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Contents

ARTICLES

Introduction to Special Issue
David F. Salisbury 2

The Search for Meaningful Reform: A Third-Wave Educational System
Charles M. Reigeluth 3

Why the Schools Can't Improve: The Upper Limit Hypothesis
Robert K. Branson 15

Prospects for Instructional Systems Design in the Public Schools
Ernest Burkman 27

Instructional Design Skills for Classroom Teachers
Glenn E. Snelmeker 33

Influencing Public Education: A "Window of Opportunity"
Through School Library Media Centers
Shirl S. Schiffrin 41

An Instructional Development Look at Staff Development in the Public Schools
Sharon A. Shrock and David M. Byrd 45

DEPARTMENTS

Book Reviews, edited by Allison Rossett 54

Software Evaluation: A Criterion-Based Approach
by Ronald D. Cossin
Review by William M. Burton

ERIC Reports on ID
edited by Pamela McLaughlin 55

Division of Instructional Development Selects
1988 Award Winners 57

Awards Program for Outstanding Achievement in
Instructional Development 58

Comments From the Editors 60
Introduction to Special Issue

The opportunity to guest edit this special issue of JID on "Instructional Design and the Public Schools" was, for me, a small dream come true. Like many instructional designers, I entered this field with a desire to help improve learning for students in public schools and university classrooms. Instructional systems design seemed to be the only field that offered viable solutions to many of the educational problems I saw around me and those I had experienced as a student and public school teacher. Eventually, though, reality set in and I discovered that while instructional design skills and approaches were becoming well accepted in business and industrial training, it was difficult to make significant inroads in improving instruction in public school settings.

Although most of us, in the field of instructional design, work largely with business and industry, it is my observation that there is a definite feeling among professionals in the field that it is our field which can provide solutions to many of the problems facing the public schools. We are often frustrated, though, by our always being maintained on the outside looking in. We want to, and we know that we could, do more.

This special issue brings to focus current thinking on how instructional design can and should influence the public schools. The issue also serves to provide some explanation as to why we have not been nearly as successful as we would have liked.

The articles in this special issue represent at least three approaches to improving the public schools through systematic instructional design. The first approach deals with school system reorganization. The articles by Branson and Reigeluth represent this approach and argue that widespread, long-lasting improvements in the public schools will only come about if large-scale, system-wide changes are made in the public school system.

A second approach for improving the public schools is the diffusion/adoption approach. This approach involves getting well-designed instructional materials and programs implemented in the public schools. Burkman's article illuminates why widespread diffusion of well-designed instructional materials into the public schools is so difficult. As former director of the National Science Foundation Intermediate Science Curriculum Study (a project which had massive impact on the public schools) he speaks from a solid experiential background.

A third approach to improving the public schools is the teacher training approach. This approach deals with giving teachers better instructional design skills so that they can use these skills to better select and design instructional materials and programs. Glenn Snelbecker's paper explores the prospects and potential problems in helping teachers acquire and use instructional design skills. Sharon Schrock's paper examines the content of teacher staff development programs and the commonalities which exist between that content and instructional design. Shiri Shifman's article focuses on the role of the school media specialist. Her proposal is to gain entry into schools through their need for expertise in media or computer technology. Then, once successful with setting up effective learning or computer labs, expand the role of the school media specialist into instructional designer.

In my opinion, this collection of articles by such a distinguished group of scholars provides a wonderful and needed contribution to our literature. Hopefully, this special issue will spark renewed interest and efforts in instructional design/public school relationships. As guest editor, I would like to thank those authors who have contributed and request feedback from JID readers on either the ideas discussed in these articles or additional ideas for dealing with the public schools. Norm Higgins has agreed to consider publishing reactions, criticisms, or comments pertaining to this special issue in future issues of JID. The author and other JID readers would like to hear from you regarding the ideas expressed in this issue.

David F. Salisbury
Guest Editor
Special Issue
The Search for Meaningful Reform: A Third-Wave Educational System

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Abstract. It is widely reported that our educational system has some important shortcomings. This paper proposes that such “problems” as lack of teacher incentives, poor student motivation, lack of leadership, and lack of community support are, in fact, just effects of a more fundamental problem. It is the structure of our educational system that is at the heart of current problems. For example, it is our group-based, lock-stepped, graded, and time-oriented system that has the dubious distinction of effectively destroying the inherent desire to learn in all but a small percentage of our children. Furthermore, microcomputers are accelerating the trend toward increased use of nonhuman resources in the education of our children, and the current structure of our educational system cannot adequately accommodate the effective use of these powerful educational tools. Thus article describes a general approach and a specific strategy for effecting the needed structural changes, and also describes some initial progress on implementing that strategy. This initial progress is a preliminary “blueprint” outlining the structural characteristics that a “third-wave” educational system should have.

The recent National Commission on Excellence in Education was created because of “the widespread public perception that something is seriously remiss in our educational system” (1983, p. 1). The Commission’s report, entitled “A Nation at Risk: The Imperative for Educational Reform,” (1983) cites Paul Copperman as drawing the conclusion that “for the first time in the history of our country, the educational skills of one generation will not surpass, will not equal, will not even approach, those of their parents” (p. 11). The Commission concluded that, “if an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war” (p. 5). As Paul Berman (1983) has recently noted, “The debate is no longer over whether American education is in trouble, but over what should be done” (p. 188).

What is the Cause of our Problems?  Before we can identify what should be done, we must identify the causes of the current problems with American education. The Commission cites poor content (we are teaching the wrong things), insufficient learning time (we are not teaching it long enough), poor quality of teaching (we are not teaching it well enough), low standards and expectations (we are not demanding enough from the students), and lack of leadership (we are not getting the kinds of initiative and direction that are needed from our administrators). But are these really the causes? Or are they symptoms of a more fundamental cause? Two things may be helpful to answer this question: (a) analyzing what goes on in a typical school and (b) looking at ways of improving systems in general.

Imagine you are a high school teacher. You want very much to excite your students about learning. How are you going to go about it? You have been handed a list of over a hundred students in four classes. You have a textbook that you are required to use and a year-end exam for which you need to prepare the students, so that all but a few minutes of class time per week must be carefully scheduled in advance. On the first day of classes, twenty-five or thirty students will troop into your classroom at the ring of a bell and will troop back out 40 minutes or so later at the ring of another bell, regardless of whether the great moment of insight you have spent the entire class working up to is still two minutes away. The students will come into your class with very different levels of knowledge about your subject; most will not be very interested in it; and practically all will be hoping to be entertained more than educated. You don’t really know anything about any of those students as individuals, so you are forced to focus your attention on the content and how you will deliver it to the “average” student in the class, rather than focusing on the individuals you are teaching and how you can address the needs and interests that each of them has.

Is a longer school day really the solution to your problems? Or better teacher training? Or higher expectations? Will such reforms help to sustain a love of learning in the teacher or to instill a love of learning in the students? Milbrey McLaughlin and associates (1986) at Stanford University have noted:

Many of the current reform efforts aimed at improving the quality of teachers fail to consider the configuration of conditions that leads even the most dedicated teachers to experience demoralization and a sense of personal failure. Indeed, some of the organizational and environmental features that contribute most prominently to this sense of failure are also basic aspects of the current system of education in the U.S. (p. 422)

Similarly, Willis Hawley (1985) notes that “motivating teachers without changing other conditions that affect teaching will not only limit the
effect of incentives, but may cause frustration and alienation” (p. 60). During my years as a high school teacher, I came to understand what many teachers have complained of: that the structure of the educational system is the root cause of most of the problems that beset our educational system.

What do we mean when we refer to the “structure” of our educational system? The structure is the basic organization of the teaching process. The major structural aspects of our present system include (a) group learning: having knowledge delivered to children in groups of 20 to 40 at a time, such that all children receive the same content at the same time and rate; (b) constant rotation: rotating the children from one teacher to another every 45 minutes or so; (c) time-based grade levels: requiring all children to “serve” the same amount of time before they are allowed—or forced, as the case may be—to progress to new levels of learning, regardless of when (or even if) they have mastered all the necessary knowledge and skills; (d) isolation: having all learning occur within the confines of the school walls and not encouraging (nor usually even allowing) parents or other segments of the community to participate and cooperate in the teaching process; and (e) administrative organization: having a single large school in a district, with administrators who are not also teachers and teachers who are relegated to a less influential and professional “staff” role within the educational system.

Of course there are other causes of our problems besides the structure of our educational system. Bad teachers do exist, lack of parental concern for their children does exist, and so forth. But there is increasing recognition that the major cause of the current problems with our educational system is the basic structure of that system. Theodore Sizer (1984) states:

Can students learn how to learn to “study,” when they are rushed from class to class over a seven-period day, where they are being taught by six or seven different teachers, no one of whom sees them more than five hours per week (and usually in groups of over 20 students), and when there is rarely any unequivocally reserved time for private study (homework, study halls)? Of course not. ... Until we honestly confront the inadequacy of school structure, we will continue to cheat students, frustrate teachers, and waste money. (p. 37)

In A Place Called School (1983), John Goodlad concludes:

... far-reaching restructuring of our schools and indeed our system of education probably is required for us to come even close to the educational ideals we so regularly espouse for this nation and all its people (p. 92).

Anne Westcott Dodd (1984) states: Band-Aid solutions proliferate: a longer school day and year, more required subjects, more homework, higher pay for teachers. But more of the same is not necessarily improvement. ... America can develop a whole new structure for public education. ... (p. 685)

Maurice Gibbons (1984) laments, “Ironically, when the old fails into disrepute, we do not make major changes; instead, we focus more intensely on those things we have always done.” (p. 691). Selma Wassermann (1984) talks about an alternative system: in which each learner sets his or her own pace in working toward mastery of course material; in which teachers play diagnostic and facilitative roles, rather than controlling and judging ones; in which the initiative of the learners is cultivated rather than thwarted ... (p. 691).

Harold Shane talks about “a growing need to redesign—not merely to reform—education in the U.S.” (Long, 1986, p. 530). Ernest Boyer (1983), Seymour Sarason (1983), and Richard Brandt (1981) all advocate some structural reforms, and the list goes on and on. As Paul Berman (1985) put it, “The conclusion is inescapable: American education, as it is now organized, has reached the limits of its effectiveness” (p. 189).

Comparing Systems

Educational systems are like other kinds of systems in many ways. How are other kinds of systems improved? Our transportation system consisted primarily of the horse for a very long time. Like the one-room schoolhouse, the horse was very flexible for meeting the needs of the individual; you could go almost anywhere you wanted to. But, there were problems with the horse. It wasn’t very fast or very comfortable, especially in bad weather. Now, some people spent a lot of time trying to reform the prevailing structure by doing such things as breeding faster horses and building better roads and bridges to improve the horse’s speed, or making more comfortable saddles and creating carriages for the horse to pull to improve comfort. But the gains to be made were small compared with the development of an alternative structure, the railroad.

The railroad was far faster, more comfortable, more reliable, and more.

As we enter deeper into a highly technological, rapidly changing, information-oriented society, the present structure of our educational system will become more and more inadequate.

JOURNAL OF INSTRUCTIONAL DEVELOPMENT
Information technologies make it possible to create far better learning resources and environments than has ever been possible before.

As the one-room schoolhouse, a "first-wave" educational system, was appropriate for what Alvin Toffler (1980) calls a first-wave agrarian society, so our present, second-wave, educational system has a structure and philosophy that were appropriate for a second-wave industrial society. Although there are problems with the industrial production model of schooling (Goodlad, 1983), one cannot help but note some structural similarities to an assembly line, whereby students move from one specialist teacher to another at the ring of a bell to have a new component of education added to them. A "third-wave" system will provide a quantum leap for meeting the changing needs of our society, and like our current transportation system, it is likely that it will make use of a variety of means of learning, including peer tutoring, discussion groups, projects, and group activities of various kinds, in addition to well designed individualized resources and learning environments (Brandt, 1981, p. 148).

Each structural change that has occurred in our transportation system has become possible only by the advance of technology, and in fact technological advances have made the rise of alternative structures inevitable. But the change is never revolutionary; it is evolutionary. Horses are still used for transportation in some places. Many trains are still in use today. And, there are still many one-room schoolhouses. Structural reform is one of gradual replacement in places where the societal needs for change are strongest.

The process of structural reform in education will be a slow one for another reason as well. The more advanced our technology, the more room there is for improvement through fine-tuning a structure. Look at how far the airplane has come since the Wright brothers' early days. How long was it between Kitty Hawk and the first trans-oceanic flight? How much longer until the first jet planes?

Although the change may be slow and gradual, it will also be sure. We can already see technological developments of the "information age" that are making structural reform inevitable. Since the invention of the printing press, there has been a gradual but steady increase in the use of nonhuman resources in the classroom, including textbooks, workbooks, handouts, and audio-visual materials of various kinds. Now, it seems that microcomputers, because of their interactive capabilities, are greatly accelerating this trend. We are already reaching the point where the current structure of our educational system can no longer adequately accommodate the effective use of such resources. As more and better resources become available to relieve teachers of some of their more routine, boring tasks, we are likely to find even greater internal pressure for schools to adopt an alternative structure.

As we enter deeper into a third-wave, highly technological, rapidly changing, information-oriented society, the present structure of our educational system will become more and more inadequate, both from the society's point of view and from the school's point of view, not to mention the child's point of view. According to Naisbitt (1982), an information society requires a different kind of person, one who is more of an analyzer, evaluator, problem solver, and creative thinker, one who has more initiative, more love of learning, and more responsibility for his or her learning and decision-making. A third-wave educational system will provide a quantum leap in producing this kind of person.

In her excellent analysis of school reform reports, Patricia Cross (1984) compares the kinds of structural reform needed in schools with the structural changes taking place in businesses as outlined by Peters and Waterman in their best-selling book, In Search of Excellence (1982). She concludes that in the long run, would-be reformers may be doing more harm than good, if they transmit the message that state officials can legislate and regulate educational excellence without paying attention to the task of creating climates of excellence at the local level. "...I have concluded that our commitment to the lock-step, time-defined structures of education stands in the way of lasting progress. It is simply unrealistic to think that all students can learn from the same materials, to the same standards of performance, in the same amounts of time, taught by the same methods. (p. 170-171)"

In sum, as we advance into this information age, our highly regimented, graded, lock-stepped, group-based, and time-oriented rather than achievement-oriented system is less and less able to meet the needs of the individual, the society, and the school itself. Changing the curriculum, lengthening the school day, and legislating higher standards are band-aid approaches to fixing a broken leg, and they are likely to do as much harm as good in the long run.

In reference to the problems cited by the Commission's report, it is the structure of our educational system that renders the selection of content relatively insensitive to teachers and parents, the two groups that perhaps should, as a team, have the strongest voice (with information and advice...
provided to them by curriculum experts and other concerned people. It is the structure of our educational system that leads to the establishment of minimum standards and expectations that are usually tailored to the least capable students in a class. It is the structure of the system that results in a very small proportion of the time in school being spent on actively learning. It is also the structure of the educational system that works against quality teaching by making it harder to teach well and by diminishing the rewards and incentives for quality teaching. Similarly, the structure of our system does not reward the kinds of leadership that are needed, and in fact it often rewards (or at least promotes) good bureaucrats and public relations people instead of good educational leaders.

But if this is true, how do we know that an alternative is feasible now? First, it is certain that an alternative will never be feasible if we don’t work to develop it. If current feasibility were a necessary condition, the Wright brothers would have never gotten off the ground. But we are well beyond Kitty Hawk in the development of a third-wave educational system. The alternatives to a group-based, lock-stepped, time-oriented, graded system require the availability of well designed learning resources and environments that are at once highly effective and highly motivating. Information technologies make it possible to create far better learning resources and environments than has ever been possible before, and those technologies are reaching a level of power and affordability that make them cost-effectively competitive for many educational tasks.

But “hard” technology (equipment) is only half the story. We haven’t known enough about how to design effective and appealing learning resources and environments to make alternative structures for education feasible. Finally, that situation is changing and has in fact already changed enough so that a third-wave educational system is feasible. (See Reigeluth, 1983). The important question then becomes, “What would be a workable approach for determining the best structure and for implementing that structure?”

An Approach for Improving Public Education

Many problem solvers in business, industry, and education feel that initial efforts should entail thinking in the ideal, forgetting temporarily about constraints, and later compromising as necessary to implement a workable plan. When working with professors to help them to improve their courses, Syracuse University’s Center for Instructional Development has found education, gradual, piecemeal modifications of the structure of the present system will not achieve the desired result. We need to develop an alternative system with a comprehensively different structure—a quantum leap. The alternative system would then slowly and gradually be adopted by school districts across the country perhaps as a single alternative school within a district, as it became evident that the new structure would be better for that community’s needs. The following is an outline of a strategy for facilitating this gradual transition to a

If we want significant improvement in public education, gradual, piecemeal modifications of the structure of the present system will not achieve the desired result.

A Strategy for Significant Educational Improvement

The airplane represents a quantum leap over the railroad in long-distance transportation. And, just as a better long-distance transportation system (the airplane) was planned, developed, and gradually implemented and improved over a significant period of time, so also a better educational system can be planned, developed, and gradually introduced and improved over a significant period of time. In fact, any attempt to achieve widespread adoption of any significant innovation within a short period of time (such as occurred with Dewey’s progressivism) is virtually doomed to crash, if it ever gets off the ground. The necessary training and coordination simply cannot occur effectively in such a short period of time, and the ideas and techniques inevitably become perverted and ineffective. Hence, the following strategy is offered:

Phase 1 Develop a comprehensive blueprint for an ideal third-wave educational system, with considerable involvement of educational analysts,
practitioners, reformers, parents, and students. To the extent that it is cost-effective, conduct research and field tests on parts of the system to improve (replace, modify, or supplement) them as much as possible before implement-ation of the first prototype.

Phase 2. Secure funding from private and government sources to implement a prototype.

Phase 3. Identify the community for implementing the first prototype, perhaps a new community that will be starting up a public school system, or perhaps a large city district in which the new system would function as an alternative school within the current system.

Phase 4. Select or develop necessary instructional resources (described later), train personnel, build or remodel facilities in the selected community, etc.

Phase 5. Open the prototype school and constantly monitor and revise the various aspects of the system until it operates effectively and smoothly.

Phase 6. Build an Institute to publicize results of the system, facilitate its adoption by interested school districts, train personnel (and train schools of education to train personnel), accredit schools (but this accreditation would supplement rather than replace state accreditation), monitor and disaccredit schools, and develop additional edu-

cational resources.

Adoption would be a local school district decision, and there would be severe limits on the number of new systems that could be implemented each year, because of the training and "retooling" requirements that could realistically be handled by the Institute. Within 10 years of the implementa-tion of the prototype school, it is likely that fewer than five per cent of the nation's public school districts would have changed to the new structure. The limitation is not so much one of expense, for we do not anticipate that teacher training would be any more expensive than it is at present, nor would the buildings and resources be any more expensive. Rather the limitation is one of expertise. It will take time for schools of education to learn how to train the new type of teachers. Hence, the new system will be equally affordable for rich and poor districts alike. In fact, it seems plausible that the districts which are having the most trouble will be the first to want to adopt the new structure (especially if outside funds accompany it for the first year or two), thereby, providing a significant means for redressing current inequality of educational opportunity. We propose that this is a workable and not particu-larly expensive strategy for implementing a significant improvement in public education.

Initial Progress on a Blueprint

The remainder of this paper reports on some preliminary efforts to develop a blueprint for the third-wave educational system (Phase 1 above). A small team of theorists and practitio-ners, parents and teachers, was organized to work for four months on the initial development of the blueprint. The team decided to focus our at-}

from one of disseminating knowledge to one of motivating, advising, and managing the child's learning. Well-designed resources (including interactive computer and videodisc systems), peer tutors, projects, and learning labs are used to convey most skills and knowledge. A teacher is responsible for a child for a period of three to five years. And the school district contains a variety of small, competing "schools" for parents to choose from (all at no cost to parents, and with no power for any school to turn any child away, thereby providing a degree of diversity and simultaneously a degree of accountability that are both sorely lacking in the present system). These and other aspects of the structure of an ideal educational system are described next. However, it is important to keep in mind that this blueprint is not likely to be a solution to all our nation's educational problems. We hope it will help to encourage new ideas and to further developments in the design of a better school system.

Teachers as Guides. Most people who have advocated structural reform of our schools have called for a different role for teachers, a role that is more professional and that relies more on technology to free the teacher from routine tasks and drudgery. Accordingly, in the third-wave educational system, the relationship between the teacher and the child is not one of purveyor and receiver of information. First, not all learning occurs in schools; the parents and the community are important sources of learning. Therefore, one of the teacher's roles is to orchestrate and coordinate efforts by parents, community, and school. Second, within the school, most knowl-edge is conveyed through well-designed resources (including objects, printed materials, and interactive computer-based instruction), inexpensive assistants (including apprentice teachers, senior citizen volunteers, parents, and peer tutors), projects, discussion groups, learning labs, and resource people.

