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ABSTRACT

Programmatic instructional development refers to sequenced and coordinated efforts to produce effective instructional programs which cumulate over time and which attain outcomes that would be impossible under non-programmatic projects. As practiced at the Southwest Regional Laboratory (SWRL), it involves the combined efforts of specialists from such fields as education, the social and behavioral sciences, and the information sciences. SWRL has consistently defined an instructional product as "organized methods and materials which accomplish specified instructional outcomes under natural conditions." An instructional product becomes an instructional program with the addition of the human resources support system and the instructional management system required to effect instructional improvement. The staff at SWRL recognizes that the program one is currently producing is always third best; the second best is the one you are working on, but is not yet deliverable, and the first best reflects ideas that are bright and promising for the future. Programmatic instructional development, coupled with the required continuous direct allocation of personnel and financial resources, results in a high degree of replicability and an actual attainment of reliable increments in the instructional effectiveness of a given program. (JY)

PROGRAMMATIC INSTRUCTIONAL DEVELOPMENT

Richard E. Schutz

ABSTRACT

A discussion of the implications and potentials of programmatic instructional development as an area of professional endeavor. Indications of the rapidly advancing sophistication and complexity of the field are presented.

PROGRAMMATIC INSTRUCTIONAL DEVELOPMENT[1]

Programmatic instructional development is a relatively new area of professional endeavor which is rapidly advancing in sophistication and complexity. The recent popularity and fluid growth of the endeavor create certain difficulties for this presentation. As is the custom in education, several of the key concepts in the endeavor have been overgeneralized and distorted faster than they could be reasonably applied. Terms such as product, system, formative evaluation, and instructional management are being used with promiscuous abandon to try to lend new status to tired traditional practices. Thus, there is a strong likelihood that the meaning of some of the terms I'll be using has already been inflated out of all value.

My article, "The Nature of Educational Development," (1970) was an attempt to counteract this operation of Gresham's Law of educational fads. That article was intended to define the general boundaries of programmatic instructional development. The present remarks will address personal implications and potentials of such efforts.

Point one. The field of instructional development requires more, rather than less, general intellectual resources and specialized discipline competence from an individual than does the field of instructional research. Although some people are beginning to call themselves educational developers, the term "developer" is an unfortunate one, and persons who use it tend to be as shallow professionally as persons who call themselves educationists. Programmatic instructional development involves a division of labor among highly competent professional specialists, each doing his own thing in the interest of accomplishing a common specified outcome.

Educational researchers have tended to be independent operators. The style has been medieval rather than modern. Individual research barons over time surround themselves with few or many itinerant serfs and some command the allegiance of a band of knights in shining armor who do battle in the broader world. The results of such efforts accumulate, but they do not cumulate. This condition has been generally acknowledged by the educational research community within the past few years, but efforts to do something about it are still in their infancy. It is an open question how fast it will be possible to accomplish in <u>human</u> enhancement endeavors what it took a couple of hundred years to accomplish in the science and technology generated during the industrial revolution.

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[1]A version of this paper was presented at the Annual Meeting of the American Educational Research Association, Minneapolis, March 5, 1970.

My point is that treating the lore and knowledge of educational research as directly relevant to educational development is a serious error. A one-man developer will inevitably be superficially trained and will operate superficially. Interdependent, coordinated, and sequenced efforts of highly competent professional specialists are required in a modern development effort. These efforts cannot be effectively conducted by prima donna generalists who call themselves "developers." The level of personal methodological competence and substantive specialization of the individuals involved is as important in determining the quality of a development as of a research effort. Now, and likely forever, such high quality persons are likely to be trained and to identify themselves as discipline specialists rather than as developers.

Although educational researchers can shift to development efforts just as physicists can shift to engineering efforts, a somewhat different personal orientation is required. It is unfortunate that the hypothesis-testing perspective has so strongly influenced educational research methodology. It is, of course, quite feasible to cast either research or development activities into a hypothesis testing framework. To do so, however, leads to a formalism and methodological dogmatism which usually takes precedence over the outcomes of the activity.

It is far more productive to view both research and development as uncertainty reducing rather than hypothesis testing processes. Uncertainty may be associated either with abstract concepts and their interrelationships or it may be associated with real world accomplishments. Procedures directed to reduce the uncertainty associated with relationships among abstract concepts -- theories -- may be termed research. Procedures directed to reduce the uncertainty in accomplishing natural world outcomes may be termed development. Several distinctions between research and development endeavors are shown in Table 1. While the table lists distinguishing differences, I want to emphasize that the researcher operating in a development context retains all of the intellectual challenges of the research context and adds a few. Not only does development effort generate reports, it also contributes directly to the creation of organized methods and materials which can accomplish socially useful ends. This is a personal satisfaction which is only gained by wishful extrapolation in a research context.

