



Serving education since 1966

Quality Questions Can Power Learning for All

Dull. Monotonous. Pointless. Boring. Not exciting. A group of high school students used these adjectives to characterize classroom questioning as they had experienced it. When asked if they knew who would answer the teacher's questions in any given class, they responded, "Yes. You always know."

These student perceptions mirror the findings of studies showing that a small number of students tend to dominate class interactions.¹ Meanwhile, students from the subgroups that are struggling to make adequate yearly progress in many schools—students from low-income households, those receiving special education services, English language learners, African Americans, and Latinos—have lower rates of classroom participation. About a quarter of all students never participate in class at all.²

Former teachers and AEL Senior R&D Specialists Jackie Acree Walsh and Beth

Dankert Sattes propose a solution to this pattern of disengagement in a new book, jointly published by Corwin Press and AEL.

Defining a Quality Question

A quality question focuses attention, stimulates thinking, and results in real learning. Quality questions have four characteristics: they (1) promote instructional purposes, (2) focus on important content, (3) facilitate thinking at a stipulated cognitive level, and (4) communicate clearly.

These kinds of questions don't happen by chance. "Questioning is fundamental," says Bob Iuzzolino, director of curriculum services for Pennsylvania's Westmoreland Intermediate Service Unit. "Questioning needs to be developed, just like the fundamental skills in sports, yet teachers are rarely given the opportunity or training to develop those skills."

(continued on page 2)

Book Cover Here

Quality Questioning: Research-Based Practice to Engage Every Learner is full of practical strategies teachers can begin using right away. See story at left.

IN THIS ISSUE

Effective Teaching

Quality Questioning, p. 1

Research Notes

What Makes District Staff Successful; Analyzing Student Data; School-Family Support for English Language Learners, p. 3

Resources from AEL

See the catalog insert in the center of this issue.

Resources of Interest

Online Professional Development from USED; SchoolsMovingUp; Troops-to-

Teachers; Students Tell the Story; Free Professional Development; Science and Our Food Supply; Assessing Educational Technology; ERIC: The Next Generation; Math Assessments; Middle School Math Reform; Improving Math Achievement; Making Math Fun, p. 7

Grant Opportunities

See pages 10 and 11

Profile Opportunity

Improvement: Are You Ready? p. 12



Telephone:
304-347-0400
800-624-9120

E-mail: link@ael.org

Questioning

(continued from page 1)

Glad You Asked . . .

In the early 1990s, the authors of *Quality Questioning* developed a professional development program called QUILT (Questioning and Understanding to Improve Learning and Thinking). It is featured in the *LPD Video Journal of Education* (www.teachstream.com). Once a year, Walsh and Sattes conduct a national training for school teams. The 15th annual training for trainers will be held in Nashville, Tennessee, on June 20-23, 2005. Learn more at www.ael.org/quilt.

References

1. K. Tobin and J. Gallagher, "Target Students in the Science Classroom," *Journal of Research in Science Teaching* 24, no. 1 (1987): 61-75; and G. Wells, "The Development of a Community of Inquirers," in *Action, Talk, and Text: Learning and Teaching Through Inquiry*, edited by G. Wells, 1-24 (New York: Teachers College Press, 2001).
2. D. Sadker and M. Sadker, "Is the OK Classroom OK?," *Phi Delta Kappan* 66, no. 5 (1985): 358-61; and M. G. Jones, "Action Zone Theory, Target Students and Science Classroom Interactions," *Journal of Research in Science Teaching*, 27, no. 8 (1990): 651-60.
3. See T. R. Sizer, *Horace's Compromise: The Dilemma of the American High School* (Boston: Houghton Mifflin Company, 1984).

Achieving Quality Questioning

"As we looked for ways to help teachers go beyond the basics of effective questioning," says Walsh, "the research on effective teacher learning led us to create professional development that was long-term and personalized, and we incorporated peer coaching and opportunities for teachers to learn together.

"But many teachers were still finding it difficult to change the dynamics of classroom questioning, even when they collaborated to improve their practice. From our conversations with these teachers emerged an aha: *Teachers must also teach new questioning behaviors to students and adopt classroom norms that support these behaviors.* Increasingly, we conceptualized quality questioning as a student-centered, collaborative process. And that, according to many teachers, has made all the difference."