Hence, the teacher is more a guide than a teacher, as is the case in the Montessori system, which has functioned extremely well in this mode.

Anything beyond fine-tuning of any system requires system-wide planning and modification.
The role of the guide is one of motivating, advising, and managing the child, rather than delivering most of the content knowledge. The guide is a conductor rather than a musician. She or he is an instructional manager who helps the child and parents decide upon appropriate instructional goals (within limits) and then helps identify and coordinate the best means for the child to achieve those goals. And, those goals go beyond the intellectual development of the child; they may extend to the child's physical, social, moral and psychological development, depending on the parents' wishes.

Guides work individually and in small groups with children to insure that they reach their goals. Therefore, there is no such thing as a "class" in the sense of a group of children who learn the same material in the same place at the same time for a whole term or academic year. (There are, however, occasional discussion groups and seminars, which are especially useful in such areas as literature; and some mini-courses utilize class meetings when better alternatives are not available.) Each child has individual educational goals and could be matched to a unique combination of resources with the help of a computer-based advisement and management system. The cost-effectiveness of this system is very promising and is discussed later.

Developmental Levels as "Grade Levels". In the third-wave school system a guide is responsible for each of his or her students for one of the developmental stages of the child's life: a period of approximately 3 to 5 years. On the basis of work by Piaget, Erikson, and others, we currently conceive of four stages as being relevant to the school system: approximately ages 3 to 5, 6 to 9, 10 to 13, and 14 to 18. The school organization is structured around these four levels, enabling each guide to work with a child for an average of four years. Either the parents or the guide can request a change before the child has entered the next developmental level, but there is a "test period" of, say, 6 months during which no changes are allowed. The process whereby parents request a guide is described next.

Parents Choose Guides. Parents request a guide for each of their children. On the basis of information made available by an independent "consumer reports" type of district office and on the basis of word of mouth and interviews with guides, the parents request, in order of preference, about three to five guides (depending on the size of the school district). The "consumer aid" office also provides diagnostic testing and interviews to help parents make the best decision, or to make it for them if they are not interested. Each guide decides how many children to accept each year, but does not decide which children to accept; that is decided by a formula that maximizes the number of first choices filled district-wide.

"Clusters" as Independent Schools. In other professions like medicine and law, professionals often work together rather than independently; and, unlike teachers, they maintain a high degree of decision-making participation in, and control over, the organization. In a similar way, even though parents choose an individual guide, that guide does not work independently, but is a member of a "cluster" of guides. A cluster usually consists of about 3 to 6 guides, their assistants, their students, and a leader, who is a "master guide".

Like a lawyer in a law firm, each guide has considerable responsibility for the success of the cluster, and considerable incentive to meet that responsibility (see next paragraph), and considerable power to meet that responsibility. In the present system, teachers are given the first but not the last two! Is it any wonder that the structure works against good results? Just as the "administrator" of a law firm is a practicing lawyer, so the master guide is an active teacher. But the master guide also has a variety of other responsibilities, foremost of which is instructional leadership for the cluster. Ultimately, the master guide has the major responsibility for the success of the cluster.

Incentives and Rewards. The cluster's success depends on how satisfied the parents and children are, because its income depends in part on the number of first, second, and third choice requests for all of its guides. But, it is the income of each cluster that depends on demand for its guides, not the income of each guide directly. A guide's salary is based only on the number of students he or she has and the cluster's gross income. Hence, there is considerable incentive to help any guides in the cluster who are not doing well. This results in a nice combination of competition between clusters (providing incentive for excellence and responsiveness to the community's diverse desires and needs) and cooperation within each cluster (providing support and encouragement among guides), not unlike that characterizing most other professions.

With respect to competition, the dependence of cluster income on parental satisfaction makes guides very accountable for what they do or don't do. If a cluster is doing a bad job of meeting parents' expectations, it's income will fall, as will the income for all of its guides. With respect to cooperation within each cluster, the fact that a guide's income depends not only on his or her own efforts, but also on the success of the other guides in the cluster, results in a much greater incentive to cooperate and help each other to insure that all the cluster's children do as well as they can.

Learning Labs. In the fields of law,
accounting, and medicine, the general practitioner has access to specialists in different areas. In a similar way, the guide has access to various learning labs. A learning lab provides instruction in a specific subject area. It can be a traditional, discipline-oriented area such as biology or a cross-disciplinary, problem-oriented area such as pollution. These learning labs operate completely independently of the clusters.

All children in the school district receive a certain number of tickets or passes that entitle them to use the learning labs. The labs in turn receive their budgets on the basis of the number of passes that they collect, so there is considerable incentive to attract students and satisfy cluster guides' needs. Again, there is a nice combination of competition between labs and cooperation within a lab. We currently envision three types of learning labs: "shopping mall" labs, site labs, and mobile labs. They are described in some detail later.

In summary, the major aspects we currently envision for the third-wave educational system are the following:

1. Teachers are guides who, in cooperation with the child's parents, motivate, advise, and manage a child's education for three to five years.

2. Resources (including well-designed materials, peer tutors, projects, discussion groups, learning labs, and resource people) are used to effect most of the learning.

3. There are no traditional classes, but each child has individual goals, and a unique combination of resources and approaches is prescribed to reach those goals.

4. Guides work cooperatively within an educational cluster with about two to five other guides, including a master guide.

5. The master guide sets the school climate and philosophy, hires guides and assistants, provides professional development for guides and assistants, and provides direction and leadership for the whole cluster.

6. After a trial period, parents are free to request to move their child to another available guide and cluster if they are not satisfied with their child's progress. Hence, individual guides and clusters are very accountable for what they do or don't do, and they have considerable incentive to work with parents.

7. Guides have a great financial incentive to cooperate and work together for the success of the whole cluster.

8. Guides can send children to learning labs of various kinds to receive the best available instruction on selected subjects.

The following is a more detailed description of the various aspects of the structure of this third-wave educational system.

Cluster Operations

Because the guide is the hub of this educational universe, we shall further describe the structure of the system on that level. As was mentioned above, every guide must belong to a cluster, which is much like a small law firm or medical clinic. Also, a guide is responsible for children for one complete level of development (approximately four years). In an exceptional case, a guide might prefer that his or her students be spread out over two or even three levels rather than just one. In such cases, it is probably advisable that children switch to the next guide upon transitioning to the next level.

Each guide often uses apprentices (training to become guides), advanced students, and volunteers (including parents, senior citizens, and other members of the community) as assistants to help teach his or her students. Many receive credits for their services rather than money. Those credits entitle them to personal use of the learning labs for continuing education or the child care center for care of their own children. Tutoring is also a valuable experience for students. Students are a very much overlooked resource that can save a school system much money, improve learning, and result in even greater benefits for the tutors. But they must have proper training and guidance to be most effective (Frey & Reigeluth, 1986).

At this point, our best guess is that in Level 1 (ages 3 to 5) each guide is responsible for about 25 children; in Level 2 (ages 6 to 9) about 35 children; in Level 3 (ages 10 to 13) about 45 children; and in Level 4 (ages 14 to 18) about 55 children. These differentials reflect the increased use of learning labs as the age level increases. The services of apprentices, advanced students and volunteers considerably lightens the load of each guide. These figures are our best guess at present, and experience may reveal better figures.

As mentioned earlier, each guide decides how many children to accept; that is, what portion of a "full load" to accept. The importance of parent satisfaction keeps this figure from becoming too large, and the guide's personal income needs keep it from being too small. But if a guide wants to work half-time on, say, writing a book or computer program, then he or she can do so by accepting fewer students (and receiving a lower income).

Anywhere from about three to six guides can comprise a cluster. With 4 guides in each cluster, there would be one guide on each of the four developmental levels, assuming that the cluster elects to serve all four levels. Such a cluster would have about 160 children spread out over the ages of 3 to 18. This means that there would be an average of about 10 children of any given age within the cluster. If the cluster serves only two developmental levels, there would be an average of about 20 children of any given age within the cluster. This size allows the children to get to know most other students in the cluster fairly well, resulting in a more friendly and caring environment and more cross-age interaction.

Specifics by Level

In Level 1 the guides are very similar to Montessori teachers (Standing, 1962). They introduce children to well-designed educational resources as the children become ready for them, and the resources do most of the teaching of knowledge and skills. The guides also arrange activities that help develop the child socially, emotionally, and physically (motor coordination). Children are exposed to a variable environment in which caring guides and assistants nurture their development and en-
encourage them to alternate regularly between learning activity and social interaction, free play, exercise, and/or rest.

Most learning at this level takes place within appropriate cluster facilities, but field trips are occasionally taken so that the outside environment can influence the children's development. Mobile labs (discussed in the next section) and other outsiders (including parents) occasionally come and put on a program to enrich home-room activities.

Parents can leave their child in the cluster facility as long as they wish, but there is a charge if the child is left for more than six hours per day. This charge can be paid in money or in time contributed to the cluster. The more advanced children occasionally participate in activities in a Level II group. This facilitates their transition into the next level with a minimum of anxiety (even if the child advances to a different cluster). The timing of the full "graduation" to the next level is made in consultation with the parents and is based on a combination of the child's intellectual, social, and emotional development, including level of learning skills and degree of self-directedness and responsibility.

In Level IV, the opposite end of the developmental spectrum, the cluster facility is more of a conference room than a home room and activity room. Almost all content learning occurs in the learning labs, including lab-sponsored seminars, projects, and tutoring sessions. Also, intellectual scavenger hunts entailing inter-disciplinary problem solving are widely used. Guides spend much time monitoring and motivating the children and just plain caring. Much time is also spent in individual conversations, for the guide is more a counselor (an educator in the true sense of the word) than a teacher.

In the domain of cognitive development, those conversations are often directed at higher levels of knowledge, including synthesis and evaluation in Bloom's taxonomy (Bloom, 1956) and cognitive strategies (or generic skills) in Gagne's taxonomy (Gagne, 1977). Service projects are often required of students.

The guide also works closely with the parents on such other concerns as the child's emotional, social, artistic, moral, and psychological development. This entails (a) identifying with the parents any aspects of development that need work or any obstacles to further development that need to be removed, and (b) developing an appropriate plan that entails certain parental actions as well as certain guide actions of which the parents approve. As parents who have occasionally felt as if we were at our rope's end with one of our children, we feel it should also entail providing advice, when desired by the parents, on how to handle behavior problems and how in general to increase the quality of home life.

On the intervening levels (II and III), the guides serve both roles described above (for Levels I and IV). The degree to which each role is played by the guide progresses as the child develops from a Level I person to a Level IV person.

At whatever level, each guide must abide by a "renaissance approach" that establishes certain minimum levels of development in each of a broad range of basic areas (including basic skills). As long as the minimum levels of achievement are met in all areas, the children can study whatever they want, whenever they want. As might be expected, the yearly levels vary depending on the general ability level of the child. For example, a child with an IQ of 50 is not expected to achieve the same minimum levels as one with an IQ of 150. Benjamin Bloom has evidence to suggest that the differences in rate of learning that currently exist in our schools are more a function of differences in accumulated knowledge than of differences in "intelligence" (Bloom, 1976). The emphasis is on each child achieving according to his or her potential. For late bloomers the minimum levels are adjusted to represent relatively larger steps.

The guide maintains an achievement profile on each of his or her students on a computer-based advisement and management system. Grades are not given, because in an information society a profile of the kinds of abilities and knowledge one has is more important than a letter grade or a general rank in class.

There are cluster-wide and district-wide interest groups and clubs, dealing with such interests as computers, drama, photography, woodworking, music, chess and dance.

There are also cluster-wide and district-wide social events and athletic events. A major benefit of this structure is a much higher rate of student participation in athletics and other interests. Opportunities for leadership and exercise of responsibility are also increased (Brandt, 1981). Volunteers (parents, senior citizens, and other community members) and older students do much of the supervision, much as is presently done with Little League baseball and Scout programs.

Learning Labs

It was mentioned earlier that learning labs provide specialized expertise on different subject areas; and we have recently seen that the older the child, the more the labs are used. A learning lab can be for a traditional, discipline-oriented area such as biology or for a cross-disciplinary, problem-oriented area such as pollution; and, it can be for an intellectual area such as philosophy or for a technical area such as automobile maintenance and repair. In all cases, labs would be encouraged to incorporate instruction in thinking skills and other higher-order skills into the content area instruction, and guides would be responsible for helping the student to put together a program of study that represents a good progression of such higher-order skills instruction. Resources are allocated to the labs on the basis of their usage, providing a combination of cooperation and competition similar to that for the clusters.

We mentioned earlier that there are three types of learning labs: mobile labs, shopping mall labs, and site labs. The mobile labs are labs on wheels that travel around from one cluster to another and even from one district to another. The shopping mall labs are centrally located labs to which the children in a district go. They range from a one-room, one-person (part-time) "craft shop" operation to a nationwide...
operation (the Sears of the shopping mall labs). There tends to be continuous (although not too frequent) turnover as the “offerings” adjust to changing times and changing demands. Also, there are cooperative arrangements whereby children may use labs located in another school district. The site labs are located at the part-time organizations which sponsor them, such as museums and businesses. Tax write-offs are an important incentive for the creation of such labs.

All learning labs must be approved and periodically recertified by the school district’s Lab Management Organization (described later). Learning labs can be started by almost anyone in any subject area, including and would allow for district facilities such as library, auditorium, child-care facilities, and food services to be easily accessible to all clusters, while still maintaining some physical separateness for each cluster. (Although food preparation could be done centrally, each cluster should have its own cafeteria to help build cluster cohesion.) Very large districts might have several such “wheels” at different locations within the district. Although such a logistical arrangement might be ideal, existing school buildings could be utilized with relatively few modifications to meet the same needs.

At the beginning of each quarter (three month period), each student in the district is awarded a certain number of learning lab passes. The exact number depends on the child’s level of intellectual development—the higher the development, the more passes awarded. Also, each child can earn additional passes through such activities as tutoring, helping with the preparation of displays and materials, supervising extra-curricular activities, etc.

Some of the passes are restricted passes and some are open passes. The restricted passes must be used for the study of skills and knowledge specified by the child’s “quarterly contract” (see below), whereas the open passes can be used to study anything. This results in a combination of structure and flexibility.

Each pass must be filled out and signed by the guide, who indicates the lab in which it is to be used. This helps the guide to influence and keep track of the child’s learning. The child hands in the pass to the lab, so that the lab can then cash it in for payment from the district office. The passes could be implemented electronically with magnetic ID cards and electronic time clocks that feed data on student and lab usage into the district-wide, computer-based, advisement and management system. Teacher approval would be entered into the computer system, and the system would reject any child who did not log in to a lab without such approval. Each lab allows each student a minimum of one hour of free browsing every quarter for purposes of seeing if there is anything he or she would like to learn in that lab. Of course, the lab receives remuneration from the school district for such browsing.

Having a limited supply of passes to use in a quarter, the children are more concerned with making the most of each one—that is, not wasting precious time hacking around. And having the flexibility to study what they want when they want (within the structure of the minimum requirements and the other goals specified in each child’s quarterly contract) provides heightened motivation and increased self-determination and self-management that are so important in an information society.

What the Student Does

At the beginning of each quarter, the guide sits down with each of his or her students and the student’s parents, if possible. Together, they prepare a plan or contract for the child’s learning goals and activities for the quarter. As a result of this plan, a checklist of required goals and activities is prepared (probably with the help of the computer-based advisement and management system), and the use of restricted passes is planned. However, the plan is devised in such a way as to leave some time for children to pursue their own interests with their own passes, whose use is also discussed and informally planned at the beginning of each quarter.

The intent here is to establish a balance between structure and flexibility. Each cluster may establish its own policy (or lack thereof) with respect to the balance between requirements and options, except that the district may establish certain minimum levels of development in different areas for different age groups (perhaps adjusted by individual limits to rate of development as measured by, say, IQ or some better...
indicator).

At this time, the guide and parents may also have a private conversation about any problems the parents are having with the child so that the guide can give advice and/or take steps to help out. The guide also identifies things the parents can do or need to do to help the child achieve his or her quarterly goals (not just intellectual, but also emotional, social, artistic, physical, etc.).

At the end of each quarter, the guide sits down with each child and the parents (although two separate meetings would not be uncommon) and reviews the child’s achievements in relation to the contract for the quarter. This provides part of the basis for planning the next quarterly contract, which usually occurs at the same session.

District Organization and Administrative Systems

All school tax revenues, block grants, and state aid go directly to the school district office for district-wide distribution. The district office establishes a budget for clusters (probably by establishing an amount per pupil and multiplying by the number of pupils anticipated for that year) and a budget for the Learning Lab Management Organization (probably by establishing an amount per pupil and multiplying by the number of passes anticipated for that year). The budget for clusters is allocated to each cluster in accordance with the demand for its guide. The budget for the Learning Lab Management Organization is allocated to each lab in accordance with the number of passes it receives, except that a certain per cent is kept to meet its administrative expenses. Finally, the Consumer Aid Agency receives a flat percentage of the total school district budget (around one-half of one percent), and the district office keeps a flat percentage of its administrative expenses.

Cluster Organization and Administration. A new cluster can be started by anyone who meets the requirements, but a cluster can be disbanded if it ever fails to meet minimum standards, set by the school board (and individual personnel can be “disbarred” if they are found by the district review board to be negligently unprofessional). It is probably wise to specify a minimum of two or three guides for forming a cluster. Training and certification are required for anyone who wants to be a guide. This training and certification would be provided by schools of education that have been certified by the Institute. Some local training may also be required regarding the district’s computer-based advisement and management system and current learning labs. The master guide is chosen by the guides that comprise the cluster, and a two-thirds majority is required to replace the master guide.

For an established cluster, the hiring of new guides is decided by a two-thirds majority of the cluster’s guides. The hiring of guides would be based on standards that are clearly laid out in the charter of the cluster or school district regulations, but those standards should allow a sufficient length of time for new guides to improve and for older guides to reform their ways. Because of the importance of cluster cohesiveness and cooperation among guides, a simple majority is sufficient for a cluster’s guides to decide whether or not the criteria for release have been met. There is no grievance or appeal procedure, again because of the importance of cluster cohesiveness and cooperation among guides. There is no grievance procedure when a lawyer or doctor is kicked out of a law firm or medical clinic, but such is extremely rare.

An administrative person from the district office is in charge of the accounting, reporting, and logistical aspects for all clusters within the school district, but the cluster decides how its budget will be spent. This frees the head guide to concentrate on instructional concerns and school climate.

It was mentioned earlier that each cluster’s gross income is dependent on the total demand for its guides. A point system is used whereby each guide receives 3 points for being the first choice of a “new student,” 2 points for being the second choice, and 1 point for being the third choice. A new student is one entering a new level of development, one entering the school system for the first time, or one requesting a new guide after the six-month trial period. The income rate for each cluster is determined solely by the cluster’s total points divided by the number of guides in the cluster. The cluster’s budget is then determined by adjusting that income rate according to the average percent of full capacity for its guides (determined by the actual number of students divided by the full-load number of students for each developmental level). In turn, the guides’ salaries are based only on cluster budget and individual load—no merit—and are a percent of the cluster’s gross income. Hence, the only way to increase one’s salary, as in a law firm or medical clinic, is to increase the demand for the cluster’s guides. In this way, there is a tremendous incentive to cooperate within each cluster. All master guides receive a fixed salary supplement set by the school board.

It might be beneficial to have two levels of guides based on merit, such that a beginning guide would likely not receive the same salary rate as a veteran guide. However, this raises difficult questions as to who should make the promotion decision. Alternatively, it might be beneficial to allow each cluster to set its own salaries, for the guides will know that if their other budget categories suffer, parents will be displeased and the cluster’s points and budget for the next year will be lower.

Some districts may also want to allocate a certain fixed dollar amount per student to each cluster’s budget, to partially offset the expenditures per student across clusters. However, it should be understood that the more the cluster (and lab) budgets are influenced by demand for them, the easier it will be for superior ones to grow and thereby offer a better education to more students in the district. It will also be less necessary for the district office to close down weak clusters (or labs) by executive mandate, which is likely to be politically difficult, if not impossible. This will be less necessary because insufficient personal incomes will lead the guides in less successful clusters to seek more lucrative positions on their own initiative. In the long run the community will be better off by rewarding excellence and not encour-
Learning Lab Management Organization. There is a Learning Lab Management Organization which has the following responsibilities:

- It surveys the needs of the clusters for external instructional support from labs and prioritizes those needs.
- It contracts new learning labs. These may be (a) part-time individuals (e.g., a retired biologist who lives in the community and is willing to devote a part of her time to the school district), (b) part-time organizations (e.g., a local museum or business which is willing to devote a part of its time to the school district), (c) full-time individuals (e.g., a mechanic who would like to quit his job and work full-time with kids), and (d) full-time organizations (e.g., a publishing company that has established a subsidiary for running learning labs in schools across the country).
- It trains lab directors whenever necessary, and it provides professional development support services to the labs upon request.
- It distributes money to the labs according to the amount that each lab is used.