The distinctions between researcher, "developer," and programmatic development have consequences for manpower training as well as for the conduct of development efforts. In my view, it would be a serious error to establish special university training programs designed to prepare "educational developers." The requirement for specialists with sound methodological training in various research areas and with experience in educational development activities will certainly increase. However, the need is for specialists, not generalists. The specialist requirements are not limited to education and the social and behavior

TABLE 1

Distinguishing Characteristics of Research and Development

	Research	Development
Base	Science	Technology
Outcome	Knowledge	Techniques
Artifact	Reports	Products
Time Referent	Insensitive	Sensitive
Boundary Limits	Variables	System
Producer	Individual	Group
Control	Peers	Users
Management	Loose	Tight

science disciplines. Specialists are also required from the information sciences, linguistics, business, engineering, and the health fields. I would not rule out the hard sciences or the humanities, but at the doctoral level, the chief value of such specialists in an instructional development effort is to specify and sequence desired instructional outcomes. Unfortunately, such people tend to view their capability as extending more broadly, and this severely reduces their net as well as their gross potential contribution.

The conscious division of labor in programmatic instructional development has a couple of other consequences which are worth pointing out. First, it is possible to make very effective use of non-doctoral persons to accomplish many of the tasks conventionally handled by the doctoral level researcher. At SWRL we run a ratio of about two bachelors-masters people and one secretarial-technical person for each doctoral level person. It is possible to have highly competent artists, printers, computer programmers, school liaison personnel, editors, story writers, test constructors, statisticians, audiovisual and instrumentation specialists, experiment conductors, as well as general "graduate student type apprentice" assistants. This means that rather than a do-it-yourself generalist, it is possible for each doctoral person to function as a specialist, taking advantage of the skilled services of other specialists.

Under these circumstances, one begins to view personal time priorities from a different perspective. The priority is no longer a hot idea. Out staff generates hot ideas at a dime a dozen. Each hot idea, or hypothesis if you like, could be the basis for a study. The criterion for deciding whether the potential study should be performed is not that it would generate a project grant, but that it would likely yield the most useful information in terms of time and cost to reduce the uncertainty associated with developing some aspect of an instructional program. Thus, one is able to think much bigger, move much faster, and over time see more substantiation of his efforts in programmatic instructional development than in most other areas of education at the present time.

Perhaps it is now time to indicate more precisely what I mean by the term programmatic. The term "programmatic" as used here refers to <u>sequenced</u> and <u>coordinated</u> efforts which cumulate over time and which attain outcomes that would be impossible under non-programmatic projects. It is true that small project support, when added to an ongoing publicly supported institution such as a school district or university, can generate many separate activities. On a straight cost comparison of number of individual activities, "little science" is inherently a better bargain than "big science." The problem is that little science is also inherently uncoordinated and noncumulative. Unfortunately, Educational R&D is still all little science. The

Educational Laboratories are viewed by some as "big science," but they have been financially starved from the beginning. Lee DuBridge has remarked that the biggest lesson learned by the physical scientists during World War II was how to spend money. Unfortunately, the physical scientists tended to overdo their learning and the backlash on this is currently affecting R&D support generally, including that for educational R&D.

In many respects, educational R&D appears to be in much the same shape as the physical sciences in the pre-World War II period. Whether there is any further parallel in the history remains to be seen. It is ironic that the War on Poverty, which accompanied the 1965-68 growth of educational R&D, lacked a number of the sustaining scientific growth properties of World War II, which propelled the physical sciences to a prominent level. Rising social expectations have exceeded social accomplishments. While the original expectations, in retrospect, were excessive, so now are the current disappointments excessive, but they are creating a revolution of rising frustrations.

Daniel Lerner, the political scientist, has noted an analogous situation in a very different domain -- the recent history of the developing countries of the world following Marshall Plan and Point IV efforts of the United States in the 1950's:

> "The spread of frustration in areas developing less rapidly than their people wish can be seen as the outcome of a deep imbalance between achievement and aspiration. In simple terms, this situation arises when many people in a society want far more than they can hope to get. ... A serious imbalance in this want-get ratio characterizes areas beset by rising frustrations. Typically, in these situations, the denominator increases faster than the numerator; that is, aspiration outruns achievement to such a degree that many people, even if they are making some progress toward their goal, are dissatisfied because they get much less than they want. Indeed, in some developing countries aspirations have risen high enough to annul significant achievements in the society as a whole" (1969, pp. 189-90).

