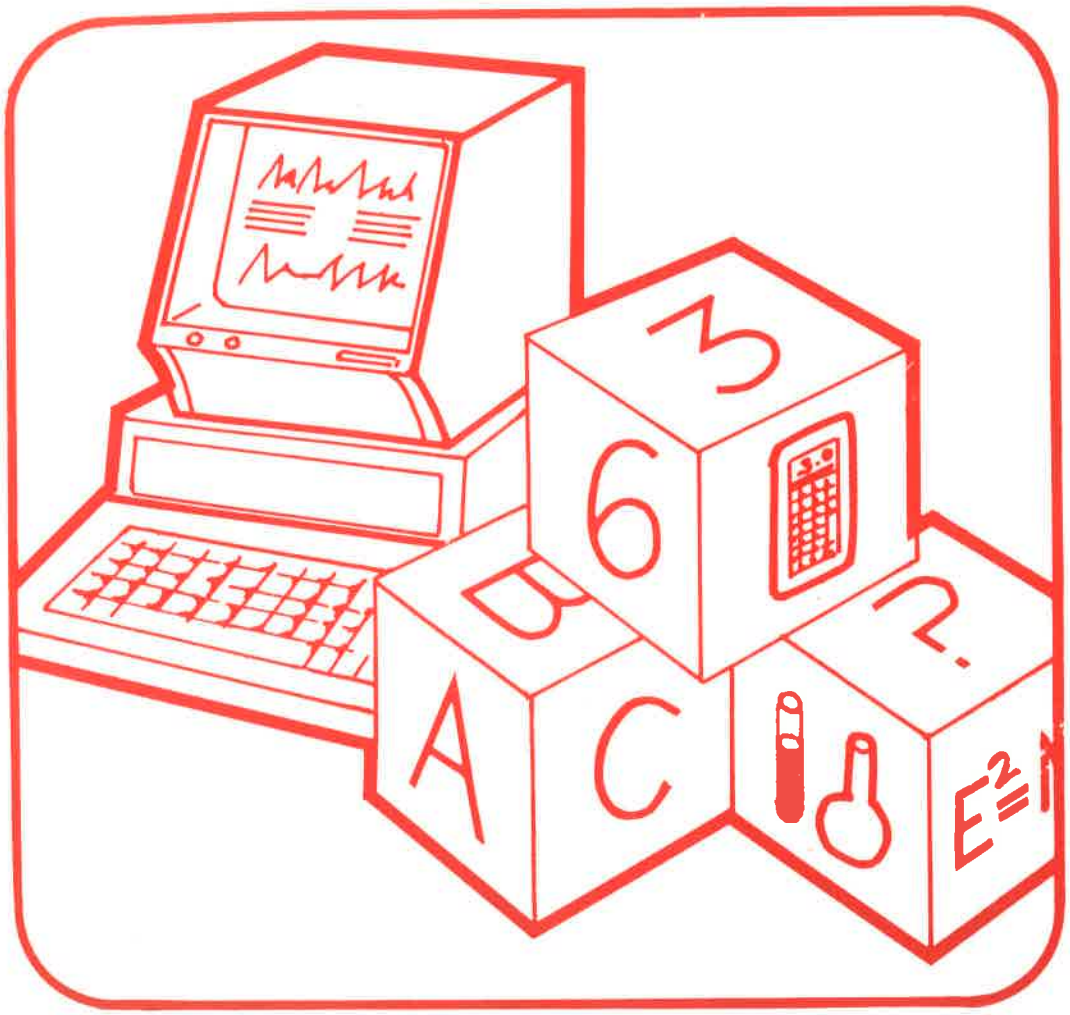
THRESHOLDS IN EDUCATION

Vol. X No. 3
August, 1984



APPLIED BASICS IN EDUCATION

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Erekson
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Manuscripts. Submit manuscripts to Editor, *Thresholds in Education*, P.O. Box 771, DeKalb, Illinois 60115. Suggested length - 900-5,000 words. Typed double spaced include author's vita.

The *Publications Manual* of the American Psychological Association (Sec. Ed. 1974) should be followed in preparing manuscripts.

Advertising rates: 1 page $200; half page ads $110.00; classified ads: up to 50 words, $8.00, 51-100 words, $15.00. Address: Business Manager *Thresholds in Education*, P.O. Box 771, DeKalb, IL 60115.

Thresholds is entered as Third Class mail at the Post Office in DeKalb, Illinois under permit number 120.

Subscription information. Subscription rates are as follows: one year $12.00, two years $23.00, three years $33.00. For foreign subscriptions other than Canadian add $3.50 more per year. Send to Editor, *Thresholds in Education*, P.O. Box 771, DeKalb, IL 60115.

Thresholds is a refereed journal published quarterly in February, May, August and November.

Basic Skills: Beyond Knowledge to Application

By Thomas L. Erekson

Education has gained national attention in the past few years as a result of reports of various commissions and groups convened to study education. These national reports have produced varying recommendations for the improvement of education. However, a general theme keeps surfacing in the recommendations-- education in America needs to improve.

Most of the reports recommend that improvements in education should come through a stronger emphasis on the basics--or a movement of "back to the basics". With a renewed emphasis on basic academic skills (reading, writing, mathematics, science, and social studies), the authors of these reports suggest that educational improvements will take place. These improvements include improving the economy, better preparation for future life in a technological society.

While the reports tend to stress these relationships, this author raises questions about the validity of the recommendations made by these reports. Is going "back to basics" a move forward or a move backward? Alvin Toffler (1971) in his book Future Shock had this to say about the school curriculum:

> As for curriculum, the Councils of the Future, instead of assuming that every subject taught today is taught for a reason, should begin for the reverse premise: nothing should be included in a required curriculum unless it can be strongly justified in terms of the future. If this means grabbing a substantial part of the former curriculum, so be it.

Toffler calls for a strong justification for anything that is to be included in the school curriculum and that justification must be based on the future. We should consider moving forward to the basics that will be needed for life in a highly sophisticated, technological, informational society. It appears that many of the reports would justify a traditional liberal arts curriculum based upon the past. The writers of the reports seem to justify their recommendations on the philosophy of "what has been good for me will be good for my children". What was good for people in the past was a traditional liberal arts curriculum of English, math, science, social studies and foreign languages. Is this curriculum really the best? Will it prepare students for the future? Or, is the present curriculum a holdover from the past, a holdover that will not prepare students to effectively be able to cope, adapt and adjust in a futuristic, technological society that will be greatly different from the society we live in today?

Thomas L. Erekson is Head, Department of Vocational Education, University of Wyoming, Laramie.

A Historical Perspective

America should be commended for its great experiment to educate the masses. This education goal has been facilitated by the policies of our democratic society. The comprehensive high school, a school that has an educational program for all students, is a remarkable achievement that has been accomplished by American education. For example, in 1900 only 11% of the eligible age group of high school students were attending high school. And, this grew to an astonishing 99% of the eligible age group of students attending high schools in 1980.

With the growth in the number of students attending high school, changes came in the high school curriculum. In the early 1900's, the high school curriculum was basically dictated by college entrance requirements. Those students who attended a high school were almost exclusively preparing to attend college. Many secondary school educators were disturbed by the fact that the high school curriculum was being dictated by college entrance requirements. This is one of the forces that led to a study that has become known as the Eight-Year Study. The Eight Year Study ran from 1932 to 1940. The thirty high schools that participated were "freed" from the conventional college entrance requirements and were permitted to experiment with various courses in their curriculum. Prior to this study three hundred colleges across the country agreed to accept the graduates of these thirty high schools upon the recommendations of the high school principals. A follow-up evaluation study was undertaken to see how well the whole group had done in the academic subjects, in college life, and in personal development. Students in the experimental group were shown to have a slightly higher academic average in college, and they also earned more non-academic honors than the students did who had attended the high schools with the traditional curriculum. Over a period of time the results of the Eight-Year Study caused colleges to adopt different, and in many cases, less stringent entrance requirements.

With changes that came about from research and other concerns, the focus of secondary education shifted from only preparing for college to include other emphases. For example, in the 1950's the cold war and the successful launching of the Russian Sputnik suggested education had a role in fulfilling national purposes for defense and technical superiority. In the 1960's the purpose of education turned to the war on poverty and equality in terms of education for certian groups that had been discriminated against previously. And now, in the 1980's, there appears to be a call for a move backwards to something that is more traditional.

Basic Education

Speaking out against basic education is like speaking against motherhood and apple pie. It is not the intent of this author to speak against basic education or to suggest that we do not need to strengthen education in language arts, science, mathematics, social studies, and foreign languages, and all other areas of the secondary school curriculum. Rather, this author would suggest that we need to focus on the quality of education that is delivered to students today. From reading the national reports it appears that many of them call for more time on task. This has been interpreted as requiring a specific number of years or specific subject matter courses. Calling for increased time in basic education courses affects the quantity, or the amount of time that the students spends in a course. This does not necessarily equate to improving the ability of the students to master basic educational competencies. It is imperative that educators today focus on quality issues rather than quantity issues.

We need to focus on the quality of education that is delivered to students today.

Basic educational skills are needed by all students today. The basic skills that they need, however, should not be equated with time spent in traditional subject matter courses. Rather, the basic skills that are needed by students today to prepare for the future are the new basics. The new basics include three types of skills: (1) communication skills, (2) problem solving skills, and (3) scientific and technological literacy. To achieve the goals of teaching the new basics it will require an integrated curriculum. We will need to redirect education away from the traditional curriculum segregation into specific courses to an integrated curriculum with an activity-orientated approach to teaching and learning.

Leaders of the progressive education movement, including John Dewey, called for a student-centered, scientific-based, activity-orientated educational program. They suggested that this would greatly improve and reconstruct education for the betterment of students. It is time again to move into a more progressive educational program, one which includes relevancy with real world examples to help the students understand and gain the competencies needed for them to participate fully in our future technological society.

When establishing an emphasis on basic skills it is important to determine what the future employers of the students feel about the educational preparation that the students have received. A Nation at Risk argues that there is a direct connection between the reported decline in high school quality and the difficulties that have recently been experienced in the American economy. However, a recent study conducted by the Center for Social Organization of Schools at the John Hopkins University (Crain, 1984) found that this is not necessarily true. Crain reports, "this survey of employers of American high school graduates provides no evidence to support the contention that American industry is suffering because the high school graduates it is hiring are inadequately educated". This major conclusion came after a survey was conducted of personnel directors of several businesses and corporations. The Crain study came to another conclusion about the need for the traditional curriculum. "Certainly there is little evidence that employers need high school graduates with trigonometry, calculus, physics, chemistry, foreign languages, or the skilled ability to comprehend literature". Very few of the personnel supervisors reported that they were having difficulty hiring people with minimal skills in reading, writing, and arithmetic. The John Hopkins researchers also suggested that if there has been a decline in high school quality, there was no evidence that it has been of great concern to American industry. Instead of basic education skills, the personnel supervisors surveyed suggested that more important skills for high school graduates would be dependability and proper attitudes.

