

From the Associate Director

Making Meaning

Students enter school with a great deal of knowledge about the way the world works. Some of this information was imparted to them explicitly; the rest they have acquired implicitly. From their families and peers, they have learned various roles, expected patterns of interaction, and values. Through rituals and celebrations, they have learned cultural mores and what is expected of them as members of their communities. These funds of knowledge—the accumulated strategies (e.g., skills, abilities, ideas, practices, or knowledge) of a household or community—are a sound foundation and bridge for acquiring new knowledge and skills in and about school. Making meaning—contextualizing teaching and curriculum in the experience and skills of home and community—is the third of our Five Standards for Effective Teaching and Learning.

Making meaning for students happens on three levels. We must carefully attend to each of these levels if we are to maximize learning
see Meaning, page 2

In This Issue

Making Meaning	1
Findings on the Effectiveness of Bilingual Education	1
Program Showcase: Instruction in Context	1
Linking Home and School	3
Teaching/Learning in the Context of African American English Culture and Community	3
At-Risk Preschoolers' Questions and Explanations: Science in Action at Home and in the Classroom	5
Expanding the Dimensions of Funds of Knowledge	5
Developing a Culturally and Linguistically Responsive Science Curriculum	7

Findings on the Effectiveness of Bilingual Education

[On April 8th, 1998, CREDE issued the following press release. -Ed.]

SANTA CRUZ, CA and WASHINGTON, DC — How should we educate English language learners to succeed academically and to become productive and integrated members of American society? State, federal, and local policies should be congruent with research-based findings, in order to stimulate and, when necessary, regulate programs to be most effective.

Summarized below are the findings from research conducted by CREDE and other bilingual/ESL researchers on the effects of bilingual education, the goals of which are to teach competence in English language, English literacy, and English-based academic skills. This research shows that:

All students benefit from strong cognitive and academic instruction conducted in their first language.

English language learners (ELLs) also benefit from on-grade-level academic instruction in their first language. These benefits begin in the first years of schooling, and if such instruction is sustained, the benefits are cumulative. ELLs whose schooling develops them academically and cognitively, using their first language, are *more* successful in

see Findings, page 2

Program Showcase: Instruction in Context

Norma González, University of Arizona and **Beth Warren**, TERC

This program, Instruction in Context, focuses on the principle that teaching, curriculum, and the school itself should be contextualized in the experiences, skills, and values of the community. These projects examine a variety of contexts: the communities of the students' parents; the communities of practice of science and mathematics; the communities of the workplace; the cultural communities reflected in peer interactions; community organizations; and the entire historical, linguistic, and value complex of cultures. In each of these projects, the researchers accept the communities' sociocultural activities as the contexts for making school work meaningful, and devise school activities to bridge home and school, thus building authentic classroom communities that can produce high academic achievement.

Each project in this program includes a strong component of professional development—indeed, of professional transformation—by creating new sociocultural practices that allow teachers to know the contexts of their students and to develop ways of bridging these to the academic world. These new activity settings involve teachers as full participants, from


see Showcase, page 6

Meaning, from page 1

opportunities for all students. The first level focuses on the act of teaching, or *pedagogy*. Patterns of participation and speech vary widely across cultures. For example, some cultures encourage student participation through simultaneous talking. Others encourage extended periods of silence after questions. In some classrooms, teachers and students can make use of dialects in contextualizing instruction. Teaching practices must take into account these established patterns of participation and speech that are drawn from family and community life.

The second level of contextualization is the *curriculum*. The content and design of instructional materials must reflect the cultures that are represented in the classroom. Commercial (and frequently mandated) curricular materials may or may not adequately assist the classroom practitioner in contextualizing instruction. Personal- and community-based experiences of students should be used as the foundation for developing school skills. Students then are able to apply learning in both home and school contexts.

The third level, *policy*, looks at the ways the school itself is contextualized. Most of the current school reform strategies and programs include parents, families, and community members in restructuring efforts. Schools that design learning experiences for students in collaboration with parents, families, and communities show greater and more lasting progress.

