DOCUMENT RESUME

ED 163 895 IR 005 873

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TITLE Experience and Paradigms in the Application of Educational Technology.
PUB DATE 77
NOTE 21p.; Paper presented at the 1976 Scandinavian Workshop/Seminar on Educational Theory and Educational Technology: Questions and Cases (June 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Adult Education; *Comparative Education; *Conceptual Schemes; Educational Development; *Educational Technology; Foreign Countries; International Programs; *Policy Formation; Systems Development
IDENTIFIERS Finland; Norway; NOVU Project; Sweden

ABSTRACT

A regional workshop with participants from Norway, Finland, and Sweden held in June 1976 analyzed the concept of educational technology as it is reflected in a Nordic project on the use of educational technology in adult education--the "NOVU" project--with the help of a scheme suggested by the 1975 Strasbourg workshop on educational technology. This report also includes discussion of alternative paradigms of educational technology, the different theoretical bases of educational technology, and their implication for educational practice, and the distinction between different conceptions of educational technology. (Author/RAO)

Rapport nr 65 1977

"Experience and Paradigms in the Application of Educational Technology"

1976 Scandinavian Workshop/Seminar on
"EDUCATIONAL THEORY AND EDUCATIONAL TECHNOLOGY: QUESTIONS AND CASES"

Report by
Mats Myrberg

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BACKGROUND

In November 1975 a workshop on educational technology was held in Strasbourg. The workshop, which was organized by the Council for Cultural Co-operation of the Council of Europe, aimed at starting an assessment of the potential and prospects of educational technology as a tool of a "permanent education" policy.

The primary concern in Strasbourg was to clarify the different views on educational technology held by the participants. The result of this work is dealt with in "Critical appraisal of present concepts and approaches" (CCC/TE (76) 4) by the rapporteur of the workshop, Sverker Lindblad.

The second step towards defining the utilization of educational technology as a tool for permanent education was a number of regional workshops, dealing with practical examples of the use of educational technology.The present report is the result of one such local seminar held on the theme "Educational theory and educational technology: questions and cases".

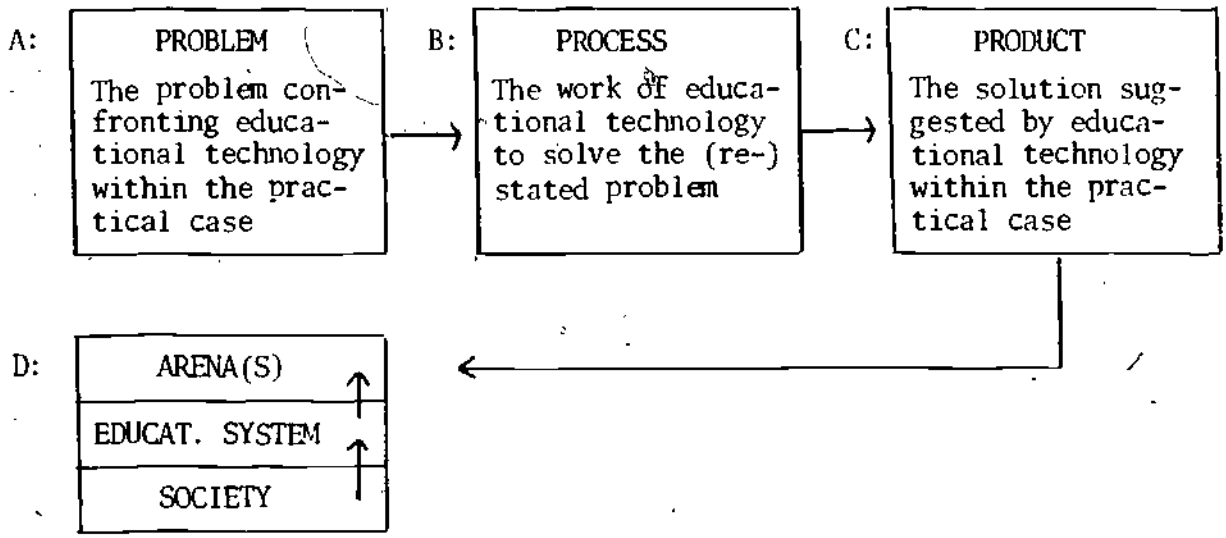
Further steps toward defining the use of educational technology as a tool for permanent education will be taken during 1977-78. European regional and central workshop/seminars are planned, which will hopefully produce a basis for practical action.