It is the opinion of this author that we must address the new basics of communication, problem solving, and technological literacy in American education. As the nation moves into a post-industrial society, these new basic skills, with the ability to change and adapt, will be needed by students in order to make a smooth transition from school to the world.

The findings of the John Hopkins report suggest that the curriculum change recommendations made by the national reports may not be what is needed. It is the opinion of this author that we must address the new basics of communication, problem solving, and technological literacy in American education. As the nation moves into a post-industrial society, these new basic skills, with the ability to change and adapt, will be needed by students in order to make a smooth transition from school to the world.

What is the most effective way to develop competencies in the new basics that the student will transfer to life and work in a technological society? Should we be teaching "traditional" subjects with the "traditional" methods? Will a movement "back to the basics" provide students with experiences that will transfer to life? These questions have been debated extensively. However, it is the position of this author that developing these new competencies will require new approaches. Students will need to participate in learning activities that facilitate educational transfer. In discussing transfer, Bugelski (1971), stated that "past experience does not count in the transfer of training and is of basic importance to future adjustments that involve identical elements". Therefore, education for a future technological society should provide the students with an experience base that will facilitate transfer. For example, the future society will require students to solve real problems. School should actively involve students in problem solving activities and not just teach about problem solving. The same holds true for

communication and technological literacy--we must not limit education to teaching about it, rather involve the students in "doing" it.

What is being suggested by this author is that we focus education on application of the new basics to provide students with an experience base for the future. Application teaching and learning can be an effective way to develop high level skills in the cognitive domain. Students will have to move beyond knowledge and comprehension to application, analysis, synthesis, and evaluation. Teachers will have to teach beyond knowledge and comprehension. Without focusing education on higher level cognitive skills, the current panacea to improve education will be "as sounding brass"--soon losing its sound without making substantial changes.

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Applied Basics in Elementary Education: Application Teaching Via Industrial Arts

By Lyndall L. Lundy

"Hands On" learning experiences can help children understand the technological world in which they live while developing competencies in basic educational skills. These learning activities develop skills and knowledge that the students can utilize in daily activities or leisure time pursuits later on in life. In this paper an attempt will be made to describe how application teaching through industrial arts can be used to teach the basics that are essential for people to live in a society described with terms such as industrial, technological and informational.

Applied Basics

Basics in elementary education are commonly defined as reading, writing and arithmetic. These three skills are essential for all people to fully participate and to make progress in our modern, technological society. Because these basic skills are so essential, the most efficient, relevant and interesting approach should be used in teaching them. "Back-to-basics" has been the trend that is surfacing again with the national attention being placed on education. Reading is the primary concern because so much of the rest of what is learned depends on the ability to read. Elementary school personnel need to find more time and better methods for teaching this needed skill.

Experts easily disagree as to how "best" to teach reading and comprehension. Could it be that more attention needs to be given to "hands-on" activities as a tool for teaching reading? Children are naturally curious, and to induce them to read in order to satisfy that curiosity is not difficult. Westcott and Smith (1977) suggest that "when children study how people live and work and think in various parts of the world or read about different historical areas, certain industrial arts (hands-on) activities can be used to increase their understanding." As their understanding increases, it seems likely that their reading ability will also. Research has shown that children learn better, have a greater interest in study, and retain knowledge longer when they can learn through direct, purposeful experience. Industrial arts and hands-on experience help to enrich and supplement all areas of elementary school curricula (Wescott & Smith, 1977).

Writing ability, along with reading, is needed by all children. Society demands that children learn to read and write so they can communicate throughout life. It is generally thought by educators that learning is strengthened when children have experiences that are meaningful and relevant. Students should be able to write about topics that have meaning to them. Real world examples and other application experiences can provide the source for meaningful writing instruction.

A "hands-on" approach can be the motivation and practical way of making mathematics meaningful or relevant. In writing about mathematics,

Lyndall L. Lundy is a Professor of Vocational Education, University of Wyoming, Laramie.

Westcott and Smith (1977) indicate:

> Meaningful mathematics makes provision for the application of quantitative procedures in social situations both in and out of school. A practical balance must be achieved between the teaching of basic number facts and processes, and the social application of mathematics. Motivation to learn mathematics becomes intense when the children identify mathematical problems that arise from a felt need in a social situation. Meaningful mathematics programs are built around "problem solving situations" rather than problem solving as drill. It is imperative that students know the "whys" of problem solving and not just the "hows."

Industrial Arts as a Method of Application Learning

In the elementary school, hands-on activities are a means that the teacher can employ to accomplish the overall objectives of general education. Industrial arts is a subject matter that utilizes the hands-on approach or method. The goals of Industrial Arts are to develop in children knowledge, skills and appreciation which will help them to become productive citizens in a rapidly changing technological and free enterprise type society. To this end, industrial arts activities provide opportunities for the use and knowledge of tools, materials, processes and machines that will develop the following outcomes in students:

1. manipulative skills;
2. knowledge of our technological society;
3. problem-solving skills;
4. safety attitudes;
5. understanding of scientific/industrial processes;
6. knowledge of applied science;
7. a base for proper work attitudes;
8. greater interest in learning;
9. ability to make better career decisions;
10. increased self-awareness and strengthening self-concepts;
11. development of interpersonal skills;
12. development of problem-solving ability.

In the early part of this century, leaders in the emerging field of Industrial Arts expanded the conceptions of Industrial Arts in the elementary school. In particular, Bonser, a Professor of Education at Teachers College, Columbia University, considered industrial arts as a subject and a method which laid the educational foundation for further learning.

A report by a Harvard Committee (1945) entitled General Education in a Free Society stated that the direct contact with materials, the manipulation of simple tools "...are indispensible aspects of general education for everyone."

Proponents of the technology education emphasis for industrial arts today are saying that students should know about industry and our technological society--including materials, processes, tools, machines, careers, products and the impact of technology on society. An excellent way to accomplish this is through industrial arts content and practices including the production of products.

Miller and Boyd (1970) refer to industrial arts in the elementary school as "constructional activities." Industrial arts activities have been given a variety of names, but the overall goal generally remains the same. That goal is to provide actual hands-on experiences that result in improved learning and retention of knowledge as it relates to different subject areas in a technological society. According to Scobey and Graham (1974), "the overall aim of industrial arts is to help children and youth, as individuals and as members of our society, to cope in a technological culture." Research indicates that industrial arts experiences in the elementary classroom have resulted in greater learning and retention. More specifically, the positive outcomes include improved reading, greater interest and motivation, and improved work study skills (Scobey & Graham, 1974). These are all desirable outcomes.

The overall aim of industrial arts is to help children and youth, as individuals and as members of our society, to cope in a technological culture.

It seems logical, without citing any specific research, that students will learn to read, write and compute "better" if they are motivated. One strategy would be to infuse into the elementary curricula significant "hands-on" activities that make coursework relevant and interesting. This does not mean a redirection of the curricula, rather the infusion of enriching learning activities, thereby making existing curricula more meaningful.

For further information about Industrial Arts/Technology Education activities, content and methods, contact the American Council on Elementary School Industrial Arts, American Industrial Arts Association, 1914 Association Drive, Reston, VA 22091.

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Basic Skills for Work and Living: A Model for Self-Empowerment*

By Joseph S. Karmos, Cheryl A. Presley, M. Harry Daniels and Ann H. Karmos

Basic skills are a reflection of Americans' work activities and values. For a long time, it has been relatively easy to revise basic skills as technology and society changed. But now changes are occurring so rapidly that predicting lifelong basic skill needs has become very difficult. In fact, change itself has become the only predictable certainty of the future. Already, the ability to deal with change is critical for many Americans. They are now confronting changes in their jobs, changes in their schooling, changes in their personal lives, and changes in the world around them. Contemporary education must provide opportunities for students to learn to be adaptive, and the skills to do so must be considered basic skills. This paper describes a model for preparing students to adapt and cope with change. Three classes of adaptive skills are described: Generalizable Skills, Problem Solving Skills, and Transitional Skills.

A Model for Adapting With Change

Change has always been central to American life. More than a century ago, de Tocqueville remarked that "the American has no time to tie himself to anything, he grows accustomed only to change and he ends by regarding it as a natural state of man" (Pierson, 1938). This social commentary about nineteenth century America seems remarkably apt as our nation approches the 21st century. Contemporary theorists (Schlossberg, 1982, 1981; Moos & Tsu, 1979; Schneider, 1984; Levinson, 1978; Bridges, 1980; Gould, 1978) have noted that American adults are encountering an increasing number of changes during their lifespans which call for new patterns of behavior or for revisions in their perceptions of self and environment.

Educational systems will be called upon to play a central role in educating students who can adaptively respond to the changes that the future holds. Parents will expect schools to provide the skills and strategies that their children will need to survive and prosper with ever increasing social and technological change as they enter the world of work. In the monograph Adaption to Work (Ashley, 1980), from the National Center for Research in Vocational Education, it was noted that an inability of many workers in the American labor force was that of adapting to the changes, demands, and responsibilities of work. Business and industry will look to the schools to produce workers who posess and manage skills which contribute to acheivement of employers' goals. Education has no alternative but to respond to this emerging imperative because society will surely hold public schools accountable for accomplishing this important task.

How should the educational community respond to these clear, urgent, and pressing demands? Alternative solutions have been proposed from a variety of sources (Adler, 1982; Botkin, Dimancescu & Stata, 1982; Boyer, 1983; DeBevoise, 1982; Goodlad, 1982; Gisi & Forbes, 1982; Naisbitt, 1982; Pratzner, 1978; Ravitch, 1983; Selz, 1980; Timpane, 1982). Based on a review of these and other resources, our own research, interviews and workshops, we have identified a comprehensive model for pretechnical curricula for preparing students to adapt with change. The model has two basic assumptions:

ASSUMPTION: The nature of work in the future will be characterized by constant change, which means that most workers will be employed in several different jobs within or across occupations during their lifetimes. Accelerated change represents a significant factor which must be considered by individuals as they prepare for their initial employment.