Helping students to make meaning of the curriculum and the processes of schooling raises several important questions. How can practitioners tap into students' funds of knowledge? Once the funds of knowledge are understood, how do they affect teaching, learning, and schooling? Are practitioners and schools adequately prepared to contextualize learning and the experiences within the school for culturally and linguistically diverse student populations? CREDE's Instruction in Context program is highlighted in this issue of *Talking Leaves*. The studies within this program are attempting to answer these important questions. Connecting school to students' lives is critical if we are to make learning and schooling meaningful for students at risk. 

-Barry Rutherford

This newsletter is supported under the Educational Research and Development Center Program (Cooperative Agreement No. R306A60001-96), administered by the Office of Educational Research and Improvement (OERI), U.S. Department of Education. The findings and opinions expressed here do not necessarily reflect the position or policies of OERI.

Findings, from page 1

English-based instruction by the end of their school years than those ELL students who are not provided such first-language instruction.


These effects presume that they also receive on-grade-level academic instruction through English for part of the school day, and throughout the school year.

Four to seven years of such combined high quality instruction appears to insure that by the end of high school, typical ELL students will perform as well as typical native speakers of English. The more years in which first-language-based plus English-language-based instruction is present, the greater is the eventual English-based achievement.

The design of programs for English language learners should be responsive to the needs and strengths of local communities, student populations, and available resources. Conventional program labels (such as first-language immersion; transitional; sheltered and content instruction in English; or English as a Second Language) are not useful in predicting school success. However, all effective programs share crucial features: a) understanding students' language knowledge and needs, b) planning and delivering instruction that meets those needs, and c) assessing whether students comprehended the instruction.

For good student achievement, effective teaching methods must be employed by well-prepared teachers. Effective teaching methods have been identified by research, but are not in widespread use—neither in English-mainstream nor in bilingual/ESL classrooms. Effective approaches include students and teachers working together, in discovery processes and supportive interaction across the curriculum, developing language through dialogue, and making school meaningful by connecting instruction to students' strengths and everyday experiences in their homes and communities.

There is a critical shortage of teachers who can work successfully with English language learners, whether they be in mainstream, bilingual, or ESL classrooms. Research is underway to document effective methods for recruitment, training, and support of such a workforce.

A bibliography of selected publications on the effectiveness of bilingual education is available online (http://www.crede.ucsc.edu/HomePage/PR_EffBE.html). 

**Read past issues of
Talking Leaves online:
<http://www.cal.org/crede/>**

Linking Home and School: A Bridge to the Many Faces of Mathematics

Marta Civil, Norma González, and Rosi Andrade, University of Arizona

In the BRIDGE project, CREDE researchers are building on research showing that people are often quite competent in dealing with mathematical tasks that they view as relevant to themselves. This practically error-free arithmetic in everyday situations dramatically contrasts with performances in school situations. The BRIDGE researchers are working with teachers in Tucson, AZ to bridge the gap between in-school and out-of-school mathematics for language minority students in grades 3-8. They are focusing on mathematics classroom teaching that stresses students' construction of meaning and their connections to their outside-school world.

The BRIDGE project is an extension of the Funds of Knowledge project, carried out from 1991-1996 under the National Center for Research on Cultural Diversity and Second Language Learning. That study was based on the idea that household and community knowledge can provide strategic resources for classroom practice. Although the current study involves different families, teachers, and students, researchers are using a similar methodology, this time focusing on one content area.

The main goal of the BRIDGE project is to engage students in working on challenging mathematics that will help them advance their schooling. This goal is approached by building instruction on the experiences and knowledge of the students, and going beyond the "everyday" uses of mathematics.

This 5-year project has several main components. The first component is learning from students' households. After receiving training in ethnography and participant observation, teachers visit students' homes to conduct ethnographic interviews. During these visits, which usually last 1-2 hours, teachers learn about the households' family and work histories. The subsequent discussions often reveal accumulated bodies of knowledge and an array of skills, information, and strategies within the family.