It remains to be seen whether the current Federal priority to stem the revolution of rising frustrations will result in a regressive reaction for education R&D. However, it should lead to long-range advancement as responsible persons begin to recognize that the solution of social problems must give high priority to the knowledge problem; of supporting sustained efforts to generate knowledge that permits problem solutions. President Nixon's announcement of the National Institute of Education is an extremely hopeful sign in this regard.

Meanwhile, let's get back to the ranch. One hears a good deal of talk these days about educational products. SWRL has contributed to this talk, but we do not hold ourselves responsible for the way the term "product" is being used by others. SWRL has consistently defined an instructional product as "organized methods and materials which accomplish specified instructional outcomes under natural conditions." Thus, a product represents the organized wherewithal for reliably accomplishing socially desirable ends. We have been careful to distinguish products from people. We have also been careful to distinguish products from unorganized materials and practices which do not reliably produce specified results. This eliminates considerable confusion. It is also important to recognize that instructional products do not an instructional program make. Two additional requirements must be considered: the human resources support system and the instructional management system required to effect instructional improvement.

In addition to students and teachers, SWRL-developed instructional programs make specific provision for parents, tutors, and aides; principals, supervisory and curriculum specialists, pupil personnel specialists, and district administrators; development agency and monitoring support agency personnel.

This structure is also the basis for the instructional management system and the installation training system. The instruction is computer managed. En route criterion-referenced tests are automatically scored and analyzed and reports are generated for the teacher indicating student performance and suggesting supplementary instruction as appropriate. Cumulative summary reports are also generated for the various other groups included in the human resources network.

The currently available supply of knowledge and qualified people in instructional product development is small. Most of the recent literature concerning the field is rhetorical, not operational, and if you take a close look at the actual work of people who are espousing fancy models of development, you find little relationship between their model and their activity. It is easy to talk in general of a design-test-retest-produce model, but the what-and-how-to of this very general paradigm does not follow in a straightforward deduction. It must be learned the hard way.

While physical analogies such as automobiles and bridges are better than nothing, they wear very thin, very quickly. The chief limitations with these product analogies, so far as I'm concerned, is not that they are inherently faulty, but that they are simplistic -- they don't go far enough. It is true that we need educational products analogous to automobiles and bridges. A few of these have actually been generated in the past couple of years. That is, I can identify organized methods and materials for you which will dependably accomplish specified instructional consequences under natural real-world -- what we call hands-off -- conditions.

However, the automobile functions in a complex environment of support -- highways, the petroleum industry, etc. The automobile also has a complex delivery network -- marketing, advertising, etc. To consider the automobile out of this context is simplistic. Similarly, it is simplistic to consider instructional products without considering support system and delivery system requirements.

It is easy to become overwhelmed by the apparent complexity of such support and delivery system requirements in an educational context. To expect instant change in current educational marketing and training institutions is obviously as silly as to expect it of public schools. The temptation is to branch either to despair and withdrawal or to dismay and revolution. Examples of persons pursuing each branch are now dangerously prevalent throughout society. Neither route can be expected to effect a solution. The trick appears to be to recognize the complexity and allocate reasonable personnel resources to reduce the complexity over time. The seven recommendations recently set forth by Patrick Moynihan (1970) appear eminently reasonable.

"First, put first-rate minds to work." What constitutes a "first-rate mind" is relative, but if in doubt, figure you should keep looking.

"Second, establish measurements of problem situations that get as close as possible to what it is you are trying to achieve." Secondary outcomes are fine, but they are not substitutes for primary results. Direct measures of significant educational outcomes are not that hard to come by if you don't get intellectually tied up in "the criterion problem" or in psychometric trivia.

"Third, begin an experimental mode." This point is not necessary to embellish for this group. Moynihan's reaction is to non-replicable anecdotes or specially selected situations such as "gifted teachers."

"Fourth, be on guard for social aggression masking as social commitment. ...One of the better ways of doing competitors in is to assert a superior concern for either the general welfare, or else the welfare of some specifically deprived group. Behind this facade there goes on the bloodiest form of ethnic competition, individual aggrandizement and group aggression in general."

"Fifth, do not expect instant results. ...Hard as it may be for the ardent heart to believe this, overpromising hurts everyone."

"Sixth, think of processes, not institutions" -- of what goes on in and outside of the schools, not of the schools per se.

"Finally, be of good cheer." Dramatic improvement is unlikely. Small, steady moves in a clearly comprehended direction may be possible.