PURPOSE AND STRUCTURE OF THE REPORT

The present paper reports the work of a regional workshop with participants from Norway, Finland and Sweden held in June 1976. The workshop tried to analyze the concept of educational technology as it is reflected in a nordic project on the use of educational technology in adult education, the "NOVU" project. First, the NOVU project is analyzed with the help of a scheme suggested by the 1975 Strasbourg workshop (A more extensive description of the NOVU project can be found in Handal and Sandelin (1976)). This is followed by a section which treats alternative paradigms of educational technology as they were introduced in the discussion. Next comes a discussion of the different theoretical bases of educational technology, and their implication for educational practice. A final section deals with the distinction between different conceptions of educational technology.

I. A STRUCTURE FOR THE ANALYSIS OF NOVU

The discussion of NOVU as an example of educational technology was guided by a model originally suggested in the report from the 1975 first Council of Europe workshop (Lindblad, 1976). The model is shown in the figure below.



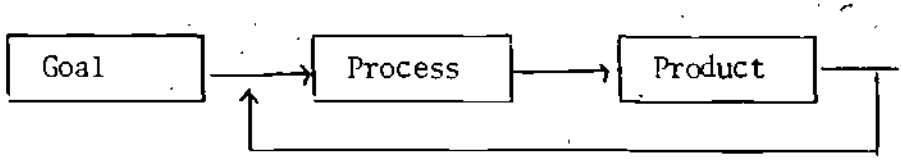
II. THE ANALYSIS

A. The problem

The problem in the NOVU project was to produce educational materials on the theme "generation conflicts" utilizing mass-media for a target group defined as "adults from 25 to 45 years of age with teenage children".

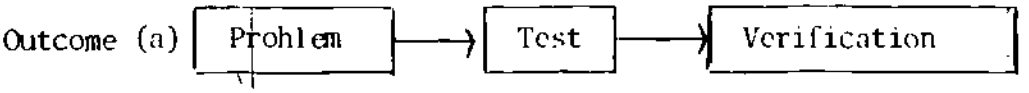
It was argued that this kind of problem formulation would hide the significance of the problem. It is impossible to analyze the problem by following this approach. No context or background is given to situate the problem. Also a distinction was made between knowledge produced by a technological process and knowledge produced by an experimental process. The two principles are illustrated in the figure below.

Technological knowledge

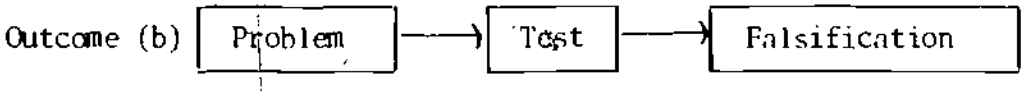


This model does not allow a verification of the problem.

Experimental knowledge



This outcome makes the problem disappear.



This outcome means that the problem is substituted by another problem.

It was questioned whether NOVU really was an example of the production of technological knowledge. The problem was not actually handed down by some higher authority, but formulated by the national project groups themselves. It could be said however, that the "NOVU problem" in Finland was formulated in a context set by the Secretary of Education: "How can less educated adults, who are handicapped by geographical, economical and social factors, get access to education?" This is another problem than using mass-media for educational purposes.

Educational technology was expected to produce guidelines for measures to improve the situation of the educationally disadvantaged, but also to produce educational "hardware" for adult education. One of the main purposes of the project was to find ways to utilize mass-media in adult education.

The initial conception of the problem was however somewhat vague. The sponsors had difficulties in specifying the task, and also in defining what was actually meant by "less educated". The group of educational technologists thus had to specify the task themselves to a considerable extent. In this way the planning group had to exercise the double role of the policy-makers and technocrats. To the extent that this is characteristic of educational technology work, it implies a severe dilemma.

