The Third Decade of Educational Technology

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1. The Past Two Decades of Educational Technology

We are now at the beginning of the third decade of the educational technology movement. Educational practices have always been helped by various technological products, ranging from printed textbooks to audiovisual aids, classroom equipment, and school buildings. Technologies have been at work in education ever since the start of modern schools. Indeed, the very concept of the modern school has developed in answer to the needs of the technological society of the post-industrial revolution era.

In spite of this history, however, it has been only during the past two decades that the term "educational technology" has come into widespread use. Concepts such as school architecture, audiovisual education, etc., were much more common before that, although occasionally a limited and arbitrary sub-set of technologies at work in education was referred to as "educational technology." With some degree of arbitrariness, I wish to place the start of the contemporary educational technology movement as being around 1956.

A technology is something more than the sum total of the techniques useful in performing specific tasks. In addition theories and programs, or at least perspectives which function as the schemata for various machines, are necessary. Techniques and knowledge must interact to form a meaningful organization.

In or from around 1956 schemata putting hardware, software and pedagogies together in various contexts were provided. B. F. Skinner, in his debate with Carl Rogers, one of the major events of the 1956 APA Convention, publicized the idea of a teaching machine or the "Skinner box to teach human students" as a member of the audience put it. As it was soon to become clear, it was not the machine but the concept of programmed instruction which was revolutionary.

The training psychology model, with the rich experience it gained after being applied to military training during World War II, had the rigor, clarity and simplicity necessary to subsume a technology of hardware. Other psycho-pedagogical models, such as Piagetian and Galperinian models which came to claim world-wide audiences again in the later 1950's, were also found to provide alternative programing principles once the idea of teaching machines had been set forth.

This timing coincided with the rapid growth of an electronic information processing technology. From around 1956 high-speed electronic computers became accessible to behavioral scientists, and with the progress of transistorization, this accessibility drastically increased during the next few years. Pedagogical programers became able to conceptualize computerized teaching systems (Stolurow, 1961).

An interesting coincidence was the concurrent Zeitgeist promoting centralized and new curriculum projects. In March 1956, Jerrold Zacharias proposed a project to develop "movie aids for teaching physics in high schools" which soon grew into the pioneering Physical Sciences Study Committee (PSSC) project (Killian, 1964). The PSSC pattern has been followed in various subject matter areas. Similar excellence-oriented, nation-wide curriculum revisions took place in various other countries such as England, the USSR, Japan, and so on.

Although it symbolically started as an audiovisual materials production project, the new curriculum movement did not aim at just the revision of the courses of study. The development covered pedagogy, materials, machines and devices for better presentation and learning activities, and evaluation methods. It called for re-designing the total system. And, being nation-wide projects, the products had to be exportable, a requirement which made some kind of a systematic technological approach necessary. Thus, in the period, 1956 through 1965, pedagogy, information science, teaching and the audiovisual materials industry amalgamated to define a
discipline labeled "educational technology."

Educational technology in this first decade was typically conceived as the design and development of an instructional system which would bring about the best learning in terms of some externally defined goals or values. The course of growth, however, was dialectical rather than straight-tracked. The educational scene of 1966, and for a few years following, was characterized by worldwide student unrest. This was, among other things, a revolt against the concept of institutionally defined control and optimization. Relevance, self-identity, humanity, and so on, constituted the basic tone of the slogans. Instead of training to serve externally defined goals, integrity structured around one's own system of values became the goal.

It would not be appropriate to overestimate the results of the student movement, but it was certainly a manifestation of this Zeitgeist. In relation to educational technology, this Zeitgeist was an anti-thesis against the performance-oriented criteria of the earlier period. The term "humanization" came to be preferred to "individualization." Two events which took place early in the decade 1966–1975 demonstrate the shifts which reflected this Zeitgeist.