What Quality Questioning Looks Like

In a *quality questioning* classroom, the teacher asks clear, focused, purposeful questions at levels of cognition ranging from simple recall to evaluation. After asking a question, the teacher gives students time to think about answers. This 3- to 5-second pause is called Wait Time 1. After a student responds, the teacher lets another 3-5 seconds pass, providing the student an opportunity to add to the original answer. This pause is called Wait Time 2. The students are accustomed to wait time. In fact, they can explain that its purpose is to give everyone time to think.

Students have equal opportunities to participate. Those who never raise their hands are just as likely to be called on as those who volunteer. This encourages all students to think of answers to all questions. Once called on, if a student has trouble answering, the teacher might rephrase the question or provide prompts. Or the student might ask another student for help.

However, classroom exchanges are not limited to the teacher asking a question and a single student answering. Depending on the objective, the teacher might ask for choral responses (everyone answers at once), or signaled answers (thumbs up or thumbs down). The teacher might employ a cooperative response format, such as Think-Pair-Share, when appropriate.

The teacher invites and allows time for student questions. In fact, students often work in pairs or small groups, formulating and asking questions of one another as they focus on a learning goal.

More Students Are Engaged

In a *quality questioning* classroom, the teacher establishes classroom norms that invite participation. He or she teaches students how to answer—and ask—good questions at various levels of cognition. Walsh and Sattes also suggest using alternate response formats to break out of the recitation mode (the teacher asks questions, and a few students respond, one at a time).

A number of researchers who study student passivity, or the tendency to avoid academic interactions, find that certain teacher behaviors encourage it, particularly in low-performing students. One of these behaviors is the failure to teach classroom communication skills—including question asking and answering—in a direct and explicit manner. Students who come to school with these skills command and get more teacher attention.³

Sattes and Walsh agree: "Research and our experience with teachers in hundreds of schools confirm that the answer to the problem of student disengagement—at least part of it—lies in quality questioning."

The book can be ordered from the AEL Distribution Center (see the catalog insert for details). An annotated table of contents, excerpts, author bios, and reviews are available at www.ael.org/qualityquestioning.

What Makes District Staff Successful

From the Cross City Campaign for Urban School Reform

This recent research report draws from a larger qualitative study of district/school interactions and provides evidence that central office staff can make or break critical initiatives. Although much has been written about the leadership of superintendents and their instructional initiatives, this report focuses on the intersection between schools and districts—the place on the organizational chart where leadership and new initiatives should translate into action.

Manager Roles

Within the larger study, researchers gathered and analyzed information from 55 midlevel managers at three urban public school districts—Chicago, Milwaukee, and Seattle. When the managers described their work, their roles could be sorted into four categories: (1) tools designers, who translate reform agendas into tangible materials for schools to use; (2) data managers, who help school personnel use data to improve instruction; (3) trainers and support providers, who design staff development to support instructional leadership; and (4) network builders, who create routines and practices to build or sustain connections between people who have expertise to share. Researchers noted that these categories did not always align with titles, and one person might assume more than one role on any given day.

Manager Orientations

The researchers then identified two distinct orientations that were reflected in the managers' accounts. The first orientation was *authoritative*, and these midlevel managers saw themselves as experts, while viewing principals, teachers, and school staff as targets and beneficiaries of expertise. The second orientation was *collaborative*. These

managers saw principals and teachers as both targets of policy change and substantive sources of expertise, and they fostered exchanges that helped both sides become more informed.

The majority of midlevel central office staff in the study held an authoritative orientation. However, researchers found that when midlevel managers collaborated with school staff as equal partners and valued their expertise, the opportunity for success increased greatly.

The researchers identified four barriers that prevent change in central office support to schools. They then made recommendations about how to redesign central office staff interactions with schools.

Four Barriers

(as seen from the school level)

1. School relationships are seen as low priority.
2. Communications are based on directives, not dialogue.
3. Administrators lack understanding of school issues.
4. Central office staff lack expertise on teaching and learning.

Six Recommendations

1. Make school issues and needs drive the district's policy agenda.
2. Redefine the role of midlevel central office staff to be responsible for supporting and facilitating rather than issuing directives and monitoring.
3. Reorganize the work of midlevel staff so they can spend more time in schools.
4. Invest in ongoing professional development for midlevel managers.
5. Evaluate midlevel staff members' performance based on their ability to facilitate improvement in schools.
6. Minimize interruptions that distract school and central office staff from focusing on instruction.

To order the full report, *Leading from*

Research Notes

The U.S. Department of Education's Institute of Education Sciences funds research through regional laboratories, national centers, and field studies.