B. The process

The project was organized in a rather loose manner. The staff consisted of the project leader, one educational technologist, one expert on adult education and one radio/TV producer. Furthermore, the project staff could address themselves to subject-matter experts, if

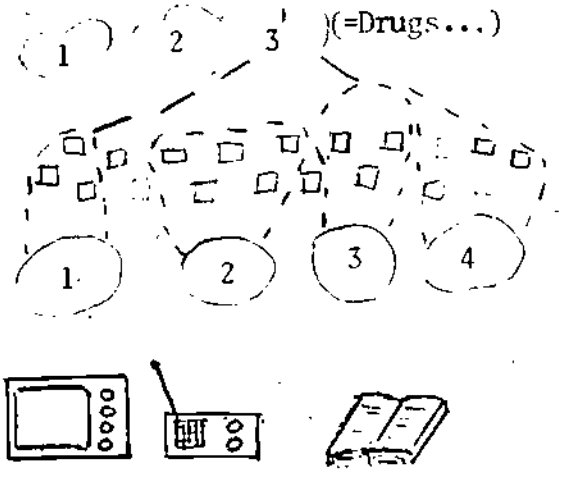
necessary.

The potential learners thus did not take part in the planning of the programme.

The people engaged in the NOVU project belonged to different "expert-communities", not directly linked to the target group of the less educated. The diffuse borderlines between different expert categories caused some difficulties. The role of the "educational technologists" was independently played by all the members of the project group. The function of the person designated as "educational technologist" thus became very unclear. This led to discussions of the role of educational technology, or should all categories of project members possess "educational technology competence?" (1).

The production process started with the subject matter specialist who gathered relevant facts on the problem area. One "problem area", or "theme", could for example be "drugs and adolescents". These collections of "raw" materials were transformed into a first draft. This draft was then discussed among the project members: the educational technologist, the radio/TV producer and the adult education specialist. The result of this discussion was a synopsis, where presentation media, presentation sequences, etc. were determined. Independent study and study groups were the main instructional forms used. The process is illustrated in the figure below.

1. Decision on which problem to treat:
2. Collect facts with the help of subject matter experts
3. Aggregate facts to a couple of /grundmanus)
4. Choice of presentation form
5. Instructional sequence



1) This question turned out to be very central to the seminar. It is treated extensively later in this report.

This somewhat idealized version of the work within the NOVU project did not correspond to actual working procedures. The main distortion of the working plan was that all the specialist groups wanted to get back to the problem level once more, even if it was thought that they should base their work on the material of a precedent group. Thus a simple linear operational model of ET did not work. There was a demand for experiencing ET work in its entirety.

C. The product

The main products of the NOVU project were:

a. a "new" working model for educational technology
b. a lot of "software"
c. changed views on the "target group" on the part of the project members

D. Implementation and evaluation of the product

The educational programme which resulted from NOVU was a series aimed at educationally disadvantaged adults, the main theme being concerned with sources of conflict bewteen adults and adolescents. The project resulted in many study groups and arose interest among the TV-radio audience. No definite changes in the attitudes or behaviour of people exposed to the NOVU material could, however, be traced. Reactions from the public were registered in a series of interviews. This was, however, done after the NOVU material had been used and the radio and TV series were completed.

III. DIFFERENT CONCEPTIONS OF EDUCATIONAL TECHNOLOGY

The discussion of the NOVU project was initially focussed on the working model used in the project. The NOVU project set off a number of different models bearing various degrees of difference among them.

Such revisions have appeared in "the educational technology paradigm" repetitively during the sixties and the seventies. The group used this as a point of departure for a discussion on the development of educational technology. It was argued that educational technology had passed through different stages, each one represented by a working model. All working models still have proponents though they do not actually represent a line of "development".