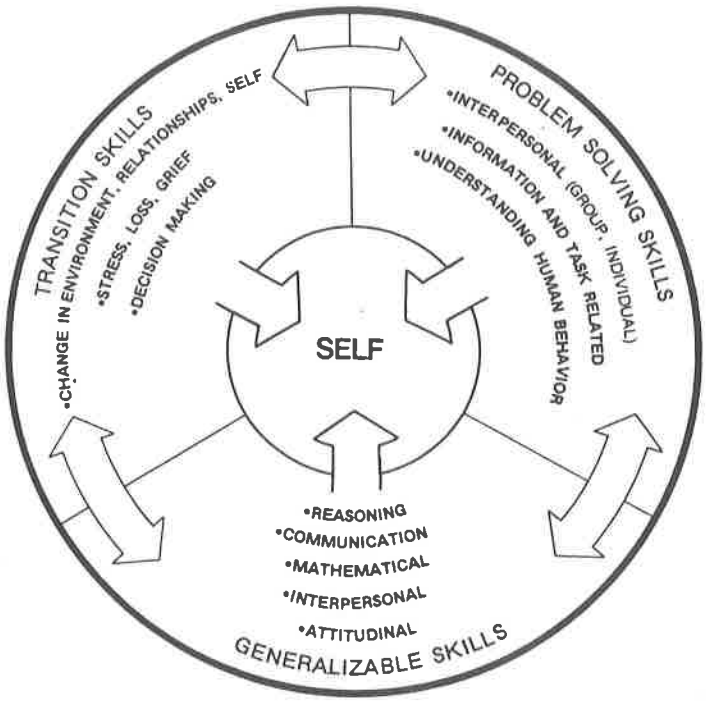
ASSUMPTION: Individuals' employability options in the future will be shaped by the acquisition and maintenance of specific classes of skills. Three classes of such skills have been identified: Generalizable Skills, Problem Solving Skills, and Transition Skills.

Joseph S. Karmos, Cheryl A. Presley, M. Harry Daniels and Ann H. Karmos are Professors of Education, Southern Illinois University, Carbondale.

*This study was supported in part by a funding agreement with the Department of Adult, Vocational and Technical Education of the Illinois State Board of Education. Opinions expressed in this article do not reflect, nor should they be construed as policy or opinion of the Illinois State Board of Education or its staff.

The figure below displays three classes of skills within which instructional strategies and pretechnical curricula decisions may be developed.

SKILLS FOR ADAPTING WITH CHANGE



DEFINITION: Generalizable Skills refer to those skills which are actively used in work performance, which are transferable across jobs and occupations and which are instrumental to success on the job and in the classroom. Examples include mathematical, reasoning, communication (written and oral), interpersonal, and attitudinal skills.

DEFINITION: Transition Skills refer to those skills which are used to manage life transitions, especially occupationally related ones. They include managing changes in the environment, in realtionships, and in oneself; managing stress, loss and grief; and making decisions.

DEFINITION: Problem Solving Skills refer to those skills which are employed in the resolution of problematic situations including interpersonal problems (group and individual), information and task-related problems, and problems related to the understanding of human behavior.

Two classes of skills from the model are discussed below: Transition Skills and Problem Solving Skills. Generalizable Skills have been described in detail in several current sources, one of which is Greenan's Identification of Generalizable Skills in Secondary Vocational Programs (1983). Generalizable Skills, including the 3 R's of reading writing and arithmetic, are crucial for adapting with change, but they are no longer a sufficient education for the workers of tomorrow. We have extended essential skills to include Transition Skills and Problem Solving Skills. They are the focus of the article. These skills will help provide tomorrow's worker the opportunity for life-long employability and well-being.

Handling Transitions

A transition has been described as an event or nonevent resulting in a change in relationships, routines, assumptions, or roles within the setting of self, work, family, school, health, or finances (Schlossberg, 1984). Adolescents face many transitions: Becomig educated, choosing a career, finding first jobs, seeking individual identity. Passage from youth to young adulthood often involves decisions to marry, to drop out of school, to leave parents, and to have children. Throughout their life-spans, change and transition will continue--changes in values, purposes, and circumstances. As adults, some will lose or change jobs, experience retraining, become sucessful, encounter illness, divorce or be divorced, develop and change emotional and spiritual perspectives, and adjust to retirement and the challenges of old age. Each of these events will signal a transition in their lives, some inevitable and predictable, many not. Forecasts for the future signal the certainty of a far greater number of these life transitions for them than their predecessors ever dreamed of encountering.

The educational system must help prepare students to cope with these realities by utilizing education as an instrument of change through which they may have the resources and options with which to build and survive the future. Various programs have been developed to help individuals deal with the stress of transitions. They focus only on specific topics such as stress management, coping skills, burn-out, and anxiety reduction. A more comprehensive approach to handling transitions is needed as a framework for designing public school curriculum. A model is needed which (a) clarifies transitions, (b) accounts for the developmental issues students experience, (c) integrates the content and process of transitions, and (d) which can be integrated into existing educational programs. The model presented below is based on Nancy Schlossberg's (1984) Conseling Adults in Transition, on William Bridges' book, Making Sense of Life's Changes (1980), and on John Scneider's book, Stress, Loss and Grief (1984).

Model for Handling Transitions

I. IDENTIFY THE TRANSITION

What has ended (something personal, interpersonal, family, school, friends)?
What were some of the factors that made the changes occur (people, job, school, values)?
What is the impact on you?
What are your feelings about the transition?
Describe the transition as best as you can.

II. IDENTIFY COPING RESOURCES

What are your competencies? Your strengths? Your weaknesses?

What do you know? What capabilities do you have that will help you?
What personal skills are being used?
What obstacles do you have to overcome in order to change (financial, psychological, interpersonal)?
Who could provide a personal support network (emotional, physical, group, individual)?
What are the major steps that help you solve problems in general? Think about a problem solving model.
How might you benefit or not benefit from this transition?

III. IDENTIFY AND CHOOSE WAYS OF MANAGING THE TRANSITION

A. Examine various alternatives for coping

Maybe a problem has to be solved. Choose a problem solving model.
Individual or group counseling is always a possibility.
Do you need to learn new coping skills? Relaxation Skills (exercise program, time management, health care, etc.)?
Examine the positive and negative consequences of all planned actions.

B. Take full advantage of the "Neutral Zone"

Find a regular time to be alone.
Identify what you really want.
Reexamine your values and your goals.
What do you know about yourself from the past that you can use in managing the transition?

IV. TRIAL, INTEGRATION AND SELF TRANSFORMATION

As you try things out, who can you discuss them with?
In what ways is this a positive experience? A negative one?
How are you different?
What did you learn from this experience?
What did you learn about you?
Is your grief or disappointment part of the healing process?
What will you do if your plan for managing the transition does not work out well for you?
Can you accept the transition and go on with your life?

The model is versatile. It is applicable to almost any kind of transition. The model may be used by students contemplating career or college choices, experiencing the loss of friendship, or dealing with the loss of a parent through death or divorce.

Two references (Schollberg, 1984; Abrego & Brammer, 1979) are useful for high school teachers. Both give excellent guidelines for helping students handle transitions. Educating students to deal with life transitions should be an important part of the high school curriculum. Some guidelines are: (1) students should become aware that life transitions are natural and inevitable and that they already have personal resources for dealing with them. (2) students should first examine and analyze transitions they are already experiencing. They should become aware of their values, interpersonal skills, competencies, and other personal resources which strengthen their ability to cope with change. (3) Students should preceive instruction as relevant to their present lives so that a meaningful extension can be made to typical anticipated and unanticipated tranisitions later in life. (4) Students should become aware of future anticipated transitions such as graduation, leaving home, etc., and future unanticipated transitions such as not being accepted for college, losing a job, the death of a spouse, etc. (5) Throughout the study of transitions, the Model for Handling Transitions should be applied and it should be viewed as a problem solving strategy.

With change and transition as the rule rather than the exception it becomes evident that one of the more pressing concerns before educators today is the empowerment of students to identify, adapt, and manage transitions which occur developmentally, socially, and occupationally in their life courses. Changing times will bring more self-responsibility and more self help. Maurice Gibbons (1984) noted that "...institutional care and support services are diminishing, and people can expect to take more responsibility for themselves throughout their lifetimes. Self-help is replacing institutional help." The management of change and transition must become a part of the learning life of the individual. This model for educating for transition is a beginning.

Solving Problems

Problem solving is receiving more national attention now than ever before. Daniels and Karmos (1983) found that except for the three R's, problem solving was listed most frequently in the literature and by employers as an essential skill for dealing with the future. Michael Timpane in his report of corporations and public education emphasized the need for teaching young people problem solving skills so they will be ready for further education and training (Timpane, 1982).

Except for the three R's, problem solving was listed most frequently in the literature and by employers as a essential skills for dealing with the future.

Not enough problem solving is occurring in classrooms. In the April, 1983 Kappan, John Goodlad remarked that "teacher talk" was by far the dominant classroom activity. "Teachers rarely encouraged student-to-student dialogue or provided opportunities for students to work collaboratively in small groups or to plan, set goals, determine alternative ways of acheiving these goals, and the like. The emphasis was on recall not on problem solving or inquiry." Goodlad went on to say that each of the 50 states believes in problem-solving instruction but very few are doing much with it.

Something is being done about problem solving by business and industry. General Motors is currently training approximately 50 percent of its employees in problem solving skills. Kathy Long, Director of Research and Development for GM, said in a personal interview (1983) that the training has been sucessful, that productivity and positive attitudes have both increased, and that General

Motors is going to devote more time and money to problem solving training. The training has improved worker competency, enabled workers to diagnose and solve job related problems, taught them to examine their own behavior and consequences of it, and has helped workers to be more cooperative with each other in solving problems (Guest, 1979). The Center for Public Resources in its report Basic Skills in the United States Work Force (1982) identified corporations and schools which are currently involved in problem solving training.

Roy Forbes, Director of the Assessment and Evaluation Division for the Education Commission of the States, predicted that by 1990 between 900,000 and 2 million high school graduates will not possess the problem solving skills required for employment in a highly technological society (Whimbey & Lochhead, 1984). For students to hold jobs, be retrained, and in general to adapt to a constantly accelerating rate of change in their lives, they will need strategies for how to attack and solve problems.

Possession of at least one general model for solving problems is essential strategy. There are many different models, but the one we have developed is given below. It is based on the group problem solving model from General Motors (Kolb & Baker, 1980), from G. Polya's book How to Solve it (1957), and from Thomas Gordon's book Teacher Effectiveness Training (1974). There are five steps to the model.

Model for Problem Solving

1. UNDERSTAND THE PROBLEM

   What are the essential data?
   Is there enough information to solve the problem?
   Would a figure or sketch help? Maybe introduce symbols or other variables.
   Separate the problem into manageable parts, if needed. Write down each part.
   Can the problem be restated in a different way to help understand it?