Research from the nation's 10 regional laboratories can be found on the Internet at www.relnetwork.org.

The work of the 12 national centers is available at <http://research.cse.ucla.edu>.

Research Notes

(continued from page 3)

the Middle: Mid-Level District Staff and Instructional Improvement, by Patricia Burch and James Spillane, contact the Cross City Campaign at 312-322-4880. Or, download the executive summary at www.crosscity.org.

Analyzing Student Data

From the Center for Research on the Education of Students Placed At Risk (CRESPAR)

For student data to be useful in school and classroom decision making, administrators and teachers need practical analyses. In a recent report, CRESPAR researchers considered issues surrounding the use of student data and data-based decision making. They looked at the state of the field and possible future directions, presented reviews of commercially available software, and proposed a Web site that would contain ongoing updates of software reviews.

The accountability requirements of No Child Left Behind have clearly heightened the emphasis on school use of data. Software companies have become more interested in the education market. Advances in computer hardware and software have made practical solutions to data use more cost efficient. Together, these factors signal the potential to make using student data in schools and classrooms an everyday reality. The report discusses the factors involved in that reality.

Information Management

This business term, synonymous with data-based decision making, refers to getting data and other information—in useful formats—to the people who make decisions. While this is standard business practice, implementing it in education depends on the availability of software that can gather and manage data from myriad sources. These are examples of how information management can be applied in the school setting:

- Storing and retrieving performance data on students can substantially increase the information available to educators.

- Quick and easy generation of standard reports can provide useful information within and across classes and schools, which educators can share and use to seek “best practices.”
- Generating reports fitted to the unique questions of an individual educator or group can help educators make data-based decisions within a specific context.
- Making a broad range of student data easily available to teachers can help them become classroom researchers.
- Storing years of students’ work electronically creates a comprehensive portfolio of student progress, available to professionals, parents, and students at any time.

Important Implementation Issues

CRESPAR researchers identified several issues related to software implementation.

- **Assessment of data needs.** This would include data inventory and preparation, data “cleaning,” software needs, and outside help.
- **Time to implement.** This is a major consideration in whether to buy or build a system. Experience shows that building can take years, while buying may result in a system operating within months.
- **Cost.** The many cost considerations include district size, number of features chosen, external help with collecting and cleaning data, and whether technical support will be external or internal. Time, too, must be evaluated as a cost, particularly when it represents lost opportunities to better diagnose and educate students.
- **Choosing a vendor.** Without a “best product,” educators need to evaluate systems to find the best fit. It can pay to talk with current users for feedback on software features and vendor services.
- **Schools Interoperability Framework (SIF).** This collaboration of school data stakeholders has set data exchange standards to enable software packages to communicate. SIF members include

technology companies, school districts, federal and state government offices, and research organizations. Some vendors support the process, and others are waiting to see if SIF becomes the industry standard. (To learn more about SIF, visit www.sifinfo.org.)

Features of Good Software

The researchers defined features to use as criteria for reviewing commercial software packages. Important features were grouped into five categories:

1. **User friendliness** includes familiar presentation, ease of use, and fast access speed.
2. **User features** include comprehensive query tools, drill-down capability, and access from anywhere.
3. **Information access** includes multiple ways to access, varied methods of representing information, and availability of longitudinal presentation.
4. **Creating and sustaining quality data** includes proper security for data transmission, acceptance of many common data formats, and capacity to enable clean data.
5. **Additional features** could include exporting into common programs, capacity to link individual teacher data to student data, and availability of online student work samples.

The researchers included reviews of many software packages in the report and have, as proposed, created a Web site that continues the discussions and reviews. To get the most recent reviews, visit the site at www.csos.jhu.edu/systemics/datause.htm.

Software Enabling School Improvement Through Analysis of Student Data, Report No. 67, by Jeffrey C. Wayman, Sam Stringfield, and Mary Yakimowski, is available online at www.csos.jhu.edu/crespar/reports.htm. It may also be ordered from the Publications Department, CRESPAR/Johns Hopkins University, 3003 N. Charles St., Suite 200, Baltimore, MD 21218.

School-Family Support for English Language Learners

From the Center for Research on Education, Diversity & Excellence (CREDE)

Based on a three-year study in a Title I middle school in northern California, this report discusses Family Literacy Nights designed to teach children's supporters what and how the children are learning in school. These events were aimed at strengthening the school-family relationship and transferring classroom knowledge to the home environment. The outcome: teachers and parents worked collaboratively to support student learning and to serve as their advocates.