An administrative person in the district office is responsible for the accounting, reporting, and logistical aspects for all labs within the school district, but again each lab decides how its budget will be spent.

Consumer Aid Agency. The district-wide Consumer Aid Agency which was mentioned earlier serves (a) as a placement counseling service for matching children with guides and (b) as a watchdog service for providing consumer reports on clusters, guides, and learning labs (explained below). This Consumer Aid Agency is run by parents (many on a volunteer basis) but receives a permanent fixed budget (something like one-half of one percent of the total district budget) as part of a system of checks and balances.

The Consumer Aid Agency's counseling service helps parents to decide which guide will be best for their child. It maintains extensive data on each guide's characteristics and accomplishments, and it diagnoses a child's needs, if parents so desire, so as to enable them to select the guides which seem most likely to meet those needs. Such people-categories as "intuiters" and "thinkers" may be very useful for part of this function.

The Consumer Aid Agency's watchdog service has responsibility for collecting and disseminating information about the quality of performance of the clusters, guides, labs, and Lab Management Organization.

Given that some parents do not care enough to choose a guide for their child, the placement service diagnoses each such child's needs and applies for the most appropriate guides. However, such applications are not included in the point count described under Cluster Organization and Administration above, to avoid the temptation for dirty politics. Federal, state, and local supplements for disadvantaged children would be passed through the district office directly to the clusters' budgets.

Cost-Effectiveness

No thorough cost analysis has been performed as yet, but preliminary indications are that this system would cost approximately the same per student as our present system, yet would be considerably more effective. Although guides are paid more than present teachers, their various assistants (apprentice guides, volunteers, and older students) cost considerably less. Their use enables a much higher student-guide ratio, but with increased human contact and caring.

The learning labs are the element that may influence costs the most. The number of labs and relatively the number of passes provided to students each quarter will greatly influence the cost. Also, the extent to which the labs are staffed and/or directed by volunteers or semi-volunteers (those who accept nominal payment to supplement retirement or other income) will also greatly influence the cost.

In a small school district, it might be wise for each guide to also serve as a lab director, with fewer students to guide. We presently anticipate that this entire system can be run within present school budgets, especially given that local businesses, foundations, and individuals would be considerably more inclined to sponsor learning labs, including basic-skill and content-area shopping mall labs, as well as more application-oriented and problem-oriented site labs.

Conclusion

Much work needs to be done to further develop, field test, and refine this blueprint of a third-wave educational system to the point where we can begin to think about implementing it in a pilot school. And, this only represents the first step in a systematic strategy to make significant improvements: a quantum leap in our educational system. Although the road to meaningful structural reform of public education is long and difficult, we feel that the strategy and approach are both very sound. With persistence and dedication from a national coalition of concerned citizens, we feel confident that we can achieve very significant improvements. We would be interested in hearing from anyone who would like to be a part of this effort.

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References


Why the Schools Can't Improve: The Upper Limit Hypothesis

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Introduction
The first purpose of this paper is to question whether there is a significant discrepancy between the current levels of productivity and quality of American schools and the levels required to serve the society well. The second purpose questions whether the current approach, or the approaches of blue ribbon commissions are likely to produce significant improvements. A third purpose sets forth the hypothesis that the current school operations model cannot be improved by the recommendations offered by the National Commission. The fourth purpose is to suggest that some form of technological intervention must be made before any substantial increases are made in productivity.

Are Quality and Productivity Problems?
Numerous researchers have recently addressed this persistent question from a variety of perspectives: including Murname (1975), Heyns (1978), National Commission on Excellence in Education (1983), Coleman, Hoffer, and Kilgore (1982), Aker, Spaulding, Adams, and White (1984), Walberg (1984), Kozol (1985), Bickel (1986), Pallos (1986), Bureau of the Census (1987), and Walberg and Fowler (1987). Common among these researchers and reports is the conclusion that school performance and quality are severely inadequate to meet the needs of modern society. Further, Bauding (1972), established that not only are the results disappointing, but that the real costs of schooling doubled between 1930 and 1970.

Parent organizations, state education agencies, the United States Department of Education, and blue ribbon national commissions, have all agonized about the problem, and some have offered concrete proposals for improvement (e.g., National Commission on Excellence in Education, 1983). Virtually all of these proposals have centered on trying to repair, stimulate, and improve the existing educational establishment. They have implicitly accepted the current operations model as adequate and have urged changes intended to improve it. A major contention in this paper is that the existing operations model is seriously flawed and cannot simply be patched up for modern use. A second contention is that even if these proposed changes could be successfully made, they could produce, at best, a limited improvement.

Commissions, state education agencies, and teachers organizations, all seem to urge additional funding, but the empirical evidence has not demonstrated any solid relationship between funding and school performance (Boulding, 1972; Murname, 1975; Walberg & Fowler, 1987).

Is there a documented problem in quality and productivity? In this paper, "quality" refers to both quality control and quality assurance concepts as elaborated by Lessinger (1976). The quality control question centers on how closely what happened resembled what was planned. (e.g., Do actual mean achievement scores match expected scores?). The quality assurance issue addresses the fitness for the intended use, (How well prepared is the graduate to meet employability requirements or succeed in additional schooling? (Juran, 1974). Productivity refers to the relative achievements of the students compared to the relative expenditures.

Walberg (1984) compared American students with those in other developed countries and found that we are clearly second-best compared to any other industrialized country on commonly used measures of language, mathematics, and science. More recently Walberg and Fowler (1987) concluded: A substantial literature shows no consistent association between spending on education—including total per-student expenditures as well as specific spending on such things as class-size reductions, physical facilities, teacher salaries, and the like—and how much students learn. (p. 6)

Aker, Spaulding, Adams, and White (1984) used an absolute output measure, functional literacy, to infer instructional outcomes. They estimated the number of functional illiterates to be about 12.5 million, with the number not able to function at levels of conceptual development attainable by some students in good high schools to be more than 50 million (see also Kozol, 1985). According to the United States Center for Education Statistics, the average score on the international eighth grade math test was 52; the mean for American students was 46. The functioning and literate remainder of the society is carrying this economic burden.

According to a recent story in the New York Times (1987), a hiring program established by four New York Banks to employ 250 qualified graduates, yielded only 100 graduates who could pass the entrance test that was roughly equivalent to an eighth-grade mathematics test. The United States Army must spend millions of dollars each year to prepare high school graduates in functional basic skills prerequisite to job training programs (Branson & Farr, 1985).

If the banks cannot find qualified applicants in times of high youth unemployment, and if the taxpayer must pay twice for the same schooling as it does when Army recruits must be given remedial instruction in basic academic skills, we will certainly continue to find ourselves in situations of low industrial productivity and a worsening trade deficit. Thus, Walberg (1984) argued coherently that our
schools have not kept up with even the smokestack industries in terms of increased productivity when measured over comparable time periods.

While we must make our individual, personal evaluation of school performance, there is an emerging consensus that the current levels of performance and efficiency are unacceptable, and that direct action is required soon. But what kind of direct action? There appear to be two distinct views:

- Those who believe that significant improvements can be made in the present operating concepts and models (National Commission on Excellence in Education, 1983; Finn & Tomlinson, 1987; Florida Department of Education, 1987), and:
- Those who accept the argument, to be urged here, that fundamental redesign must occur before any important
ent state of affairs. If there is blame, we are all to share it. We do have a significant problem and we must get on to fix it, but to fault any group would be entirely wrong.

The Life-cycle of a Maturing System

Life cycles of maturing technologies and systems can be represented by a sigmoid curve as presented in Figure 1. The introduction of any process is characterized by an extremely slow start with a limited relative productivity. This slow beginning gives way to a rapidly changing rate until increases in productivity begin to taper off and the system approaches the upper limit (asymptote) for the process or technology. For any system or enterprise, there is an upper limit of achievement at 100%, which is never reached. As indicated in the curve, the view pre-

mult-engine aircraft had been effectively optimized. That is, engine manufacturers and airframe manufacturers had produced about as much efficiency as they could produce under the existing piston engine technology. For each aircraft mission, the designs were approaching the practical upper limit of capability.

Aircraft designers must take into account three major factors when producing an aircraft for any defined mission. These factors are:

- Speed,
- Payload, and,
- Range.

For any mission, these three variables must be traded off—optimized—to achieve the performance requirements. It is not possible to maximize all three variables simultaneously. If you want more speed, you must give up range or payload. Mission requirements for aircraft design are the equivalents of system requirements for what could become an educational "system." While education may now be a system in the sociological sense, it is not, in my view, a system in the cybernetic sense. The mission and system requirements for education will be discussed in a later section of this paper.

I will argue here that all major possible improvements to schools, under the current management model, had been implemented by 1950 or 1960 at the latest. The results under this model have reached their practical upper limit; that is, performing in the vicinity of 97% to 98% as well as they can ever function according to the current design philosophy. Trying to make improvements to operations under the current management structure can yield, at best, only a 2% to 3% improvement and to achieve even that trivial gain would require immense investment. It is well known in quality programs that the last 2% to 3% improvement to a "zero-defect" goal can cost half again as much as the first 97% (Lundvall & Juran, 1974).

Marketing Perspective

Such curves can also describe the market introduction-penetration-saturation process for products and serv-

Common among these researchers and reports is the conclusion that school performance and quality are severely inadequate to meet the needs of modern society.
Figure 1. Hypothetical upper limit of productivity of the traditional school operations model as a function of time. This function was adapted from the concepts of maturing technologies and markets.

ices as well. The curve describes the early process or penetration in terms of the absolute percentage of possible achievement. From a marketing perspective, if 50% of the American people now see a dentist regularly, as indicated on the curve, there is a theoretical maximum possibility that dentists could see a 100% improvement in their market. In this particular case, the 50% they now see probably represent 90% of the currently available purchasing power. While they could see 100% more people than they now do, most of those people not now being seen cannot afford to pay, thus, there is not a high probability of a 100% improvement.

Negative Research Results
It is one of my major contentions that many of the negative findings with regard to discovering what many people believe are intuitively obvious relationships among educational practices (teacher pay; per pupil expenditures; teacher training; class size) are due to the near asymptotic condition of existing practices. When all schools have approached the practical upper limit of performance, there is so little room for improvement in the traditional variables of interest, that significant differences reported in the literature are more parsimoniously explained by sampling error. That is, the true difference in population means is zero; those differences that are found are due to chance (see Bickel, 1986). I will further contend that this account is far more parsimonious than the endless explanations of the practitioners (see Boulding, 1972) who believe that the true mean difference is not equal to zero.

Yes, some schools are better than others, some cost more, some have better students, some have better teachers, some have better principals, but these distributions are normal and independent. Relationships among them are better explained by sampling error than by methodological faults in the research. Traditional school attributes and operations variables are random processes, not principled ones. Making one school better can often make other schools worse. A given school gets better, but the average for all schools does not.

I will further contend that blaming placing and single variable fixes, such as teacher training, pay incentives, longer school days, and longer school years, cannot be efficient means of improvement. The problem is principally one of system design, not of faulty operation. It is critical to make
that distinction. No group can be singled out for blame: not teachers, not principals, not school boards, not parents (see Finn & Tomlinson, 1987; Class, 1987).

To blame these groups for functioning in the system as their roles have demanded, would be similar to blaming the pre-antibiotic medical establishment for failing to cure infections. Better physician training, better nursing training, and improved hospital management would have helped little without the technological breakthrough of penicillin.

There is also a continuing and well-lobbied view that schools do not have adequate financing, in spite of consistent findings that school quality is not related to school cost (Boulding, 1972; Murnane, 1975; Walberg & Fowler, 1987). Those results can also be readily explained from the near-asymptotic performance perspective. Since the greatest percentage of additional funds provided to the schools are consumed by teacher salary increases, no affordable level of funding would ever be thought of as adequate. Thus, the problem is one of resource use, not of resource amount.

Design Versus Operations Problems

The principal argument here is that fundamental flaws in management and operations permeate the contemporary education establishment. The education sector was never designed to meet today's needs; it matured by reaction to various political and social influences over an extended time period. That maturity is represented by the sigmoid curve in Figure 1.

Systems can fail because they are obsolete (which I believe is the case in education); because they are overloaded; because they have fundamental design flaws; and, because they have inadequate management. Some examples of system failures with different causes might clarify this point.

Overload. In the mid-1960s, there was a complete electric power black out in the Northeast, resulting from a surge in demand and a design problem in the distribution system. It was not possible to identify a group or person responsible, only a failed part.

Undercapacity. Current analyses of the United States air-traffic control system indicate that it cannot meet the demands placed on it, causing an increase in flight delays, near misses, and other unfavorable statistics. The problem cannot be blamed on the air-traffic controllers, or President Reagan for firing members of the striking union, or the airlines. The system cannot meet public demand. Reducing the number of flights is a palliative, not a cure.

Obsolescence. Galley slaves were once used to power ships. Could the navy have really improved the performance of the armada if they had selected stronger slaves; trained them better; given them more money, fewer lashes, or better rations; waxed the hull; redesigned the oars; provided swivel seats; or, told them how important it was to the Queen for them to work harder?

NASA's Management System Failure

In early 1986, on the morning of President Reagan's State of the Union message, the space shuttle Challenger, was launched from Cape Canaveral during a rare Florida cold snap. Shortly after liftoff, one of the main booster rockets exploded and caused the shuttle to fall into the Atlantic. Instantly, a national demand was sued to find the culprits and deal harshly with them. Ultimately, it was found that the proximate cause of the accident was a defective O-ring.

If you believe that disaster was an accident caused by a defective O-ring, then you will probably also believe that single variable improvement schemes will improve public education. The accident was caused by a major system flaw. The shuttle was launched on a day that was clearly too cold for the vehicle to endure. The NASA launch director was warned by the manufacturer that the weather was out of tolerance. The contractor was threatened with reprisals if he persisted in recommending a launch delay.

If there is a major system flaw, any new launch could go with some other system out of tolerance—temperature, cloud cover, lightning, wind, and many others. Fixing the O-ring, though probably necessary, is not sufficient to fix the system. The O-ring was merely a scapegoat. NASA is, however, still throwing money at the O-ring, and it is attempting to change its system. Will it succeed in solving both problems? A large government system is a close analogy to the kinds of problems being discussed here.

In each of these examples of system inadequacy, the owners and operators were not at fault, the system design and the available technologies were not adequate to meet the increased needs. While no systems are perfect, examples of effective systems, presented in the sections that follow, should help to define the scope of the problem addressed here.

Meeting Changing Requirements

In the 1950s, a major bank projected the number of checks that would be written by customers during the next ten years. Then, by estimating the number of checks each clerk could process in a day, they came up with a staggering conclusion: There would not be enough space in the bank for the number of people required to process the checks they forecasted to be written. What to do? Redesign the check processing system by including optical character recognition and automatic data processing. Without the availability...
ity of a new technological development, the banking system, as we knew it, would have collapsed from the paperwork burden.

In my hometown, Shawnee, OK, making a telephone call involved lifting the handset, waiting for the operator to say, "Number, please," then giving her my friend Tommy's number, and hearing her ring the number or say, "The line is busy." When my neighbor, Louise, was the operator, she would even say, "There is no one at home, I just tried that number." There was no need to complete the call.

Recently, I pressed one button on my automatic dialer and was speaking to a colleague in Paris in less time than it took Louise to ring Tommy. In the last twelve months, my telephone has not been out of service for a single day. The voice quality is good, it transmits data, it is an excellent value for the price, and, by adding features like international direct dialing, the system has continued to meet my increasing needs by adding features. Though mature, the system is not obsolete. Wires were replaced by microwaves, microwaves by satellites, and both have been augmented by fiber optics. All permit me to use the same black dial telephone that I have had since 1960.

The essential elements of success in both cases has been to focus on system output requirements, to keep what was good and what worked in the old systems (handwritten checks, black rotary telephones), to replace that which no longer met system output requirements (local service operators), and to increase the capability of the systems through ingenious applications of technology and effective management.

How could major change be managed in these two well entrenched bureaucratic systems, to meet changing needs? What can be learned from organizational changes that have worked, that could be tried in the educational establishment? Is there an available technology that could improve education? Since we have convincing research evidence that there is (Walberg, 1984), why have similar technologically-based changes not taken place in education?

Recommendations of the National Commission on Excellence in Education

To illustrate the difficulties of making improvements within the confines of the current establishment, let us examine selected recommendations from A Nation at Risk (1986), in light of what has been learned in educational research and development during the last 75 years.

Recommendation A

"Minimum requirements of 4 years of English, 3 years of mathematics, 3 years of science, 3 years of social studies, one-half year of computer science," (p. 24 ff).

Three problems are: first, numerous studies of mastery learning have taught us clearly that when students are managed to achieve mastery of the objectives, different amounts of time are required for different students.

I want to declare explicitly that I do not believe there is any culpability in the current state of affairs. If there is blame, we are all to share it.

Stating recommendations in terms of years of instruction rather than intellectual competencies, is an erroneous practice no matter how widespread.

Second, all emphasis is on teaching rather than providing learning. On saying, "Number please," rather than arranging fast, efficient connections.

Third, the report recommended that more hours be spent in school each day for more months, rather than providing for increasing time-on-task and providing effective feedback.

Recommendation B

Raise standards and expectations for improved academic performance, (p. 27 ff).

A commendable goal. One just cannot urge lower standards.

One problem is: It is the same as urging better times for the track team with no mention of how to reach that goal. Just as in manufacturing, quality cannot be inspected into a product, it must be built there (Juran, Gryna, & Bingham, 1974). Higher standards cannot be tested into an educational system, competencies must be systematically built into the students.

Recommendation C

Have higher standards for teachers and raise teacher salaries, (p. 30 ff).

Two problems here: first, having higher standards (higher grades in college) for teachers does not address the issues of competencies they ought to have and how to teach well. Following the medical example, in the absence of penicillin, flunking out more physicians would have had no impact on the infection death rate.

Second, paying higher salaries to teachers has only political appeal. There are no known instances in which paying incumbent teachers more money resulted in higher quality or productivity. Further, the same class can be taught equally effectively and much less expensively, by teachers with three years of experience instead of twenty years of experience. There is no evidence that paying higher salaries to those teachers for another 20 years will result in increased effectiveness or productivity, although it would certainly result in increased costs (see Murnane, 1975). A salary structure that provides increased pay for more time in service and more hours of instruction at the university may not be the best option for the taxpayers (see Boufing, 1972; Walberg & Fowler, 1987).

Florida's recent experience indicates that only about 7.75% of the workforce of some 100,000 teachers are new hires.
There are no known instances in which paying incumbent teachers more money resulted in higher quality or productivity.

in any year. If one assumes that these new hires are distributed approximately randomly across the grades and the schools, it would amount to about 4 new teachers per school per year. At those odds, each new hire would have to be a miracle worker to have any real impact on the establishment. Unfortunately, unless the new hire is the CEO (see Iacocca, 1984), the literature tells us clearly that the organization is far more likely to shape up the new hire, than the new hire is to shape up the organization (Cornbleth, 1986).

Do More, More

Another government publication, *What Works*, (United States Department of Education, 1986; see also Glass, 1987; Finn & Tomlinson, 1987), urges schools to adopt practices known to work in other schools. Increasing quantity and quality of homework are urged as a means to “do more, more, more” students to be independent learners.” This benefit is presumed to be a byproduct of their learning the subject matter. Homework is treated as an end rather than a means. It is reasonable to raise the design question, “What is the instructional, management, or discipline problem for which homework is the optimum solution?” Do students from all socioeconomic groups have an equal chance of profiting from homework? Should they?

The Miracle Worker

In another section, schools are urged to get the “right” principal because good principals can turn bad schools into good ones. A management structure that leaves the decision about whether a bad school ought to be turned into a good one, to the whim or inability of an incumbent principal, is going to fail no matter what it attempts to do. The very fact that a bad school is known to exist in a system ought to scream loudly enough to cause direct management action to insure that the school is as good as it can be.

Regardless of management’s indifference or ineffectiveness in making schools as good as they can be, blaming a principal for bad school performance is much like blaming a 1940 hospital administrator for deaths caused by infection. The existence of bad schools is clear evidence of system failure, not bad principals.

Probably the most dangerous aspect of the story, suggesting that the solution lies in getting the right principal, is the fact that we will be looking for miracles in the person, not in the system. There just aren’t that many miracle workers available. The true hazard stems from the publicity about an occasional miracle—someone actually does come in and save a school from disaster—then the superstition builds that miracle results can be similarly obtained in other schools. When dramatic results are not achieved, the principal gets blamed, or changed, nothing is done to improve the system, and as in any other superstition, the endless cycle of false hope is sustained. A specific example of how a principal can work negative miracles will be presented later.