2. BRAINSTORM FOR POSSIBLE SOLUTION STRATEGIES

   Generate a lot of ideas. Don't judge them, just write them down.
   Has a problem like it been solved before?
   Would working a related problem be useful?
   If there were some particular additional information, could the problem be solved? Where could the information be obtained?

3. CHOOSE A TENTATIVE SOLUTION STRATEGY

   Remember, the strategy may not work and the process may have to be started over.
   For "people" problems, consequences associated with carrying out tentative strategies must be carefully weighed.
   Also, if people are working out an interpersonal problem, then the tentative strategy will likely be a compromise. No one is likely to get everything they want.

4. CARRY OUT THE TENTATIVE SOLUTION STRATEGY

   Check each step as the plan is carried out. Check that each step is OK. Is each step correct or valid?
   Are there probably places for errors, mistakes, or faulty reasoning? Where are they?
   Would it be useful to have someone else go over your steps?
   For implementing solutions to "people" problems, decide "Who does What, When." Maybe write it down.

5. LEARN

   Check the result if possible. Is the judgment sound? Does it have a reasonable chance of solving the problem?
   What are the implications or consequences of the solution?
   Could the problem be worked out another way? Perhaps look at other people's solutions and hear what they have to say.
   If appropriate, evaluate the effectiveness of the solution.
   Have enough problems like this one been worked to begin to generalize to a plan for solving similar problems?
   Does this solved problem open up new relationships that hadn't been thought of before? Think about it!

At the beginning, we have our students follow the Five Step Model, step by step. Later on they are encouraged to freely use their own creativity and intuition to solve problems since no single model is directly applicable to all problems.

Commercial programs for teaching problem solving exist. The June 1983 issue of the Kappan listed more than 30 programs, video-taped presentations, computer assisted instruction, instructional programs for teachers, and materials for student use.

Problem solving is a diffucult subject to teach. But there are some essential guidelines: (1) students must be given substantive problems to solve and actively pursue their solutions. People learn by doing. And their "doing" must have substance. There is no merit in teachers being superb at teaching trivia. (2) Students are to be armed with models and strategies for solving problems. Breaking problems into simple parts, making sketches, reading carefully, etc., are all necessary strategies for good problem solving. (3) Knowledge in specific content areas is necessary for solving problems in that area. One can't solve many problems in mathematics if one doesn't know much math. The best problem solvers have a very broad base of specific and general knowledge. (4) Some problems are more appropriately solved in a group setting and others in an individual setting. The group setting needs to be used more so students can better learn the give and take of cooperation that is now so vital to business and industry. (5) Students need to become more self-reflective of themselves as problem solvers. "What kinds of problems do I have difficulty with?" "What are my strengths, weaknesses?" "Where do I need to improve?" "What can I learn from that mistake?" "How do I learn best--hearing, seeing, touching, imagining?" "Where do I go for help?" Students can always become better problem solvers, and educators can always improve materials and instruction for helping it happen.

Summary

The future is where today's students will spend the rest of their lives. It is essential that educators do the best job they can in forecasting an adequate preparation for it. Five major assumptions in this preparation for the future are: (1) people will have to process more information and data than ever before, (2) human relationships will increasingly be strained as change accelerates, (3) to cope effectively with this acceleration, people will have to respond faster and faster to the increased tempo, (4) people as individuals will need to progressively take more responsibility for their own growth and well being, and (5) self-empowerment is the key assumption for guiding schools in preparing young people for their futures.

A new balance must be struck between the impact of technology and change and the people who are affected by it. It is ultimately the individual who must apply the new techniques in the workplace. A machine, a process, a system is no more effective than the people using it. People must not become slaves of tecnology and change. The Human Factor in education and work must stand above all others.

We want to help people cope. After three years of talking to educators, business people, teachers, students, and unemployment victims, we have settled on three catagories of essential skills for helping people cope: Generalizable Skills, Problem Solving Skills, and Skills for Handling Transitions. People will use these skills in their daily lives, on their jobs, in their classrooms, during crisis, and during personal growth. There is self-empowerment in these skills: People can help themselves to lead more meaningful, balanced, and productive lives.

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Needs of Secondary Vocational Programs in Teaching Generalizable Mathematics Skills

By James Greenan and Jo Powell

The American school system has long operated on the assumption that the 'Three R's' were basic skills required by a burgeoning industrial society. The importance of basic skills, especially reading, writing and mathematics, has been a renewed focal point of educational discussions for the past several years. The seeming decline of the acquisition of basic skills through the formal educational system, the turmoil in the job market as a result of the influx of high technology and the obsolescence of certain skills, and the complexity of the demands has thrust basic skills into the public arena (Lotto, 1983). This concern has been further reinforced by Federal legislation with the Basic Skills Improvement Act of 1978.

However, basic skills have significance not only for educators, but also for employers (Ashley, Laitman-Ashley & Faddis, 1979; Brickell & Paul, 1978; Faddis, Duckles, Woditsch & Brower, 1980; Johnson, 1981; Wiant, 1977). Perhaps flexibility will be one of the most important characteristics of the new American worker to meet the new industrial challenge. More so than specific vocational skills, the basic skills are readily transferable between jobs and occupational classifications (Cunningham, 1971; Kuwala & Smith, 1975; Marquardt & McCormick, 1972; Meecham & McCormick, 1969; Short, Dotts, Short & Bradley, 1974; Smith, 1975; Smith, 1977). The research on basic skills and occupations suggest that basic skills are critical to employability to a broad range of occupations and jobs (Pratzner, 1978, 1981; Stump, 1978). This transferability is especially important because of the several occupational changes an average person makes in one's lifetime.

More recently, the idea of basic skills, transferable skills, and the skills and abilities needed for success in vocational programs and occupations have been conceptualized in terms of generalizable skills. The concept of generalizable skills is commonly concerned with the transferability of cognitive, affective, or psychomotor skills which are necessary for success across vocational programs and occupations (Greenan & Smith, 1981; Greenan, 1983). Frequently, proficiency in cognitive and affective skills may be prerequisite to proficiency in vocational psychomotor skills. Thus, the concept of generalizable skills can be viewed as a procedure for identifying those skills and abilities necessary for success in vocational/technical programs and occupations.

Generalizable skills have significance, therefore, for vocational education programs. However, students in vocational programs have been less proficient in the basic skill areas than 'academic' students, typically scoring about one standard deviation lower (Lotto, 1983). Lotto notes,

> The dilemma for vocational educators is how to maximize the basic skill proficiencies of vocational students within the structure and resources of an occupational curriculum.

James Greenan is an Assistant Professor in the Department of Vocational and Technical Education, University of Illinois, Urbana.

Joe Powell is a graduate research assistant, University of Illinois, Urbana.

In addition, students need to be informed of the skills they have acquired and their level of proficiency, and those skills not acquired or not developed that are necessary for continued training and employment success. Thus, assessment of student's proficiencies becomes even more important.

In many instances, school personnel do not have reliable, valid instruments to use. Vocational education (and other fields) has often used skills and standardized tests to classify students, assess student's learning problems and guide curriculum development. These tests and procedures frequently have had a questionable relationship to the content of vocational programs. Therefore, their reliability and validity are suspect regarding usefulness and application for vocational students and school personnel. Also, these tests frequently do not have standardized administration, interpretation and scoring procedures, and are expensive and time consuming. They often result in offering minimal remediation and having minimal application to vocational personnel in assessing student performance. The implication for vocational programs is that the need is apparent that instruments and procedures should be devised in order to (1) assist in better curriculum development of vocational programs and (2) provide sufficient and appropriate information to guide the student in vocational/career decision making.

The central problem in this study was to examine the nature and extent of mathematics skills assessment and instructional strategies/procedures used in secondary vocational education programs.

Purpose of the Study

The central problem in this study was to examine the nature and extent of mathematics skills assessment and instructional strategies/procedures used in secondary vocational education programs. The specific research problem was to determine: (a) the extent of utilization of assessment information of a student's level of mathematics skills; (b) the types of instruments, strategies, or procedures used to assess a student's mathematics level; (c) who actually conducts or administers these assessments; (d) the need for assessment instruments with regard to the vocational program; (e) how mathematics skills assessment information could be effectively utilized in the vocational programs; (f) who provides the needed mathematics instruction within programs; and (g) the process for assessment of students' mathematics needs and the delivery of instructional services. In order to resolve the central problem of this study, the following objectives were developed: (a) develop and validate an instrument to determine the mathematics skills assessment and instructional strategies used in vocational programs; and (b) identify the specific assessment needs of vocational programs with regard to students' mathematics skills.

The expectation was that the information obtained from the study would contribute to the knowledge base, and in planning and conducting future activities regarding mathematics assessment, planning and evaluation, and instructional activities at the local level. Subsequent strategies and procedures could assess learning abilities or diagnose and identify those students who may have functional learning problems. The information from assessments could suggest remedial needs, and provide a basis for determining and delivering the appropriate support services and instruction needed for students to succeed in vocational programs.

Research Methods

Several methods were used to achieve the major objectives of the study. The population consisted of the 32 secondary area vocational center (AVC) directors in the State of Illinois. Each AVC was selected and participated. The Generalizable Mathematics Skills Assessment Survey (CMSAS) questionnaire was developed to collect the necessary data for this study. The survey consisted of seven items and an open-ended item. The items were generated from the research questions developed for this study. These items were reviewed by a panel of experts and after several revisions were determined to possess a sufficient degree of content and face validity.

The cover letters and surveys were mailed to the AVC directors and were to be returned within two weeks. The directors were asked to complete the surveys or to give them to a designated person (e.g., mathematics teacher, guidance counselor, support services personnel), if appropriate. The initial response rate was 40%. A follow-up letter and survey, was sent to each non-responding director two weeks after the initial survey which increased the response rate to approximately 80%. Two weeks after the mail follow-up, a telephone follow-up was made to each AVC which did not return the survey. The final response rate was 100%.

The data obtained for each of these surveys were analyzed using frequencies and percentages whenever possible. The data were also analyzed using a qualitative descriptive analysis.

The results of the study confirmed previous expectations that there exists a general lack of practical procedures for identifying and assessing an individual student's level of generalizable mathematics skills.

Results

The results of the study confirmed previous expectations that there exists a general lack of practical procedures for identifying and assessing an individual student's level of generalizable mathematics skills. The major findings of the study include:

- Twenty-six (80%) AVC instructional personnel have access to assessment information that describes an individual student's level of mathematics skills. Of these, 21 (68%) use

standardized instruments, strategies and/or procedures in assessment, such as high school achievement tests, teacher-made tests, and standardized tests such as WRAT, DATL, ACT, Stanford-Binet, ITED, MATS and others. About one-half of the centers rely on the comprehensive high school personnel to conduct assessments; some of these given in combination with AVC personnel, especially vocational teachers.