Originally the concept of "educational technology" was used in a rather restricted sense. The main idea was that both instruction and

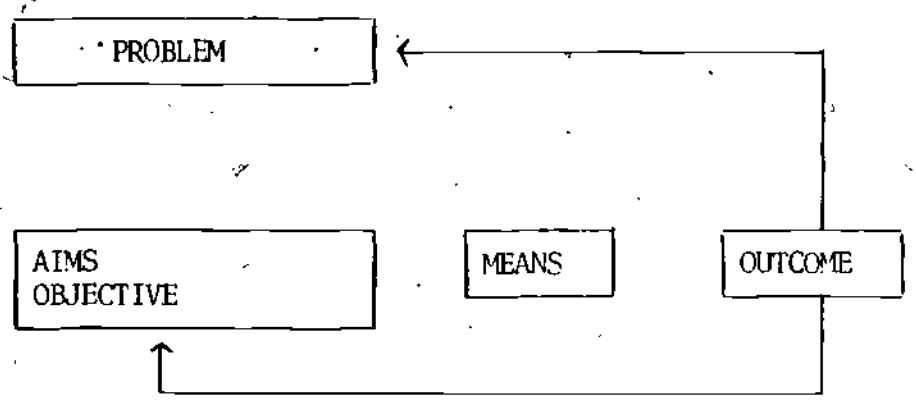
educational media production should be governed by feedback of results. This idea is exemplified in programmed instruction. Control of learning should be kept by continuous monitoring of the learning process (through prompts and inserted questions) followed by immediate correction of incorrect learning results.

This early drive resulted in a focus on educational aids of different kinds. The teacher's function as transmitter of knowledge was replaced by educational media. The teacher role was regarded as that of planner, organizer and administrator of instruction. The essence of this version of educational technology is that the results of technology are gadgets. (cf. Flechsig, 1975).

To be able to monitor, revise and guide learning, clearly defined educational objectives were essential. The original focus on technical aids in instruction gradually changed to a focus on planning and evaluation of instruction instead. This development meant that sciences other than psychology of learning had to be introduced. Organizational theory, systems analysis, operational research etc. were introduced in the theoretical and methodological arsenal of educational technology.

This lead to a development of educational technology into a "systems approach" where a key word was multi-media systems of instruction. The NOVU project is an example of this approach in the sense that it used mass-media in adult instruction. The result of educational technology consisted neither of products, nor of "software" which could be taken in isolation. It was rather a plan for educational action, where considerations of various kinds have to be made.

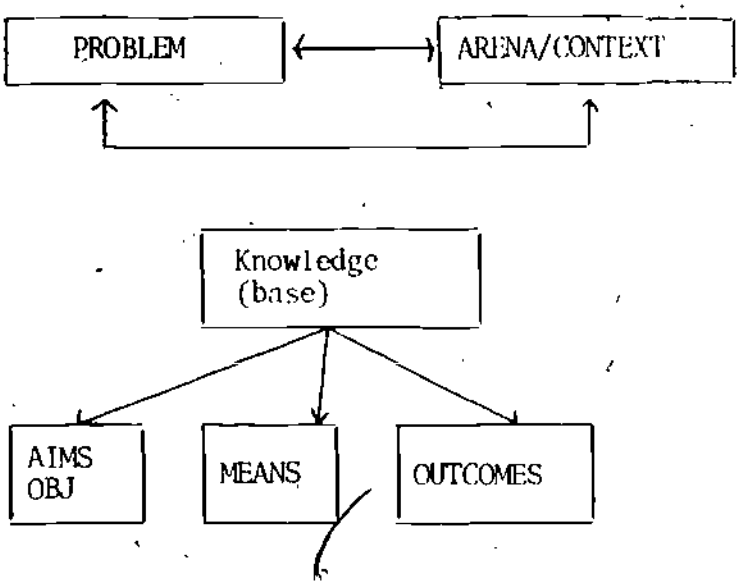
The discussion of the different versions of educational technology pointed at some differences in perspective between the participants. It was argued that the "planning variety" of educational technology simply concealed the real intentions of the decisions makers. It the educational decisions are made by the teacher himself, in direct connection with the instructional process, the purposes of such a process is more easily understood by the pupil. If, on the other hand, a "complicated" planning process has preceded the instruction, the instruction cannot be understood in terms of its underlying intentions. Educational technology as a planning technique might therefore result very "unpedagogical". This aspect of educational technology is illustrated in the figure below.