No matter how well motivated the reports may have been and no matter how prestigious the members of the Department or Commission, I believe that these reports and others that preceded them have suggested that we do more, and longer, of what is not working now, pay more for it, make it more difficult for new applicants to get hired, and screen more students out of the universities. These reports have not, in my view, provided us any basis to hope for success in the 1990’s (but see Smith, 1986).

Historical Perspective

In the late 1960’s, the United States Office of Education undertook an extensive study of the operations and performance of the public schools in the United States (see Morgan & Bushnell, 1967; Morgan, 1969). When they studied, observed, and interviewed groups representing teachers, administrators, principals, school board members, and the general public, they concluded that the schools were as they were and were unlikely to change. Their most significant observation was that there were no villains in the piece: the blame for the massive problem could not be laid at the feet of teachers, or unions, or parents, or elected school board members, or principals, or any other power group. The performance problems in the schools were caused by inherent structural and operations faults and the probability of success of any single “fix” to the existing model was low.

Morgan and his associates recognized that system faults must be addressed with system solutions. Simplistic, single-variable fixes, advocated by different power groups, were found to be completely inadequate. Subsequently, they organized a consortium of school districts across the country to participate in the development of an organic curriculum (Morgan & Bushnell, 1967; Morgan, 1969). They sought to develop a systemic curriculum that would relate broad new ideas, new concepts, new thoughts, and vastly improved methodologies to get the schools closer in touch with the society they serve. In spite of the hard work, money, time, effort, and good intentions, the consortium could not make and sustain any important changes.

Why didn’t the new approach survive and flourish? There were three reasons. First, there was not an adequate infrastructure to provide people with the knowledge and skill they needed to operate in the new environment. Second, all of the work was being carried out in the face of tradition; compromises had to be made that reduced the impact of the changes. Third, over time, goal conflicts developed or were found within the cooperating systems and within other pro-
grams in the Office of Education (Branson, 1979). As a consequence, the money programmed for the change was not provided over a sufficient period of time to institutionalize the new model.

After hearing about Morgan's experience, and clearly understanding the basis for his conclusions, I wanted to try my own hand at making school fixes. Because I had always worked on Instructional Systems Design programs from the top down (e.g. Oakland Community College; Parks Job Corps Center; The United States Naval Academy) and was thoroughly familiar with the pockets of resistance that had to be overcome in those programs, I naively assumed that if ideas and proposals for change originated at the grass roots level, they would be accepted, implemented, and then institutionalized. Based on my own experience and the change agent literature, I believed that whatever teachers liked, teachers would do, and that they would do only what they liked.

In early 1970, I was trying to find a school in which to begin a cooperatively developed instruction and management model, keep that model in place for a period of time, manage the program well, and make planned adjustments to the design and operation as required by using the accumulated performance data. I looked at candidate schools in the Bureau of Indian Affairs, continuation schools, proprietary schools, and others, including military training programs, finally selecting a school operated by the United States Dependent Schools—European Area (USDESEA).

The USDESEA Project

In 1970, the Center for Educational Technology at The Florida State Uni-
versity signed a contract with USDESEA to provide design and development service to the Karlsruhe American Elementary School in Karlsruhe, West Germany. Overseas Department of Defense schools are identical to typical schools within the country, except they have a higher turnover of students. As military personnel are transferred from one post to another, their children get hopelessly out of step with the other students who are not moved. It was the turnover problem that provided a focus for the systematic curriculum design.

During a period of three years, we worked with teachers and administrators to define an educational mission consistent with Army needs, elaborated program objectives, and developed a plan of action with milestones. In-service training was provided for teachers and administrators to establish the basis of cooperation in designing a new curriculum, developing it, and implementing it.

This finally approved curriculum was a hybrid of off-the-shelf materials developed by the Regional Educational Laboratory for the Carolinas and Virginia (RELVC), materials developed by teachers specifically for the school, and other commercial off-the-shelf courseware, traditional and non-traditional.

The RELVC-developed program was the Individualized Mathematics System, a fully integrated, continuous progress K-12 mathematics curriculum, that had been carefully field tested in schools throughout the Southeast. In addition to mathematics, the language arts, science, and social studies parts of the curriculum were also developed on a vertically integrated basis.

From all professional viewpoints, it was technically sound, it worked, and it was a perfectly acceptable curriculum to the Karlsruhe faculty. The project staff and teachers believed that we had made a major breakthrough in technology transfer; we had installed a research-based and fully tested curriculum in a school that had not been one of the tryout schools.

The first tryout of the new curriculum and materials was during the school year 1972-1973. Based on that tryout, certain revisions were made to accommodate problems that had developed. There was still, however, solid support from the teachers and principal. During the summer following, the final versions of the materials were reproduced and plans were made to implement the program the following year on a school-wide basis.

Comes the Villain

A new teacher, who was transferred to the school in the fall of the 1973-74 school year, decided not to participate in the integrated curriculum. That fourth grade teacher told the principal to remove her class from the program; she intended to use the books she had used the previous year. The project staff and other teachers protested this arbitrary decision to the principal and to the various central office coordinators, but to no avail.

The principal, under some strange interpretation of the concept of academic freedom, was unwilling to tell the teacher that this was a well developed program for all students in the school and insist that she participate. The principal, not one of the miracle workers described in What Works, and who had been appointed during the second year of the project, permitted that single teacher to abort a program that we had spent three years developing. He really didn't want more work for himself or the administrative heat that would have been generated by insisting that the teacher participate.

This decision illustrates precisely why the management structure is faulty. In fairness to the principal, he did not participate in the plans that would affect his professional life. The school culture of the day did not require that he accept what had been...
done by his predecessor. He could regard what went before his arrival as invalid, unimportant, trivial, or excellent, according to his own whim. The fact that the central office had invested many thousands of dollars and thousands of person-hours to develop the curriculum was of no consequence in his decision (Braun, 1979).

While we tried all avenues known to us, we could do nothing to set the project right. We finally learned that so long as individual teachers can make whimsical decisions to abort major programs, it will be impossible to make improvements in education. Teachers are unable to make system fixes.

While we recognized that this particular problem would not have happened in many well-managed schools, particularly when we had the support of the principal and the entire staff, it does reflect the critical importance of the principal to any change effort. More importantly, it highlights that fundamental flaw in school management. While thousands of dollars were spent in developing a new approach, the management structure was not sufficient to get it implemented and sustained. The same kinds of failures have occurred repeatedly in numerous single school and district programs throughout the country (see Parish, Underwood, & Eubanks, 1986-87).

The Korean Model

Morgan saw the potential to cause educational change from another perspective. He reasoned that if one could really get central government support, and the support of significant academics and ministry staff, change models could be implemented. Instead of starting at the grassroots where I was working, he started with a major needs analysis and master plan in Korea (Morgan & Chadwick, 1971). In Korea, the federal government is paramount. With money from the United States Agency for International Development, and extensive support from the Korean government, he initiated and brought to fruition a fundamental improvement in Korean education (Morgan, 1979).

Why did Morgan’s ES ’70 program (1969) fail and his Korean program succeed? Both had funding from the United States Government, both were managed by the same person. Both had supervise as many as thirty or more teachers and other staff. Adequate supervision of that many teachers by one principal is logically and empirically impossible. Flat management models do not permit the development of high-performance systems regardless of whether one is working in schools, factories, government agencies, or athletic teams. The span of supervisory control has been documented since at least the time of the Roman Empire, and probably before the Pharaohs, to be seven plus or minus two.

In Rome, where teachers were first put on the public payroll, the school model was based on one administrator-teacher and several teachers, but not thirty. Schools operated with selected students and were small enough to be easily managed by one person. That model met the needs of the Romans of the day, though it certainly does not meet their current needs any more than it does ours. Recent research suggests that there is a negative relationship between school district size and achievement (Walberg & Fowler, 1987). However, if one accepts the practical upper limit hypothesis advanced earlier, this modest relationship would likely be attributed to sampling error.

When schools in the United States were started, they, too, were small and could be comfortably managed by one principal teacher. Then, the colossal error occurred. It was assumed that one principal could manage 9 teachers, then 15 then 30, but no true management analysis was made. In those days, there was no longitudinal evaluation of the schools. They existed as they had mutated and evolved from the Roman model. They were never planned according to a set of defined requirements; they were rationalized according to what they were. The current management and operation structure of the schools has evolved from an original model that served small primitive schools adequately. The same approach is now used in an attempt to manage large schools and districts. Generalizing management structures that are perfectly suitable for small schools, with simple requirements, to
The existence of bad schools is clear evidence of system failure, not of bad principals.

Delquadri, Greenwood, Whorton, Carta, and Hall (1986), among many others, have urged widespread peer tutoring. There are numerous approaches to improve socialization, such as manipulating teacher expectations (see Thordike, 1968).

Custody

How can the custodial function be facilitated and improved? Madsen, Becker, & Thomas (1972), present a model for student management that has a very impressive history in improving discipline and performance. There are many other research-based procedures available.

These three requirements can be manipulated and traded-off to carry out the mission successfully. Success will not just occur spontaneously to meet the mission or system requirements. The entire process must be managed into place and competently operated to achieve the planned results. Operations refers to the day-by-day diligent attention that is devoted to the progress of each student, the early identification of any discrepancy between expected performance and actual performance, and the action taken to correct these discrepancies. Yes, adequate data management systems do exist that are fully capable of keeping up with thousands of students.

Back to the Drawing Board

How did aircraft designers improve the performance of piston-engine aircraft beyond their theoretical upper limit? They didn't. A totally new power concept was introduced in the 1940's, the jet engine; a fundamental advancement in technology. When the jet engine was brought into the aircraft industry all three major flight variables—speed, payload, and range—could then be completely reset and reconsidered. Now it is possible to design aircraft that will fly faster, far-
We must find a way to bring the available research and technology in the behavioral, management, and communications sciences to bear on the school problem.

We must find a way to bring the available research and technology in the behavioral, management, and communications sciences to bear on the school problem. Unless we can find a means of achieving significant change in public education—the jet engine of instruction and the improved airframe structure of management—it will not be possible to make any real improvements in the ability of the educational establishment to meet the ever-changing mission requirements, and education will not be able to support national priorities.

What Will Not Work
Continued performance of old school operations rituals will be no more effective than practicing medicine exactly like it was practiced in 1940. Trying to prop up the status quo with single variable fixes cannot increase productivity beyond the practical upper limit of the traditional school model. Fixing one school by changing principals does not improve the overall performance of a district.

The Implementation Problem
Regardless of how many new research-based programs for improvement of public education are discovered and offered, they are regularly rejected at local levels. Sometimes they are rejected because of disagreement; sometimes because of ignorance. From the standpoint of trying to make improvements, neither excuse is forgivable. If the same practices were followed in medicine, or engineering, or other major professions, there would likely be a landslide of lawsuits charging malpractice (Stewart, 1971). Failure to take prudent action is just as professionally irresponsible as taking incorrect action.

Implicit Models
When considering how one must make changes in public education, keep in mind that all of the people who manage the schools and districts, in which new programs could be implemented, have a strongly traditional concept of school operations, teaching, and administration. I call these traditional concepts an implicit model. It is implicit because one learns the proper traditional models, roles, and attitudes throughout academic life, incidental to learning the subject matter. As each of us experiences elementary school, middle school, high school, and post secondary education, we develop an internal reaction to them. These reactions are both intellectual and affective. The personal concept of the good and bad features of our personal schooling are true for us, but these impressions are not the correct data source for developing valid knowledge. It is most likely that our personal experience base is not as accurate as the more objective empirical base, but, we tend to trust our own intuition, nevertheless (see Lerner, 1985 for an elaboration of how these early experiences dominate our thoughts and behaviors).

Explicit Models
Change models (Burkman, 1987), instructional systems development (Branson & Grow, 1987), and other approaches for improving instruction (Gagne & Briggs, 1974), improved management approaches, such as differentiated staffing (English & Sharpe, 1972), and well managed peer tutoring are all explicit models, because they clearly indicate both the form and the content of the intervention in the specifications.

Teachers and administrators do not know in advance, or solely from past experience, what is to be called for in the new approach. Training is required. How many times have you heard, “Why, there is nothing new about the systems approach—good teachers have been doing that all along.” And, from Statistics 101, you also know that half of the teachers are below average; at least half of them have not been following reliable, empirically developed practices on their own, nor have they been managed to do so.

Systematically designed models and applications of research-based solutions always require approaches to instruction that differ from the traditional school model. That is not at all strange. We do not expect people to have known research outcomes prior to the time that the research was done. School administrators are not likely to have experienced any systematically designed courses or curricula. Most of them will have gone through traditional schooling in elementary, middle, high school, and college and they will consider any variation in the Implicit model of instruction or management system to be abnormal, improper, and perhaps unnatural. Without effective management, they will not be able to imagine systematic design and operations as an important method of improvement.

If one accepts the practical upper limit hypothesis, probably the most seductive and most seriously erroneous idea that surfaces from time to time, is that somehow educational system improvements can be made by improving preservice teacher training and increasing the salaries of the incumbents. Why blame the teachers? The amount of variance that could be accounted for on the basis of improved teacher-training for the current operations model is probably of the same percentage magnitude as can be obtained by the piston engine aircraft operator who waxes the wings. Wing-wax and teacher-training do not account for a large percentage improvement. Teacher-training is a typical and naïve single variable solution.

If there is no management structure in place to insure that effective and
proper treatments are applied to all students consistently, it really makes little difference what preservice training is given to teachers. When individual teachers and principals can decide whether they offer good quality instruction, no one can be sure of getting it.

Fundamental to the notion of the implicit model of instruction is the concept of the "classroom." In my view, the fact that the classroom model (one teacher, one class, one room) still operates when we have solid empirical evidence about school learning and other variables known to impact student performance, including basic classroom management techniques, is a preservation of the past and clear evidence that the system must be changed. The classroom concept is archaic and should be abandoned in favor of a school environment that has been designed to serve specific purposes set forth in the system requirements. The design should provide for individual learning, space for group processes, and should be organized according to its function, not vice versa.

Some people believe that Jefferson's insistence on decentralized control of education is responsible for the survival of the Republic. Others believe that it is a terribly high price to pay for freedom. The problem for which decentralized education was the solution has been over for one-hundred years, the real threat in this century has been from abroad. Unfortunately, the price is getting so high that we can no longer afford it.

Conclusions

1. Based on the available evidence reported in the literature, both popular and professional, there is indeed a discrepancy between the expressed needs of the society and the productivity of the schools. There is a critical requirement for substantial improvements in performance.

2. The research literature has provided numerous tools and approaches to improve existing practice in instruction, socialization, and custodial functions which are all critical to school operations.

3. The organizational and management structure is based on a model that has been obsolete for many years and which is totally inadequate to operate and control the large and complex required programs necessary for improvement.

4. The existing management, operations, and instructional models have completely matured. Their productivity function is near the attainable upper limit; little further improvement can be made without fundamental redesign.

5. All other major operating sectors in the society have had to incorporate technology to meet the increasing demands for service and products. Many of these sectors have gone through several generations of technology to meet the nation's needs (manufacturing, communications, services), while the schools persist in adhering to an archaic model.

6. Recommendations provided by national commissions and conventional fixes proposed by members of the establishment have uniformly urged putting more effort into the status quo. Suggestions such as increasing standards for teachers and students, paying incumbents more money, increasing per pupil expenditures, and lengthening school days and years, will add to costs but cannot add substantially to benefits.

7. It is essential that the entire establishment go through a fundamental redesign to define mission and system requirements, then develop empirically based methodologies to meet those requirements.

8. As long as there is no externally imposed requirement for change, school administrations will not change. There is now no known way to cause the necessary and sufficient changes that would make a significant difference.

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References


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Prospects for Instructional Systems Design in the Public Schools

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Instructional designers routinely complain about school people's lack of interest in their craft. And many designers are convinced that most problems in schools would evaporate if instructional systems design (ISD) was used to determine teaching methods and what is taught. But exactly what would schools have to do to satisfy designers? How likely is it that schools will respond to the call for ISD and if they do, will it be the panacea that is claimed? These are the questions that I will explore here.

It is highly unlikely that the schools will ever use ISD as it is defined by designers, but that it is perfectly reasonable to expect some schools to use some components of ISD under some circumstances. Piecemeal use of ISD is probably appropriate in view of the way that schools are organized and what the public expects of them.

The paper has four sections. The first describes what designers mean when they say that schools should use ISD. The second contrasts what schools are doing now with what designers say they should be doing. Part three describes the way that schools presently make decisions and the likelihood that the changes favored by designers can and will be implemented. In the final section is a summary of what can and cannot be done in terms of implementing ISD in the schools with implications for designers and the schools.

What Do Instructional Designers Want?

What do designers want when they say that the schools should use ISD? Since more than sixty systems models have been proposed (Andrews and Goodson, 1980), it is probably correct to say that many of the critics would remain unsatisfied no matter what the schools were to do. But, if we ignore the details of the intricate procedures involved in the models, there is a good deal of common ground among them, and, therefore, some hope for setting a target that most designers would at least applaud if not approve. This is especially true if the target is subdivided into two levels, minimum expectations, and expectations that go beyond the minimum.

Minimum Expectations—Effective Instruction

The basic tenet of every systems model is that it is necessary to spell out in advance precisely what targeted students are expected to be able to do after they have been instructed. Although the procedures for doing it vary widely, all models also require that learning activities that teach students to perform as specified be identified, empirically documented to work, and then used correctly and consistently. Normally the aim is to use activities that not only work but that can also be completed quickly and cost effectively. Some of the models apply to situations like large school systems in which the same instruction is often repeated many times. They propose that the documented learning activities be incorporated into instructional materials which are further empirically verified by field testing and revision, if necessary, then disseminated and used repeatedly and with fidelity.

To meet these fundamental requirements for ISD school people would have to spell out behavioral objectives that explicitly describe what each student should be able to do as a result of the instruction in each lesson, course, grade or other unit of instruction. They would also have to empirically verify that their instructional procedures really do teach students to perform as specified and do so efficiently. Finally, those in the schools would have to see to it that the verified instructional procedures were used properly by teachers, and document that the targeted students really learn to perform as specified. Getting the instructional procedures used properly would probably require developing and verifying appropriate instructional materials and equipping and training teachers in their use.

Beyond the Minimum—Justifying Content

Many ISD models view instruction more broadly as a means to an end. These models require that the targeted learners must be able to perform useful functions after instruction and that instructional programs be designed, implemented, and evaluated in terms of how well their graduates actually perform in the real world. These broader models suggest that instructional designers begin with a needs assessment to determine gaps between the way things are and the way that they should be. They specify that the objectives for any instructional program be justified in terms of whether learners who have met them close the targeted gaps. Finally, after the instructional program has been developed and is working as it should in terms of reaching the pre-specified skills, these models propose that the program should be further documented in terms of whether the learners actually can and do close the gaps that were targeted. (For an example of such a model, see Kaufman, 1983.)

School people would have to do more to meet this broader concept of ISD. First, they would have to identify and be very explicit about their needs, their goals, and how students graduating from a curriculum or course would be expected to use their skills and knowledge (i.e., 90% of those completing a high school physics course would enter and pass the introductory college physics course for physics majors, 100% of elementary school graduates would be able to read and understand the articles on health in Time...
Specified goals would have to be valid in terms of the types of students involved and realistic in terms of the capacities of the schools involved (i.e., rigorous college prep physics instruction would be inappropriate for noncollege bound students and schools with no physics laboratory).

Once the goals were agreed upon, they would have to be analyzed to determine the specific skills that graduates would need to acquire in order to attain them. In turn, the skills required would determine the behavioral objectives toward which the instruction would be directed and the instructional procedures that would be used. After development of the procedures, it would have to be shown that the learners in the instructional program actually achieve the specified objectives. Finally, the program would have to be further evaluated in terms of a follow-up study of graduates to determine if the goals were met (i.e., find out if they actually do pass physics and are really able to read *Time Magazine*). If the specified goals are not met initially, the program would be revised, as needed, until they are.

**What are the Schools Doing?**

What are schools actually doing? How large is the gap between the way things are in schools and the way they would have to be to satisfy ISD requirements?

**Elementary School Goals**

There is quite good agreement among school people across the country that the primary goal of elementary schools is to teach learners to read, write and do certain kinds of arithmetic computations. And, although this goal is not often spelled out in terms of why these basic skills are needed, it does tend to unify the instructional program. Virtually every elementary teacher in the country focuses on getting students to master these three basic skills.

Beyond teaching the three basic skills, elementary school goals tend to be both fuzzy and inconsistent from school system to school system. Most elementary school teachers teach other subjects like health, art, music and science. But, this instruction is usually low priority when compared with teaching the basic skills, and often done with no specific purposes in mind. From school to school there tends to be little agreement about what else elementary students must learn and this leads to tremendous variation in what they are taught (Bartholomew, 1980).