Two-thirds (27) of the respondents felt that their AVCs had a need for practical instruments, strategies, and procedures designed to assess the generalizable mathematics skills necessary for students to succeed in their vocational programs. Some respondents felt the need for specific instruments that would assess students' mathematics ability by subject matter areas, (e.g., decimals, metrics) and by their specific vocational program needs, as more vocational programs are requiring basic mathematics competencies. Some directors indicated that sufficient information was available and being articulated from the sending school.

When respondents were asked how mathematics skills assessment (MSA) information could be applied to the following specific areas, they commented:

a. Assessment: MSA information would be helpful in determining the entry level of students' mathematics proficiencies, the gaps in their mathematics knowledge, and their individual needs, such that instruction could be better structured toward the individual student, remedial or support services could be administered if needed, and students could be referred to sources of additional instruction as needed. Further, the assessment would be time-saving for instructors.

b. Planning: This information was felt to be especially helpful in planning such that curriculum and staffing for mainstreaming and special needs students could be assessed, staff would be allowed an adequate time frame to develop learning packages before classes meet, and articulation between home, school and vocational center needs would be improved. Course level could then be determined by the level of the skill possessed by the students, not idealized abilities. Special help could be given early on and any needed support instruction in mathematical skills required could be determined. It was also felt that it would be particularly helpful in high technology program planning.

c. Curriculum: MSA information would be valuable for new program development as well as revision of existing programs, and to improve and devise mathematics competency content. It could be used to determine individual programs in competency-based systems both for vocational skill areas and the related mathematics skills area. Progress measurement factors would also encourage greater emphasis on mathematics skills. Students' needs would be incorporated into the programs.

d. Instruction: Information in this area would allow instructors to 'get to know' the students, i.e., point out areas where specific instructional needs are, and to gear instructional level to students' needs. It would assist the instructor in individualizing programs and to better prepare them in helping students schedule the packets (of instruction) they plan to work on. Mathematics instruction could be integrated into the programs and duplication of efforts or omission of instruction could be avoided. Further, it would assist in developing inservice for AVC instructors concerning appropriate methods for including mathematics units to their courses, and would allow staff to develop curriculum for adaptation of the needed materials in their coursework.

- One-half of the AVCs reported that both comprehensive and AVC personnel provided mathematics instruction. Of the AVC personnel, the vocational teacher for a specified program was the principal instructor. Of the remaining centers, the AVC personnel were largely responsible for mathematics instruction for their own students.
- About one-fourth of the AVCs had their individual teachers report students with difficulties to the AVC counselor who then contacted the home school and recommended program changes. Some AVCs made use of special remedial units or resource teachers at the AVC when available. Few had little or no provision for remedial instruction, or an organized program. Several had within-program instruction built into the class or the vocational teacher would provide extra instruction either for the class or on an individual basis.

. . . AVC directors generally expressed the need for a single, simplified testing instrument or procedure for mathematics skills assessment.

Summary and Recommendations

Overall, the AVC directors generally expressed the need for a single, simplified testing instrument or procedure for mathematics skills assessment. Such an instrument would assist their personnel in tailoring their programs to an individual student's needs, particularly with regard to whatever mathematics component might be necessary. Currently, a wide variety of assessment instruments are in use in vocational programs and are being administered in the 'home' high school or the AVC.

However, some AVCs do not have access to any assessment procedures. In addition, not all AVCs have the resource staff for dealing with students' generalizable mathematics skills needs, and, therefore, students are often referred back to the 'home' high school. Moreover, some vocational

teachers, either because of a lack of training or other reasons, do not feel that their responsibilities include the teaching of mathematics skills, particularly remedial mathematics skills.

Based upon the findings and conclusions of this study, several general and specific recommendations can be made with regard to the needs of secondary vocational programs in generalizable mathematics skills. The recommendations include:

- Develop strategies for maximizing the basic skills proficiencies for students participating in the vocational curriculum. Determining a level of providence in basic skills for employability would be a necessary first step. From there, the provision of time for basic skills instruction and reinforcement within the vocational program would give emphasis to the importance of basic skills. Curricular materials also could be more geared toward student's mathematics performance levels.
- Develop practical strategies and procedures for assessing students' mathematical skills. Student self-rating, teacher-ratings, and performance tests could all be used to determine more accurately students' mathematical skills, particularly when the assessment procedures are derived from vocational curricula.
- Develop procedures to assist vocational teachers in working collaboratively with 'academic' teachers (e.g., mathematics, English teachers) while working with students. This could include something as basic as improving and facilitating communications channels to more formal procedures, such as joint curricular planning or individualized career/vocational programming.
- Develop inservice for vocational education teachers regarding the integration of generalizable mathematics skills in all phases of instruction, including planning, assessment, instructional delivery, and evaluation. Teacher training in basic skills instruction would be a fundamental starting point. Many vocational teachers have not been prepared for basic skills instruction. The concept that mathematics skills are generalizable across vocational programs needs to be better understood.
- Determine the best method of delivery of assessment procedures as well as additional mathematics instruction. Since vocational teachers are most familiar with the requirements of their programs, they may be in the best position to assess students' abilities and performance. Due to financial and structural considerations, vocational teachers may also be in the best position for delivery of the necessary mathematics instruction. However, it is important to determine the roles of the various partners in the secondary school programs.

In summary, the lack of an adequate and applicable testing procedure or strategy to determine a student's mathematics skills proficiencies points to the need for the articulation of such procedures and strategies within the vocational curricular area. Vocational teachers, and other school personnel, must become more involved in planning, assessing and teaching mathematics skills in their programs.

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Microworlds and Work Models:

Instructional Strategies for the Future

By Brent G. Wilson

Although personal computers are currently the rage in the schools, computer-assisted instruction (CAI) is not a new idea. Since the 1960's, major efforts have been made to use the computer as the delivery system for instructional lessons (Kearsley, Hunter, & Seidel, 1983). Indeed, the field of instructional design is deeply rooted in teaching machines, computers, and other technologies in education. It is not surprising, therefore, that computers have historically provided a fertile testing ground for innovative instructinal theories and strategies such as learner control, instructional algorithms, simulations, and gaming strategies (Merrill, Kowallis, & Wilson, 1981).

Advocates of computers in education claim that, among other advantages, computers can provide more application level activities for students. Well-designed computer-based tutorials (Walker & Hess, 1984) do more than simply dispense knowledge; they give students opportunities to practice their new skills and demonstrate a clear understanding of new knowledge. Feedback to practice sections can be made specific to the student's particular error. Programs can branch to the appropriate content and difficulty level, based on individual student responses.

Simulations can also help students apply what they know in a problem-solving setting. Simulations simplify and stimulate some aspect of real-world performance by placing the student in a situation and requiring a reasoned response. The situation changes depending on the student's choice, beginning a cycle of choices and revised situations until an end goal is reached. Obviously, simulations are not the most efficient method of presenting new knowledge and skills but they are unmatched in their ability to develop problem-solving and knowledge-applying skills (Lepper & Malone, 1984).

Beyond traditional uses of CAI, there is growing interest in alternative design models for instruction using computers. The purpose of this article is to review the ideas of two researchers as they relate to improving the fidelity and transfer between instruction and real-life activities. Seymour Papert is probably the most influential educational theorist working with computers today; he is a major advocate of the use of computers for programming purposes in education. C. Victor Bunderson has a worldwide reputation as a CAI theorist and instructional designer (Merrill, Schneider, & Fletcher, 1979). A co-designer of the TICCIT computer-based

Brent G. Wilson is a professor of Instructional Technology, Department of Leadership and Educational Policy Studies, Northern Illinois University, DeKalb.

instructional system, Bunderson is presently president of WICAT, Inc., the leading developer of hardware/software curriculum packages for education. Although their ideas differ sharply in some areas, both researchers agree that personal computers hold tremendous potential in their ability to provide an exploratory environment for learning, solving problems, and mastering a subject matter.

Logo Microworlds

Beginning in the late 1960's, Seymour Papert led a team of artificial itelligence researchers in the development of the Logo programming language (Papert, 1979). Their aim was to develop a programming language that novices--children and adults alike--could easily and quickly grasp, but which exhibited the powerful programming features being discussed among computer scientiests at the time. Now with the sudden availability of personal computers in the schools, Logo has emerged as the most popular computer-literacy tool in the middle grades. Hundreds of school districts have implemented some sort of Logo curriculum. Versions of Logo exist for nearly every major brand of personal computer used in the schools. Thousands of tachers have completed workshops in Logo programming.

Why has Logo been so successful? Much of the attraction of Logo is attributable to the Logo "turtle"--a small triangle on the screen that is controlled by user commands (e.g., FORWARD 10 RIGHT 90 moves the turtle forward, then turns 90 degrees). Figure 1 shows an example procedure written in Logo. "Turtle graphics" provides a "microworld" in which the student can set goals, plan projects, explore, and create a variety of graphic images. In so doing, the student masters the commands and syntax of Logo, while at the same time coming to understand the plane geometry upon which the images are based.

Figure 1. An example of Logo's turtle graphics. The turtle begins facing up and ends facing the same way.

