includes simple shapes and relationships. Money, measurements, some pictures, and more complex relationships are real for slightly older children. For progressively older students reality may include still more abstract entities. For all children, a certain amount of fantasy is real and can be used effectively. For generations teachers have known that slower students learn and remember mathematics better when it is related to their reality. But many of these same teachers believed that since quicker students could learn to perform calculations without reference to reality, they should do so. As a result, many bright students believe there are two distinct kinds of mathematics, the kind that applies to the real world and the kind they are taught in school. Such children tend not to be good mathematical problem solvers.

After abstracting the mathematics from reality and practicing it for awhile, students should apply it to many different situations that seem realistic to them. Properly constructed games can be a good source of problems and practice. Real-world activities such as finding best buys at grocery stores, synchronizing traffic lights to enhance traffic flow, or analyzing news articles provide excellent practice.

Well-constructed sets of textbook word problems can also provide good problem-solving experience. A variety of applications is important lest students get the impression that the mathematics they've learned works only with ice cream sticks, or fingers, or money, or some other limited number of situations. One of the great powers of mathematics is that the same mathematical system can be used as a model for a great variety of situations.

Problem solving, like bicycle riding, requires lots of practice. Students should have regular experience, work with others, and formulate and solve their own problems. A small amount of theory about problem solving (such as lists of procedures that sometimes help) can be useful after a lot of practice, but it is of little help before the practice and worse than useless without the practice.

Another characteristic of an effective program for teaching mathematical problem solving is a lot of direct two-way communication between teacher and student and multidirectional discussions with several students and perhaps the teacher. Long lectures are inappropriate even for older students. Dull ditto sheets (or a textbook that is essentially hardbound ditto sheets) cannot replace active, interactive teaching using materials, games, and the learners' natural curiosity.

Students should learn to communicate with others about mathematics. They should be able to receive information that is presented orally or in writing. They should be able to present answers orally or in writing so that others can understand them. Textbooks that delete verbs, use strange constructions, or otherwise damage the English language in order to lower the computed "reading level," and teachers who accept numerical answers without any words to provide context, do not help students learn to communicate with others about mathematics.

Mathematical problem solving involves using mathematical reasoning to achieve a desired goal in spite of obstacles. The most effective methods of teaching mathematical problem solving involve always relating the mathematics to the learner's reality and providing plenty of well-motivated practice in solving problems and communicating with others about mathematical problems. Superficial, cosmetic revisions of "back-to-basics" or 1960s "new math" programs will not provide effective means to teach problem solving.

**Supervision**

**Robert Krajeviski**

**Improving School-University Relationships**

Seven years ago an ASCD working group on "Roles and Responsibilities of Supervisors" was commissioned to gather current data on the role of the instructional supervisor by reviewing literature and empirical research. Part of the data included five-question interviews with executive directors and other representatives from nine national education associations.

The respondents agreed that interaction among all instructional personnel was central to learning and that clinical supervision is the main process by which instructional supervisors gain access to and understanding of the quality of this interaction. Well over half of the respondents said that instructional supervision should include techniques and practices of clinical supervision.

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der. Although their list of impedi-
mentary programs. In most cases, it ap-
pears, tradition is hard to change.

How, then, can universities keep pace with contemporary instructional supervision needs? How can they en-
sure that they don't lose their primary preparation role to the ever-increasing
workshops sponsored by professional organizations, intermedi-
ates and consulting groups? I sugges-
t that the responsibility belongs to professors of instructional supervision; specifically, they need to be
more active and creatively involved in meeting program development needs. Further, professors must form partner-
ships between themselves and other constituencies involved in selecting, evaluating, and rewarding educational supervisors.

I recently asked leaders of profes-
sional education administration and supervision organizations and practic-
administrators and supervisors, "What are some of the impediments to effective relations between school ad-
ministration and supervisors and profes-
sors of supervision?" and "What are some of the proactive measures prof-
sors can effect to improve the relations-
ships? They responded candidly with two critical observations and several proactive suggestions.

First, many practitioners feel supervi-
sion professors are outdated, too far
removed from the realities of day-to-
day instructional supervision chal-
enges, and not in the schools long
enough to do anything but sell. Profes-
sors, they suggest, need to address
their image as perceived by practition-
ers and ask, "What do we do to bring
about this image? Is this image accu-
rate? The key is communication, and
professors must communicate with their constituencies, ask practitioners why they feel this way and what the
supervision professors can do to im-
prove their image. (On the other
hand, organization leaders suggest
that some practicing supervisors feel
threatened by the demands of their
positions and may blame others—
such as professors—for their seeming
lack of skills required for job effective-
ness.)