The second component of this study involves study group meetings once every 2-3 weeks, where teachers and researchers meet after school to discuss findings from household visits, develop ideas for curriculum development,

see BRIDGE, page 4

Teaching/Learning in the Context of African American English Culture and Community

Michele Foster, Claremont Graduate School

In this CREDE study, researchers are examining a professional development program in San Francisco designed to teach elementary and middle school teachers about African American language and culture, and effective ways of teaching African American students in their classrooms.

The program involves 70 teachers from nine elementary schools and three middle schools, all of which are targeted under the San Francisco desegregation decree. Teachers attend 8-10 professional development sessions each year, and are invited to attend a week-long summer institute.

In these sessions, consultants explore a number of topics with the teachers, including African American language development, African American cultural precepts and themes, and effective instructional strategies for educating African American students. The program's content is represented by the "5R's": Ritual, Rhythms, Recitation, Repetition, and Relationships.

CREDE researchers have been studying how teachers apply this new knowledge in their classrooms, and to

what extent it improves the academic achievement of their African American students, particularly those achieving in the lowest quartile on standardized achievement tests.

Teachers have incorporated the information from the professional development sessions in a number of ways. First, teachers use more visual displays of Afrocentric materials and books. Some examples of displays are large word cards listing the seven principles of Nguzu Saba-umoja (unity), kujichagulia (self determination), ujima (collective work and responsibility), ujamma (cooperative economics), nia (purpose), kuumba (creativity), and imani (faith), or the seven principles of Maat—justice, propriety, reciprocity, truth, order, harmony, balance.

Teachers also utilize rituals—repeated acts or activities in which teachers and/or students participate, like class songs and pledges. Sometimes these rituals are brief, sometimes quite involved. For example, every day one middle school teacher leads his students in an elaborate opening and closing ritual, which emphasizes excellence, togetherness, and success.

see San Francisco, page 4

BRIDGE, from page 3

and review recent literature on teaching mathematics. In these meetings, researchers also conduct hands-on mathematical activities to help teachers explore in more depth the mathematical concepts they are teaching in their classrooms. Researchers are documenting teachers' progress and professional development by recording and transcribing these study group meetings.

Another component is teacher implementation of mathematical lessons involving knowledge gained from the home visits. At the end of each year, teachers attend a curriculum retreat, where they develop ideas for new curriculum units that will satisfy Arizona state requirements, based on what they learned from the home visits. Last year's retreat resulted in a curriculum unit on gardening, which is currently being piloted in some classrooms. Over the course of the study, the researchers will evaluate these units and measure the students' progress.

The last element of the project is parental involvement. A math study group of parents is currently in place. Through periodic workshops, the participants work to expand their knowledge of mathematical concepts in much the same way that the teachers do in their study group meetings. The workshops are also designed to establish a dialogue between parents and teachers, so teachers can understand the parents' expectations and also learn how the parents use math in everyday life. The parents have made presentations to a larger group of parents on their experiences with the study group. For example, they recently shared a game involving fractions. Finally, project researchers are planning to have the parents in the study group serve as teacher aides in future classes.

Researchers are also conducting occupational interviews with a small group of parents from the middle school involved in the project. Through these interviews, researchers are eliciting how working class, minority parents use mathematics at home and in their jobs. This information will be used to develop school curriculum units.

For more information on this project, contact Marta Civil at 520-621-6873 or civil@math.arizona.edu. 

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San Francisco, from page 3

A third strategy is situated enactment, which typically occurs when a teacher invokes the principles of Nguzu Saba or Maat to make a point. In one middle school classroom, for example, students were chatting instead of listening to a classmate. The teacher commented, "You're not giving her respect. You're not giving her justice. She listened to you when you were speaking. There's no reciprocity. Give her the same respect she gave you," as he pointed to the Virtues of Maat displayed on the wall. Teachers tend to employ situated enactment and ritual for social purposes more than for curricular ones.

Some teachers include more material about people of African descent in their curricula. Social studies units have included lessons on African countries, and African foodstuffs have been studied in some botany lessons. Some literature classes feature historical fiction about the African American experience in the United States.