Logo Commands

```
FORWARD 50
RIGHT 90
FORWARD 80
RIGHT 90
FORWARD 50
RIGHT 90
FORWARD 80
RIGHT 90
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The notion of "microworld" warrants further discussion. According to Papert, a microworld is an incubator--a nurturing environment where powerful ideas can be hatched. A microworld is a simplified, artificial environment controlled by a set of logical rules. The student actively controls the microworld by mastering the commands and using them in structured problem-solving projects that include planning, executing, and debugging. Through the student's active pursuit of chosen goals, he or she comes to master the rules of the microworld, which often include a subject matter beyond simple computer programming (e.g., math, physics, or linguistics).

In his widely acclaimed book Mindstorms (1980), Papert makes a strong case against "school math"--the version of math taught in schools that is stripped of much of its relevance to everyday life, taught in an authoritarian style that treats children as passive recipients of the curriculum. Comparing Logo's turtle grapics with school math, we begin to see the strength of a microworld. With the Logo turtle, students have a physical image that can be manipulated and acted upon. The feats of the turtle become a direct reflection of the student's mastery of the subject matter; succeeding in a personal project is an instantiation of important generalities and principles. Rather than receiving in a rote fashion the Received View, students learn for themselves the value of math ideas by experimenting, exploring, and using the ideas to complete projects. Papert believes that a microworld such as turtle graphics provides a concrete representation of abstract reasoning processes. Microworlds thus can aid abstract thinking by giving students a form of feedback and representation of their plans unavailable in a traditional school setting.

Work Models

Vic Bunderson is a strong believer in the future of CAI. Following a productivity view, the job of instruction can be seen as work (Bunderson, 1981). Historically, technological developments have resulted in productivity increases by replicating work that previously required large amounts of labor. Examples relevant to education include the printing press, the typewriter, and the Xerox machine. These productivity aids made it economically feasible to replicate large amounts of instruction of a consistent quality. In a similar manner, Bunderson argues, computers represent a substantial gain in the replicability of instructional work. Just as advances in printing press technology allowed the replication of print-based media, computers allow the replication of instructional work. Just as advances in printing press technology allowed the replication of print-based media, computers allow the replication of instructional interactions. Using sophisticated programming and design techniques, CAI programs can control entire patterns of student interaction, ensuring that progress toward mastery occurs. Following this line of thinking, the effective use of the computer as an instructional delivery system can make good instruction more easily replicable, thus improving the cost effectiveness and productivity of the educational system.

Historically, technological developments have resulted in productivity increases by replicating work that previously required large amounts of labor.

Accepting the idea that instruction, once developed for computers, can be easily replicated across situations, the next question becomes, is it worth replicating? Can the features of the computer be harnassed to design effective

instruction? These questions are current topics of research (Chambers & Sprecher, 1983). Bunderson has some interestingthings to say about instructional strategies for computer-based lessons.

First, consider how instructional materials are presently developed. Following a typical systems model as illustrated in Figure 2, a "master's" knowledge is observed and analyzed. Preliminary observations are translated into a list of goal statements, which in turn are translated into a lengthier list of behavioral objectives. This list then becomes the basis for developing paper-and-pencil test items and, typically, print-based media. Students are then expected to translate the print-based presentation back into the starting point: the master's knowledge and skills. "They are expected to create a model of the performance of the expert from the verbal abstractions" (Bunderson, Gibbons, Olsen, & Kearsley, 1981).

Bunderson gives the name "lexical loop" to this cycle of translations, beginning with the knowlege of the master and ending with the assumption of student mastery. He claims that the translations--from print-based goals to print-based objectives to print-based tests and instructional presentations--result in a loss of fidelity. Fidelity can be thought of as the validity of the instruction as an accurate representation of the knowledge and skills of the master. Moreover, the cost of the lexical loop can become prohibitive.

Figure 2. The lexical loop vs. work models (adapted from Bunderson et al., 1981, p. 206).

KNOWLEDGE OF THE MASTER	
Translation to goal statements through goal/job analysis.	Mastery performance is documented through multiple media.
Translation to print-based tests through test item technologies.	Work models are designed through systematic decomposition of tasks.
Translation to print-based tests through test item technologies.	Work Model 1
Translation to print-based media using text-design principles.	Work Model 2
	Work Model 3
Student expected to translate to skills of the master.	Work Model n
(Actually, negligible transfer to everyday life.)	Student demonstrate master's knowledge/skill in real-life performance.

Bunderson's proposed solution includes the idea of work models, defined as

> a single integrated unit of practice. It may correspond to one or a group of performance tasks. Work models provide settings in which the learner can converse using the new vocabulary and concepts, perform the new procedures, and make predictions and solve new problems

(Bunderson et al., 1981). Work models employ a variety of media, both in observing and documenting mastery performance, and in interacting with the student. Computer-based interaction should be supported by video-based presentations, small group discussions, and of course, print media. The use of work models as an instructional design process shifts focus from print-based objectives lists to a series of carefully designed instructional environments.

Bunderson distinguishes three main kinds of knowledge targeted by work models: conversational, procedural, and causal. Each work model is meant to help students gain knowledge through the performance of realistic, educationally meaningful activities. Instruction begins with a highly simplified work model and proceeds through a series of more complex, challenging work models until the student can demonstrate mastery in a real-life setting. This sequence is made possible by careful task analysis and instructional design. "The total integrated practice situations must be broken down into practice situations of decreasing complexity. This decomposition into simpler forms must continue until performance models for practice are simple enough for the beginning learner, possessed of only the minimum prerequisites" (Bunderson et al., 1981).

Consider the similarities between Papert's microworlds and Bunderson's work models. Both devices were born out of the recognition that traditional schooling methods are severely lacking in constructive, integrated problem-solving activities. Students too seldom have a chance to work in a realistic problem-solving environment, manipulating content elements in a way that, according to Piaget, aids the development of cognitive structures and processes.

Work models can have a more obvious relevance toward training applications, while microworlds seem at this point to represent a more radical vision of future educational environments.

Of course, significant differences exist between the two ideas. Microworlds are basically curriculum-free, non-didactic environments in which students--usually children--can play and explore at their own level of understanding. Work models, on the other hand, are carefully designed, highly controlled environments whose reason for existence is to contribute to student mastery of pre-defined knowledge and skills. Work models can have a more obvious relevance toward training applications, while microworlds seem at this point to represent a more radical vision of future educational environments.

Both ideas, however, have a great deal of relevance for the future of education and training. The availability of the computer, as well as other related technologies, will change the way education is done. Rather than merely "putting worksheets into the computer," educators will begin to change the structure of their work

as they exploit the potential of computer resources.

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Basic Skills and the Community Colleges/School District Educators Exchange Networks

By Byron F. Radebaugh

The term "basic skills" is equivocal. To some it means the three "R"s, reading, writing, and arithmetic, to others the four "R"s, which includes reasoning, and to still others expertise in at least twenty basic skills areas (See Note 1).

The purpose of this article is to make a case for a broad definition of the term "basic skills" and to present a plan for providing educators with "hands on" experience in helping students learn and apply them.

The Case for a Broad Definition of "Basic Skills." In the early part of this century a set of basic skills was described and labeled the SEVEN CARDINAL PRINCIPLES OF SECONDARY EDUCATION. These skills were related to:

- Health
- Command of Fundamental Processes
- Worthy Home Membership
- Vocation
- Civic Education
- Worthy Use of Leisure
- Ethical Character

Twenty years later, the Educational Policies Commission of the National Education Association formulated what they considered to be the important general goals of education in American democracy:

- Self-realization
- Human Relationships
- Economic Efficiency
- Civic Responsibility

Some evidence of how the public rates the importance of many temporary suggested goals of public education is found in the 1984 Gallup Poll of the Public's Attitudes Toward the Public Schools (Gallup, 1984). This poll identifies many of the goals of public education, explicitly or implicitly reveals the "basic skills" contained in them, and reports the national percentage of the public that supports them:

National Totals %

- To develop the ability to speak and write correctly 68
- To develop standards of what is "right" and "wrong" 64
- To develop an understanding about different kinds of jobs and careers, including their requirements and rewards 56
- To develop skills needed to get jobs for those not planning to go to college 54
- To develop the ability to use mathematics for everyday problems 54
- To encourage respect for law and order, for obeying the rules of society 52
- To help students make realistic plans for what they will do after high school graduation 52
- To develop the ability to live in a complex and changing world 51
- To develop the desire to excel 51
- To develop the ability to think - creatively, objectively, analytically .. 51

Other goals were listed but they received less than fifty percent of the total ratings.

What is perhaps as significant as the above goals and their ratings, are the goals and skills that appeared low on the list:

- To develop an understanding of democracy and to promote participation in the political process 33
- To develop an appreciation for and participation in the arts, music, literature, theater, ect. 35
- To develop respect for and understanding of other races, religions, nations, and cultures 39
- To encourage the desire to continue learning throughout one's life 41
- To gain knowledge about the world of today and yesterday (history, geography, civics) 42

(Not all of the goals are listed here)

This writer is concerned that the goal of education (and the basic skills that are implied--to develop an understanding of democracy and to promote participation in the political process--appears low on the list and apparently has little public support at this time. This concern is related to the awareness that democracy is not

Byron F. Radebaugh is a Professor, Foundations of Education Faculty, Northern Illinois University, DeKalb, Illinois.

self-executing--we have to make it work--and to make it work we must understand it. It is also related to the fact that democracy is something more than a method of conducting government or a method of settling differences. It is as well a way of living characterized by certain basic values such as those found in the Constitution