If the teacher acts and is perceived as the technologist he may together with the pupils see the problem in the immediate context, which might make the instructional process understandable to both. Solution/instruction is seen in relation to problem/context. If, on the other hand, instruction is pre-planned - as TV programmes, teaching/learning materials etc. - the teacher and the pupils may not be able to see the meaning of the instruction as this is not related to the problem placed in an identifiable context. This is so by definition, as the context/arena is not included in the model. Still the planner has to tackle the problem on the basis of some (pre-)conception of the arena, though such conception is only implicit. This is the reason why this kind of educational technology has been judged conservative.

This model of educational technology also treats the different boxes in the operational sequence as different entities. They are not by necessity considered and treated as starting from a common base. Thus technological knowledge is first of all possible in relation to the different boxes. Another way of expressing this is to say that the criteria for judging the solutions are success-orientated rather than cognitive criteria, i.e. deeper understanding.

Educational technology has not fulfilled the requirement for an analysis of the social context of the problem. Educational technology must clarify the premises and conditions under which education takes place. This means that the pupils' and the teachers' reflections over the conditions in which teaching/learning takes place must be central to educational technology. The aim of the educational technology process should be to reveal and use a value perspective within which instruction takes place. The resulting model is shown in the following figure.



According to the above figure the problem is related to the arena. This link is established in a perspective of values and knowledge. On the basis of these same values and knowledge, the planning takes place.

Thus, for example, pre-planned teaching-learning materials might be described in relation to the conception of the arena so that teacher and pupils are able to understand the instructional process. Otherwise pre-planned teaching-learning materials may not be possible, or rather they will have another meaning and form (see below).

Even if the last statement is true an educational technology is possible. It may then be of a "self-reflecting" kind, and also be able to increase its knowledge base.

The presentation of this model led to a discussion on the kind of knowledge ideal which should be the aim of educational technology. The "reflexive" version of the concept "technology" actually corresponds to Habermas' notion of emancipatory "knowledge interest". Along with this concept Habermas also places technological knowledge interest as an alternative. It was argued that the referred conversion of theory into practice ought not to be called technology.

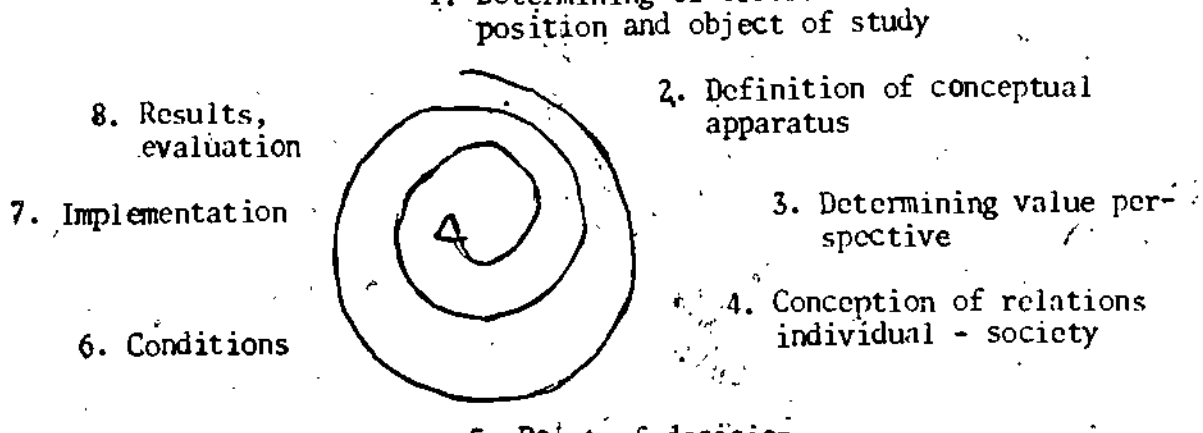
The discussion then departed from this theme to cover the general possibility of constructing a technology within the social sciences. Teaching, as any other social activity, is like a game where the participants have certain intentions behind their actions. Intentions cannot be understood from behaviour alone. They must be interpreted in a social context in order to be meaningful. This poses

quite different conditions to a science (or technology) concerned with cultural phenomena than to a science concerned with natural phenomena.

