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ABSTRACT

The activities and research directions of the Educational Search Strategies project are outlined in this progress report. A pilot project was undertaken to study the development of problems into research projects. The research was to be divided into three areas: problem perception and problem definition, information search and dissemination, and local information and documentation. In the process of doing its research the project had to consider data collection by interviews, data handling by rating scales, impressionistic content analysis, and computer-based content analysis. Throughout its work the project has focused more on model development than on field research. (WH)

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Title of project: Educational search strategies

In progress at: The Department of Educational and Psychological Research, Malmö School of Education

Scientific leader: Åke Bjerstedt

Project leader: Bernhard Bierschenk

Documentalist: Inger Larsson

Method and subject expert: Inger Bierschenk

The project entitled "Educational search strategies" was initiated (1) in order to study the procedure followed in settling on a particular research task and in analysing problems, (2) due to a feeling that the selection of problems and their development into research projects proceeded on arbitrary grounds and (3) due to a feeling that the efficacy of the procedure thus followed varied from year to year (Bjerstedt, 1970, 1971, 1972). The original plans for the project designated two areas for study. The first of these entailed charting different problem identification strategies. Information was to be collected by stages using various techniques of data collection, and these techniques were to be compared with one another. The second area of operations was to involve an experimental local documentalist service,

the object being to discover the potential implications of such a service within the sphere of activities of the department. The following account is a summary of the development of the project and of the main problems at present in the focus of attention. Current activities are concerned with the inductive phases of research, i.e. we are more concerned with the development of a model than with the testing of previously determined hypotheses.

A PILOT STUDY

In view of the unrestricted terms in which the original plans for the project had been defined, an initial attempt was made during the autumn term 1972 to establish an exchange of ideas and a creative group atmosphere in order to find out what different people think about when the initial phase of research is being examined, i.e. processes of problem perception and problem definition. Following transcription of the tape-recorded discussions, an impressionistic content analysis was carried out. This analysis does not claim to be an "objective" description of content. Instead it is based on a careful reading of text material. The content characteristics which the analysis has led to have been presented by B. Bierschenk (1973 a). On the basis of these content indicators, a more specific category system was then developed which in turn provided the foundation for the design of an interview study which was to inaugurate a more detailed study of the initial phase of research. The model on which the interview study is based was presented by B. Bierschenk (1973 b). Interview questions were drawn up and rating scales developed with a view to plotting what are experienced by researchers at departments of education in Sweden as the most important aspects of the first phase of the research process: problem perception and problem definition. An attempt was then to be made, on the basis of this information, to specify a model from which exact hypotheses could be derived concerning the problem perception and problem definition process.

Schoettle (1968, pp. 149-179) demonstrates the necessity of basing observation and analysis on the individual to begin with. Accordingly one must try to indicate the patterns in the problem perception and problem definition process which presumably occur in all the persons involved in the planning of research. One can hardly expect two persons to show absolute congruence in their perception of problems and their transformation of the same to potential research problems. Consequently this also excludes the possibility of being able to distinguish the problem and of identifying the "best" strategy of problem definition.

On the basis of the project plans from 1970-1972 and of the pilot study already described, the main spheres have been delineated and a division of labour effected as shown in box 1.

Box 1. Division of labour within the project

Area	Personnel
1. Problem perception and problem definition	Secondary School-teacher Inger Bierschenk
2. Information search and dissemination	Ass. Prof. Inger Larsson
3. Local information and documentation	Ass. Prof. Inger Larsson
Other members	Research Ass. Marjanna Berg Research Ass. Marie-Louise Annerblom

The areas listed in box 1 can be briefly described as follows.

1. Problem perception and problem definition

In this area a study is to be made of the psychology of science and the sociology of science as well as the organizational problems involved. The aim is to be able to plot processes of problem perception and problem definition with regard to the research conducted at the various educational research departments in Sweden.

2. Information search and dissemination

In this area a study is to be made of the communication of scientific and technical information. The aim is to study the search and dissemination of ideas, e.g. through an analysis of citations and personal contacts.

3. Local information and documentation

This area entails experimental activities with a local documentation service. The aim is to gain experience concerning the way in which a local system of information and documentation should be designed.

COLLECTION OF DATA

Study 1. Problem perception and problem definition processes at departments of educational research in Sweden. If we assume that problems can only be defined by people (not by groups, organizations or machines), the perception and definition of problems must be studied from the viewpoint of individual persons. If moreover we wish to concentrate our attention on the way in which problems are defined so as to be amenable to research, we have to plot the way in which the individual researcher tries to define problems. It

is the researcher's perception and definition of problems and his view of these processes which should be studied, beginning with the statements he makes.