The educational goal or basic skill first on my list would be to develop the ability to think creatively, objectively, analytically, and philosophically.

including freedom of speech, press, thought, religion, and many more. This educational goal would be second on my list of important basic skills that are essential for the preservation and improvement of our democratic way of living.

The educational goal or basic skill first on my list would be--to develop the ability to think--creatively, objectively, analytically (and I would add philosophically).

Subjects that the public would require of students (Gallup, 1984) include:

• Mathematics	96
• English	94
• History/U.S. Government	84
• Science	84
• Business	68
• Foreign language	57
• Health education	52
• Physical education	43
• Vocational training	37
• Art	24
• Music	22

The public also thinks the following special areas of instruction (and the basic skills implicit in them) should be required of students (Gallup, 1984):

• Drug abuse	82
• Alcohol abuse	79
• Driver education	73
• Computer training	68
• Race relations	65
• Dangers of nuclear waste	61
• Communism/socialism	57
• Parenting/parent training	55
• Dangers of nuclear war	51

It becomes evident from the foregoing that the term "basic skills" has many different meanings. For this reason, it will be argued, a broad definition of it makes sense.

A Plan for Providing Educators With "Hands On" Experience In Helping Students Learn and Apply Basic Skills. Whatever the outcome of the debate on the meaning of the term "basic skills," it seems to be the case that the ever enlarging volume of knowledge and the relentless advance of technology is contributing to increased changes in society, thus influencing:

- Increased institutional complexity
- Expanded educational roles
- Greater student diversity
- Renewed demands for continuous professional growth and development
- Increased awareness that students without a thorough grounding in the basic skills and the ability to apply them in a changing world will be at a serious disadvantage.

It was for these reasons, plus the belief that community college and school district educators can acquire new professional knowledge, skills, and competencies through a purposeful and planned exchange with their counterparts in other community colleges and school districts, that four educators from Northern Illinois University developed the COMMUNITY COLLEGES AND THE SCHOOL DISTRICT EDUCATORS EXCHANGE NETWORKS. These Networks provide a computer based informational service designed to facilitate faculty exchanges in the United States, Canada, and other countries where English is the language of instruction.

It was thought that participation in the Networks would help to:

- Facilitate faculty and institutional growth
- Strengthen existing faculty inservice development programs
- Stimulate desirable institutional change
- Promote renewal
- Combat individual and institutional stasis
- Provide a mechanism--the faculty exchange--whereby faculty could learn more about exemplary programs designed to help students learn and apply basic skills.

Each Network functions in eight steps designed to match community colleges or school district faculty from Network member institutions who wish to exchange with faculty and institutions having specific characteristics.

Step #1: Community Colleges and School Districts join their respective Networks by completing a data-file form, a simple contractual agreement, and paying an annual membership fee which ranges from $300 to $500 for Community Colleges and $200 to $500 for School Districts, depending on the size of the college or district.

Step #2: The Networks place the college/district data-file in its computer and provides the college/district with user application guides and forms.

Step #3: The college or district informs its faculty about the Network, policies and procedures for using it, and provides them with user application forms.

Step #4: Faculty users submit user forms which are filed by the Networks in its computer. A users fee of $15 must accompany each user application/request form.

Step #5: Upon receiving requests from users for an exchange with a faculty member, the Networks conduct a search of its files to find a faculty member and institution with the desired exchange characteristics.

Step #6: The Networks inform the faculty members who request an exchange of up to four faculty members from institutions who either have or approximate the characteritics desired for an exchange.

Step #7: Faculty members contact the identified potential exchangees and assume all further responsibilities for completing the exchange.

Step #8: The Networks will conduct an evaluation

by using a follow-up instrument. The results of this evaluation will be made available to participating Community Colleges and School Districts to guide future exchanges, and will be used to guide and improve the Network.

Both the Community Colleges Educational Exchange Network and the School District Educators Exchange Network are private businesses located in Maple Park, Illinois. Drs. Joseph R. Ellis, Byron F. Radebaugh, and Peter Abrams operate the

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We think that the most fundamental way to improve the teaching and application of basic skills is to provide faculty with "hands on" experience with other faculty who are teaching a particular basic skill well.

Community Colleges Educational Exchange Network. Drs. Ellis, Radebaugh, Abrams, and Louise E. Dieterle operate the School District Educators Exchange Network.

We think that the most fundamental way to improve the teaching and application of basic skills is to provide faculty with "hands on" experience with other faculty who are teaching a particular basic skill well. The "Educational Exchange" is one way to help achieve this goal.

For more information about the Networks you may contact:

- Community Colleges Educational Exchange Network
  Box 147
  Maple Park, IL 60151
  Phone: 815/286-3936

- School District Educators Exchange Network
  Box 147
  Maple Park, IL 60151
  Phone: 815/286-3936

THE

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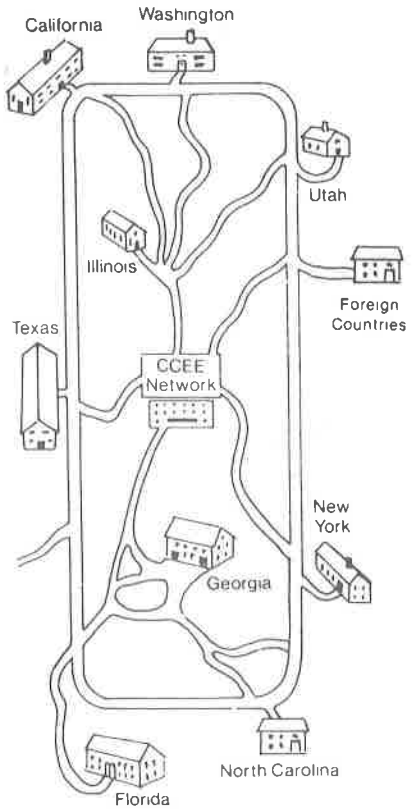

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The 16th Annual Gallup Poll of the Public's Attitudes Toward the Public Schools, Phi Delta Kappan, September, 1984, pp. 30;37-38.

Note 1. The Illinois Quality Schools Index Consultant Resources for the Basic Skills Area lists twenty basic skills.

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A Promising Approach to Improving the Basic Skills Offerings in Illinois Schools

By Joseph R. Ellis and Paula Grady

During the fall of 1984, the Program Planning and Development Section of the Illinois State Board of Education initiated an approach to a systematic and continuous voluntary process for developing and maintaining quality schools. Entitled, the Illinois Quality School Index (IQSI), the process, developed by the ISBE, evolved from earlier studies about effective schools. The IQSI provides an action-based response to recent concerns, conclusions and recommendations expressed in the media and in commission reports about the quality of education in American Schools today.*

What is the Illinois Quality Schools Index?

The IQSI is designed to provoke discussion and action within a school building or school district about various characteristics shown to be common to effective schools. Through a five-step, three-meeting schedule of activities, a coordinator and a committee of school district personnel, students, parents, and community members complete the survey instruments, review the data collection, prioritize the items, and summarize the findings. In short, the IQSI is a process for reviewing the current quality of a school or district as a basis for planning improvements.

The Illinois Quality Schools Index provides a process which defines quality schooling as the agreement between what the school offers and what the school's staff, students and community values. To facilitate this process, the IQSI provides an instrument which the school can use to determine the existing and preferred conditions in the school as perceived by those responding to the instrument. Respondents may include the school's students, staff and commuity members. The application of the instrument may be used for a specific school, for several schools or for a school district. The analysis of the responses to the instrument may indicate a discrepency between what is reported to be occurring and what is reported to be desirable regarding one or more of eight areas or characteristics considered to be important for an effective school. Thus, judgments can be made about the quality of the school and the areas in need of improvement.

IQSI Characteristics of Effective Schools

The Illinois Quality schools Index has been developed through a careful review of literature. Although the definitions of school effectiveness varied, an agreement of selected characteristics resulted from the effective schools studies. The Illinois Quality Schools Index centers on eight characteristics of effective schools as commonly identified in educational literature and research.

The IQSI instruments contain descriptions of these eight characteristics with fifteen to thirty documented indicators for each characteristic. The eight characteristics are: Leadership, Mission, Expectations, Time on Task, Monitoring, Basic Skills, Climate, and Parent/Community Participation.

The terms used in describing effective schools are often ambiguous, abstract, and difficult to define. School improvement, school effectiveness, quality (of) schooling, teacher effectiveness, and principal effectiveness are interrelated and, in some cases, overlapping and interchangeable. Quality schooling is considered to be the umbrella term for general developmental efforts and includes planning efforts, such as the IQSI process.

Members of the Program Planning and Development Section of the Illinois State Board of Education reviewed the effective schools literature. Although the research was found to vary on the number of factors which contribute to effective schools, the IQSI instruments are based on eight general characteristics most frequently mentioned in the studies and literature.

Scope of Use of the IQSI

The IQSI process allows flexibility for adapting the process to the local school district and increasing the school and community acceptance of the results. A school may concentrate on a single characteristic of effective schools, use all characteristics of the Index, or supplement the instruments with additional indicators. The target audience of the process ranges from a specific grade level or building to a community-wide effort. However, an attendance center should be considered the largest demographic unit for the

Joseph R. Ellis is a professor and Paula Grady is a Graduate Assistant in the Department of Learning, Development and Special Education at Northern Illinois University, DeKalb, Illinois.

**Most of the information presented in this article appears in The Illinois Quality Schools Index Manual, Illinois State Board of Education, Springfield, 1984, 68p.*

most effective results.

In its narrowest application, the IQSI process may involve a single instrument (characteristic) completed by one grade level, e.g., fifth grade teachers. Broad use of the process may involve a complete district staff and a community sampling with all eight instruments (cahracteristics).

Following the development and pilot testing of the IQSI, the Illinois State Board of Education conducted several awareness sessions throughout the state to acquaint local educational leaders with the concept, process, and opportunity to participate. These meetings were followed with training sessions for those who expressed a desire to apply the process in their schools.

What Are the Intended IQSI Process Outcomes?

Through the IQSI, a committee identifies indicators of effective schooling that presently exist in the school system, that need attention by school personnel, that are working effectively, and that are important to quality schools. School personnel can use the results to establish priorities and to plan effective schooling practices. More specifically, school personnel can:

- begin phase one of effective schools planning;
- participate in a group process approach to educational planning;
- define good schooling practices for possible application in the school;
- determine the current demonstration of quality as perceived by school personnel and community;
- discover indicators of quality most highly valued by staff and community;
- analyze the difference between the perceived demonstration and the relative importance of a characteristic;