The study looked at two groups of students: (1) low-performing Asian American English language learners (ELLs) placed in a sixth-grade sheltered instruction class, and (2) ELLs from diverse backgrounds with mild disabilities placed in sixth- through eighth-grade special education programs. The research concluded that the principles and strategies used can be transferred to ELLs from other cultural backgrounds and used to form school-family partnerships at other grade levels and in other contexts.

Forming School-Family Partnerships

The anticipated high enrollment of learners from low-income families and diverse groups of English language learners, coupled with the scarcity of school-family partnerships, places some schools, teachers, and students at risk of failure.

Credentialing programs seldom teach educators how to work with students' families. The problem worsens when school staff are unfamiliar with students' cultural backgrounds and when parents are unfamiliar with American school culture. This culture gap leaves many schools needing a systematic approach for establishing meaningful teacher-parent partnerships.

(continued on page 6)

Research Notes

(continued from page 4)

Research Notes

(continued from page 5)

Theoretical Frameworks

Project planners drew up guidelines based on theoretical frameworks that value social and cultural influences on learning:

Vygotsky's theory of learning and cognitive development presents the concept of a zone of proximal development. This theory asserts that as an adult guides a child through problem solving, the child internalizes the steps modeled by the adult and learns to solve similar problems.

Gardner's theory of multiple intelligences fosters the belief that every child can learn and that there are many ways to teach for understanding. This perspective reminds teachers to value learners from different language and cultural backgrounds.

Planning and Implementation Principles

- **Provide ongoing professional development aimed at transferring classroom knowledge to home practices.** Forging the teacher-parent partnership involved negotiation, planning, and professional development that led teachers and the researcher to a shared understanding of what would work for learners and parents.
- **Highlight joint productive activities.** To create a zone of proximal development (ZPD) for Family Literacy Night participants, the researcher and teachers provided activity settings for teacher-parent, parent-child, teacher-parent-child, and family-family interactions.
- **Contextualize all training activities and pedagogical strategies.** Because none of the study's parents received formal schooling in the United States, hands-on and experiential activities were designed to help them learn about U.S. schools, the sheltered program, and teaching strategies.
- **Adopt the theory of multiple intelligences** to assist learners in school. Family members had many opportunities to learn about the theory, and they generated ideas about how to apply it to help their children with schoolwork at home.

- **Foster powerful habits of mind.** This principle is a reminder to engage students in complex tasks that develop and employ habits of mind (e.g., applying past knowledge to new situations, gathering data through all senses). These also can be applied to transforming classroom pedagogy for home practices.
- **Build the circle of supporters** to assist individual performance. Six strategies were identified to provide guidelines for supporting children in and out of school.

Findings and Implications for Practitioners

- In districts that have high numbers of ELLs, schools may have frequent administration changes. In fact, during this project, the middle school leadership changed three times, causing the teacher-initiated sheltered program to be abandoned during the final year of the project.
- When using multiple intelligences with culturally and linguistically diverse groups, it is important to field-test metaphors and analogies to avoid misunderstandings.
- Teachers worked together to construct a set of integrated units across all content areas. By building the circle of supporters for teachers as well as for students, most of the big ideas covered in the curriculum were represented in multiple ways.
- In a post-Family Literacy Night survey, many participants reflected that they found the hands-on modeling and interactions they witnessed in the classrooms to be invaluable experiences.

Family Literacy Nights: Building the Circle of Supporters Within and Beyond School for Middle School English Language Learners, Educational Practice Report 11, by Ji Mei Chang, costs \$8.00. Order online at <http://calstore.cal.org> or from CALstore, Center for Applied Linguistics, 40th Street NW, Washington, DC 20016-1859; e-mail store@cal.org.

Online Professional Development from USED

The U.S. Department of Education's Teacher-to-Teacher initiative offers several services to teachers. This past summer, education experts and effective teachers presented face-to-face workshops in locations across the country. The workshops couldn't accommodate every teacher in the nation, so the sessions were videotaped. Now, as follow-up to the summer workshops, the sessions are available for all teachers to access online. Each session comes with a course overview, study guide, assessment, follow-up activities, handouts, and additional resources.

In most states, educators have several options for renewing their professional certification. Earning professional development credit, sometimes referred to as in-service or continuing education, may be possible. To obtain credit for taking a course on the Teacher-to-Teacher Web site, contact your local professional development office to determine whether the courses fit the guidelines specific to your area or state.