**Goals in the Secondary School**

At the middle and high school level there tends to be general agreement that certain "core subjects" should be taught at each grade level (i.e., the vast majority of schools teach biology in the tenth grade, chemistry in the eleventh grade, and physics in the twelfth grade). But little real thought is normally given to how the students are expected to use what they learn in those courses. Consequently, instruction in the core subjects is not goal directed in the ISD sense. Instead, it is assumed that the importance of subjects like science, mathematics, English and social studies is self evident and so most teachers concentrate on "covering the subject". For college bound students this goal, by default, of teaching students the elements of key academic disciplines, is probably defensible because colleges tend to emphasize the same thing. But, for noncollege bound students, the fit is difficult to defend (Beame, 1975).

In addition to the core subjects, middle and high schools offer a vast array of elective courses. Some of these simply extend the coverage of the disciplines by treating advanced topics (i.e., advanced chemistry) or disciplines that fall outside the traditional core (i.e., geology). But, some others are qualitatively different. Often, these other courses aim to teach either practical skills (i.e., home economics, vocational education) or other topics that someone deems important (i.e., sex education, environmental education, Americanism versus communism). Courses such as these are obviously directed toward nonacademic goals but often these are not spelled out or are defined in very vague terms.

**Instructional Objectives**

Today Instructional objectives are being widely used by school people. Objectives are an integral part of all of the state-wide student and teacher competency testing programs that have been instituted. It is standard practice in many states and school districts to include objectives in syllabi and curriculum guides that are developed locally. Even textbook publishers have responded to requests from states and school districts and have added objectives to their products.

But, the recent popularity of objectives does not mean that real ISD in the schools is just around the corner. Many of the objectives found in textbooks, syllabi, and curriculum guides do not spell out what the student is expected to do after instruction. Instead they describe content that students should "know" or "understand" and so represent little more than a content outline in slightly different form. This is especially so in the case of materials for most secondary school subjects where verbal instruction often predominates and the goal tends to be to "cover" academic disciplines. It is less true for secondary school subjects that have more of a skills base (i.e., vocational education, physical science, mathematics) and for basic skills like reading and arithmetic at the elementary school level.

Often, school instructional objectives have other shortcomings when viewed from an ISD perspective. Many objectives are stated so broadly as to be I argue that it is highly unlikely that the schools will ever use ISD as it is defined by designers.
Beyond teaching the three basic skills, elementary school goals tend to be both fuzzy and inconsistent from school system to school system.

Learning Activities and Instructional Materials

For most secondary school teachers, "instructional materials" means a textbook that spells out content to be learned by students. They also may have a teachers guide to the textbook that suggests points to be emphasized and perhaps ways to teach the various topics. And they may have been given a syllabus for their course that had been prepared by their local school system. It is the teachers' task to go from there and decide what and how to teach to five classes of 30 students per day.

Studies suggest that most secondary teachers are highly influenced by their textbook (Solomon, 1978). In most classes learning activities focus on reading the textbook and conducting lectures and class discussions on topics that are included in the textbook. Teachers of a few more skill oriented subjects like art, shop, home economics, and science often include hands-on learning activities. Audio-visual products are occasionally used by a few teachers and computer based instruction is finding its way into a few classrooms. But it is clear that textbooks are the source of most of the instruction (Solomon, 1978).

Elementary teachers also tend to make heavy use of textbooks but many of them elect to supplement texts with other materials. Elementary teachers lecture infrequently, but often conduct discussions with their students. And elementary students often engage in hands-on activities and drill and practice on skills. Many elementary textbooks contain directions for student activities as well as descriptive material. Typically, the textbooks for a particular subject are organized into a series with one book per grade level. And, the textbooks in a series are usually accompanied by master topic scope and sequence charts, and by comprehensive teacher guides, that give detailed suggestions to teachers as to what to do at each grade level. Although few teachers are required to follow these suggestions, many tend to do so.

Most school textbooks are outlined and drafted by author teams, consisting of subject matter experts and experienced teachers who are brought together by a commercial publisher. The content of the book is usually based on subjective judgments made by the members of the team. They also may consider the criteria that large states and school districts use in selecting textbooks. The publisher edits the authors drafts, for clarity and marketability. Next the publisher designs and manufactures the final product and then markets it to schools. Editorial control is normally retained by the publisher, but the authors of a few large federally funded projects have retained editorial control over their products that were published by commercial publishers. Formative evaluation of commercial textbooks is usually limited to collecting subjective judgments from potential users.

It is quite rare for individual teachers to select their own textbooks. In fact, one study found that over half of the public school teachers surveyed played no role at all in choosing textbooks that they were required to use (Solomon, 1978).

In slightly less than half of the states, textbooks are selected on a state-wide basis. The usual process is for a committee composed of lay citizens, and educators to pick books to be recommended to a commissioner or Board of Education that makes the final selection. In some cases, local school districts have a choice among several adopted books, and sometimes they may choose books that have not been adopted (this usually entails a financial penalty). In other states, textbooks are usually selected by the local school boards upon recommendation of a committee of local citizens and/or teachers (Warming, 1982).
Criteria for selecting textbooks varies among states and districts but often include appropriateness of content, durability, readability, and graphic design. It is rare for adoption committees to require data relating to effectiveness but a few states are experimenting with a requirement that publishers use "learner verification" (this requires some form of testing with students). Special interest groups and citizens frequently try to influence the selection process in an effort to purge certain topics from the curriculum or to get certain topics included (Fenkl, 1979).

Summing Up

Clearly school practice does not often meet the minimum requirements for ISD that were spelled out earlier. Objectives for instruction are frequently unstated, are not behavioral, or are written in ways that make measurement difficult. Learning activities and instructional materials (textbooks) are usually designed and selected on the basis of intuitive judgment rather than to further the achievement of articulated behavioral objectives. And, it is rare for schools or publishers to use field testing and revision cycles to verify the effectiveness or efficiency of learning activities or instructional materials in meeting objectives.

Goals for school instructional programs often remain unstated or are stated in terms of things that students should learn rather than in terms of the purposes of learning. Schools rarely conduct follow-up studies of their graduates' performance in the real world as a basis for determining if instructional programs are achieving their goals.

The Public School Setting

In assessing the prospects for ISD in the schools, it is critical to realize that there is not a national school system in the United States. The main way the federal government impacts the schools is by enforcing provisions of the U.S. Constitution (i.e., prayer in schools, desegregation) and by providing limited funding for targeted programs (i.e., vocational schools, special education). Although these kinds of actions have been fairly intrusive in recent years (Boyd, 1978), it is probably reasonable to say that the federal government still delegates to each of the fifty States most of the responsibility for generating and allocating resources for its schools and most of the power to decide what will be taught in them (Moser, 1977). This delegation of authority means that it would take at least fifty independent decisions to make nation-wide changes in the ways schools operate.

The State Level

Until fairly recently, the states have tended to further delegate most of the authority for curriculum and instructional practice to the individual school districts within their boundaries. Also, local school districts have been responsible for generating most of their own resources for schools, mostly through local property taxes. This has meant that each of the roughly 16,000 school districts in the country was more or less free to decide for itself how much money would be spent on schools and for what. The districts also had most of the power to decide what would be taught and how.

The individual states have traditionally retained authority in a few areas that relate to ISD. In every state, teachers must be certified by the state before being hired by a local district (Woellner, 1979). In about half of the states, textbooks are selected on a state-wide basis rather than locally (Bowler, 1978).

In recent years, most states have taken on more responsibility for funding schools and have expanded their authority over curriculum. Introduction of state-wide teacher and student minimum competency testing programs is the most widespread example of this kind of expansion. In many states, these adjustments have been profound but their impact on instructional procedures has been minor. In those states, the local districts retain the balance of power. But, a few states have adopted comprehensive school improvement programs that integrate into a single unified strategy a combination of fiscal, organizational, staff development, curriculum enhancement, and student assessment elements (Odden and Dougherty, 1982). In these states, the balance of policy making power regarding instruction, has shifted substantially to the state.

In assessing the role of the states in determining policy and practice in areas of interest to instructional de-

The decentralization of decision-making present in the United States, means that it would take at least fifty independent decisions to make nation-wide changes in the ways schools operate.
then, it follows that putting ISD into "the schools" would require that someone in the individual districts make the relevant policy decisions and that these be followed up with appropriate adjustments in local practice. But, who in local districts decides what will be taught and how the teaching will be done? And, who has the authority and capacity to really change what happens? Put another way, who is it that designers must influence if they really want to get ISD installed? And, what is the likelihood of getting a favorable decision followed by vigorous affirmative action? Let's look at these matters.

Figure 1 diagrams a typical structure for determining instructional policy and practice in a middle sized U. S. school district. The general structure is fundamentally the same for larger districts but with increased staff at the assistant superintendent and supervisory levels. In smaller systems, the assistant superintendent and supervisory levels are either eliminated or there are fewer people with more general responsibilities.

Three aspects of Figure 1 are of special interest to designers interested in getting ISD into the schools. First, overall policy for the instructional program is set by a board of lay citizens who are elected by the citizens of the school district and who are subject to pressures from many directions. This means that much decision making in public schools is, fundamentally, a political matter that may or may not be rational.

The second striking feature of Figure 1 is the strategic role played by teachers. The teachers are the key members of the curriculum committee who often determine the syllabus and the instructional materials that will be used in the district (the school board approval usually required is often "rubber stamp"). More importantly, the teacher, after receiving the syllabus and materials, decides what is actually done in the classroom. While it is true that the persons listed on the upper part of Figure 1 often set the instructional policy for a district, instructional practice is mostly determined by the teacher after he or she closes the classroom door.

The final important feature of Figure 1 is the lack of influence by outside experts. With minor exceptions, local policy and practice are determined by local people. And, it should be noted by designers, that few people in local school districts have any formal training in ISD.

Clearly, the task of getting ISD into widespread use in the schools is complex and difficult. To get the necessary policy changes made, designers would have to convince many state departments of education and local school boards that the ISD cause is right. And, to influence practice, it would be necessary to convince large numbers of individual teachers of the advantages of ISD and to influence them to make appropriate changes. Changing the schools would also require that other relevant agencies, like textbook publishers and teacher training institutions, adjust their procedures. Since designers presently have very little credibility in school circles, this is a tall order indeed!

Implications

Given the diversity in schools around the country and the decentralized decisionmaking, designers are not likely to be successful in any effort to implement ISD in schools from coast to coast. But, this should come as no surprise. The difficulty of innovating in schools is well known and very well documented (Berman & McLaughlin, 1974, 1977, 1978).

It could be argued that one way to progress with ISD would be to press for massive changes in the way schools are governed, operated, and organized. Appealing as this approach may seem, it is not likely to bear fruit. The major thorn in the side of innovators is the diversity created by state and local control of education. That control is rooted in the United States Constitution and is entrenched by the strongest kind of political support.

A more realistic way to proceed would be to try and reduce the complexity of the existing system. One way of doing this is to focus at the local
The most likely means of getting ISD utilized in the classroom might include focusing at the local school system level, concentrating on a single subject, or focusing on school systems that are favorably disposed to ISD.

third, is to focus initially on school systems that are favorably disposed to ISD and on subjects that are skill-oriented and, therefore, relatively easy for designers to attack (i.e., vocational education). Tactics like these are unlikely to change the world but they do increase the chances for small victories (Benathy, 1969).

Simply reducing the complexity of the target will help but it will not put ISD into the schools. It is also critical that ISD projects be carried out with implementation in mind. Constraints within the receiving schools must be identified and either eliminated or accounted for. ISD products must be perceived favorably by those who must use them. It is critical that the right kind of support be given to teachers and others who must actually change what they are doing. Morgan (1987), and Burkman (1987), have recently published comprehensive models for planning and executing ISD projects to maximize the chances for successful implementation.

A Last Word

In assessing the prospects for ISD in the schools, it is important to remember that there are some limiting factors that simply can’t be overcome at the moment. The truth is that instructional designers do not really know how to teach mathematics to low ability, mathematics-shy youngsters. And, we do not know how to teach a lot of other things as well. Until and unless some breakthroughs are made in instructional procedures, the possibilities for improving schools, through ISD, are very definitely limited, even if the schools were to become highly receptive.

References


Instructional Design Skills for Classroom Teachers

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Abstract. This JID issue focuses on instructional design and the public schools. The present paper considers a curious paradox: Despite expressions of concern about the quality of instruction offered in schools, and despite the existence of considerable research and theory in the instructional design literature which might be of value for teachers, there seems to be a "gap" between the teacher education literature and the instructional design literature. Two major purposes of this paper are: (a) to consider the extent to which instructional design skills are relevant for teachers; and (b) to explore prospects and potential problems in helping teachers to learn to use instructional design approaches and techniques. The paper summarizes ideas derived from the author's research and teaching experiences with these topics during the past quarter century.

Overview and Background Information

A major purpose of this paper is to stimulate discussion about topics that have been recognized to some degree for at least a quarter of a century but which need to be addressed more extensively and constructively. More specifically, this paper explores possibilities that the instructional design literature may contribute to and benefit from the teaching practices described in the literature on classroom instruction, and explores prospects and potential problems in helping teachers to learn and to use instructional design approaches and techniques. Given the focus of this issue of JID, the present paper emphasizes implications for teachers rather than for trainers.

Some questions and concerns reported by Reiser (1986) illustrate the genesis of work discussed in the present paper—even though Reiser explicitly focused on instructional technology while the present JID issue focuses on instructional design. Reiser summarized comments by faculty members from a dozen academic programs who considered (along with other topics)—the skills and knowledge taught, the influence of the job market on academic programs, and the potential contributions to teacher training. These faculty members noted that very few of their instructional technology graduates take positions in public schools, and they suggested that efforts should be made to have a greater influence on preservice and inservice teacher preparation programs. While acknowledging that some authors "have stated that the skills needed by instructional technologists in those two settings may be quite similar" (p. 21), Reiser then asked: "Have the various graduate programs examined this issue? If so, what have they found? And how have they adapted their curricula in light of these findings?" (p. 21).

Similar concerns and questions have prompted the author's continuing explorations concerning classroom teachers and instructional design skills. The term "instructional design" has been used in various ways (e.g., Clark & Angert, 1981; Davis & Silvernail, 1981; Goodlad, 1983; Gropper, 1977; Jennings, 1987; Tyler, 1983; Wackman, 1980; Wildman, 1980). In the present paper, "instructional design" refers to the wide range of skills and activities involved in the planning, selection or preparation, presentation, evaluation, and modification of instruction. This definition overlaps with definitions of "curriculum design." But whereas curriculum design focuses on intended learning, instructional design emphasizes means for attaining curricular goals.

Need to Improve Instructional Effectiveness

During the past several years there have been a number of reports (e.g., Boyer, 1983; Buttram, 1987; Gardner, 1983), in-classroom studies (e.g., Goodlad, 1983), and professional association efforts (e.g., NEA, 1982; "Teacher Education", 1980) that collectively indicate the need for improving the quality of instruction in our nation's schools. Many professional journals contain articles on effective schools and/or on effective teachers (the former area focusing on leadership and organizational aspects, the latter more explicitly addressing instruction). Jennings (1987) suggests that the business community increasingly supports increased federal funding for education due to one fundamental reason: "The involvement of the federal government is now seen as an essential component of a comprehensive effort to improve American education in order to meet foreign economic competition" (p. 107). In a report that seems destined to provoke controversy, Walberg and Fowler (1987) question the general belief that student learning is linked to school expenditures. They proposed that "it is the educational policies of districts and the instructional practices in classrooms rather than expenditures that consistently determine achievement and efficiency" (p. 13). Whether one agrees or disagrees with their conclusions about per-student expenditures, it is noteworthy that their extensive study on student achievement led them back to concerns about instructional practices.

Thus, one might reasonably assume that teachers and teacher educators would attempt to gain ideas from almost any body of literature which could help teachers to improve their capabilities to design and provide instruction. It would also seem plausible that re-
The education literature reveals comparatively few attempts to relate instructional design theory and methods to teaching practices.

Relevance of Instructional Design Skills

Why are there comparatively few attempts to relate instructional design theory and methods to public school teaching practices? A number of possible explanations can be identified by examining available literature resources carefully. A few ideas will be offered and discussed here.

Are Teachers Unaware of Instructional Design Literature?

Two bodies of literature that share interests in the improvement of instruction can be identified, respectively, as the “teacher education literature” and the “instructional design literature.” One problem is that there are comparatively few cross-references about instructional design between these two bodies of literature. When there are cross-references they typically are limited to either Gagne’s approach (cf. Aronson & Briggs, 1983; Joyce & Weil, 1980) or some form of “mastery learning” (cf. Block, 1971; Joyce & Weil, 1980).

More typically, authors tend to cite sources only within their respective literature set. For example, whereas Rosenshine (1983) acknowledged the importance of “instructional design” as a matter of concern for teachers, his research citations consisted of two studies on elementary reading instruction, and he did not mention the major theories and models from the instructional design literature. A somewhat similar state has existed in reviews of the instructional design literature. For example, Andrews and Goodson’s (1980) reviews of instructional design models included practically no references to the models contained in the Joyce and Weil (1980) volume. Despite the fact that some of the instructional design models described in recent reviews of instructional psychology (cf. Gagne & Dick, 1983; Pintrich, Cross, Kozma, & McKeachie, 1986; Reigeluth, 1983) share common features with models in the Joyce and Weil (1980) volume, there is little or no cross-referencing to the literature on which the Models of Teaching (Second Edition) is based.

Such gaps continue to exist even though some authors suggest that “instructional psychology” may have become almost a synonym for “educational psychology” (cf. Pintrich, Cross, Kozma, & McKeachie, 1986). As a result, many teachers are not well informed about the range of publications or the topics addressed in the instructional design literature.

Perceived Problems in Identifying “Instructional Design Skills”

Another contributing factor involves problems that are encountered when identifying teaching skills in general and instructional design skills in particular. Many authorities in education prefer to think about the “art of teaching” in quite broad terms instead of identifying more specific knowledge, skills, and activities. Some even per-
by proposing that, since there are no teaching practices which are universally accepted as being consistently superior to others, all teaching methods should be perceived as "working" in one way or another.

Despite such apparent pessimism, other authors operate with the working assumption that there are some approaches to instruction which can be considered effective. This does not mean that any given approach is necessarily superior to all others, nor that there is any one approach which will necessarily be appropriate for all situations. Exploration of this possibility with regard to instructional design skills is based on the further assumptions that: (a) there can be identified one or more knowledge bases concerning instructional design, and (b) that such information is relevant to K-12 classroom teachers.

Importance of Instructional Design Skills for K-12 Classroom Teachers

In what ways might K-12 teachers be involved with instructional design, as defined here? There is more than a little controversy about this! For example, some who concede that "teachers do make a difference" take 1983; Clark & Yinger, 1980) cite decisions which teachers make about lesson plans, interactive teaching, modifications required during teaching, and other ways in which individual classroom teachers must routinely plan, evaluate and modify instruction. Those who contend that teachers are, of necessity, at least "part time" instructional designers partly base their views on routine observations that practically all curricular and instructional materials must be modified in some way to fit a given classroom situation, particular students, and one's own approach to teaching. Thus, whether formally recognized as such or not, teachers routinely design as well as deliver instruction.

For example, Tyler commented: "Teachers...are not workers with simple duties, easily defined and easily monitored. Effective changes in schooling require the participation of teachers in defining goals, in designing curricula, in planning instructional procedures, and in developing the necessary understanding, skills, and attitudes to perform the roles they have thus helped to define" (Tyler, 1983 pp. 463-464).

What kinds of instructional design skills might reasonably be expected of classroom teachers? A useful precedent can be found with regard to test construction and use. Psychometric specialists obviously have greater degrees of understanding and use of test theory, but classroom teachers do need at least fundamental test selection and test construction skills to function effectively. Similarly, the classroom teacher need not have the high level of expertise we might expect from full-time professional instructional designers but teachers do need at least fundamental instructional design strategies to plan, evaluate and modify instruction as a regular and continuing part of their classroom work.

Instructional Design Skills and Teacher Preparation Programs

Are instructional design skills taught in teacher preparation programs? There does not seem to be a clear-cut answer to this simple question, as can be seen when one surveys teacher educators or reviews books used in teacher preparation programs.

Davis and Silverman conducted two studies to detect the extent to which teacher educators consider instructional design skills to be an important part of their program. In the first study (1981), they prepared a list of curriculum design and instructional design skills and checked the extent to which these skills were included in self-reports of a sample of pre-service teacher education programs in Pennsylvania. The authors concluded that curriculum and instructional design skills are a recognized part of teacher pre-service education, but "there is little consistency across programs in the kinds of skills included in or the levels of required performance for those that were identified" (p.13). Their second study (Davis & Silverman, 1983), was conducted with a national sample of recognized curriculum experts (all 135 members of the Curriculum Committee, Association for Supervision and Curriculum Development). Based on a 70% response rate, Davis and Silverman concluded that the curriculum design and instructional design skills are viewed as essential parts of teacher preparation programs but that not all of these skills are actually represented in the curricula of such programs. These nationally dispersed respondents seemed to confirm the self-reports from the Pennsylvania teacher preparation programs.