The conditions for the social scientist or technologist are that he takes part in the game he is studying. He cannot be a neutral observer. He has to interpret what he registers in the very context in which it takes place. A strict formula for planning instructional activity cannot therefore do anything but interfere with the interpretation of the game and of the rules which the participants have to follow.

Against this background the argument was held that a technology of education is impossible. It was argued that educational technology cannot adapt the instructional discource to individual mental capacities. Instead of making human action and the game itself the object of study and manipulation, educational technology should be concerned with the conditions for the game. This means that educational technology can create and clarify an educational situation where the actions in teaching become increasingly easy to interpret for the participants. One possible point of departure would be the psychology of cognition. With its help it would be possible to depict the limits for the human capacity to communicate. This theme is further treated in a report from the project "Europe 2000" (Myrberg, 1976).

Habermas' notion of knowledge interest appeared once more in the discussion of educational technology models. This time the third variety, the hermeneutic knowledge interest, was at stake. The problem is still to study and interpret human action. A formal description of this hermeneutic "educational technology" is given in the following figure (1). Meaning and consequence are used as the interpretation tools instead of cause and effect.



1) cf Jens Bjerg & Jörgen Aage Jensen (1976): En forskningsstrategisk position. (A position on research strategy). Roskilde. (Mimeo).

IV. OPERATIONAL VERSUS SUBSTANTIAL THEORY

In one of the basic papers of the conference (Ahlström et al, 1975) two different kinds of theories were treated (in accordance with Bunge, 1967).

a. substantial theories: stating properties of the treated object and relations between transformations of the object

b. operational theories: stating relations between operations per se regardless of the object

It was pointed out that the original theoretical basis of educational technology was to be found within the substantial knowledge of psychology of learning resulting from research by Skinner and Glaser. (This was to some extent due to the fact that these theories could be acceptable and usable within education).

Though ET with this theoretical foundation worked well on its own premises, it soon became apparent that it could not deal with some serious problems within education. When educational technology turned into a technology of planning, this substantial basis disappeared, and was not replaced by other substantial theories but only by operational ones.

The discussion in the group pointed to the importance of this rather drastic change. The text-books of educational technology treat systems analysis, futurology, organizational theory as theoretical prerequisites of educational technology. This aspect of educational technology is applicable in any situation where some organized and planned human activity is to take place. There is nothing that makes it particulary suited to treat educational planning problems. Rather than technology, we deal with a systematized body of practical experience. The group set as one of the main tasks of the seminar the discussion of a possible theoretical base for educational technology.

The operational versus substantial aspects of knowledge can be illustrated with an example from biology which most former pupils are well acquainted with. When you collect flowers for a herbarium there are many rules to follow, in order to get a satisfactory result. Some of these rules require operational knowledge and some require substantial knowledge. The aim of biological studies is to describe the flora in a certain area. The description model is probably the sexual system of Carl von Linné. This classification system represents the

substantial knowledge on which the biological description is built. It is necessary to follow some procedural rules in order to get the description in the form af o herbarium the final result is very much dependent on the technique used to dry and mount the flowers. Operational and substantial knowledge is therefore necessary.

The situation for today's educational technology is that the knowledge on which the description is built is lost (or not valid). The procedural rules still exist and are even developed further.

There was no consensus concerning where the substantial basis for educational technology ought to be sought. The choice of basis is dependent on the contingent problem, of course. But on the other hand, the basis of ET is a prerequisite for defining and analyzing problems. This makes the question of basis more complicated. Opinions differred widely in this respect. One suggestion was that educational technologists should pick the fruits of behavioral research at will to see what could be useful for educational purposes. Psychometrics could be useful to assess capabilities and needs of pupils, social psychology could contribute knowledge on how groups worked and so on. This knowledge could then be used in educational settings.

Another opinion was that educational technology should be equated with educational planning. The rationale was that teachers benefit most from maximum freedom of action in the instructional situation. The intricate interplay between human beings in the educational setting cannot be replaced by technological products. The task of educational technology would then be to co-ordinate the requirements of economic and instructional efficiency in a plan for the instruction to take place. The substantial basis of this approach would be economics and cultural geography.