The first sessions to be available are

- Looking at Vocabulary
- Reading in the Content Areas: It's Just Different
- Beginning to Write
- Taking the "Dense" Out of Density

Check back throughout the fall and winter, as more sessions are being added. Get complete information at www.ed.gov/teacherinitiative.

SchoolsMovingUp

This WestEd initiative helps schools and districts address the challenge of raising student achievement in low-performing schools. The interactive Web format offers knowledge and expertise practitioners need to make decisions and take action in their school reform efforts. Online events bring experts to the Web to share lessons learned, new ideas, and related resources.

SchoolsMovingUp also offers practical information about the No Child Left Behind Act.

Highlights of the site include the following:

- **Assistance** provides a list of WestEd services designed to support low-performing schools.
- **Ideas in Action** provides an insider's look into others' school improvement efforts. Browse profiles of successful schools, reform ideas, and tips from educators working on school improvement.
- **Tools** helps school leaders manage the improvement process more effectively.
- **Reading Room** contains articles and books offering practical ideas and models for school improvement. Abstracts of each resource help users find what they need.
- **Resources** offers links related to school improvement, products for sale, and free electronic newsletters on education issues.
- **Events** provides information about upcoming workshops, lectures, and conferences related to school improvement. Users can access free online events or browse the archive to watch and listen to presentations by leaders in the field.
- **No Child Left Behind** offers guidance, resources, and tools organized by key topics to help users get the most out of this federal legislation.

To explore the site, visit <http://wested.schoolsmovingup.net>.

Troops-to-Teachers

The program, developed for military personnel interested in going into teaching, has a new quarterly newsletter, *TTT Connections*, that is available online. The newsletter contains information on programs in various states and a close-up of an individual program. Also, a new Web site has been launched. The site, managed by Eckerd College in St. Petersburg, Florida, coordi-

(continued on page 8)

Resources of Interest

Students Tell the Story

A new video that was written, shot, and edited by students asks and answers such questions as, What makes a teacher worth paying attention to? and What makes a school worth going to?

The documentary, hosted by John Mellow, will air on public broadcasting in January. A DVD of the project includes both individual segments of the video and longer versions of the documentary, and it might open some eyes about how to improve schools.

The video and DVD are part of a project from Listen Up! This youth media network connects young video producers to resources with the goal of developing the field and giving youth an authentic voice in the mass media. *The Way We See It* is available now on DVD for \$6.95, the cost of shipping. To order, go to <http://listenup.org/education/index.php>.

Resources of Interest

(continued from page 7)

Free Professional Development

The Region IV Comprehensive Center at AEL manages an NCLB Information Center at www.ael.org (look for the NCLB button on the home page). The center offers two Web-based sessions on issues related to No Child Left Behind.

1. Using Study Groups to Address AYP

A district that does not make adequate yearly progress (AYP) may impose requirements on all schools. This session begins with such a scenario and introduces study groups, a strategy often effective in changing teacher behaviors and impacting student achievement.

2. Effective Questioning: Meeting the Instructional Needs of All Children

To meet AYP requirements, teachers often need help to work with students who have learning disabilities. This session focuses on strategies that can help these students improve their academic performance.

nates with Troops-to-Teachers and provides information on alternative teacher certification. Learn more at www.ACT2Teach.org. To read the newsletter, go to www.wecomunicatideas.com/ttt/connections0904.pdf.

Science and Our Food Supply

This new curriculum, sponsored jointly by the National Science Teachers Association and the Food and Drug Administration, comes with separate guides for middle and high school science teachers. It includes an interactive video, *Dr. X and the Quest for Food Safety*, and the comprehensive Food Safety A to Z reference guide. To learn more and to order a free curriculum kit, go to www.nsta.org/288.

Assessing Educational Technology

The State Educational Technology Directors Association (SETDA) recently released *Profiling Educational Technology Integration (PETI): Resources for Assessing Readiness and Use*. This Web-based tool kit is available free to states, districts, schools, and other organizations to help them assess the integration of technology.

PETI represents the consensus and work of state directors from more than 30 states and is designed to assist states in implementing No Child Left Behind (NCLB) and evaluating the effectiveness of educational technology in all educational environments. SETDA developed the framework, instruments, and protocols in conjunction with the Metiri Group, with support from the U.S. Department of Education. The instruments and protocols have been validated through pilot tests in five states and examined through a peer review process.