One indication of how teacher preparation programs address instructional design skills is the extent to which such topics are covered in textbooks commonly used by teacher-candidates. Teacher-candidates are typically required to take an introductory educational psychology course. Thus, in a study (Snelbecker & Stepansky, 1985) not previously published, we reviewed the extent to which instruc-

Whether formally recognized or not, teachers routinely design as well as deliver instruction.
tional design skills and knowledge are addressed in educational psychology textbooks that had been used by teachers now in schools.

We constructed a list of instructional design skills, following a review of many sources. An initial list was based partly on the Florida Catalog of Teacher Competencies: 1973 (Florida Dept. of Education, 1973). This particular source was selected because it had been based on a broad scope of nationally represented literature. Only those teacher competencies related to instruction (directly or indirectly) were selected. This initial list was then modified in light of a careful analysis of many other sources, including—earlier analyses of learning/instruction concepts and techniques (Snelbecker, 1974/1985), the Davis and Silvernail (1981 & 1983) findings, reviews of the instructional/curriculum design literature (e.g., Anderson & Jones, 1981; Andrews & Goodson, 1980; Braden, 1981; Braden & Sachs, 1983; Haertel, Walberg, & Weinstein, 1983). The resulting seven major categories and sixty instructional design skills are listed as the vertical headings at the left margin of Table 1. A representative set of introductory educational psychol-

analysis indicates which of these instructional design skills was addressed in each of the educational psychology textbooks.

As can be seen from Table 1, most of the skills have been addressed by many of these introductory educational psychology textbooks. There is some variation both in the number of skills and in the patterns of skills addressed. It seems reasonable to conclude that many, if not all, teacher-candidates do have some preparation concerning instructional design skills. How much preparation and how adequately such preparation may be for them to use instructional design skills competently are matters that can not be addressed by this examination of the literature. More likely, sound information about such matters would come only from direct observations in classrooms, when the teacher-candidates have the "real" tests of their professional preparation. From this information and literature discussed above, it seems fair to state that teacher-candidates using textbooks like these should have had at least some exposure to information about instructional design skills in the course of their teacher preparation programs.

For example, Nunan (1983) took the position that the classroom teacher must be competent in instructional design and must assert control over this area. A major reason for maintaining such control, according to Nunan, is that instructional design is a central aspect of teaching. Nunan contends that the teacher must have the skills to maintain control concerning instructional design if teaching is to remain a creative, adaptive and vital undertaking.

With regard to teachers and instructional design practices, unfortunately, the available information does not seem especially encouraging. Some of the research on teachers' decision-making processes (e.g., Shavelson, 1983) suggests that teachers typically do not plan and provide instruction in accordance with procedures taught in teacher preparation programs. In contrast with most other areas, Vocational Education constitutes one major aspect of K-12 classrooms in which considerable emphasis has been placed on the use of design and development skills by individual classroom teachers. This is at least partly due to the interest in competency-based education that has been evident during the past two decades, at the teacher education level as well as in public school classrooms. Otherwise, teacher candidates are more intuitive and general in their approach to instruction. Given the findings that many teacher-educators who view instructional design skills as important have questions about how consistently and adequately pre-service programs cover these skills (cf. Davis & Silvernail, 1981 & 1983), it seems important to try to identify means whereby teacher candidates can learn how to use instructional design skills in their classrooms.

Perhaps some perspective is needed here concerning difficulties in getting teachers to use instructional design skills and information: Problems concerning use of instructional design skills and information not only occur in education; parallel problems exist in getting trainers to use instructional design skills and knowledge in business and industry training contexts. In

The contemporary uses of microcomputers in education could lead to greatly increased interest in instructional design theory, techniques, and skills.
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<td>9 Identify learning hierarchies</td>
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<td>14 Prepare materials/activities</td>
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<td>16 Plan to group students</td>
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<td>17 Plan individual experiences</td>
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<td>18 Write specific lesson plans</td>
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<td>19 Predict effectiveness</td>
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<td>C. CONDUCT/IMPLEMENT INSTRUCTION</td>
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<td>2 Establish rapport</td>
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<td>3 Provide direction</td>
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<td>4 Gain/maintain attention</td>
<td>X</td>
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<td>5 Present info/explanations</td>
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<td>7 Facilitate other opportunities</td>
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<td>9 Critical/creative thinking</td>
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<td>10 Facilitate retention, retrieval</td>
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<td>12 Arrange feedback and motivation</td>
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<td>13 Conduct group activities</td>
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<td>14 Arrange individualized activities</td>
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<td>15 Use audiovisual, other resources</td>
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<td>16 Modify teaching strategies</td>
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<td>1 Arrange physical environment</td>
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<td>2 Establish, maintain routines</td>
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<td>3 Supervise aides, tutors</td>
<td>X</td>
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<td>4 Maintain records/resources</td>
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<td>E. COMMUNICATE WITH OTHERS</td>
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<td>1 Communicate with students</td>
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<td>2 Confer with parents</td>
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<td>X</td>
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<td>3 Confer with other educators</td>
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<td>4 Instruct others in school prog.</td>
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<td>5 Establish prof. relationships</td>
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<td>F. PERSONAL/PROFESSIONAL SKILLS</td>
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<td>1 Teaching skills/leadership</td>
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<td>2 Personal/interpersonal skills</td>
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<td>G. STUDENTS' PERSONAL QUALITIES</td>
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<tr>
<td>1 Learning-to-learn skills</td>
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<td>X</td>
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<td>2 Social interaction skills</td>
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<td>3 Attitudes, etc.</td>
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fact, problems involved in relating knowledge and technology to practice occur so universally—in applications of physical science and biological science information, as well as in uses of social science information—that a substantial body of literature can be found under “technology transfer,” “knowledge use,” and similar titles. Currently there is considerable interest both in government and in private sectors because our nation’s productivity can be helped or hindered by the extent of success in applying accumulating information and technology.

Rossett (1987) wrote an interesting article with a somewhat humorous title, “What your Professor never told you about the mundane practice of instructional design.” Her article offers some information and ideas about differences between instructional design as described in graduate courses vs. what actually happens in education and training contexts. Basing her comments on her own professional experiences along with results from a survey conducted by Training magazine (published annually in its October issue), she points to an “annoying gap between coursework and the concerns and practices of trainers and educators.” She asks: “What can we learn from the discrepancy between what we are talking about in the academy and what happens in the field?” (p. 13). She suggests that graduate educators should not be too hasty in responding to the needs of the field. “We must do more than respond to the field. We must define it through the compelling nature of the research and development that we do and model it through the superlative quality of our graduates” (p. 13).

Without questioning the merits of Rossett’s suggestions, my own experiences over the past quarter century cause me to question whether having good theory and well prepared graduates will be enough. Since the mid-1960s I’ve provided workshops, courses and consultation to instructors and administrators in training and education. I’ve also conducted various studies relevant to these areas. Intended application areas have been quite diverse, including—K-12 classrooms, higher education, instruction in self-defense techniques, continuing professional education for dentists and other health professionals, training computer programmers, and helping people to use computers in their work. Across these areas have emerged “common” problems whenever the respective participants have tried to apply the instructional design skills and techniques that they have learned. I’ll list some observations and a few tentative suggestions about addressing these “technology transfer” problems.

• “I already know that.” Instructors have some difficulty in recognizing how instructional design information and techniques actually differ from their present practices.

• “That’s okay in theory but it’s not relevant to what I do.” They especially need assistance in recognizing how the information and techniques can be made functionally relevant for their day-to-day activities.

• “I know my subject matter; I don’t need any help in teaching/training.” Distinctions must be made between curricular vs. instructional issues; then, assistance is needed for integrating content and methods to provide meaningful learning experiences for their students/trainees.

• “I already know those theories.” It is not unusual for them to overestimate their knowledge about instructional design theory and techniques. They tend to assume that general knowledge about a theory or approach will be adequate to develop good instructional practices.

• “If I use that theory I’ll have to change my teaching methods completely.” Two problems are involved here. First, there is an assumption that one has to reject or accept a theory in its entirety. Second, they need assistance in recognizing how some aspects of a theory may be adopted or adapted for their setting, no matter what their views may be about the theory’s major tenets.

• “That can’t be useful for me. It was developed in another context.” This is often identified as a “NIIH” (Not Invented Here) objection. Educators sometimes question the value of a technique merely because it was developed in another context. They need help in judging a technique on its merits rather than on its apparent source. Stepansky’s (1968) doctoral dissertation investigated the influence of “source” on teachers’ judgments about utility. Preliminary analyses suggest that functionally relevant techniques tend to be judged on their merits.

• “I can’t afford the time to plan/design instruction.” Educators and trainers have the perception that planning or designing instruction is “lost time” or “down time.” They and their supervisors need to recognize that time invested in planning can reduce total time required to provide instruction. However, they also need assistance in knowing how to use planning time wisely.

• “Instructional design is okay if you’re using AV or computers but it’s not really relevant to other means for providing instruction.” Help is needed in recognizing how instructional design information and techniques can be practically useful for all forms of instruction.

Conclusion or Commencement

One can conclude that there can be a positive, reciprocal relationship between education and training at least with regard to instructional design. Thus, it is likely that effective teachers may opt for various approaches to instructional design, but it is not likely that a teacher will be effective without some set of skills in this area.

But, for other aspects of the topic considered in this paper, a “commencement” rather than a “conclusion” is in order. We need more information and guidelines to aid teachers in using instructional design skills. We must especially commence further exploration of ways in which preservice and continuing education programs can help teachers to learn and to use instructional design skills and knowledge.

One other matter should be addressed, namely the probability of increased future interest in instructional design theory, techniques, and skills. Although the literature reviewed for the present report indicates
considerable current interest, even greater emphasis may be expected mainly as a result of increased uses of microcomputers in training and education.

It has often been noted that much of the support for sophisticated developments in psychometric theory and more practically oriented testing skills can be attributed to certain events near the end of the first quarter of this century. More specifically, it has been acknowledged that advancements in test development and use (initially in psychometric theory and techniques, later in classroom teachers' uses of tests) at least partly were stimulated by World War I and the need at that time to evaluate large groups of men for possible military service. Of course, there were other important influences, and not all problems were resolved. However, the events of that period did lead to considerable efforts to devise sound testing procedures.

Somewhat similarly, although the magnitude of the effect remains to be assessed, the contemporary uses of microcomputers in education could lead to greatly increased interest in instructional design theory, techniques and skills. In the 1960s there was considerable interest in instructional design (in conjunction with teaching machines and programmed instruction), but then interest diminished or was latent during most of the 1970s. In the 1980s, however, there is growing interest in ways in which instructional design procedures may be helpful both in producing and in selecting computer-based educational materials.

This concern about design is emerging as educators recognize that the value of what we "get out of computers" will depend to a great extent on the quality of the instructional design and curricular content prepared for computer-based education (or "put into computers"—cf. Snellbecker & Stepaneky, 1983). It is conceivable that, if teachers do use instructional design skills in conjunction with computer-based education, they may demonstrate a greater tendency to use instructional design skills for planning, providing, and modifying other classroom activities. Thus, while there is evidence that many teachers now are developing some proficiency with instructional design skills, there may be even greater interest in these skills in the future. We need better ways for helping teachers to learn and to use instructional design skills.

Footnotes

1. Only authors and years of publication are noted here to conserve space and because full details can be obtained from various sources, including Books in Print.

Author Note. The author acknowledges and appreciates the assistance of Ms. Debra Stapeanly for conducting literature analyses and Ms. Wen Ru Niu for analyzing occurrences of "instructional design" in the education literature.

References


Influencing Public Education: A "Window of Opportunity" Through School Library Media Centers

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Abstract. How can the field of instructional technology (IT) have an impact on public education when their philosophies and strategies are so different? Most suggestions in the literature place instructional technology professionals in the role of external change agents to the schools. This article suggests that a new opportunity is on the horizon for modeling IT theory and practice within each school through the school library media center. Viewed primarily as support centers in the past, technological developments and the growing interest in information literacy have brought school library media centers to prominence among educators. The computerization of library systems is also finally making it possible for school library media specialists to devote a major portion of their time to instructional matters. A true change in the role of the school library media specialist, however, hinges on high quality training for these professionals. IT professionals are asked to carefully consider this avenue as a way to influence public education.

Introduction

Pondering the problems of public education and the (seemingly obvious) solutions offered by instructional technology (IT) is a favorite pastime wherever IT professionals congregate. While enjoyable, these discussions inevitably run into a major clash of philosophies. The prevailing model in public education, after all, holds individual teachers almost solely responsible for the outcomes of education. Despite back-to-back classes, high enrollments, students with widely varying levels of ability and maturity, and limited planning time and resources, teachers are expected to be subject matter experts and experts in planning, designing, delivering, and evaluating instruction. They also serve as counselors, stand-in parents, accountants, and clerks. In other words, teachers are viewed as one-person instructional systems. As a result, when there are concerns about the quality of public education, the typical response is to focus almost exclusively on upgrading the quality of teaching. Tuckman (1985) notes that:

States have built tests to screen teachers and to evaluate the training of teachers. Models have been developed to describe and presumably yield effective teaching and teacher merit plans, and career ladders have been implemented to reward the “better” teachers. In short, “education” has been presented as “teaching” and improving education, therefore, as improving teaching. (p. 36)

Instructional technology, on the other hand, focuses on the improvement of “performance” which may or may not call for “teaching” in the traditional sense. IT theory calls for systematic planning to assess what types of strategies and media can best address the task, learner, and environmental requirements for a particular instructional unit. Many of the analysis procedures that are emphasized in IT (e.g., needs assessment, task analysis, media selection/production decision-making) seem irrelevant to classroom teachers who (wisely) recognize their lack of time and resources for such endeavors. It is no surprise, then, that many educators view instructional technology as fine for industrial and military training, but unsuitable for the schools.

Despite such glaring differences, IT literature periodically presents strategies for involvement with public education. Jorgensen (1981) seeks “mutually beneficial collaborations” between IT and classroom teaching. She recommends that IT professionals (a) attempt to adapt instructional design practices to be more responsive to the needs of classroom instructors, (b) play a more intelligent role in teacher education, and (c) participate in more collaborative school-based research.

Heinich (1984), on the other hand, calls for moving from the “craft” of teaching to the technology of instruction. He has no hesitancy in describing the dramatic changes this would entail:

Instructional technology can take over much of what teachers traditionally do. The extent of the takeover is a function of subject, grade level, nature of the students (for example, normal, handicapped), etc. There is no question that the ratio of professional and paraprofessional personnel to students can be changed drastically. (p. 81)

Both writers are responding to Tuckman’s (1985) lament that “two decades of work on instructional systems [is being] ignored” (p. 36) in the public schools. Although their approaches are very different, both see the value in applying IT theory and practice to the classroom. Notice that both also assume an “us-them” distinction, i.e. IT professionals are portrayed as change agents and public education as the client (although Jorgensen advocates a much closer relationship). This is hardly surprising. Teachers and administrators rarely study instructional systems design in their preparation programs; very few schools have positions for instructional designers to
assist teachers (and the few that do reserve them as career ladder opportunities for senior teachers). Therefore, any attempt to introduce alternatives to the “teaching” as “education” model must seemingly come from outside the system.

Diffusion theory, of course, maintains the importance of generating support for innovative practices within the client system. Rogers (1983) discusses the value of “homophily” (the similarity among the sender and receiver of messages) in the adoption of innovation; Havelock (1973), after listing the advantages and disadvantages of both internal and external consultants, suggests the “inside-outside team” (p. 53) as the best strategy. The problem is identifying a professional within the system suitable for playing the role of an instructional technology change agent. If teachers and administrators are excluded (for reasons previously mentioned), the only other candidate is the school library media specialist.

The School Library Media Specialist as Change Agent

The 1975 edition of Media Programs: District and School (ALA and AECT, 1975), the professional guidelines for school library media specialists, stated that school library media specialists should work “as a member of curriculum committees, textbook committees, and other instructional groups” (p. 31) within their schools. About the same time, Moore (1976), among others, wrote of the potential for this role:

The media specialist because of his access to support materials e.g., media, and hopefully his skill in instructional design may also become the logical team member with the teacher to design and develop instruction. (p. 114)

Anyone familiar with the demands placed on school library media specialists, however, knows that their role as instructional consultants is vastly overshadowed by the management and clerical responsibilities required to keep a resource center operating smoothly. The tendency to schedule school library media centers with classes most of the day (Jay, 1986) bites into most of the remaining time that might allow for instructional design activities. Furthermore, school library media specialists have generally not been trained in instructional design skills (note the “hopefully” in Moore’s quote above) beyond those required for media production. This renders them inadequately prepared (a) to be instructional design consultants to teachers as well as (b) to model solid learning and design principles in their own curricular units. Markuson (1986) lists four common instructional problems related to the teaching of reference skills in school library media centers:

1. Research and reference skills, both concrete and abstract, are taught without sufficient regard for specific needs. (p. 38)

While some of these problems may result from enforced scheduling, they also indicate an inadequate background in learning theory and design.

One other factor that inhibits school library media specialists from serving as instructional consultants in their schools is the attitude of teachers. The notion of working with other professionals to improve instructional practice is as foreign to teachers as it is to most college and university professors. Only someone well trained in diffusion theory will have the patience and arsenal of subtle “guerrilla warfare” tactics to gradually win teachers over to a new way of doing things.

For these and other reasons, many IT professionals view the school library media specialist as simply a support role within the traditional educational model—something quite different from an instructional designer trained in the systems approach. This may be particularly true of instructional technology graduate programs for which “instructional systems design” is the primary focus. These programs are far less likely to have a program track for school library media specialists than are those that list “media” or “school library media” as their primary focus (Schifman and Gansneder, 1987). The former programs have become almost exclusively aligned with business and industry, with little or no involvement in public education.

Dramatic changes in education, libraries, and society, however, call for a reassessment of the role school library media centers can play in modeling and promoting instructional technology theory and practice in the schools. The remainder of this paper will provide support for the verity of the following hypothesis:

School library media centers represent a viable means of gradually infusing IT theory and practice into public education.

A “Window of Opportunity”

Several obvious factors make the school library media center (SLMC) an appropriate base for influencing public education. First, it is the only part of a school that cuts across all discipline
areas. School library media specialists have contact with all teachers and administrators, unlike most others in instructional roles. The SLMC is already the repository and distributor of instructional media for the schools. Nation-wide, they are also increasingly becoming the centers for computer technology, as administrators and teachers realize the difficulty in maintaining the hardware and software originally placed in classrooms. This factor has begun to give the school library media specialist more “power”, for in the schools, as in other institutions, the person who controls the computers is considered an influential figure.

Recent technological and societal changes, however, offer additional, compelling evidence for reassessing the role of school library media specialists.

Automated Library Systems

For the first time in the history of librarianship, circulation, cataloging, overdue notices, inventory, and other clerical and management functions that have perennially monopolized the time of library professionals can now be performed by “someone” else: the computer! Although the transformation to totally automated school libraries won’t happen overnight, the basic ingredients are already in use. Systems for networking academic, public, and school libraries to facilitate communication and sharing resources are also being pursued in many states (Griffith and Strain, 1985). The effect of this revolution must not be underemphasized. It represents the first true opportunity to reshape the role of the school library media specialist; all previous calls to redefine the role have merely added another layer of responsibilities to an already overloaded position.

Once the agencies of conversion to computerization are completed, librarians report a definite change in the character of their work. Decreasing time spent on clerical functions makes increasing the instructional services of the school library media center a genuine possibility. Anticipating this, the latest professional standards of AALS and AECT, scheduled for publication in 1988, call for (a) moving as quickly as possible into library automation and (b) determining the number of positions in school media centers based partially on the number of services the center offers to the school (rather than solely on school enrollment). Thus, the guidelines will provide national-level support for justifying additional positions for specialized design and technology services.

Calls for Information Literacy

Naisbitt’s (1984) statement that “we are drowning in information but starved for knowledge” (p. 17) has become the rallying cry for information literacy. Access to information has become an equity issue of concern to many educators who, confused about how information literacy skills can be taught in the schools, are turning to libraries for direction. School library media specialists are taking a leadership role in introducing CD-ROM, online, and other computerized reference tools to the school curriculum. School administrators are also beginning to question citizens? How can the regimented schedule and the routinized atmosphere of classrooms prepare students for independence as adults? Not least, how can we produce critical and creative thinking throughout a student’s life when we so systematically discourage individuality in the classroom? (p. 147)

Statements like these—from mainstream education organizations, not instructional technology professionals—challenge the traditional model of expecting all learning to take place within the walls of the classroom with materials handed to students by the teacher or the text. They support a view of learning that puts students actively in charge of accessing and synthesizing information for individualized projects—in other words, research, something school library media specialists know something about. Sophisticated information technologies increasingly found in libraries make the research process more interesting and fruitful for students than in the past. Pulling all of these concepts together, EDUCOM, an association which brings together computer, library, and academic discipline specialists, advocates a blurring of the distinction between classrooms and libraries as the form for schools of the future.