Teachers also adjust their pedagogical practices to help the African American students in their classrooms. Researchers found teachers often successfully combine three of the 5R's—rhythm, recitation, and repetition—in their lessons, to teach addition, multiplication, and spelling words, for example. From what they have learned about African American language development, some teachers use contrastive analysis to teach the differences between standard and African American English.

Although the data collection and analysis is ongoing, researchers have found several patterns in the data collected so far. Teachers most frequently use display, ritual, and situated enactment and use these strategies in language arts and social studies. However, they use these strategies more often for classroom management than for academic learning. More experienced teachers with a coherent theory of teaching and learning select strategies appropriate to their classrooms and applied the strategies to academic content. Teachers who incorporate language issues in classes often do not use the information for cognitively challenging instruction. This may be because the professional development sessions were not designed for teachers to deepen their understanding of the concepts presented or to discuss the strategies in application to their classes. The sessions tended to involve pre-packaged materials delivered by outside consultants.

While the findings of this program to date are mixed, CREDE researchers are gathering useful information about the enactment of knowledge presented through this type of professional development program that can inform future projects.

For more information on this project, contact Michele Foster at michelf9@IDT.NET or 909-621-8105. 

At-Risk Preschoolers' Questions and Explanations: Science in Action at Home and in the Classroom

Maureen Callanan, University of California, Santa Cruz

Limited English proficient preschool children ask sophisticated and interesting “why” questions related to science topics. They are able to identify inconsistencies in answers to their questions, and are strongly motivated to understand causes and consequences. This project involves three studies that explore questions and explanations about science in homes and classrooms of children at risk because of language and/or poverty.

In the first study, we explored “why” questions asked at home. We asked Mexican-descent families with children ages 3-5 years to keep a diary of children’s “why” questions. The families were divided into two groups according to the level of the mothers’ formal education. The analysis of the diaries indicates that there are no differences between the two groups in either the number of “why” questions related to scientific topics that children ask, or the likelihood that parents try to provide causal answers to their children’s questions. For example, children whose parents were in the high education group asked, “Why can you only see the moon when it’s dark?”

and “Why does it rain?” Children whose parents were in the low education group asked, “How come fish are in the water and they don’t drown?” and “Why do we have blood in our body?”

Museums provide an ideal context for children and families to interact with the exhibits, so we are conducting a second study to investigate family conversations during visits to the Children’s Discovery Museum in San Jose, California. By videotaping the museum visits and following up with family phone interviews, we are exploring the children’s understanding of the exhibits and tracking questions and explanations. Our preliminary data suggests a trend for parents with higher education levels to provide more causal explanations in the museum setting. In follow-up interviews, several parents in our study suggested the need for a Spanish language guide to the museum. We have completed this Spanish language guide and copies are now available for museum visitors at the admissions desk.

see Preschool, page 7

Expanding the Dimensions of Funds of Knowledge

Gil Garcia, Office of Educational Research and Improvement, U.S. Department of Education

The concept of *funds of knowledge*—the accumulated strategies of a household or community—in theory and practice is relatively well known and presently alive in this CREDE program. It also reinforces the principles and premises upon which the range of CREDE research projects rest. The concept represents the full complement of issues related to effective teaching and learning for *all* students, but especially for students placed at risk of educational failure and for schools that are at risk of failing these students.

Many readers are already familiar with the concept of *funds of knowledge*. Much research, including the projects in this program, focuses on how teachers learn about their students’ funds of knowledge. Teachers also bring a wealth of experiences, skills, and abilities to the classroom. This article will explore the benefits to be gained from learning about students’ *and* teachers’ funds of knowledge.

Teachers investigate their students’ funds of knowledge by studying, recording, and interpreting the contexts within which students, their families, and neighbors

live. These teacher-researchers then share their new knowledge, often in teacher study groups, with their colleagues. The goal of this structured approach is to understand the multiple facets of the community and the students’ households, in order to make classroom activity more comprehensive, realistic, and contextualized. That is, teachers can use this newly acquired information to improve teaching and related classroom management techniques, and to enhance outreach to parents. One documented result of this approach has been the transformation of many classrooms into communities of highly engaged teachers and students.