In 1967, putting together the results of an intensive study which had been conducted since 1964, the Central Advisory Council for Education in England wrote up the report which soon became known as the Plowden Report. With clarity and frankness rarely seen in reports of governmental committees, the report advised schools to become a place where children could learn to be, and enjoy being, themselves. They wrote: "The school sets out deliberately to devise the right environment for children, to allow them to be themselves and to develop in the way and at the pace appropriate to them" (The Central Advisory Council for Education (England), 1967). This assertion does not sound so new to those who witnessed one or more of the versions of progressive education in the 1930's. However the fact that the assertion was made anew, and by a committee at the highest policy making level of a great nation, was nevertheless noteworthy. The committee positively advocated self-initiated activities, first-hand experiences, flexible curricula and an open timetable. The influence was far-reaching. "Open education" or "informal school" methods patterned after the British infant schools grew to become a strong movement in the United States, Canada, Australia and Western Europe.

The idea of open education was to have children learn based upon their intrinsic motivation. Instead of control through direct command and learning of information as processed and prescribed by the teacher, the ideal required indirect control through the design of environmental stimulation. The environment should be designed to invite children into self-initiated learning and to provide a variety of support in helping them follow through. The educational technology needed in this context was not the same as that needed in direct training, but the need itself was just as, or even more, urgent. Not only was a requirement for teaching machines and other instructional devices designed to help self-learning, but new concepts of school architecture, environmental design and even urban design also had to be developed.

Another event which reflected the spirit of this decade was Sesame Street. At the beginning of this second decade, it was apparent that the various Headstart Projects in the United States were not producing results convincing enough to justify the huge expenditures they entailed. Supported by various funding agencies seeking an alternative approach, the Children's Television Workshop started its preparations in 1966. Televising started in the fall of 1969, and an evaluation of the first six months, published in 1970, declared Sesame Street a success in most of its curriculum goals (Educational Testing Service, 1970). While the present author is not unaware of the technical problems of this evaluation and recent criticisms, it is undeniable that the programs were able to teach certain basic cognitive skills while the children were having fun. The fate of TV programs are that children are free to choose either to listen or not to listen. It is the responsibility of the producer to "lure them" into listening. Thus, while there is a well-designed structure behind the curriculum in Sesame Street, there is also very little direct control of the children's behavior. Even the frequently used technique of having a star or well-known personality invite the listeners to join in the activities is carefully avoided. In a way, Sesame Street capitalizes on those characteristics of TV as a medium which demand "participation and involvement in depth of the whole being" (McLuhan and Fiore, 1967). There is no need to point out that Sesame Street has claimed many followers world-wide. What we want to take note of here is that Sesame Street, as compared to the majority of the Headstart Projects which had a highly
structured and direct control approach, demonstrated the shift of thought in educational technology which took place in the decade starting in the middle of the 1960's.

2. The Onset of the Third Decade

We now stand at the onset of the third decade of educational technology. It coincides with the onset of the last quarter of the 20th Century. Conflicts in Vietnam, Africa and the Middle East have ceased. For the first time in a long time the year ended without any major international warfare in progress. Although we do not attribute any mystical powers to arbitrary ten or twenty-five year cycles, we hope that the world is turning towards the better and that mankind is headed towards a world more sensible than it has been in the past.

For this purpose, educators must, among other things, strive to foster internationalism and open-mindedness. As a first step, those of us who are working in educational development should become more open-minded to the different needs of different cultures, different value systems and the various stages of industrialization.

In relation to educational technologists, an important problem we have to recurrently rethink during this coming decade is the proper balance of the two approaches which we have seen in technological development over the two preceding decades. One is the effort to improve the effectiveness of mastering externally defined learning tasks, the other is an orientation towards providing a learning environment wherein learning is intrinsically motivated and self-directed.

There is no a priori criterion as to the optimality of this balance. When Japan adopted a modern school system about one hundred years ago, the degree of central control and standardization was stronger than found in most American or European models, and this external control was strengthened further during subsequent years. At that time, when a late starting nation was trying to catch up with industrialization, it had a need to train people to meet certain qualifications. To provide each student with a tailor-made education or to allow everyone to choose what he wanted to learn was a luxury. A typical scene in a classroom of a primary school under such conditions is that of a teacher lecturing in front of forty to fifty pupils, carefully following a textbook written in accordance with the course of study prescribed by the government. This method attained the desired goals as far as average achievements in knowledge and problem solving were concerned. This has been shown in recent international assessments of achievements in mathematics and science. But this high level of achievement has not been without some sacrifice. Assessments have also shown that Japanese pupils, who rank at or near the top in achievement scores, are at the same time very low in attitude scores which reflect the extent to which they enjoy the subjects as being creative and flexible.