In short, the information age and a growing emphasis on life-long, self-directed learning are building support for libraries from diverse areas. The time is ripe for developing and marketing the services of the new, information-age school library media center.

An Existing Link Between IT and the SLMC

One final factor must be mentioned in support of the earlier hypothesis.
Slightly more than a third (35.7%) of the graduates of instructional technology programs take positions as librarians, all but a fraction of these in school library media centers (Schiffman and Gansneder, 1987). (What percentage this is of the total number of school library media specialists placed is unknown.) It is interesting to note that this figure is equal to the number (35.0%) of graduates placed as designers or media specialists in business and industry. Most graduates placed as school library media specialists come from programs that emphasize either "media" or "school library media," while those programs emphasizing "instructional systems design" place mainly designers in business and industry.

These figures make it clear that graduates of IT programs are being strategically positioned within the public education system. The question is, are they entering the schools trained as instructional technologies or as librarians? Have they been trained in learning theory and instructional design principles? Are they trained in consulting skills (including working with teachers as subject matter experts and working in unfamiliar content areas)? In internship experiences, do they practice their skills, or only maintain cataloging and circulation systems? Are they knowledgeable of diffusion theory and how to function as a change agent? These skills are absolutely essential to any successful effort at gradually introducing instructional technology thinking to the schools.

Are school library media specialists graduating from instructional technology programs thoroughly competent and confident in the use of computer and information technologies? Are they prepared to spearhead and manage the conversion to total library automation? Are they trained to be instructional leaders in their schools? Are they trained to make polished, persuasive presentations to faculty, administrators, school boards, etc. (perhaps, for example, on the need for flexible rather than rigid scheduling of the SLMC)? School library media specialists with these skills (in addition to library/media skills) will be well equipped to function as in-house instructional design and technology change agents within their schools.

Conclusion

Much evidence suggests that school library media centers are standing on the threshold of change. Certainly, many elements have come together to make the first true reassessment of school library media centers possible. Someone will play a leadership role in shaping this change. Many traditional library schools, for example, having experienced declining enrollments for a number of years, are retooling their curricula to reflect an instructional and informational technology emphasis (Intner, 1987).

No one has more expertise, though, in procedures which can improve the quality of instruction throughout the schools than do IT professionals. Our skills have been honed through more than 25 years of experience in education and training. We know how even a small staff of creative, competent design and technology experts could assist in making classroom instruction more individualized, efficient, and effective. Nothing will solve all the problems of public education, of course, but gradually chipping away at the "one-person instructional system" model and demonstrating the value of providing design and production assistance to teachers will be a giant step in the right direction. With the school library media specialists working on the inside and instructional technology professionals acting as external consultants and researchers, perhaps we will be able to have an impact on public education. (Could the teetering stock market, which some consider the prelude to an erosion of the training boom, portend now as a good time to turn our attention once again to the schools...and the window of opportunity opening through school library media centers?)

References


An Instructional Development Look at Staff Development in the Public Schools

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The content of conference programs and professional conversations in the field of instructional development suggest renewed interest in the public schools. After several years of focusing attention on corporate and governmental training, some instructional developers find themselves standing knee deep in the aftermath of the “rising tide of mediocrity in the public schools.” They are bothered by the fact that the ID field has had little positive impact on improving the effectiveness of the nation’s schools.

Most instructional developers have long known that the public school’s “media coordinator” is not an instructional developer; neither is the school librarian. Schools don’t hire “District Instructional Developers”. Some developers have tried to influence instruction indirectly through the application of systems processes to the design of commercially produced materials. Some of these efforts are undoubtedly promising, but teachers tend to dismantle these carefully designed materials in practice. Some instructional developers are skeptical that “teacher proofing” is possible.

Several instructional technologists have advocated rather massive reorganization of the schools accompanied by a heavy infusion of technologically delivered instruction. However, strong conviction that such reorganization and mediated instruction would solve the problems in the nation’s schools, one has to question the feasibility of these ideas. Teachers will not be forced out of their traditional roles. Unless they can come to see their role in education differently, instructional technologists are only talking to themselves about a collective dream. Those instructional developers who doubt that it is possible to plan for every conceivable contingency doubt that “teacher proofing” instruction is desirable; the dream has a nightmarish side for them. Realistically, who is going to influence changes in teaching?

What many instructional developers may not know is that there is an emerging profession devoted to improving teaching practice at the K-12 levels. This field is now routinely called “staff development” or “inservice teacher education,” sometimes abbreviated in the literature as INSET (Campbell, 1982; Daresh, 1987). Staff development has come to connotate training, education, and consultation provided to practicing teachers in the interest of improving their teaching and/or career development.

It is the thesis of this article that staff development is one of the most influential forces currently impinging upon teacher behavior and that instructional developers who would seek to influence the public schools may, find it instructive to examine the messages that are currently being delivered to teachers through staff development. Further, it is the authors’ contention that within the last few years an attempt to communicate to teachers some of what constitutes instructional development has already been made. Instructional developers can learn a great deal about the likely reception of their field within public education by examining the recent course of staff development.

This article begins with an overview of three major themes in the current staff development literature. These themes are then viewed critically for their consonance with instructional development principles and assumptions, i.e., with how much of the advice being given to teachers would professional instructional designers agree?

The article concludes with an analysis of how the reception of staff development efforts date indicates the schools’ likely acceptance of a systems approach to teaching and learning.

The New Profession of Staff Development

“Teacher inservice” has been around for decades. However, within the last few years staff development has emerged as a discrete profession. Many university colleges of education now have units or subunits composed of PhDs who are primarily staff development specialists. These programs train practicing teachers at the masters and doctoral levels to assume positions as staff developers in schools. The field has its own professional associations. One might expect this professionalization of the field of staff development to increase its impact.

There is a broadening base of research concerning staff development (Daresh, 1987). However, the literature in this area is dominated by a relatively small group of luminaries. These writers are the commonly acknowledged experts in staff development by teachers, schools, and other staff development agencies, such as units within state departments of education. Their work is frequently cited by one another, and in reading through the literature, one has the sense of an emerging, cogent practice of teacher supervision and development among professional staff developers. The new cohesion in this effort makes it possible to analyze the primary messages that teachers are receiving via staff development in a way not possible in previous years.

The Process of Staff Development

A great deal of the literature relevant to teacher staff development concerns itself with *how* rather than *what*, i.e., it...
comprises an ongoing discussion regarding how best to implement staff development programs regardless of the content of those programs. Given the history of teacher inservice education, this work represents an important contribution to the improvement of teaching.

Unfortunately, for decades teacher inservice has been characterized by the "quick fix" workshop, frequently lasting only a day or less. As described by Wood and Thompson (1980), "most staff development programs are irrelevant and ineffective, a waste of time and money. Disjointed workshops and courses focus on information dissemination rather than stressing the use of information or appropriate practice in the classroom" (p. 374). The work of this group of staff developers, whose interest is primarily in process, has been devoted to changing the concept of staff development from this ineffective strategy to one that involves long-term commitment to changes in teacher behavior.

As a result of this work, the concept of "clinical supervision" now seems well-encompassed among professional staff developers. The literature that describes the procedures of clinical teacher to practice new teaching skills and to receive feedback in an ongoing cycle of observations and conferences is a hallmark of the field (Joyce & Showers, 1980).

More recently, some writers in the area of clinical supervision have been addressing the finer points of the procedure (Hunter, 1986b; London, 1986; Pavan, 1986). Others have been addressing the elaboration of the concept of clinical supervision beyond the procedural steps (Garman, 1982) and acknowledging the requirement for concurrent organizational development in schools (Goldsberry, 1984; Howey, Maithes, & Zimper, 1985). These works are probably an indication of the growing sophistication of the field of clinical supervision.

Perhaps predictably, many of the writers in the area of staff development processes have relied heavily on the tenets of adult education in addressing the appropriate implementation of staff development (Daresh, 1987; Wood & Thompson, 1980). These authors see the previous failures of staff development efforts as resulting from a failure to consider that teachers are adult learners. As most instructional developers know, adult learning is a touchy political issue of control of staff development. The issue of adult education as a force within staff development is an important subtheme throughout the literature.

ID Perspective on the Staff Development Process

Most developers would find much to applaud in the current direction of this staff development process advice. The basic procedures of clinical supervision are well known to most developers. In fact, they are identical to the conventional wisdom espoused by instructional developers working in faculty development offices so popular in higher education during the seventies (Berquist & Phillips, 1977; Sorcinelli, 1984).

Most instructional developers who have worked in teacher improvement have used a process similar to clinical supervision for observing and giving feedback to instructors. The only major difference may be that developers working with higher education or corporate instructors have routinely included student perceptions of teacher effectiveness as a data source along with their own observations. Student data is predictably less utilized in public school settings because of the age of the learners and possibly because of the authoritarian relationship between teachers and students at the K-12 levels.

If there is an area of this literature likely to unsettle an astute instructional developer, it would be the ascendency of adult education theory in staff development. Even here there is much with which to agree. Developers certainly believe in the immediate application of new skills, plenty of diagnostic feedback, and an instructional focus on job relevant behaviors — all recommendations derived from adult education principles. However, the problematic part comes with teachers choosing the objectives of staff development. It is doubtful that, when given an array of topics, teachers would choose to learn the rigorous application of instructional design.

If one reads the staff development literature closely and is willing to extrapolate a bit, one finds some support for greater learner control of both the methods and the objectives of learning situations. As Wood and Thompson (1980) argue, teachers "want to be the origin of their own learning; that is, involved in selection of objectives, content, activities, and assessment in inservice education." (p. 376). Furthermore, "adults reject prescriptions by others for their learning, especially when what is prescribed is viewed as an attack on what they are presently doing" (p. 376). This seemingly innocuous aspect of staff development has embedded within it the
for these reservations. Daresh (1987) conducted a literature review of over 500 research studies of staff development conducted between 1977 and 1984. His conclusions confirm that teachers want to control the objectives of staff development. However, he also concluded that the skills sought most frequently by teachers were knowledge-level skills. The staff development and inservice education content most desired by teachers was concerned with topics of immediate interest to practitioners. Programs or activities designed to deal with less concrete, more conceptually-oriented topics were of considerably less interest. Daresh (1987) noted the dominance of fads in staff development topics, from mainstreaming the handicapped a few years back, to the current rage for computer applications. Add to these conclusions Wood and Thompson's (1980) suggestion that many teachers may not be functioning at Piaget's formal operational stage. These findings don't suggest that public school teachers are likely to embrace difficult, abstract content like instructional design. ID is neither concrete nor trendy; its content is not likely to occur to teachers as a "hot" topic for staff development.

Another of Daresh's (1987) conclusions is pertinent here. Many studies indicated that teachers do not wish to have someone else 'do' staff development to them. Teachers want to play the primary role as the source of their own learning. However, there is data to suggest that teacher initiated and conducted staff development is not very effective. Wade (1985) conducted a meta-analysis of research on the effectiveness of different types of staff development programs. She concluded that, contrary to the popular belief among staff developers, programs that were initiated within the school either by teachers, administrators, or supervisors were considerably less effective than those initiated by state or federal government or by a university. She also concluded that programs using teachers to teach other teachers were less effective than programs conducted by support staff or college personnel. Expertise in ID is much on-going research that has examined time-on-task variables with different types of learners in different types of schools. The second category of research, classroom management, may be somewhat less well known among developers partly because many do not work with children. This literature, characterized by the work of Good (1983) and Emmor, Everettson, and Anderson (1980), seeks to translate the research on discipline and preventive classroom management for application by teachers. Of the three categories, the third is by far the most complex. The term "interactive teaching" does not have the connotation of the term "interactivity" as used by instructional technologists. Instead the term refers to direct teaching of students by teachers. Those teacher behaviors that effective teaching research has indicated increase student learning are described in this literature. Knowledge of these research findings is then recommended as the primary content of staff development programs for teachers. Of all the staff development programs based on teaching effectiveness research, Madeline Hunter's model has been by far the most widely implemented.

Hunter's Description of Her Message

Because Hunter's work has been widely misinterpreted and misapplied, it is important, at the outset, to understand the message she has tried to convey through her books, articles, consulting, and speaking engagements. According to Hunter, she simply recommends using the results of instructional research to guide the decisions that every teacher has to make. Hunter has stated, "Teaching is a constant stream of decisions and . . . good decisions increase the probability of learning. We now know cause-effect relationships between teaching and learning. Teachers can't control everything, but they can certainly influence it" (Brandt, 1985, p.61). Hunter (1987) states that the decisions that teachers must make fall into three categories as follows:

1. What content, skill, or process is achievable and worthwhile for these students in this
group at this time?

2. What modalities and learning processes will these students use to acquire, and to demonstrate they have acquired, the content, skill, or process?

3. What research-based principles of learning will facilitate that acquisition? (p. 52)

The Distortion of Hunter’s Message

Hunter (1966a, 1967) maintains that these decisions must be considered for any learning — discovery learning, experiential or lecture driven learning, group or individualized or cooperative learning — not just for teacher dominated traditional classroom learning. However, according to Wolfe (1987), in an effort to translate the vast store of instructional research into principles that teachers could apply in real world classrooms, Hunter and Doug Russell formulated, in 1976, seven elements that should be considered when creating a lesson. These are: anticipatory set, objective, input, modeling, checking for understanding, practice, and independent practice. Wolfe points out that Hunter and Russell did not list the elements as steps, nor did they indicate that the elements were to be carried out in order.

Unfortunately, training teachers in the performance of these elements has been mistaken for the whole of Hunter’s approach to staff development. School administrators and teacher supervisors have converted Hunter’s elements for consideration into checklists of specific teacher behaviors. These checklists have become the basis for teacher evaluation schemes. Teachers have been evaluated negatively when naïve observers armed with checklists have failed to see each of Hunter’s steps in every lesson observed (Slavin, 1987). Teachers who have been exposed to these evaluation schemes report that it is easy to “fake out” the evaluator by play acting the inclusion of each step during evaluative observations regardless of their appropriateness within the context of the lesson being taught (Nancy Puckett, personal communication, July 6, 1987).

Consequently and predictably, an avalanche of criticism has fallen on Hunter’s work in the last few years (Gibboney, 1987; Sergiovanni, 1985; Slavin, 1986,1987). Some of Hunter’s most severe (and articulate) critics have been the proponents of the reflective teaching movement. The work of these authors and its relationship to Hunter will be discussed later in this article.

ID Perspective on Effective Teaching and Hunter

The research basis of the effective teaching movement within staff development is consonant with instructional development principles. Like these staff developers, instructional designers tend to believe that research has yielded valuable principles that, when applied to the design of instruction, can dramatically increase student achievement. Instructional developers also consider themselves in the business of translating research findings into practice. Hunter’s seven elements look alot like Gagne’s Events of Instruction (Gagne, 1977; Slavin, 1986). It’s hard to argue with the spirit of a movement like this one within staff development.

Reservations about the effective teaching movement within staff development literature causes an instructional developer to wonder if some of the research based principles that are being espoused are fully understood by staff development professionals. For example, Hunter (1985) distorts badly the application of primacy and recency research in relaying examples of how psychological principles can be applied to learning. She states that primacy and recency research implies that teachers ought not to take attendance during the first part of the school day since this time is the most productive for learning. For another example, the concept of task analysis and its function within instructional design does not appear to be well understood among any of these authors (Hunter, 1985; Gibboney, 1987). This criticism, however, is probably minor in comparison with the other source of discomfort discussed below.

Lack of a Comprehensive Schema

It is disturbing that writers in the area of effective teaching see the area merely as a collection of techniques, albeit powerful ones. Time-on-task may be important, but proficiency in applying this concept alone will surely not make a superior teacher. The emphasis seems to be on what teachers should do rather than on what they should think about. No one seems to be writing about providing teachers with a cognitive map that would allow them to see the relationships among the techniques recommended by effective teaching research.

One has to wonder what meaning teachers make out of all these prescriptions. Do they see, for example, the connections between objectives and choosing an instructional strategy? The intervening step of task analysis, so familiar to developers, is not discussed accurately at all in the literature reviewed. The concept of needs assessment, so important to identifying objectives in the first place, is never addressed. Hunter (Brandt, 1985) suggests that curriculum specialists rather than instructional specialists have to be consulted in order to determine objectives and their sequence; therefore, she divorces curriculum from instruction in a way that is foreign and dis-

Hunter recommends using the results of instructional research to guide the decisions that every teacher has to make.
agreeable to most instructional developers.

Furthermore, as Anderson (1987) points out, the movement seems directed toward what teachers should do, rather than toward what students should do. There are two consequences of this characteristic that occur to instructional developers. The first is that teachers are reinforced in their tendency to see themselves as the only "delivery medium" for instruction. The second is that teachers are deflected from the legitimate criterion of their performance, i.e., student achievement. By focusing on teacher behavior rather than the analysis of student behavior, the teaching effectiveness movement obscures the teacher's potentially powerful role as a designer of instructional systems in favor of the teacher's more limiting role as instructional presenter.

Hunter seems cognizant of some of these weaknesses in the effective teaching movement since her own work has been heavily criticized as a mere collection of techniques (Gibboney, 1987). In the last two years, in response to this criticism she has begun to assert forcefully that her work taken as a whole addresses decisions that teachers should think about, not behaviors they necessarily should perform (Brandt, 1985; Hunter, 1985, 1987). However, she does not describe a cognitive frame that would help teachers retain and place the advice she gives them in some sort of judgmental perspective. In short, the instructional design model is not communicated to teachers by the effective teaching advocates within the field of staff development.

The Reflective Teaching Message

The third major theme within the staff development literature deals with what is termed "reflective teaching." Generally, there are two perspectives within the reflective teaching movement both of which draw heavily on the work of Dewey (1904, 1933) and his seminal concept that analysis and introspection, rather than imitation, are central to teaching excellence. The reflective teaching advocates that are most interested in the staff development process tend to focus on ways to encourage teachers to think about teaching—they are more interested in the means ( instructional methods) than the ends (the outcomes teachers choose to pursue) (Cruckshank, 1985). Other authors who use the term "reflective teaching" focus on both means and ends. This second perspective is a more holistic interpretation of Dewey's work and is perhaps best articulated by Zeichner's (1981-1982) work in preservice teacher education and Sergiovanni's (1981, 1986) work in staff development. Authors representing these two perspectives tend to distance themselves from one another and are engaged in their own internal debate at the same time, the reflective teaching advocates, as a whole, have been strident critics of the effective teaching movement within staff development.

Reflective Teaching as a Staff Development Process

The author perhaps most closely associated with the concept of reflective teaching as a teacher training process is Donald Cruckshank (1985). Reflective teaching as proposed by Cruckshank, is a self-contained, highly controlled microteaching experience. It is based on providing micro- teachers with content which is unfamiliar to both teachers and students. In this way, teachers are encouraged to focus on the process of teaching rather than the specific subject matter. Each participant receives a reflective teaching lesson containing a measurable objective, fugal content, and a posttest. Through teaching these lessons and analyzing learner comments and performance, participants generate hypotheses relative to the teaching learning process.

The reflective teaching literature is deficient regarding other suggestions for how staff developers should go about encouraging teachers to be more reflective. Besides the process described above by Cruckshank (1985), the most specific suggestions come from Glickman (1986) who recommends direct consulting with individual teachers; curriculum development projects; inservice training involving demonstration, role playing, classroom trials, feedback, and discussion; and action research projects. Each of these techniques can, according to Glickman, be structured to suit the functioning cognitive level of individual teachers.

Reflective Teaching as Criticism of the Effective Teaching Movement

Those advocating reflective practice among teachers, are among the most severe critics of the effective teaching movement within staff development (Costa & Garmston, 1985; Gibboney, 1987a, 1987b; Glickman, 1986; Sergiovanni, 1985, 1986; Slavin, 1986, 1987). Perhaps because of her dominant position within the effective teaching movement, much of this criticism has been directed specifically at the work of Madeline Hunter.

Sergiovanni (1983) criticizes Hunter for viewing teaching and learning as "an instructional delivery system" (p. 8), a pipeline through which knowledge and information must travel toward specified objectives. Sergiovanni criticizes Hunter's emphasis on instructional objectives, explaining that many worthwhile objectives are missed if teachers focus too narrowly on objectives specified in advance. "Good teachers realize this and behind closed classroom doors teach accordingly despite supervisory efforts to the contrary" (Sergiovanni, 1986, p. 356).