While these points could be regarded as "happy talk," I consider them useful attitudinal guidelines for programmatic instructional development.

I do not wish to create the impression that instructional development technology is presently vacuous. Far from it. This is a rapidly advancing area of knowledge. Consider Table 2. The contents of the table are accurate but are easily misinterpreted. First, the stages are not linear. That is, one does not first start and complete formulation, then start and complete prototypes, and so on. Concern for and attention to the installation and program stage are present from the beginning. If none of the uncertainty associated with the various stages were present, it would be possible to go to the program stage immediately. While each stage feeds the others in a dynamic sequential fashion, the sequence is not a linear vector.

None of the stages ever really ends. For example, before the SWRL staff have completed any one formulation, the results are already obsolete as far as they are concerned. This dynamism can easily create an insurmountable personal and management dilemma in a continuous operation. Some form of task completion is vital for both personal and institutional reasons. The resolution is to recognize that the program one is currently producing is always third best. The second best is the one you are working on, but is not yet deliverable. The first best reflects the work you would rather be doing: the rough ideas which are always bright and promising in an untested form and which, over time and testing, phase into new second best and third best programs. At SWRL we deliberately, directly, and consciously label these distinct generations of effort.

<u>T</u> is the now generation. It is always something we have become tired of; but it is nearly ready to let go of, and it does represent specifiable advances over past state-of-the-art alternatives.

<u>T+1</u> is the model that commands the greatest proportionate staff effort at any given time since its development is concurrently active at many stages. It is on the way to becoming the new model <u>T</u>.

<u>T+2</u> is the wishful model. It represents the cumulation of the activities that staff think they would really like to be doing, rather than working on the <u>T+1</u> or <u>T</u> model. Some of this wishfulness adventitiously vanishes over time. Some is washed out in subsequent empirical efforts. And some turn out to provide the specifications for the forthcoming <u>T+1</u> model.

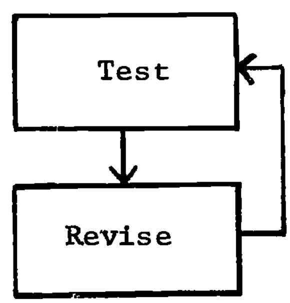
TABLE 2

SWRL Instructional Product Development Stages

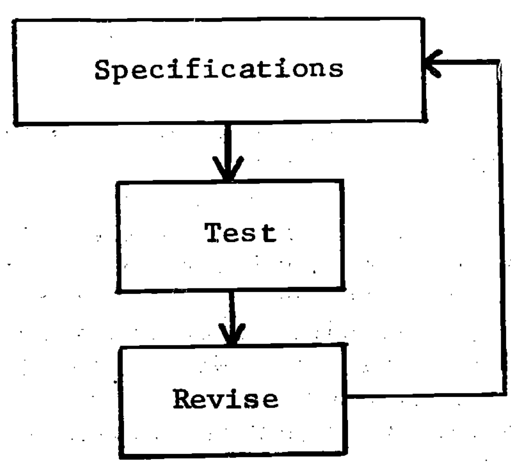
Stage	Activity	Uncertainty Focus	Typical Duration of Tryout
Formulation	Specifying the desired instructional outcomes; identifying the skills required to achieve the outcomes; designing strategies for teaching the skills.	Specification parameters.	One to several experimental sessions.
Prototype	Testing instructional strategies by empirically investigating variations of materials and methods, and assessing the impact of each variation.	Product specifications.	One day to few weeks.
Component	Producing a segment of instruction and trying it out with a single learner or groups of learners in a natural setting to determine if the instruction accomplishes its objectives.	Instruction parameters.	One week to few months.
Product	Successively trying out and revising a Combination of components in a natural setting until acceptable levels of performance have been attained.	Instructional effectiveness.	One to several "semester" units.
Installation	Integrating a product into programs which are combined with existing school instruction to determine procedures for widespread implementation.	User training.	One to several "semester" units.
Program	Involving those agencies which will be responsible for maintaining operational use of a program without the direct assistance of the development agency.	Program management.	One to several years.

Introducing these time considerations does at least two things. First, it gets products out, meaning it provides the conditions necessary to get people to let go of the results of their efforts -- not an easy task. Second, it contributes to staff mental health. One of our biggest personal adjustment problems is what I call the "whipsaw dilemma." Inevitably, before a given development effort is completed, its limitations and defects are clear to all who have contributed to it. Each staff member tends to assign himself personal blame for these limitations, not realizing first that the ability to identify the limitations is probably limited to those intimately involved in the development, that the anticipated dire consequences of the limitations may well be overestimated, and finally, that the removal of these limitations is the basis for one's job in the future. This self-defeating mechanism is undone by stretching out from first best to third best.