- learn specific activities and conditions that characterize effective schools; and
- identify staff training needs for planning inservice activities.

The results of the IQSI process will bring attention to the positive experiences currently taking place in the school.

It is expected that interest in the school generated by the IQSI will increase the effectiveness of the process and the possibility of improvements and changes based on the IQSI results. The results of the IQSI process will bring attention to the positive experiences currently taking place in the school. Some persons from the community may be involved actively in the IQSI as committee members while other community members may increase their awareness of the school through reading or hearing about the process from press releases, public announcements, meetings, conversation, or other means.

How Does the IQSI Process Work?

In three meetings and five sequential steps, a school or district can complete the IQSI process, develop an awareness for effective schooling practices, and make necessary preparations for implementing these practices. The simplicity (five stpes) and timelines (two or six weeks completion) of the process encourage opportunity for volunteer participation and immediate satisfcation in realizing results. The process includes the steps and activities listed below.

STEP ONE: Organizing the Process

- Activity 1: Organize the IQSI Committee
- Activity 2: Develop Calendar of Events
- Activity 3: Plan First Meeting
- Activity 4: Publicize the Process

STEP TWO: Gathering Information (Meeting One)

- Activity 1: Conduct Committee Meeting
- Activity 2: Administer the Instrument to Identify Population

STEP THREE: Analyzing Results (Meeting Two)

- Activity 1: Interpret Data
- Activity 2: Rate Priority Items

STEP FOUR: Reporting Results (Meeting Three)

- Activity 1: Report Results/Prioritize Items form IQSI Process
- Activity 2: Review Strategies for Addressing Priorities
- Activity 3: Disseminate Information to the Public

STEP FIVE: Developing and Implementing Strategies

- Activity 1: Develop Plan for Addressing Priorities
- Activity 2: Implement the Plan
- Activity 3: Evaluate Implementation of Plan

Once the local school leaders have committed a school or a district to the IQSI process and identified an area for improvement--several key questions should be addressed.

1. What is the level of participation.
   - Grade level
   - Department level
   - Building level
   - District level

2. Who should serve as IQSI Coordinator?
   - Internal staff
   - Administration
   - Outside consultant
   - Co-coordinators

3. What is the desired outcome?
   - Program development
   - Teacher improvement
   - Improved student achievement
   - Policy development
   - Communication

4. Who should serve on the IQSI Committee?
   - Local board members
   - Administrators
   - Teachers
   - Students
   - Parents
   - Community members
   - Others

5. What constituencies will support the effort?
   - Local board of education
   - Instructional staff
   - Community members
   - Administrators
   - Other

6. What activities need timelines?
   - Planning
   - Meeting One
   - Meeting Two
   - Meeting Three
   - Follow-up

7. What commitment are these constituents willing to make?
   - Public appearances
   - Funding
   - Committee participation
   - Follow-up activities
   - Other

8. What public relations strategies are appropriate for our school and community?
   - Press releases
   - Publications
   - Public service announcements
   - Personal interviews
   - Other

IQSI Local Coordinator

Leadership at the local level is critical for the effectiveness of the IQSI process. A coordinator is a key component in managing the IQSI program process. The coordinator may be from the district staff (e.g., superintendent, assistant superintendent, building principal, teacher) or from a local community group.

Responsibilities of the Coordinator:

- Coordinate the IQSI activities;
- Act as a facilitator at IQSI meetings;
- Provide adequate information sharing within the district and community;
- Arrange for Illinois State Board of Education services and involvement;
- Promote activities for implementing the results.

IQSI Committee

The IQSI process involves a committee in completing the surveys, interpreting the results, and suggesting improvements. Because of their contribution to the process, committee members must be chosen carefully to include individuals who care about the school and who represent the various constituencies in the community. The size of the IQSI committee may vary at the district's discretion and be based on the need to ensure a working group. The suggested size of the committee is from 40 to 45 people to allow for at least 20 respondents per scale (Scale A and Scale B) of the IQSI instrument (Figure 1).

Functions of the Committee:
- Develop a commitment to the process and procedures of the IQSI;
- Discuss the IQSI characteristics and indicators;
- Complete surveys of perceptions of the current school situations and the value of school characteristics;
- Analyze data from the surveys to determine school improvement needs;
- Identify specific priorities for the district superintendent, local board of education, curriculum committee, or other appropriate groups;
- Review tentative strategies for addressing priorities.

The basic skills area is broadly and operationally defined by the twenty-two items which comprise the IQSI assessment scale for the basic skills.

The focus of the article presented here is on the characteristic, "Basic Skills"; however, the process described is generally applicable to the other seven characteristics as well. The authors assisted in the development of the IQSI by identifying resources which school personnel might wish to use in their efforts to improve achievement in the basic skills.

The basic skills area is broadly and operationally defined by the twenty-two items which comprise the IQSI assessment scale for the basic skills. This definition is based on the assumption that recent social and technological trends have made it necessary for the traditional concept of basic skills to include more than the familiar three R's. The basic curriculum needs to expand to include language arts (particularly reading), mathematics, written and oral communication, social studies, science, and computer science. These are the framework for training students in higher level skills of comprehension, cognition, and creativity. Therefore, teaching basic skills means preparing students to be lifetime learners.

Explanation of the Instruments

The IQSI process consists of an instrument for each of eight characteristics of effective schools. As the sample which follows illustrates, each instrument contains indicators of that characteristic for respondents to assess. The instrument, an assessment rating scale, is divided into two parts:

- Scale A rates respondents' perceptions as to the extent to which the school or district is demonstrating the characteristic and indicators, ranging from an undecided category (0) followed by a scale of none (1) to very great (6).

Figure I:
ILLINOIS QUALITY SCHOOLS INDEX ASSESSMENT SCALE: BASIC SKILLS

CHARACTERISTIC:

BASIC SKILLS

Recent social and technological trends have made it necessary for the traditional concept of basic skills to include more than the familiar three R's. The basic curriculum needs to expand to include language arts (particularly reading), mathematics, written and oral communication, social studies, science, and computer science. These are the framework for training students in higher level skills of comprehension, cognition, and creativity. Therefore, teaching basic skills means preparing students to be life-time learners.

SCALE A. Rate the extent to which your school demonstrates this characteristic by circling the appropriate number from a column below.

SCALE B. Rate the importance of this characteristic to quality schooling by circling the appropriate number from a column below.

Students show they are learning basic skills by:

CODE	ITEMS	A: UNDECIDED	A: NONE	A: VERY LITTLE	A: LITTLE	A: SOME	A: CONSIDERABLE	A: VERY GREAT	B: NONE	B: VERY LITTLE	B: LITTLE	B: SOME	B: CONSIDERABLE	B: VERY GREAT
0601	Recognizing the importance of basic skills in life-long learning.	0	1	2	3	4	5	6	1	2	3	4	5	6
0602	Developing higher levels of thinking ability.	0	1	2	3	4	5	6	1	2	3	4	5	6
0603	Acquiring new ideas through listening.	0	1	2	3	4	5	6	1	2	3	4	5	6
0604	Expressing ideas clearly through speaking.	0	1	2	3	4	5	6	1	2	3	4	5	6
0605	Using basic skills as part of each subject area.	0	1	2	3	4	5	6	1	2	3	4	5	6
0606	Practicing basic skills through everyday use, not just in the classroom.	0	1	2	3	4	5	6	1	2	3	4	5	6
0607	Demonstrating that they comprehend what they read by being able to either summarize or restate the ideas from the printed page.	0	1	2	3	4	5	6	1	2	3	4	5	6
0608	Acquiring new ideas through use of the basic skills.	0	1	2	3	4	5	6	1	2	3	4	5	6
0609	Expressing ideas in a clear, organized manner.	0	1	2	3	4	5	6	1	2	3	4	5	6
0610	Performing basic arithmetical operations.	0	1	2	3	4	5	6	1	2	3	4	5	6
0611	Applying the mathematical concepts which they have learned.	0	1	2	3	4	5	6	1	2	3	4	5	6
0612	Applying basic skills and processes to problem solving.	0	1	2	3	4	5	6	1	2	3	4	5	6
0613	Using symbols, charts, and other abstractions.	0	1	2	3	4	5	6	1	2	3	4	5	6
0614	Demonstrating that they understand the computer by using it.	0	1	2	3	4	5	6	1	2	3	4	5	6
0615	Participating in the creation and/or performance of the arts.	0	1	2	3	4	5	6	1	2	3	4	5	6
0616	Demonstrating knowledge of various cultures, eras, and ideas.	0	1	2	3	4	5	6	1	2	3	4	5	6
0617	Practicing responsible citizenship at school and in the community.	0	1	2	3	4	5	6	1	2	3	4	5	6
0618	Demonstrating an understanding of physical development and healthful living.	0	1	2	3	4	5	6	1	2	3	4	5	6
0619	Developing good organizational skills.	0	1	2	3	4	5	6	1	2	3	4	5	6
0620	Developing good study habits.	0	1	2	3	4	5	6	1	2	3	4	5	6
0621	Considering career choices and valuing the importance of work.	0	1	2	3	4	5	6	1	2	3	4	5	6
0622	Completing school with demonstrated skill in using written and spoken English.	0	1	2	3	4	5	6	1	2	3	4	5	6

Scale B indicates respondents' perceptions on, the importance of the characteristics and indicators of quality schooling, ranging from one (1) to very great (6).

Interpretation of Results

Interpreting the results of the IQSI instrument involves a twofold purpose:

1. To identify those indicators of effective schools which the IQSI committee perceives as currently emphasized in the school, and

2. To identify those indicators of effective schools which the IQSI committee perceives as needing more emphasis in the school.

Subtracting the mean (average) responses of Scale A from Scale B identifies the discrepancy between "what is" (perceived demonstration) and "what should be" (perceived importance).

Acting on the Results of the IQSI

When the data have been collected, analyzed and interpreted, local school decision makers have an evidence base upon which to plan and take action to achieve improvement in one or more of the IQSI characteristics. To facilitate the school's efforts, the Illinois State Board of Education provides a directory of resources which is keyed to each characteristic and to each assessment item number of the scale for that characteristic. The ISBE's IQSI resource file consists of lists of print and audio visual materials and other resources, including people, and is available on request to those implementing the school's improvement plans. The ISBE offers technical assistance to the schools using the IQSI, prior to, during, and after the process.

While each school must set its own goals and priorities and develop, implement, and evaluate its unique plans and efforts for achieving them, the Illinois Quality School Index promises an oraganized and systematic starting point toward improved quality in Illinois schools.

Those readers who would like to have a detailed account of the entire IQSI process including a consideration of each of the eight characteristics of effective schools, should request the Illinois Quality Schools Index Manual from:

The Manager
Program Planning and Development Section
Illinois State Board of Education
100 North First Street
Springfield, IL 62777

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While each school must set its own goals and priorities and develop, implement, and evaluate its unique plans and efforts for achieving them, the Illinois Quality School Index promises an organized and systematic starting point toward improved quality in Illinois schools.

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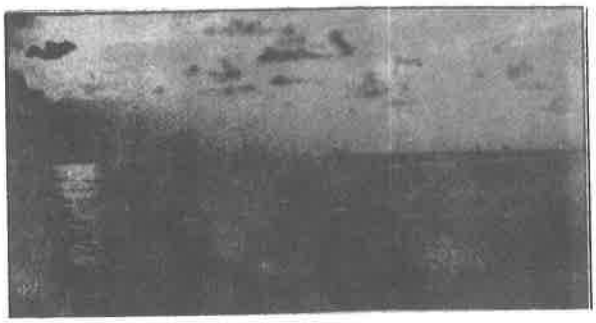

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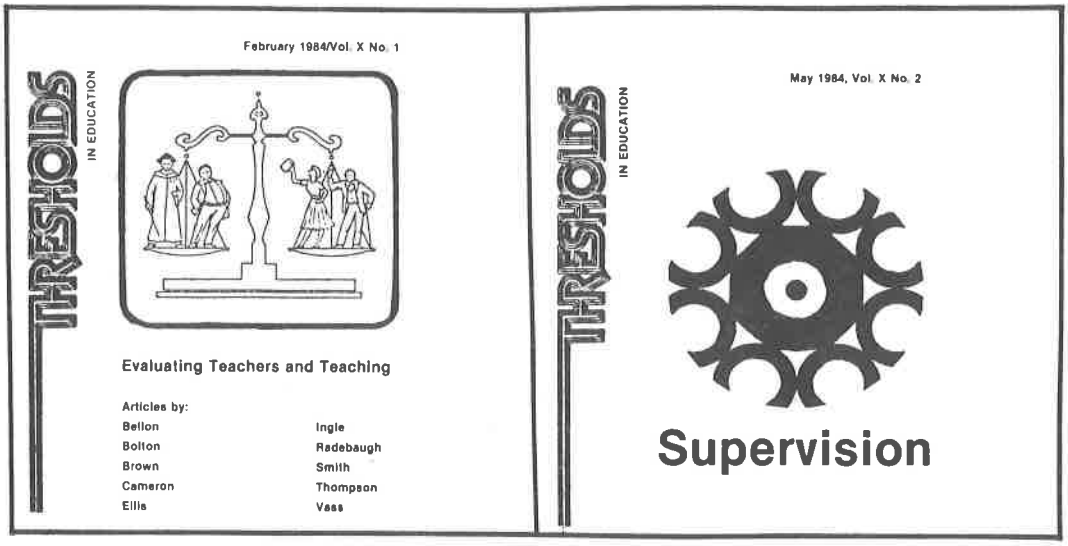

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