The tools available in PETI include

- a framework for assessing educational technology

- the NCLB Matrix, which links indicators and questions to NCLB goals
- instruments for use at the district, building, and classroom levels
- methodologies and protocols
- sample reports

To access PETI, visit www.setda-peti.org.

ERIC: The Next Generation

The Education Resources Information Center (ERIC), sponsored by the Institute of Education Sciences of the U.S. Department of Education, produces a major database of education literature. The new ERIC online system, released in September, provides a centralized Web site for searching the bibliographic database of more than 1.1 million citations going back to 1966. Effective October 1, more than 107,000 full-text, nonjournal documents (issued 1993-2004), previously available through fee-based services only, are now available free.

The link for the advanced search is www.eric.ed.gov/ERICWebPortal/Home.portal?_nfpb=true&_pageLabel=advanced. ERIC expects to begin accepting new materials in the late fall, and selection criteria are posted at www.eric.ed.gov.

Math Assessments

Federal Resources for Education Excellence—FREE—makes it easy to find learning resources and regularly adds new ones. Educators and interested persons can visit www.ed.gov/free to explore the topics and materials provided by federal agencies.

A recent addition to the math section is *Balanced Assessment*, which offers more than 300 mathematics assessment tasks for grades K-12. This National Science Foundation site presents topics and activities that include averages, addition, area, batting orders, bicycle rides, chance of rain, chance of survival, cheetah's lunch, classroom groups, cost of living, dart boards, detective

stories, genetic codes, gestation and longevity, graphing, gravity, intersections, logarithms, oil consumption, rectangles, squares and circles, stock market, triangles, volume, and more. To learn more, visit <http://balancedassessment.concord.org>.

Middle School Math Reform

In a new book, researchers and teachers from the Wisconsin Center for Education Research (WCER) discuss the challenges teachers face as they implement new assessment procedures in conjunction with Mathematics in Context curriculum materials. *Standards-Based Mathematics Assessment in Middle School: Rethinking Classroom Practice* was edited by University of Wisconsin-Madison education professor Thomas A. Romberg and published by Teachers College Press.

Each chapter tells a story of one or more teachers who discovered a need and developed methods for changing the way they judge student performance. Topics include teaching and assessment under a reform curriculum, designing new assessment tasks, embedding assessment in instructional practice, and generalizing the approach. To order the 246-page book, visit <http://store.tpress.com/0807744816.shtml> (paperback \$27.95, cloth \$58.00).

The Mathematics in Context curriculum was developed by the staffs of the Freudenthal Institute at the University of Utrecht and WCER's National Center for Research in Mathematical Sciences Education. To learn more, visit www.wcer.wisc.edu or www.fi.uu.nl/en/welcome.html.

Improving Math Achievement

The International Academy of Education and the International Bureau of Education jointly published this monograph, which is part of a series of syntheses of research on educational practices that generally improve learning. *Improving*

Student Achievement in Mathematics, according to editor Herbert J. Walberg, is “based on research carried out primarily in economically advanced countries . . . [but] focuses on aspects of learning that appear to be universal in much formal schooling.”

Authors Douglas A. Grouws and Kristin J. Cebulla present findings around 10 practices.

- 1. Opportunity to learn.** The extent of students' opportunity to learn mathematics content bears directly and decisively on student mathematics achievement.
- 2. Focus on meaning.** Focusing instruction on the meaningful development of important mathematical ideas increases the level of student learning.
- 3. Learning new concepts and skills while solving problems.** Students can learn both concepts and skills by solving problems.
- 4. Opportunities for both invention and practice.** Giving students both an opportunity to discover and invent new knowledge and an opportunity to practice what they have learned improves student achievement.
- 5. Openness to student solution methods and student interaction.** Teaching that incorporates students' intuitive solution methods can increase student learning, especially when combined with opportunities for student interaction and discussion.
- 6. Small-group learning.** Using small groups of students to work on activities, problems, and assignments can increase student mathematics achievement.
- 7. Whole-class discussion.** Whole-class discussion following individual and group work improves student achievement.
- 8. Number sense.** Teaching mathematics with a focus on number sense encourages students to become problem solvers in a wide variety of situations and to view

(continued on page 12)

Resources of Interest

(continued from page 8)

Making Math Fun

MATHCOUNTS is a national math enrichment, coaching, and competition program that promotes middle school mathematics achievement through grassroots involvement in every U.S. state and territory.