Still another potential substantive theoretical basis for educational technology could be cognitive psychology. This branch of psychology would not be used as psychology of learning has been used in educational technology in earlier times. The main aim of the psychology of learning applied to educational problems was to control the instruction process. The argument was that the factor critical to learning was reinforcement of behaviour. This is clearly in conflict with the strivings not to interfere with the teacher's freedom of action in the classroom. Cognitive psychology should instead be used to create the best possible conditions for learning. By assessing the

capability of the pupils and the characteristics and requirements of the learning task the teacher can be provided with a better basis for decisions. This in turn implies that constraints concerning conditions can be analyzed and understood.

A last suggestion was that epistemology would be the substantial basis for educational technology. The earlier suggestions in the discussion implied that the theoretical basis on which applications could be built would be derived from psychology, sociology, economics and so on. The argument for epistemology is that this is the basic problem for a science of education in its own right. This notion of a substantive basis for educational technology corresponds to the "reflective" approach to educational technology mentioned in Chapter III above. According to this model the operative working model of educational technology is deduced from the model's knowledge basis. Epistemology might, in this sense, refer to the kernel in which other bases for ET might be analyzed and structured. A basis within epistemology, if possible, will lead to an avoidance of eclecticism.

On the other hand, it seems to be of utmost importance that practice based on ET does not lead to stagnation (cf. p. 9).

Further discussions revealed that the "epistemological approach" perhaps shared a common basis with the "cognitive psychology approach". The psychology of learning represented by Piaget is denoted as genetical epistemology by Piaget himself. To look upon epistemology as the substantial basis for educational technology would not, at least in principle, be a departure from the original Skinnerian basis. Though Skinner and Piaget have radically differing philosophical perspectives on how human beings acquire knowledge, the basic problem is the same for them, that is: how human beings can learn to utilize every-day experience to adapt to and survive in their environment. This theoretical problem would also be at the roots of educational technology. How can persons intentionally transfer their knowledge to otherrhuman beings? How is knowledge developed and preserved in society? Sociology of knowledge, of course, also has a great deal to contribute to this question. ET would not then be primarily a technology concerned with the use of technical media in education. Certainly the technical aspect of human communication has to be dealt with, but only as a consequence of epistemological considerations.

V. THE DISTINCTION BETWEEN EDUCATIONAL SCIENCE, EDUCATIONAL TECHNOLOGY AND TEACHING

A question which was often raised in the course of the discussion was whether it is justifiable to go on speaking of educational technology in view of the changes in meaning imposed on the phenomenon since the advent of the original concept of ET. "Systems approach" educational technology was looked upon in the group as systematized experience rather than deductions from theory. The basic question is the relation between theory and practice rather than what theoretical content one can fill educational technology with.

There were different opinions on the relation between educational technology, educational practice and educational science. The most radical point of view expressed was that there is not science of education. There is just educational action. Educational design should reveal the intentional aspect of a message. Educational science has functioned as a false link between progressive education and educational practice. Educational science is parasitc on both educational practice and on the sciences represented in curricula. From this point of view it is futile to look for a static theory which can guide educational practice.

It was argued, on the other hand, that "technology" only based on systematized practical experience very easily turns into the kind of "technological" knowledge described earlier (page 2). This use of theory just consolidates practice. There is no possibility to question the relevance of the problems treated by the practitioners. Theory should instead fill the function of finding new problems with answers which can fertilize practice. It was questioned however whether this really is a technological use of theory. If the problem at stake is to change existing norms, technology is perhaps not the right tool. If we accept that technology is the deduction of an operational model from a base of substantial theory, the substantial theory, or, rather, the perspective it implies, has to be accepted among the practitioners first. The main problem when people use "the wrong methods" is not that they don't understand the suggested alternative, but that they won't accept it. Technology cannot be used to make them accept the new knowledge. On this ground it can be questioned whether an educational technology based on educational theory is really possible. If it is accepted that the issue for all kinds of educational action is to make the pupils realize the meaning and the consequence of a discourse, technology cannot be used

until the educational action is completed.

According to another point of view, educational technology and educational science actually are identical. This statement is in accordance with the view that there is no separate science of education, just educational actions. It implies that technology just distorts the direct connection between theory and practice. The task for the educator is to see intentions in a methodological perspective, or to interpret the intentional background of method. Such a task is not only dependent of his/her own will. It is also dependent on possibilities for reflection (on one's own actions, on existing conditions ...) and on the functions of education.