Other suggestions were that profes-
sors should:
* Attend state meetings of practi-
tioners and maintain active roles in
their associations. Contact evinces prof-
fessional concern and good public rela-
tions; most important, it allows pro-
cessors to participate and make profes-
sional contributions to practi-
tioners' associations.
* Occasionally visit schools to better
understand the daily instructional
challenges that teachers, supervisors,
and principals face. Such interactions
might lead to job sharing for agreed-
upon time periods.
* Initiate monthly Issues Seminars
with ten to 12 invited school supervi-
sors and administrators, on a round
round table basis, to help groups understand each other better and promote supervision and leadership. Group mem-
bership may be rotated to ensure ex-
panded participation.

Second, there seems to be a con-
tinuing gap between what is taught
and what is needed. Courses are
taught for certification, but do they
teach supervision skills to help stu-
dents? Program standards are now
based on courses, not competency.
Courses fail to keep pace with contem-
porary needs; thus, they don't focus on
real issues of instructional supervi-

The most critical issue to both lead-
ers and practitioners seemed to be
preparation programs. Researchers
suggest that professors strike a balance
between theory and practice in teach-
ing their courses, try to speak from
recent direct experience bases (school
visits) to better balance theory with
practice, and, as much as possible, test
tory and practice against each other.

Additionally, professors should thor-
oughly examine the supervision skills
essential to success and offer not only
knowledge base content, but also the
generic skills for problem analysis,
instructional leadership, communica-
tion, and so forth. Practitioners need
base line management skills—skills
not often taught in the preparation
programs.

I asked these same two questions of
various supervision professor col-
leagues. Although their list of imped-
ments (including professional image
and preparation program content) was
similar to that of professional organi-
zation leaders and practitioners, their
rationale for each was less intense.

Some of their suggestions for im-
proving both were that professors
should:
* Demonstrate continuing aware-
ness of contemporary theoretical, soci-
etal, and institutional developments
that have implications for practicing supervisors. (Of course, that requires
flexibility.)
* Seek cues from practicing supervi-
sors as decisions about revising prepa-
ration programs are undertaken by higher education institutions.

- Discuss the problems confronted by practicing supervisors (especially in informal settings, which supervisors typically favor for such discussions). That really means moving to their turf!

  - "Stop being so damned pompous and superior in contacts with practicing supervisors," an impression often projected unintentionally.

  Perhaps professors try too hard to impress each other in formal university communication. Several weeks ago, for example, in a meeting discussing possible changing of program core requirements, a professor listed this as a common experience item for a specific study area: "Secure an eminent advocate of educational reform and conduct a seminar session telephone interview of this individual." If the professor were to have said, instead, "Conduct a telephone interview with an eminent educational reform advocate," others would have understood the message and felt an interest to communicate—not impress.

Profs of supervision ought never allow anyone to doubt that they are competent. It is up to them to ensure that the preservice and inservice programs they conduct, the images they present, and the skills they foster in their students, and the ways they communicate are the best they can offer.

These associations were: American Association of Colleges of Teacher Education, American Association of School Administrators, American Federation of Teachers, Association for Supervision and Curriculum Development, National Association of Elementary School Principals, National Association of Secondary School Principals, National Education Association, presidents of Council of Professors of Instructional Supervision, and Professors of Curriculum.

Curriculum Abstracts

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Student Participation in Archaeological Digs Uncovers Success

Nothing seems to succeed better with students than practical, hands-on activities. For instance, students and teachers in the Morris, New York, schools have undertaken an archaeological dig as part of the curriculum. What began three years ago as a simulated dig for artifacts buried by teachers has now expanded into realistic settings.

The present dig is an ongoing project offered as a 20-week elective. A local citizen donated the rural site after consulting with an archaeologist. Students participate one afternoon each week and for single periods when feasible. Aside from specific dig skills, students can apply ideas from science, mathematics, history, art, and industrial arts. The speech and drama class has videotaped activities, and the art department is developing a pictorial record of the project. Cost to the district has been negligible, and the greatest problem has been maintaining a balance between students' desire to spend time at the site and their commitments to other academic responsibilities.

This project is an example of continuing efforts by educators to inject life into the curriculum. One can easily imagine the enthusiasm and pride students experience as they unearth artifacts from their dig site. Urban schools might develop similar, projects using city sites or nearby parks. Even a simulated dig offers possibilities for the kind of learnings reported here. Whichever the case, interdisciplinary, practical programs such as this would be worthwhile additions to any school's curriculum.


Word Processing Facilitates Writing for 1st Graders

Twenty-one 1st graders in Mississauga, Ontario, recently participated in a six-week, word processing-based program designed to help develop their writing skills. While the novelty of the computer was motivational, its capacity to help children develop easily readable text greatly encouraged their efforts. The Story Writer program proved very user friendly with the 1st graders. Several students even asked to use the librarian's typewriter when they did not have access to the computer.

Case studies of individual children revealed earlier increases in story composition and transcription skills. Students also grew markedly in their ability to develop and sequence ideas as they became comfortable in allowing their ideas to flow directly into print. Some students, however, continued to sound out the words of their