Participating schools, both nationwide and overseas, select students to compete in one of more than 500 written and oral competitions. Local winners go to state competitions, where the top teams earn the right to compete at the national level.

New teams must register by December 10 to participate in 2004-2005 activities. For more information, contact the MATHCOUNTS Foundation, 1420 King Street, Alexandria, VA 22314; phone 703-684-2828; send e-mail to info@mathcounts.org; or visit www.mathcounts.org.

*For more information on grant programs, funding sources, and technology funding, visit the AEL Web site at www.ael.org or *Philanthropy News Digest* at <http://fdncenter.org/pnd>.*

*Consider also watching the *Federal Register*, published every weekday, at www.access.gpo.gov/su_docs/fedreg/frcont04.html.*

Grant Opportunities

Institute of Museum and Library Services: National Leadership Grants for Libraries

Purpose: To provide models that can be widely adapted or replicated by others to extend the benefit of federal support.

Proposals should reflect an understanding of current issues and needs related to library services, provide creative solutions to issues of national importance, and provide leadership for other organizations.

All types of libraries, except federal and for-profit, may apply. Partnerships are encouraged but not required. Focus areas include the following:

Advancing Learning Communities supports the development of learning networks and services for people of all ages, whether that learning takes place in communities, in schools, or in the workplace.

Building Digital Resources supports the creation, use, and preservation of significant digital resources as well as the development of management tools.

Research and Demonstration supports basic and applied research and demonstration projects to test potential solutions to problems in a real-world environment.

Grants cover up to three years and range in size from \$25,000 to \$1 million. Cost sharing of at least one third is required.

Deadline: February 1, 2005

Application and information available online at www.ims.gov, or from Martha Crawley (202-606-5513, mcrawley@ims.gov) or Susan Malbin (202-606-5389, smalbin@ims.gov).

NASA: Explorer Schools Program

Purpose: To bring engaging mathematics, science, and technology learning to educators, students, and families.

Each spring, a three-year partnership is established between NASA and 50 new

Explorer School teams of teachers and education administrators from diverse communities across the country. The selected teams work with education specialists from NASA Centers during the summer in an effort to spark innovative science and mathematics instruction for students in grades 4-9. While partnered with NASA, Explorer School teams acquire new teaching resources and technology tools using NASA's unique content, experts, and other resources. NASA education specialists and scientists provide investigation opportunities and professional development programs.

Deadline: January 31, 2005

Application and information available at <http://explorerschools.nasa.gov/portal/sites/nas>.

U.S. State Department and USAID: iEARN

Purpose: To help U.S. schools and teachers increase interaction with peers in countries with significant Muslim populations.

Scholarships totaling \$80,000 help U.S. teachers and schools participate in iEARN, a global network for educators interested in working online and in face-to-face events with peers in 19 countries with significant Muslim populations.

Scholarships will cover membership costs, online professional development course fees, Arabic language software licenses, and participation in seminars and conferences in New York City and the Middle East.

Deadline: Ongoing

Information and application available online at www.iearn.org/join or by contacting Mariam Habib at mhabib@us.iearn.org or by fax at 212-870-2672.

National Science Teachers Association: Student Competitions and Teacher Awards

Purpose: To encourage innovation in science teaching and learning.

Toyota TAPESTRY Grants for Science

Teachers will award \$550,000 in grants to a minimum of 70 K-12 teachers.

Deadline: January 19, 2005

For information, go to www.nsta.org/programs/tapestry.

Toshiba/NSTA ExploraVision Awards

reward students for creativity and ingenuity in envisioning the future in science and technology. Students can win up to \$10,000 in savings bonds.

Deadline: February 1, 2005

For details, call 800-EXPLOR-9, e-mail exploravision@nsta.org, or visit www.exploravision.org.

Craftsman/NSTA Young Inventors

Awards puts problem-solving skills at center stage. Open to students in grades 2-8, the program challenges students to use creativity and imagination along with science, technology, and mechanical ability to invent or modify a tool. Top winners receive \$10,000 savings bonds.

Deadline: March 15, 2005

For more information, call 888-494-4994, e-mail younginventors@nsta.org, or visit www.nsta.org/programs/craftsman.

CDW Government, Inc. and Adobe: Fourth Annual Education Contest

Purpose: To encourage the use of technology to enhance learning.