It is wrong to accuse decision makers of one hundred years ago of designing a too tightly centrally controlled education system. In a way it worked and perhaps it was the only way they had. Having secured a certain basal level, however, we can now afford to be more sensitive to what we have missed. The assignment for Japanese educational technologists during the coming decade will be to design methods and systems which will encourage initiative, creativity and enjoyment. What balance of the two approaches is accepted as optimal however, depends very much upon the national, local and socio-cultural needs.

Individual techniques may interact with the cultural background also. Programed instruction fascinated many Japanese educators in the early 1960's, to such an extent that several monthly and bi-monthly journals solely devoted to that subject were established. In spite of this celebrated start, at present programed instruction techniques in Japan do not seem to be quite as strong as they are in the U.S. and Europe. In a cross-national study on communication between mothers and their pre-school children, which I am conducting in collaboration with Robert Hess of the United States, we are beginning to think that there is a noteworthy difference in styles of maternal control between the two countries. The tendencies of typical American mothers are characterized by clarity, directness, a step by step strategy and contingent feedback. Japanese mothers prefer a general overview, less direct control and less explicit feedback (Azuma and Hess, 1976). If this difference is definitively established, we may well reason that American children are better atuned to highly structured approaches like programed instruction, and that the principles of programing need to be modified if they are to be used in Japan.

Technology adds exportability to methods, but the exported methods may show quite different main as well as side effects in their interaction with local needs and cultures. This leads us to the
need for technology assessment at local and sub-cultural levels. A technology which success-
fully reduces the educational handicaps of minority groups in one culture may very well
amplify them in another culture. Generally speaking, any technology that leans heavily upon
advanced and industrialized machines tends to better serve the privileged classes unless special
precautions are taken at the policy level. Because
of the very fact that technology has a certain
degree of universality, its implementation should
be accompanied by careful research and assessment
penetrating into local needs, existing
technologies and cultures.

3. Regarding Educational Technology Research

Thus, we believe that for the sound develop-
ment of educational technology it is benefic-
tial that research and experience in Asia be shared by
world educational technologists.

Educational Technology Research publishes
original contributions of Japanese researchers in
educational technology. It is also hoped that
circumstances will soon allow us to introduce
research and developments from other Asian
countries. In this issue, some of the articles
selected by the editorial members are from among
articles which appeared in the Japanese Journal
of Educational Technology (Nippon Kyōiku Kō-
gaku Zasshi) and at other scientific forums dur-
ing the past year. Others were prepared specifically for this English publication. Preference was
given to those articles which were believed to be
useful to an international audience either in judging
the general trends of educational technology in Japan or in sharing common interests.

We define the area to be covered by Educational
Technology Research rather broadly. The term
technology may be considered as any system of
knowledge and techniques to achieve certain
practical purposes. In education these practical
purposes are not easy to clearly define. There are
purposes which are relatively tangible, like skills
in the three R’s, but there are also purposes
equally important but intrinsically ill-defined such
as self-actualization, creativity, and so on. Even
with highly tangible purposes, the sciences con-
cerned with learning and training are still young.
When criteria are ill-defined, the boundaries of
the network of relevant techniques, knowledge
and sciences are even more hazy. Tangible and
intangible purposes rely upon each other and any
technological optimization limited to only one
sub-set of purposes may cripple the balanced
functioning of the system as a whole. And, as we
have discussed, it is very important to be alert to
unintended side effects. Since such side effects
are unintended, scrutiny must cover a wide field.

Thus, in editing Educational Technology Re-
search, we intend to be open for contributions
from a wide variety of disciplinary backgrounds
with the behavioral, social and information
technologies being just as important as the
physical technologies.

One danger of a cross-disciplinary forum is
that rigorous academic criteria which charac-
terize each individual discipline tend to drop
out. This danger is even greater when the topic
deals with problems like those in education in
which the broad public is also interested. While
paying open-minded respect to different styles
which have emerged from different backgrounds,
we will strive to maintain a quality of disciplined
inquiry such that “the argument can be pains-
takingly examined” (Cronbach and Suppes,
1969). Hopefully in Educational Technology Re-
search, research from different fields will in-
teract to form a truly disciplined field of study.

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