with their families, or because they go to the "pulguita" with their families. We need to teach content through the native language/culture.

One of my male 2nd grade students refuses to color. However, when we wrote our "Indian Stories" and graphed the number of tepees or buffalo in our Indian pictographs that accompanied their stories, he shared with me that "I like coloring these."

Today, more than ever, our students must be able to understand and apply mathematical and scientific ideas. The achievement levels in mathematics among Latino and Native American students are cause for concern. Through offering high-quality materials to teachers, students have greater opportunities to learn and apply higher-level math concepts.

The PDS TENET courses provide teachers with these opportunities to provide a more effective learning environment for mostly high-poverty, English Language Learner students. Teachers

are embedding their math lessons with real-world examples linked to their students' cultures that help them learn new concepts. The heart of this project is the partnerships developed by teachers who have varying expertise they can share with each other to accomplish better learning environments for their students.

**Yolanda De La Cruz** is an Associate Professor of Mathematics Education at Arizona State University. She is Co-Chair of the Bilingual/ESL Faculty Group. Her research interests include: developing math materials for English learners, developing resources to establish stronger home/school connections, and developing educational programs that reach underserved populations through Distance Learning Programs.

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