High school juniors and seniors are eligible to enter. They will create an original, two-dimensional digital artwork and write a 250-word essay responding to the question, How has technology enhanced your learning experience? Entries are judged on creativity; style; distinctiveness; use of color, space, and medium; and originality, grammar, and content. The top 10 winners will receive technology products and will be featured in a CDW-G Solutions magalog. The first-place winner's school will receive a \$1,000 gift certificate from CDW-G.

Deadline: December 15

Information and application available online at www.cdwg.com/artcontest and from CDW-G Education Contest, Attention: Gwen Sawitz, 200 North Milwaukee Avenue, Vernon Hills, IL 60061.

3-D Life Adventures: Action Grants

Purpose: To help young people take thoughtful action to affect the hearts, minds, and actions of their peers and communities.

The program provides financial and consulting support for student-led initiatives related to natural or cultural diversity. Students—individually or as part of a group—can receive up to \$500 to help design and implement a project. Every project needs an adult mentor.

Examples of projects might be creating a cultural festival for a school or an environmental education program for grade-school children at a church, temple, or mosque. All projects should be student-led and related to natural or cultural diversity.

Deadline: Ongoing

Application and information available from Laura Jackson at 703-312-0541 or lauraj@3dzone.org or online at www.3dzone.org/html/Programs/appfaq.asp.

General Mills Champions Youth Nutrition and Fitness Grants

Purpose: To improve the eating and physical activity patterns of young people.

Schools and local nonprofit organizations that work with children are encouraged to apply. Fifty grants of \$10,000 each will be awarded to programs that demonstrate the greatest need and likelihood of sustainable impact.

Deadline: February 1, 2005

Application and information available online at www.generalmills.com/corporate/commitment/champions.aspx.

National Center for Chronic Disease Prevention and Health Promotion: Grants for School Health Programs and Services

Purpose: To improve the health of American children and youth.

This initiative offers databases of federal and private funding sources that support programs to improve health. To search the databases, go to www.cdc.gov/healthyyouth/funding/index.htm.

Resources of Interest

(continued from page 9)

mathematics as a discipline in which thinking is important.

- 9. Concrete materials.** Long-term use of concrete materials is positively related to increases in student mathematics achievement and improved attitudes toward mathematics.
- 10. Students' use of calculators.** Using calculators when learning mathematics can result in increased achievement and improved student attitudes.

The monographs in the Educational Practices Series are available free of charge (if print copies remain) from the Publications Unit, IBE, P.O. Box 199, 1211 Geneva 20, Switzerland. E-mail: b.deluermoz@ibe.unesco.org. All monographs are free in PDF (some in several languages) at www.ibe.unesco.org.

Improvement: Are You Ready?

Today, every educator needs to know a bit about education research. NCLB requires schools, districts, and states to consider the scientific base that supports decisions to employ programs.

Here's your chance to become part of that scientific base. AEL needs schools to participate in a study to develop norms for a new assessment instrument: the AEL Measure of School Capacity for Improvement. This survey uses the perceptions of a school's professional staff to assess the school's readiness for improvement. To give depth of meaning to the survey's results, we need a database of schools that is large enough to set norms, against which future users can be measured.

Every school that joins the database through our norming study will receive a free profile of its capacity to improve in several areas, including program coherence, responsive pedagogy, and peer-reviewed practice. Staff can use the profile to inform programs, policies, and decisions about school improvement. Faculty members should be able to complete the 64-item survey in about 20 minutes.

If your school or district would like to take part in this study, contact Georgia Hughes by phone (800-624-9120, ext. 5413) or by e-mail (hughesg@ael.org). The deadline to sign up is February 1, 2005.

Founded in 1966 as a not-for-profit corporation, AEL provides services to educators, education publishers, and policymakers. Services include rigorous research design and implementation, intensive product and program evaluations, randomized field trials, technical assistance, and award-winning professional development.

This publication is funded by the Institute of Education Sciences (IES), U.S. Department of Education, under contract number ED-01-CO-0016. Its contents do not necessarily reflect the views of IES, the Department, or any other agency of the U.S. government.

The Link is free to educators on request. Readers are encouraged to reproduce its contents, giving proper credit. Current and many back issues are available in PDF at www.ael.org. Print copies of some back issues are available; please inquire by e-mail to link@ael.org.



Appalachia Educational Laboratory
P.O. Box 1348
Charleston, WV 25325-1348

Address Service Requested

Nonprofit Org.
U.S. Postage Paid
Cleveland, OH
Permit No. 1940

AEL is an Equal Opportunity/Affirmative Action Employer