

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 and 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; Wackerman, 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-

searchers and theorists who share concerns about improving instruction would exchange ideas with those who are preparing classroom teachers. However, instead of such collaborative ventures, there appears to be a long-maintained gap between the instructional design literature and the literature typically used by teacher educators and public school teachers. While the present paper was being prepared, a check was made of ERIC and CIJE indices to detect patterns in the use of "instructional design" to identify publications. Many of the 1,100 items found from the past two decades are concerned with "media" and "instructional technology" (which usually refer to some form of equipment) or are explicitly concerned with training applications. The education literature reveals comparatively few attempts to relate instructional design theory and methods to teaching practices (i.e., K-12 use), even though there seems to be somewhat more interest in recent years than was true twenty years ago. Fortunately, there are some exceptions to this general statement. Bernstein (1985) recently noted that instructional design ideas are sometimes used when selecting textbooks. Sullivan and Higgins' (1983) book, *Teaching for competence*, is proving to be useful in helping teacher education students to learn about and use instructional design skills, as is evident in Driscoll's (1984) review. The present paper explores some reasons why these two examples represent exceptions rather than the rule.

Relevance of Instructional Design Skills ¹

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, respec-

tively, 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

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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-

ceive attempts to identify skills as being counterproductive or even destructive for teaching as a profession. Thus, some educators perceive more problems than prospects in identifying instructional design skills.

For educators who choose to identify instructional design skills, certain issues emerge as they go beyond broad philosophical positions and more closely consider what it means to be an effective teacher. Identifying teaching skills in general, and instructional design skills in particular, presumes that teachers and teaching techniques *can* make a difference in a student's educational progress. Anyone familiar with the mass media or the professional literature over a period of time knows that there is controversy about this view. There are some authors who take the position that students will learn no matter who the teacher is or what the teacher does. Over the years various publications have contained titles with some variant on the theme, "Do teachers make a difference?" For example, Stephens (1968) seems to have been quite skeptical about a teacher's impact, even suggesting that at least some students learn "spontaneously" no matter what instructional techniques may be used. At a regional educational research conference a few years ago, another speaker extended this theme

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

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 Silvernail 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 & Silvernail, 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 Silvernail 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-

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the position that teachers simply *deliver* or *implement* instruction. Advocates of such a view contend that "good" teachers mainly follow curriculum guides and administrative directives. They contend that teachers typically have little or no involvement in the *design* of their instructional methods and procedures, since those decisions are usually made by curriculum coordinators, principals and other administrators.

On the other hand, critics of that position contend that teachers do *much more* than merely deliver or implement instruction. Persons taking this latter view (cf. Briggs, 1977, 1980, 1982; Kerr, 1981; Shavelson & Stern, 1981; Tyler,

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

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, teachers tend to be 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.

ogy textbooks was examined to detect the types, if any, of instructional design skills covered in each book. Listed by author and year in Table 1 are the educational psychology textbooks which were examined.¹

Fairly conservative "scoring" procedures were used. An "X" indicates that a given textbook provides *some discussion* of the particular skill. No notation was made if the topic was only mentioned in passing. The procedures used permit general comparisons without indicating special emphases of the respective books. This

Use of Instructional Design Skills

To what extent do teachers *use* instructional design skills? Answers to this question should be of interest to teachers and teacher-educators, given the importance that at least some educators ascribe to instructional design functions. Some teacher-educators have even expressed concern that, if *teachers do not* have adequate preparation in *instruction design*, someone other than the classroom teacher *may gain control over classroom instruction*.