The development of ideas and the definition of problems are forms of behaviour which are intimately bound up with the specifically human capacity for verbal expression. The present study accepts the fact that the content of speech is as relevant an aspect of human linquistic behaviour as speech per se. To ignore the content of speech when it refers to non-observable properties would be to ignore an important part of human behaviour and, in a study of processes of problem definition, would necessitate the exclusion of the researcher as "a source of ideas or information". As with all kinds of raw data, the analytical problem involved in using written or spoken text is that the researcher has to infer specific events, behaviour or properties connected with the "object of measurement". Thus it is the researcher's "communications" regarding problem perception and problem definition processes that constitute the foundation of this survey. For these reasons it was decided to collect data by means of an interview method. This decision was also justified by the interview method probably being more sensitive than e.g. a questionnaire or statements combined with rating scales, since the interviewee can communicate all the shades of meaning he wishes to express in and through his statements.

Every form of scientific inquiry presupposes the elucidation by the researcher of the aspects to be investigated. Moreover it is very difficult to study a phenomenon adequately without taking different attributes or variables into account. On the basis of the pilot study, the interview was composed round the following main components:

1. Process:	Problem perception, information search and hypothesis formulation

2. Individual:	Motivation, strategies of action and individual actions
3. Reference systems:	Formal organizations, informal organizations and group identifications.

This represents a first attempt to give structure to the development and conditions of problem perception and problem definition. Researchers at Swedish departments of educational research were interviewed during the spring term 1973, the purpose of this interview thus being to collect information about the way in which research projects originate and the problem definition process develops and also concerning the effect on this process of various constraints, e.g. those connected with a specific situation or with organizational forces.

Study 2. Search and dissemination of information. Access to "high quality" information is a necessary, though not a sufficient, precondition of problem perception and problem definition. Deficient communication between people in general and researchers in particular has an adverse effect on the intellectual development of areas of research. It is above all at research departments and research laboratories that information is converted into "intellectual energy" with a view to the production of new knowledge. For this reason a study will be made of the types of information which researchers at Swedish department of educational research belive to have influenced the research process. In the light of this study we hope to attempt an investigation of whether and to what extent the references quoted by researchers reflect "social circles" and whether it is possible to locate key persons. The initial material is made up of the publications written by the researchers included in the random sample for the interview study. A survey entitled

"Citation patterns of Swedish educationalists" was started during the spring term 1974. This survey includes all the writings by these researchers contained in the card index of the Library of Education and Psychology in Stockholm in March 1974. Work is now in progress on the collection of the basic material.

DATA HANDLING AND DATA PROCESSING

The interview study carried out during the spring term 1973 has led to two different types of data concerning the view taken by researchers of the conception of research projects and the development of their initial phase. These are (1) data in the form of spoken text and (2) data in the form of ratings. Various statements have been rated with the aid of bipolar scales.

1. Rating scales

The schedule, containing the rating scales was constructed in order (1) to obtain the researcher's view "in brief", (2) to obtain researchers' reactions to the use of rating scales in this context and (3) to obtain any suggestions that researchers might have to offer concerning possible improvements as well as their comments regarding the phraseology of the statements in the schedule. Although a large number of studies (most of the surveys) employ rating scales - which means that the advantages and disadvantages are relatively well known - this does not tell us anything about the suitability of the rating scales for the purposes of a particular survey. Apart from there being a wealth of statistical programmes available for the analysis of numerical data, it is also easier to present certain preliminary results. An initial report under the working title "Problem perception and problem definition processes at departments of educational research in Sweden" is now in

preparation. Far greater problems arise when it comes to devising suitable techniques for the handling and processing of spoken text in order to acquire knowledge concerning the events to which researchers pay attention during the problem definition process and the way in which they assess what they observe.

2. Impressionistic content analysis

Text analysis implies that we have to make use of content analysis methods and that within these methods we have to select a suitable technique. The interview texts will be evaluated by means of two separate techniques. Analysis will proceed by means of impressionistic content analysis and by means of a computer-based technique.

The condition of a collection of interview texts or any other kind of texts can vary a great deal. Moreover the information to be derived from the interviews may be very widely scattered or highly concentrated. Each individual interview has to be read through from beginning to end in order to extract the relevant information. The postulate that a text should have a structure may seem rather trivial, but is it not superfluous. The principal aim must be to make the interviewees' own structuring, i.e. the latent structure of the material, explicit. But there is also a so-called manifest structure in the interview material (established among other things through the sequence of the interview questions or explicit references made by the interviewees, e.g. to names, objects etc.). This manifest structure can be made the starting point of an impressionistic analysis. The quality if this type of analysis is very much dependent on the sensitivity and judgment of the individual reader.

The material is scrutinized against the background of the questions included in the interview schedules and clues are extracted. This analysis is made in order to examine the

material for information on which the continuing development of the project can be based. It should perhaps be pointed out once again that these inferences are highly subjective, based as they are on the ability of one person to perceive and evaluate the information contained by the interviews. Some starting points of impressionistic analysis are presented in Annerblom (1973).