An illustration of this identity problem for technology was the role the educational technologist played in the NOVU project. Most of the specialist in the different areas in the production of the NOVU material played the role of educational technologists themselves. Is it perhaps wrong to try to designate a certain person as educational technologist?

The relation between theory, technology and practice is certainly problematic if the aim of "technology" is to reveal intentions, or detect methodological consequences of intentions. This is an example of an emancipatory or hermeneutic knowledge interest and not of a technological one. The question was now whether technology was really possible within the social sciences. The discussion of the relation between educational science, educational practice and educational technology ended with a question that the seminar worked out as follows: "Is it possible to keep using the educational technology concept against the background we have given it in our discussions?" The answers to this question were as follows:

- Yes. There is, however, not one specific educational technology, but as many as there are pedagogical approaches.
- No, if the aim of "technology" is to reveal intentions or see methodological consequences of intentions.
  Yes, if the aim of the technology is to create the best possible conditions for learning. This technology however relies on psychological, sociological and economical theory as well as pedagogical theory.
- No, the concept of "technology" should be replaced by maieutics instead. Technology is an unnecessary link between educational theory and educational practice.
- Yes. Educational technology represents the analytical and critical function in the relation to subject matter experts and politicians. Educational technology is identical with educational science.

- Yes. Utilization of all kinds of social science knowledge, in a very eclectic manner, for educational purposes creates an educational technology. Components in this technology could be for example interview techniques, psychometric techniques etc.
- No. There is a direct link between educational theory and educational practice. The technology link is distorting this direct coupling between theory and practice. The conditions for education are parallel to those valid for economics. Labour market policy is for example based on theoretical knowledge gained from economic research. No "labour market technology" is needed for the application of economic theory.
  Popper's model for the falsification of theories ought to be the example.
- Yes. Technology is the "grammar of upraising". Technology answers the question "How.....?"
  Educational research on the other hand answers the question "Why..?" Educational research is thus the "semiotics of upraising". The distinction, however, can only be applied analytically. Technology gives causal explanations, while educational science gives intentional explanations.
- Yes. Pedagogics has two distinguishable features. It is technology when it is related to other sciences, and it is a science of its own when it studies the conditions for education.
- Yes, but technology does not choose perspective, or the conclusions to be drawn from its results.
- Yes. The technology concept is not superfluous, but it is unfortunate. It is better to speak of the relation between theory and practice in general instead.

The verdict thus seems to be in favour of educational technology. It seems, however, as though the members of the jury accept different phenomena as educational technology. Some of the participants accept the emancipatory version as educational technology. Others reject the concept altogether while still others reject the emancipatory version, but believe in the general possibility to systematize knowledge deriving from social science into a technology. There are, however, differences in meaning even within this last group.

SUMMARY AND CONCLUSIONS: Educational Technology and Permanent Education

First it must be mentioned that gatherings of this kind, where descriptions of current work in ET are given, have value in themselves. To step outside of daily work for discussing different points of view on work done might be essential for the development of a reflective approach to ET.

Second, this workshop dealt to a great extent with the "theoretical foundations" of ET. It showed clearly that there is not one basis for ET. This is quite in line with the statement of an independent

ET, but does not mean that different approaches have to be eclectic. On the other hand such diverse bases for ET might lead to an eclectic approach which in turn might be legitimizing actions of the bureaucracy or the policymakers. This problem is complicated by the fact that ET tends to be attributed the role of policy-making once its work is already in process (within certain constraints, of course).

Third, there seemed to be some agreement on the desirability for ET to be concerned with and to help clarify the educational context and actions. If this holds true, ET is not to give directives but rather to work pedagogically while clarifying these to the actors, - not only to make directives understandadble but also to qualify the actors to handle their own situation and to work on their own as educational technologists.

The implications for the Workshop Series on Educational Technology Theory and Policy of the CCC, in connection with permanent education, would be:

- to stress the reflective approach of ET
- to clarify ET to the actors when implementing the concept of permanent education.

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