Three other facets of Table 2 warrant attention. The first is the emphasis on specifications. The essence of development is iterative feedback. But this has usually been perceived in education as a test-revise-retest cycle.



This is a non-analytic, uncontrolled, and inefficient paradigm. Tremendous gains are made by adding a specifications box to the paradigm:



It is erroneous to infer that specifications are generated cleanly and simply or that they are originally conceived in the summary form in which they may be later stated. Most of the work in preparing specifications is thrown away or is synthesized from much broader paper work. The point is that it is more reasonable to key on specifications as the basis for revision rather than on the product per se. Documentation thus becomes a, if not the, prime concern in programmatic instructional development.

A second point revolves around the concept of subset optimization. It is both reasonable and necessary to use subset criteria. For example, although specified changes in pupil behavior represent the criterion which instructional development is attempting to optimize, it is very unwise to use this as the sole feedback basis. For example, our staff have, at times, been very disappointed when the introduction of specific procedures such as teacher training, audiovisual segments, etc., have not improved pupil performance. One could throw out the prototype and look in a different area. But on closer examination and analysis, we have each time determined that the intended function was itself not being performed by the instructional component. That is, the teachers learned nothing or the wrong things from the training, the audiovisual segments were being "misused," etc. With subcomponents performing optimally, one has a much better likelihood of accomplishing larger functions optimally. Optimization is unlikely achievable with unreliable subcomponents. This sounds obvious, but it is almost universally overlooked in education.

The final point involves the distinction between comparative and cumulative experimentation. The experimental tradition in the behavior sciences is comparative. One compares effects of different phenomena introduced concurrently or simultaneously. An equally venerable experimental tradition involves comparisons over time which cumulate in more optimal performance. This tradition has often been rejected in education because of industrial connotations. Cumulative optimization methodology can, however, be applied to educational endeavors without considering people as machines; just as comparative experiment methodology may be applied without considering people as fertilizer.

Two things have impressed me in our use of the cumulative optimization approach at SWRL. The first is the high degree of replicability that is possible. If one is concerned with reducing "treatment variance" rather than analyzing it, the signal-noise ration very quickly can be improved. This has been very evident in the criterion-referenced measurement of pupil performance. The differential difficulty of a set of skills is very reliable. That is, word attack skills are more difficult than word recognition. Word selection skills are more difficult than construction skills, and so on. This differential difficulty holds up very well across extreme differences in personal characteristics of pupils and in ecological characteristics of schools. This is highly useful information in a development context, since it permits the differential allocation of uncertainty reducing efforts to shore up difficult-to-attain areas while maintaining performance in "no problem" areas.

The second impressive thing has been the actual attainment of reliable increments in the instructional effectiveness of a given program against specified objectives. This incremental improvement has involved full-year programs under hands-off tryout conditions. I had had faith that such improvement could be demonstrated, but I must admit that after so much previous experience with NSD comparative experimentation, I was holding my breath the second year.

Programmatic instructional development by definition requires continuous directed allocation of personnel and financial resources. SWRL planning is within a three-five year time frame. That is, we arbitrarily limit the time to reduce an effort from T+1 to T and out to no more than five years. This is pressing it and is due to the still unreasonable pressure from both the schools and the Federal Government to "produce quickly." A four-seven year time frame would be more reasonable and less costly in the long run. This does not mean that it takes four-seven years to "peek" at the results. Development is inherently inefficient compared with production; the bulk of the total work output of a development effort is by intent discarded. But the small, steady steps of uncertainty reduction which are cumulated are clear from the beginning. If they are not, the development effort is a boondoggle.

By definition also, any development effort involves a continuous risk of failure. This risk is also characteristic of the overall enterprise of instructional development at the present time. Programmatic instructional development has not yet fully paid off demonstrably, but the risk is being rapidly and successively reduced. Achievable returns now appear to be extremely high and the risk low for both personal and societal levels of involvement.

REFERENCES

Lerner, Daniel. "Communication for Modernization." In Arnold A. Rogow (Ed.) Politics, Personality, and Social Science in the Twentieth Century. Chicago: University of Chicago Press, 1969. Chapter 8.

Moynihan, Daniel P. To Solve Problem First Define It. New York Times, January 12, 1970.

Schutz, Richard E. The Nature of Educational Development. Journal of Research and Development in Education, 1970, 3, 39-63.