3. Computer-based content analysis

Useful analysis becomes a formidable task when confronted by a complex verbal material with a low level of structuring. Consequently researchers often try to avoid this type of situation by constructing questionnaires with fixed alternative answers which are easier to process, even in cases where it would be more appropriate to collect information e.g. by means of an interview. Moreover manual analyses of verbal data are often influenced by practical considerations to a greater extent than is scientifically desirable. The result of this type of procedure is usually for analysis to be confined to simple comparisons of frequencies, in which case a great deal of information relevant to the investigation is lost. In order to counteract coarse analyses of this kind, researchers should create data quantities characterized by a high degree of structuring. Without going into any greater de[illegible]n the present context concerning problems connected with the formalization of a verbal data quantity, we shall simply observe that this formalization cannot be separate from subsequent phases of the analysis which has been planned. Nor can it replace categories in any way, for categories are the link between the theoretical basis of the research problem and the technical aspects of content analysis. The difficulty in retrieving information lies in the problem of being able to identify one's gestalts in the material that has been collected and stored, i.e. in being able to indicate relevant

or at least partially relevant information corresponding to questions framed on a subsequent occasion. The analytical model facilitating an evaluation of the text material to this end is the discourse model. This model describes extra-linguistic phenomena. It reproduces (is representative of) events within the source of information (the researcher) and nominals occurring in the discourse which refer to, separate or connected non-grammatical objects or concepts.

The model presupposes the development of rules for determining the syntax of the material. Rules of this kind have been framed by I. Bierschenk (1974) and an initial reliability test has been carried out by Berg (1974). It should be pointed out here that structuring of this kind is not possible without a heavy input of energy, labour and time. Not until a highly structured data quantity is available can it be used in practical research work and when we wish to retrieve different types of information at an accelerating rate. The creation of material characterized by a high level of structure will probably be particularly important if the material can be presumed capable of supplying the answers to future questions.

The storage of text for a computer-based processing presupposes storage according to a particular format. The format indicates how each individual element should be stored so that different elements can be related to each other. The prime interest of this investigation centres on the researcher's perception (description) and evaluation of the initial phase of research. Work is in progress on the development of a programme for a computer-based analysis of the interviews. This development is being based on theories and techniques presented by Osgood (1956, 1959), Stone (1966) and Holsti (1969). An analytical technique based on Osgood's work is highly suitable for the analysis of the interview material, since it is the individual researcher's subjective

interpretation of a given situation and action on which we wish to focus. The tecnique and programme now being developed are based on AGENT-ACTION-GOAL-RELATION and their appurtenant MODIFIERS. Over and above this segmentation, themes are extracted from the sentences so that important information can be retrieved or communicated over and above the information made available by the basic paradigm. Thus the information we wish to gain from the interview material is: (1) How does the researcher evaluate the agent of an action? (2) How does the researcher evaluate the goal of the action? (3) How does the researcher evaluate actions. Osgood's semantic differentials will be used for this purpose. Each modifier is scaled in terms of (1) evaluation, (2) potency and (3) activity. Rating is based on seven-point and bipolar scales with (1) positive/negative (2) strong/weak and (3) active/passive pairs of adjectives. A more detailed description and account of this development work has been provided in B. Bierschenk (1973a, 1974a, 1974b).

If a computer-based analytical techniques are developed, content analytical procedure will become flexible and can then be used to process large quantities of verbal data. It will then also be possible to refine the technique of analysis so that better statistical models can be used than has hitherto been the case.

EXPERIMENTAL ACTIVITIES

Local documentalist service

Scientific information and the documentation of scientific products are increasing, and with them the need for increasingly better systems of information and documentation (I&D systems). This development trend has sometimes been characterized as an information or knowledge explosion. Yet researchers still insist that the information they require

does not exist or that the information they find is irrelevant. Local information centres could provide a means of bringing the development of information and documentation under control. Now that a documentalist has been seconded to the project, the construction of a local I&D system can begin. The functions of the documentalist in these experimental activities will be as follows:

1. The design and planning of systematic information retrieval and dissemination and advisory activities on information matters

2. The design of retrieval strategies for computer-based literature retrieval

3. The opening of information channels and the observation of development trends

4. The mediation of research findings from the department and of liaison activities

5. Continuous observation of information needs and information utilization.

A detailed discussion of the principles of an interactive, self-regulating and self-controlling I&D system based on considerations of system theory can be found in B. Bierschenk (1974b).

The problems to be handled in the project "Educational search strategies" are referable to very young fields of research such as computer-based information and documentation and a scientific investigation of science itself. Theory formation and attested models are needed in these fields. Well-established research strategies and suitable techniques are lacking. The development work described above is therefore inevitable if the principal aims of the project

are to be realized. The activities now in progress under the project concern all three fields and will lead to the framing of hypotheses which can provide the basis for the design of more precise investigation strategies, i.e. methods and techniques for the collection, processing and analysis of data concerning research and the communication of scientific information.

REPORTING

Successive reports will be issued in the series of reports published by the Malmö department.

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