Two related dimensions of funds of knowledge reveal potentially powerful factors for transforming classrooms into exemplary teaching and learning contexts for teachers with students whose social and linguistic profiles do not adequately meet the school’s expectations. First, the funds of knowledge that teachers and administrators bring onto the school campus can also have a profound effect on the school staff’s teaching and, by

see Dimensions, page 6


Dimensions, from page 5

extension, on student learning. The resources that middle class professional educators bring to the classroom are as valuable as the students' funds of knowledge.

Teachers can be subjects in a type of funds of knowledge investigation where the students and parents are the investigators and have at their disposal information about their teacher that is equivalent to the information the teacher has about them. In short, if student-focused and highly personal/familial information helps the teacher to teach better, teacher-focused information may help students learn better.

Second, the synthesis of the teacher's and the students' funds of knowledge can have a profound effect on the quality of the classroom as a true learning community. As teachers and students integrate each other's funds of knowledge, they can create truly collaborative teaching and learning. The effort also helps the school and students' community reveal all the resources available to the participants. In order for this to work, the parents and, as appropriate, the students, would be trained in the ethnographic principles, observation techniques, and listening skills that effective funds of knowledge exercises use.

Teachers, students, and parents can use each other's funds of knowledge to inform and help each other. For teachers, this means enhanced abilities to teach. For students, it means enhanced opportunities to learn. For parents, it means a greater understanding of what the teacher is trying to impart.

In future articles, I will address other topics from the federal perspective. Always, I appreciate your recommendations on topics that interest you. 


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Showcase, from page 1

the design of the activities themselves, to leadership within them, to speaking for them. In this program, the professional transformation models themselves are studied.

Several projects in this program are characterized by the model of teachers as researchers, who engage in domain-specific learning and examine local knowledge and practices as well as students' discourse and learning (Warren & Rosebery, showcased in *Talking Leaves* vol. 1 no. 2, and Civil et al, this issue, p. 3). In doing science and mathematics, teachers learn about themselves as learners, and grapple with the big ideas and practices of these disciplines. At the same time, they investigate and use community funds of knowledge to create curriculum, and carefully study their students' ways of knowing and talking to lead them to scientific and mathematical ideas and discourse. In these ways, teachers' own learning in science and mathematics is integrally tied to their ongoing study of their students' sense-making resources.

As researchers, teachers use the tools of scientific or mathematical practice as well as ethnographic or classroom-based investigation; through writing and speaking they communicate their experiences and findings to others. Further, by collaborating with other professionals, presenting at professional conferences, and designing and implementing research agendas, these teacher-researchers can help to begin a national dialogue on instruction in context for culturally diverse students. Their classrooms, too, are transformed. Through their ongoing participation in communities of professional practice, teachers are able to guide their students who are going through similar struggles, in science, mathematics, social science, and literacy. Teachers may also act as joint workers with students, as through "Life Lab" gardening programs (Stoddart, this issue, p. 7), to provide a shared context of experience for science learning.

Two projects address parental, community, and cultural contexts as a basis for transforming education. Callanan (this issue, p. 5) studies parents' dialogue with young children as the source and potential model for teaching based on child curiosity and cognitive growth. Foster (this issue, p. 3) studies African American language and interaction styles as the context for school activity. 

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Developing a Culturally and Linguistically Responsive Science Curriculum


Trish Stoddart, University of California, Santa Cruz

Elementary school teachers in rural central California face the challenge of providing quality science education to a rapidly increasing number of language minority students. A regional consortium that includes the University of California, Santa Cruz, Life Lab science program, and seven school districts is working to implement a National Science Foundation local systemic change project called Language Acquisition through Science Education in Rural Schools (LASERS). The goal of LASERS is to improve science education in a tri-county area where 66% of the students are Hispanic, 48% of the students are limited English speakers, and 33% of the students are children of migrant agricultural workers.