Table 1
Instructional Design Skills Included in Illustrative Introductory Educational Psychology Textbooks

	Biehler 1978	Cronbach 1977	Gage & Berliner 1979	Glover, Bruning, & Filbeck 1982	Good & Brophy 1980	Lindgren 1980	Owen, Froman & Moscow 1981	Schwartz 1972	Sprinthall & Sprinthall 1981	Woolfolk & Nicolich 1980
A. STUDENTS' STATUS/NEEDS										
1 Evaluation times, places	X	X	X	X	X	X	X	X	X	X
2 Select instruments	X	X	X	X	X					X
3 Develop instruments	X	X	X	X	X		X	X	X	X
4 Quantity information	X	X	X	X	X		X			X
5 Affect./cogn./psychomo. attrib.	X	X	X	X	X	X	X	X	X	X
6 Students' functioning level		X	X	X	X		X	X	X	X
7 Learning needs	X	X	X	X	X		X	X		X
8 Learning styles		X	X	X	X				X	
9 Interpret information	X	X	X	X	X	X	X	X	X	X
10 Non-test monitoring		X		X	X	X				
B. PLAN/PREPARE INSTRUCTION										
1 Plan with others	X	X	X	X	X	X		X	X	X
2 Select goals	X	X	X	X	X		X	X	X	X
3 Analyze existing curricula	X	X		X	X				X	
4 Distinguish among objectives		X		X	X					
5 Identify curricular content		X	X	X	X				X	X
6 Evaluate existing materials		X		X	X					
7 Prepare measurable objectives	X	X	X	X	X		X			
8 Conduct task analysis		X	X	X	X		X		X	X
9 Identify learning hierarchies		X	X	X	X					X
10 Cogn. learning requirements	X	X	X	X	X	X	X		X	X
11 Affect. learning requirements	X	X	X	X	X	X		X	X	X
12 Behav. learning requirements	X	X	X	X	X	X	X		X	X
13 Select instruct. strategies	X	X	X	X	X	X	X	X	X	X
14 Prepare materials/activities		X		X	X			X		X
15 Diagnostic/prescriptive teaching	X	X		X	X					X
16 Plan to group students	X		X	X	X	X	X	X	X	X
17 Plan individual experiences	X	X	X	X	X	X		X		X
18 Write specific lesson plans		X	X	X	X					X
19 Predict effectiveness		X		X	X					X
C. CONDUCT/IMPLEMENT INSTRUCTION										
1 Establish atmosphere	X	X	X	X	X	X	X	X	X	X
2 Establish rapport		X	X	X	X	X		X	X	X
3 Provide directions		X	X	X	X		X	X		
4 Gain/maintain attention		X	X	X	X				X	
5 Present info./explanations		X	X	X	X		X	X		
6 Community resources				X	X					
7 Facilitate other opportunities				X	X			X		X
8 Inductive/deductive thinking		X		X	X			X		X
9 Critical/creative thinking	X	X	X	X	X	X	X	X		X
10 Facilitate retention, retrieval	X	X	X	X	X		X	X	X	X
11 Student's responses		X	X	X	X	X		X	X	X
12 Arrange feedback and motivation	X	X	X	X	X	X	X		X	X
13 Conduct group activities		X	X	X	X	X	X		X	
14 Arrange individualized activities	X	X	X	X	X	X		X	X	X
15 Use audiovisual, other resources		X		X	X			X		
16 Modify teaching strategies	X	X	X	X	X					X
D. CONDUCT ADMINISTRATIVE DUTIES										
1 Arrange physical environment				X	X	X				X
2 Establish, maintain routines					X					X
3 Supervise aides, tutors					X					X
4 Maintain records/resources				X	X	X				
E. COMMUNICATE WITH OTHERS										
1 Counsel/confer with students					X	X	X	X		
2 Confer with parents					X	X	X	X		
3 Confer with other educators						X	X	X		
4 Involve others in school prog.							X	X		
5 Establish profes. relationships							X	X		
F. PERSONAL/PROFESSIONAL SKILLS										
1 Teaching skills/subject matter	X		X		X	X	X	X	X	
2 Personal/interpersonal skills	X		X		X	X	X	X	X	
3 Plan self-improvement	X		X		X	X	X	X	X	
G. STUDENTS' PERSONAL QUALITIES										
1 Learning-to-learn skills		X	X			X		X	X	X
2 Social interaction skills		X				X		X	X	X
3 Attitudes, etc.		X				X		X	X	X

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’m already doing 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 method 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 an “NIH” (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 (1988) doctoral dissertation investigated the influence of “source” on teacher’s 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 pre-service 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. Snelbecker & Stepansky, 1985). 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*.

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