The works cited above by Sergiovanni, were printed before Hunter's most recent attempts to convince critics that her model of effective teaching does not prescribe lock-step behaviors in which all teachers must engage every time they teach. It is doubtful that these authors have been convinced by her recent protestations. It is clear that they do not feel that teaching is an applied science. Gibboney (1987a, 1987b) goes so far as to assert that Hunter has no scientific data to back up her advice to teachers. Sergiovanni (1986) is less inclined to deny the validity of applying the techniques recommended by effective teaching research in certain circumstances; however, he finds the objective driven approach assumed by effective teaching simplistic, and asserts that real teachers do not
think and act in accord with discrete goals and objectives.

Reflective Teaching as the Focus of Staff Development

These reflective teaching authors, feel that no amount of training in applying the results of effective teaching research will improve teaching practice. Instead they advocate encouraging and/or teaching teachers to think about teaching, i.e., to become reflective practitioners and to discover their goals and objectives during the act of teaching. As noted above these authors are concerned about both the process of teaching and the outcomes. One might infer that they disapprove of the split between curriculum and instruction that appears to characterize the teaching effectiveness approach to staff development. However, they do not use that language to describe their position, and they are adamantly opposed to any teaching model that would encourage objectives to be specified in advance of instruction.

ID Perspective on Reflective Teaching

Principles of instructional development support some but certainly not all of the points argued by advocates of reflective teaching.

Reaction to Teacher Training Method

Instructional development practice is consonant with many aspects of the process outlined by Cruickshank (1985), as a device for encouraging teachers to reflect on their teaching performance. The procedure's use of content previously unknown to the learners and the microteacher, is particularly laudable. Any instructional developer who has consulted with teachers, has probably noticed a tendency for the teacher to focus on, and to debate intricacies of the subject matter, rather than the design of that subject matter's presentation. Cruickshank's reflective teaching materials discourage that digression. Furthermore, since the topics of Cruickshank's lessons are sufficiently obscure, few of the learners in the microteaching session have any previous knowledge of them. Therefore, the microteacher gets a much clearer picture of just how successful she was in teaching the lesson. However, Cruickshank's procedure has some weaknesses when viewed from an instructional developer's perspective. Developers — focusing as they do, on very specific features of a lesson's design — might have less confidence in teachers' ability to diagnose their own strengths and weaknesses on the basis of the microteaching activity. For instance, if learners do poorly, will it occur to teachers that their task analysis of the lesson's terminal objective may be in error? Teachers would probably focus on the delivery of the lesson rather than on its design. Developers might heartily endorse the process, provided that some substantial debriefing of the activity under the direction of an expert was included. The debriefing would prompt teachers to consider aspects of their lesson design and delivery that might otherwise escape them.

Reaction to Criticism

One can view the reflective teaching advocates' criticism of the teaching effectiveness movement from two perspectives: criticism of the intent of the movement and criticism of the actual attempts to implement staff development based on teaching effectiveness research.

One has to agree with much of the criticism of the implementation in this area. For example, it has been well documented that Madeline Hunter's model has been reduced, at the hands of naive school administrators and supervisors, to checklists of specific behaviors that teachers are expected to demonstrate every time they are observed (Goldstern, 1986; Hunter, 1985, 1987; Slavin, 1987; Wolfe, 1987). Since this scheme increasingly has been tied to teacher evaluation, it raises the specter of hoards of teachers mindlessly engaging in techniques divorced from the specific context that makes them effective. Sergiovanni's (1985, 1986) scathing criticism of Hunter would make sense if this implementation of Hunter was all that her work is about.

However, anyone with instructional design sensibilities who reads the teaching effectiveness literature can readily discern that this distorted implementation has little to do with the intent of the scholars in this area and even less to do with the potential impact of this valuable information. Even two years after Hunter (1985) expressed horror at the "checklisting" of her approach to making teaching decisions, critics have continued to misrepresent her model (Gibbone, 1987; Slavin, 1987). Instead of placing the responsibility for the deplorable state of implementation where it belongs, (i.e., on poorly trained school administrators and supervisors looking for simple solutions to complex problems) some reflective teaching advocates have indicted the authors of teaching effectiveness approaches to staff development. Responsible criticism should make a distinction between intent and implementation.

A lack of instructional design knowledge prevents some of these critics from seeing the worth of Hunter's perspective. Slavin (1987), for example, asserts that Hunter's model is merely traditional instruction and that almost all teachers already use her recommended elements. This statement translates roughly into an assertion that all teachers already know about Gagné's events of instruction, so Gagné's work can make no contribution to teaching improvement! Most developers who have interacted with public school teachers know that teachers understand very little about behavioral objectives, let alone the rest of the

The instructional design model, as we know it, is not communicated to teachers by the effective teaching advocates within the field of staff development.
components of sound instruction.

It appears that many of the critics of the teaching effectiveness movement are hastening its demise by attacking its faulty implementation without an exploration of its legitimate potential. It is difficult to escape the conclusion that some of these critics are either naïve, irresponsible or both. This is not to say that these authors don’t raise legitimate questions about weaknesses in teaching effectiveness approaches. They complain that the teaching effectiveness writers do a better job of telling teachers what to do than of assisting them to apply teaching techniques conditionally. Furthermore, Gibbons (1987) makes a point similar to one made earlier about Hunter’s model lacking guidance regarding the determination of higher order objectives. He seems to miss in Hunter’s model, the curriculum part of instructional design, a discussion of how content decisions should be made.

Reaction to Reflective Teaching as a Staff Development Goal

Instructional developers would agree with the reflective teaching advocates that teachers should be able to think about their teaching, not just to engage in rote behaviors. Costa and Garmston (1985) have described one process for how staff developers might assist teachers in thinking about their teaching performance. Their work contains the only representation of an ID like model discovered in the staff development literature reviewed.

Sergiovanni not only maintains that most teachers do not teach to a set of preordained objectives, he asserts that teachers should do so. He goes so far as to suggest that teaching to objectives runs counter to “human nature” (Sergiovanni, 1985, p. 359).

Sergiovanni (1986) criticizes objectives as “the linchpin in a chain of events which is presumed to characterize best practice” (p. 355). He finds the tight alignment between discrete goals, curriculum, teaching, and testing objectionable. He emphasizes the importance of discovering goals and objectives in the act of teaching and feels that it is arrogant and naïve to suggest that objectives must be set beforehand.

Sergiovanni’s (1985) recommendations for staff developers must be inferred from passages similar to the following:

In reality, the task of the supervisor is to make sense of messy situations by increasing understanding and discovering and communicating meaning. Since situations of practice are characterized by unique events, uniform answers to problems are not likely to be helpful. Since teachers, supervisors, and students bring to the classroom beliefs, assumptions, values, opinions, preferences, and predispositions, objective and value-free supervisory strategies are not likely to address issues of importance. Since uncertainty and complexity are normal aspects in the process of teaching, intuition becomes necessary to fill in between the gaps of what can be specified as known. (pp. 11-12)

In contrast instructional developers find that instructional research helps to make sense of messy situations. Patterns of effective practice are typically found even in superficially unique situations. The advice of instructional developers is not value-free, and seeks to convince practitioners to align their beliefs, assumptions, etc. with empirically supported effective practices. Instructional developers acknowledge uncertainty and complexity and think that what springs from a basis of sound instructional design knowledge is powerful intuition indeed, possibly even a hypothesis worth testing (or reflecting upon.)

The greatest danger in Sergiovanni’s message, as well as that of other reflective teaching advocates, is that it is likely to be used as a justification for dismantling staff development al-

This analysis suggests to us that it is extremely important for instructional designers to be involved in preservice teacher education.

Implications for ID as a Focus of Staff Development

This concluding section seeks to explore what meaning the foregoing analysis of staff development has for instructional developers who hope to communicate their message to schools. An attempt to get practicing teachers to use instructional design would be very difficult. A partial list of the barriers derived from an examination of this literature follows.

1. Teachers think they already know instructional design (Slavin, 1987).
2. Teachers want to control staff development (Wood & Thompson, 1980).
3. Task analysis and teaching to an objective are the two most difficult concepts for teachers to master (Hunter, 1986a).
4. Teachers rely on their own experiences and on other teachers, rather than on theory or abstract principles when forming conclusions about teaching practices (Sergiovanni, 1985).
5. Adult learning theory argues for staff development content that addresses immediate, limited needs, not for abstract, difficult content requiring rigorous analysis (Daresh, 1987; Wood & Thompson, 1980).

7. Staff development programs seem not to be addressing the lethal split between curriculum and instruction. Teachers have no basis on which to integrate the two. They take curriculum courses separately from instruction courses in college, and as practicing teachers they find this separation maintained (Hunter, 1986a). The process of task analysis of objectives that informs the selection of instructional behaviors is unknown to them. Cohen (1987) also cites the separation of instruction from assessment in preventing what mainstream educators are now calling “curricular alignment” (Hunter, 1986a, p. 178) or “instructional alignment” (Cohen, 1987, p. 16).

As Cohen (1987) points out, the refined analysis that allows objectives, instruction, and testing to match has always been a part of instructional design, but has never been accepted by conventional educators.

Add to these obstacles the following inferences that might be drawn from this analysis of the course of staff development during the past few years.

8. Madeline Hunter’s message for teachers has been distorted beyond recognition in the process of attempts to implement it in the public schools. As Hunter (1987) herself has stated, it is an indictment of the preparation of school administrators and teaching supervisors that this has happened. The temptation to convert conditional, complex knowledge into concrete observables is probably overwhelming given the personnel and contingencies prevalent in the public schools. The message of instructional development is far more complex than the decision making model offered by Madeline Hunter. There is no reason to believe that ID processes would receive any other treatment than that afforded Hunter and others advocating the application of research based principles to teaching.

9. Furthermore, the criticisms that would likely be launched against an ID focus in staff development have already been largely articulated by the reflective teaching advocates. ID has not been communicated to teachers; however, the vaccine in the form of teaching effectiveness research has already been injected and the antibodies are already forming. We may find the schools already “immune” to our message.

Conclusion

In conclusion, it is important for developers who seek to influence the public schools to realize that others have preceded them. Teachers have already heard about, been forced to write, and rejected behavioral objectives as a meaningful part of their practice, if not as an acceptable part of their teaching philosophy. This rejection happened because teachers did not have a cognitive structure in which to place objectives. Teachers didn’t know what they were supposed to do with the objectives after they had them; therefore, the objectives appeared useless to them. Teachers may presently be having a similar experience with other facets of the instructional design message.

This analysis suggests that it is extremely important for instructional designers to be involved in preservice teacher education. Teachers will not emerge from their undergraduate years as accomplished designers. However, they might acquire a cognitive structure that would allow them to add to their expertise as they amass experience and additional training. This frame of reference would allow them to put instructional research findings into perspective and to apply the results conditionally. Such a schema might also prevent teachers from dismantling sound instruction that they seek to adopt and hasten their acceptance of delivery systems other than themselves.

Perhaps the wisest course of action in regard to staff development or inservice teacher education, is to enter immediately the ongoing debate now taking place within the staff development field. After all, instructional development provides the schema that the teaching effectiveness approach has lacked, and, therefore, provides the support for thinking about teaching for which the reflective teaching advocates are calling. If carefully communicated, instructional design could be seen as a logical extension of the teaching effectiveness movement, and as an answer to criticisms raised by the advocates of reflective practice.

Footnote

The Association for Supervision and Curriculum has long had an interest in staff development. The National Staff Development Council (NSDC), is an association exclusively for those devoted to improving teaching practice. NSDC holds an annual, national conference, and their journal, The Journal of Staff Development, began publication in 1983.

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References


Stillings, J. (1982). How useful are the findings from the research on teaching? In M. E. DePino & H. Carter (Eds.), *Charging teaching practices: Proceedings of a national conference* (pp. 5-24). Austin: University of Texas Research and Development Center for Teacher Education.


Software Evaluation: A Criterion-Based Approach presents two valuable contributions to the discipline of evaluation. The first half of the book succinctly outlines the issues and limitations surrounding educational software evaluation, and the second half is an excellent reference, outlining the York Educational Software Evaluation Scales (YESES). Unfortunately, the two halves don’t fit very well.

In the preface to Software Evaluation: A Criterion-Based Approach, Owston explains his interest in software evaluation began while developing an online database of educational software evaluations to be available to educators across Canada and beyond. Owston notes three constraints imposed by this means of distribution of software evaluations: evaluations must be concise, credible, and reliable. Failing to find a suitable evaluation procedure, Owston and other faculty at York University in Ontario, Canada, set about developing the YESES approach. The reader of Software Evaluation: A Criterion-Based Approach, must keep in mind that Owston’s YESES technique is bound by his self-imposed constraints, and he has targeted classroom teachers as the intended users of the YESES evaluation approach.

Owston begins by looking at the purpose of evaluation and notes that potential users—classroom teachers, school consultants, and software developers—have different purposes in evaluating software. Here lies the crux of the problem that Owston fails to resolve. Given the different informational needs of users of evaluations, how can one procedure meet those varying needs? Owston elaborates on the different evaluation services (EPIE, MicroSoft) and publications (Software Reports, the Digest of Software Reviews), but only the context of noting an overall finding of low quality software. Owston provides a critique of the objectives model of evaluation and lists seven alternate models. Owston concludes this initial discussion by noting that “the ultimate test of the effectiveness of your evaluation is how well you satisfy the information needs of your readers”.

Chapter 2 expands on the problem of different approaches by showing the two dimensions of evaluation: formality and audience, in which various approaches may be classified in four categories. For example, MicroSoft and EPIE are “Formal/Wide Audience” approaches, and a checklist developed by a school district is an “Informal/Limited Audience” approach. Owston then notes the limits to these current approaches.

- **Comparative Nature**—lacking explicit criteria, questions are often phrased such as “is the software easy to run?” These questions beg the question “easier than what?”
- **Subjective Nature**—what philosophy, beliefs, or biases is the unknown evaluator bringing to bear on the evaluation?
- **Poor Reliability**—meaningful evaluative comparisons are very difficult to make.
- **Overall Impression**—global ratings obtained by totaling answers to individual questions provide little guidance in interpreting the discrete answers as a meaningful whole.

These limits to interpreting software evaluations are points well made. The second half of Software Evaluation: A Criterion-Based Approach is an excellent reference for evaluators using the YESES approach, and for classroom teachers understanding YESES evaluations in the software selection process. Chapters 3 & 4 detail the YESES approach and provide methodology for applications.

The YESES approach places software attributes on five scales, each of which may receive a score of 1 to 4:

- **Content**—The skills and knowledge that the software purports to teach, including their organization, accuracy, and appropriateness.
- **Instruction**—The manner in which the software takes advantage of the unique capabilities of the microcomputer in conveying the content.
- **Documentation**—The supporting materials and instructions, available both in print and on screen, that accompany the software and explain its use.
- **Technical**—The overall quality of the software design, with respect to user inputs, software outputs, and system errors.
- **Modeling** (for simulations)—The adequacy of the model used in the simulation to simulate a real-life situation.

Each scale may be rated as Exemplary (4), Desirable (3), Minimally Acceptable (2), Deficient (1), and a full definition of these terms for each scale is provided in the Appendix. Familiarity with the parameters of these definitions is essential to either conducting a YESES evaluation or interpreting the results. Examination of the definitions reveals some problems:

1. The scale is not continuous: the intervals between 4 and 3 or 1 and 2 are not equal to the interval between 2 and 3. Stated another way, we have “great” and “almost great” with “horrible” and “almost horrible”, with a wide gap between “almost horrible” and “almost great”.
2. The scales group discrete ques-
ERI C Reports on ID

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This report focuses on and suggests ways of using instructional technology to provide better education/training delivery systems, especially the use of interactive videodiscs. The first chapter discusses the need for technology-based training; describes the computer interface components, functions, and characteristics of interactive videodisc systems; considers the theoretical principles involved in designing instruction to enhance learning; provides a historical perspective on the development of interactive videodiscs, including the names of companies that were forerunners in the field; and, lists current interactive videodisc manufacturers. Citing information from an extensive literature review of conceptual reports and experimental studies, the second chapter discusses future instructional uses of interactive videodiscs; the purchasing and integration of hardware components into workable systems; and, the development and pilot testing of software programs. The chapter concludes with five general statements about interactive videodisc systems. The discussion of instructional design for adult learners in the third chapter includes information on the learning process and four phases of development peculiar to adults. The last chapter summarizes the potential uses of interactive instruction and notes factors that may inhibit its use in education. A list of the literature cited is provided. —Microfiche 78 cents, paper copy $1.85 plus shipping, as document ED 282 543


Developed in order to understand how learning theory can be applied to software application in the classroom, the learning model discussed in this paper is based on the assumption that the learner wants to learn, accepts a challenge, has a willingness to try software, and will become independent in choosing software and making it work. A hierarchy of software complexity that was developed through observation of students is presented; it delineates four levels ranging from simple feedback programs at the lowest level through increasing learning control to utility programs. Five parts of the model are then discussed in the context of an adult computer classroom: (a) insight into students' knowledge and needs; (b) choosing appropriate software; (c) hands-on work; (d) establishing an appropriate level of challenge; and, (e) sharing of experiences and results. Footnotes and a brief bibliography are included. —Microfiche 78 cents, paper copy $1.85 plus shipping, as document ED 282 543


This paper makes a distinction between the formative evaluation that can be carried out in the early stages in the development of educational television programs (from the emergence of the idea through the development of a script), and those that have to be executed in the later stages of development (during the production process). The nature of those phases of development is explained, and the evaluation activities that could be integrated with
them are suggested as well as who should carry out the evaluations. Cognitive, affective, medium, content, design, and aesthetic criteria that can be used in the evaluation process are listed, and it is argued that the earlier the evaluation takes place, the more effective and feasible it is. Sixty-three references are listed. —Microfiche 78 cents, paper copy $3.70 plus shipping, as document ED 281 512.


An interactive video program, "The Screening Interview," has been developed at Miami University (Ohio) to help prepare college and university students for on-campus employment interviews with corporate recruiters. Within the context of the simulated interview situation provided by the program, students function as the alter ego of either the candidate or the recruiter as they review and evaluate five stages of the interview process: breaking the ice, answering questions, asking questions, closing the interview, and decision-making. The program focuses on appropriate verbal and nonverbal behavior and provides a rating profile of the student's interviewing skills. Much attention was given during the design process to the two components of the visual presentation—the videotaped action and electronic text frames. The conceptual and pedagogical advantages of blending interview content with technology include: (a) immediate visualization and application of theories to a realistic situation; (b) content material that will be held constant over a long period; (c) a high degree of student involvement; (d) ability to skip or review material as needed; and, (e) elimination of the necessity of bringing students to a central location for instruction. Pilot testing of the program focused on both the affective and the cognitive dimensions. It was found that student reactions to the program experience were positive, and preliminary findings on cognitive dimension support the effectiveness of the program in promoting learning. —Microfiche 78 cents, paper copy $1.85 plus shipping, as document ED 281 488.


This research project was designed to explore ways of making computer text presentations more readable as a way of compensating for the constraints that computers impose on the display of text as compared with printed-on-paper displays, e.g., limited screen resolution and display area. Forty-eight undergraduate teacher education majors enrolled in an instructional technology course received either a print or computer-based instruction (CBT) statistics lesson containing low-density (concise) narrative text, high-density (conventional) text, or the density type they preferred (learner-control). Results showed that the low-density display reduced completion time relative to the high-density version while yielding equivalent achievement. However, subjects receiving the lesson in the print mode had shorter completion times and higher achievement than their CBT counterparts. Attitude results showed that, although CBT was favorably regarded, it was perceived as longer and slower-moving than print. A discussion of these results and their implications for designing instructional material in accord with CBT attributes and learner characteristics concludes the report. An extensive reference list is provided as well as samples of the low- and high-density frames from the CBT lesson. —Microfiche 78 cents, paper copy $3.70 plus shipping, as document ED 282 529.


This study focused on the cognitive conflicts experienced by young children in using software programs that provided them with tools to create and/or combine individual graphic elements into larger structures. Six five-year-old children, none with prior computer experience, were observed using three programs—Kids at Work, Picture, and Springboard. Through 12 sessions, each child spent 15 to 20 minutes per week interacting with the microcomputer and the same program. Observations revealed several types of conflict caused by software constraints when a child began to build a conceptual picture, e.g., only one of the programs (Kids at Work) allowed the children to change the direction faced by individual graphics after they had been put in place, and the children did not at first understand the "color fill" function of Picture Perfect and there was no way to correct their mistakes. These results suggest that the constraints of these particular software programs short-circuited the children's interest in and attention to that experience. It is concluded that if software for young children is to maximize their cognitive development, it should provide an opportunity for children to exercise their intentions, reflect on the results of their actions, and subsequently revise these intentions/actions. It is suggested that the Logo programming language and software that emphasizes kinesthetic movement are types of software that might facilitate cognitive development. References are included. —Microfiche 78 cents, paper copy $1.85 plus shipping, as document ED 279 311.

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