We are studying the integration of science teaching and language development in LASERS classrooms. Our research focuses on the role of language and culture in science teaching, and the relationship between culturally and linguistically responsive teaching and student learning. We are conducting case studies in 16 classrooms. Data includes intensive interviews with teachers and students, video taped observations in classrooms, and student assessment in language and science. We have analyzed teachers' classroom practice along four dimensions: teacher directed/student centered, structured/unstructured, contextualized/decontextualized, and connected/discon-

nected. Initial findings indicate that these four dimensions of teaching practice operate independently of each other. For example, teachers who contextualize instruction do not necessarily connect instruction to students' prior school learning or structure science activities in a coherent manner. Our preliminary analysis indicates that there is a relationship between the four dimensions of teaching practice and student learning outcomes. A high level of contextualization in an unstructured, student-centered classroom is associated with the development of student social language. The development of academic science language required a higher degree of connectedness and structure. The development of both academic and social language and science concepts occurred in classrooms that were high in contextualization and connectedness with student-centered curricula and instruction.

These early findings underscore the multidimensional relationship between instructional strategies and student learning. In the next year of the study, we plan to collect more student and teacher data in a second set of classrooms in order to verify our initial findings.


For more information please contact Trish Stoddart at stoddart@cats.ucsc.edu or 831-459-3850. 

Preschool, from page 5

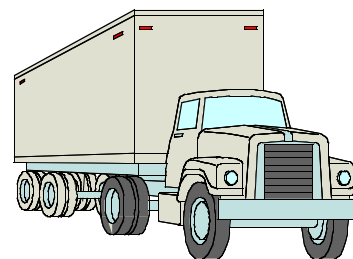
Our third study focuses on "why" questions at school and in school-like environments. We are examining children's "science talk" in two different settings: a bilingual preschool and an after-school program for school-aged children in a Latino community. We are collecting data from videotapes of instruction and teacher journals.

In a new phase of the third study, we are exploring several avenues for making a link between teachers and parents by informing teachers about the "science talk" that occurs at home. One method we have pilot tested involves asking parents to report to teachers on home conversations about an ongoing class project. We have also begun a collaboration

with Life Lab Science, informing teachers about home conversations regarding weekend "Family Science" workshops. In addition, we are working with the Children's Discovery Museum to develop home-school connections through museum programs. One of the goals of this set of studies is to work with teachers on ways to contextualize instruction using what they learn about children's interest, understanding, and engagement in science as illustrated in their everyday conversations at home.

For more information on this project, please contact Maureen Callanan at callanan@cats.ucsc.edu or 831-459-3147. 

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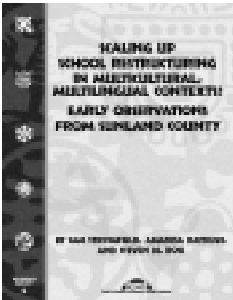


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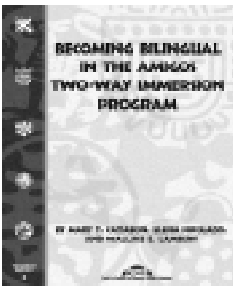
NEW REPORTS FROM CREDE



Scaling up School Restructuring in Multicultural, Multilingual Contexts: Early Observations from Sunland County

by Sam Stringfield, Amanda Datnow, and Steven M. Ross

This report examines 13 culturally and linguistically diverse elementary schools, each of which is implementing one of six externally developed school restructuring designs. The report describes the initial successes and challenges these schools are experiencing as they adapt the designs to suit their students' needs, and identifies the conditions that facilitate and hinder implementation. (RR 2, \$4.00)



Becoming Bilingual in the Amigos Two-Way Immersion Program

by Mary T. Cazabon, Elena Nicoladis, and Wallace E. Lambert

This reports examines students' attitudes toward becoming bilingual in the Amigos two-way immersion program, both through their school achievement in Spanish and English and their responses to questionnaires. Many students in grades 4-8 understand the importance of and enjoy becoming bilingual. Through exposure to two cultures, many have also developed a sense of biculturality. This report extends earlier studies of the Amigos Program published by the National Center for Research on Cultural Diversity and Second Language Learning. (RR 3, \$4.00)

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