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## ABSTRACT

This publication brings together seven papers by writers who have been extensively involved in the preparation and use of protocol materials in teacher education. These papers are: (a) Protocol Materials: Historical Notes on Protocols Development, by Doris V. Gunderson; (b) The Protocol Materials Movement: An Exemplar of Efforts To Wed Theory and Practice in Teacher Education, by Donald R. Cruickshank; (c) The University of Colorado Protocol Project: A Case Study, by Celeste P. Woodley and Laura A. Driscoll; (d) A Catalogue of Concepts in the Pedagogical Domain of Teacher Education, by Bryce B. Hudgins; (e) The Protocol Materials Program, by Donald E. Orlosky; (f) A Protocol Materials Evaluation: The Language of Children, by Victor M. Rentel; and (g) A Survey of Protocol Materials Evaluation, by John E. Cooper. (MBM)

PROTOCOL MATERIALS: TRAINING  
MATERIALS FOR UNITING THEORY AND  
PRACTICE

*Compiled by*  
*Joel L. Burdin*  
*and Donald R. Cruickshank*

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## FOREWORD

An examination of the educational data base reveals relatively few citations on protocol materials. A very large number of ERIC-processed documents indexed under "protocol materials" are primarily about micro-teaching. Undoubtedly there are some documents which have been circulated among those actively producing protocol materials, but, for whatever reason, materials on protocols available to the general educational community are limited. The Clearinghouse is pleased to present a series of papers which provide some suggestions on how to move from a conceptualization on integrating theory and practice; to production, field testing, and revising; and finally to publicizing and marketing.

Special credit is due Donald Cruickshank for his help in conceptualizing the contents of this publication. Recognition is also due to the writers who contributed their articles.

It is appropriate to note the unique role played by Lawrence Lipsitz, editor of *Educational Technology*. The possibility that this series of articles would be published in that journal provided a stimulus to each of us. The ERIC system benefits from the cooperation of editors who provide a valued supplement to the dissemination capabilities of the ERIC Document Reproduction Service.

It is hoped that this document will provide a solid addition to the educational literature on an important topic: the creation of training materials which have considerable potential for transforming the abstract study of education into something more vital, dynamic, and meaningful. When this happens, it will be a just reward for the inventor of the protocol idea in education--B. Othanel Smith.

You may do further research on this topic by checking issues of Research in Education (RIE) and Current Index to Journals in Education (CIJE). Both RIE and CIJE use the same descriptors (index terms). Documents in RIE are listed in blocks according to the clearinghouse code letters which processed them, beginning with the ERIC Clearinghouse on Career Education (CE) and ending with the ERIC Clearinghouse on the Disadvantaged (UD). The clearinghouse code letters, which are listed at the beginning of RIE, appear opposite the ED number at the beginning of each entry. "SP" (School Personnel) designates documents processed by the ERIC Clearinghouse on Teacher Education. For readers uncertain how to use ERIC capabilities effectively, we recommend How To Conduct a Search Through ERIC, ED 036 499, microfiche \$.75; hardcopy \$1.85. It is available from the ERIC Document Reproduction Service, P. O. Box 190, Arlington, Virginia 22210.

--Joel L. Burdin, Director

February 1974

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This publication brings together seven papers by writers who have been extensively involved in the preparation and use of protocol materials in teacher education. These papers are a) Protocol Materials: Historical Notes on Protocols Development, by Doris V. Gunderson; b) The Protocol Materials Movement: An Exemplar of Efforts To Wed Theory and Practice in Teacher Education, by Donald R. Cruickshank; c) The University of Colorado Protocol Project: A Case Study, by Celeste P. Woodley and Laura A. Driscoll; d) A Catalogue of Concepts in the Pedagogical Domain of Teacher Education, by Bryce B. Hudgins; e) The Protocol Materials Program, by Donald E. Orlosky; f) A Protocol Materials Evaluation: The Language of Children, by Victor M. Rentei; and g) A Survey of Protocol Materials Evaluation, by John E. Cooper. (MBM)

## ERIC DESCRIPTORS

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TOPIC: *Protocol Materials: Training Materials For Uniting Theory and Practice*

DESCRIPTORS TO USE IN CONTINUING SEARCH OF RIE AND CIJE:

*Behavioral Objectives	*Protocol Materials
*Program Development	*Teacher Behavior
*Program Evaluation	*Teacher Education

\*Asterisk(s) indicate major descriptors.

THEME INTRODUCTION  
Protocols: A Reality Approach to  
Vitalizing Teacher Education

Since Smith introduced the term "protocols" into the literature,\* there has been a continuing search for the meaning and use of such materials. Protocol materials are commonly recognized as a high-potential approach to vitalizing pre- and in-service teacher education. These materials supplement others used in teacher education and provide a creative way to meld theory and practice into effective learning.

The literature on protocol materials tends to be somewhat limited. The authors of these papers hope that they will increase understanding of an important concept, encourage experiment with effective use, and stimulate assessment of that use and continual efforts to improve protocols utilization.

Gunderson delineates the need for developing understandings about learning and gives an overview of how protocols conceptualization and development were stimulated by U. S. Office of Education (USOE) efforts. Her perspective is that of a former USOE project monitor for the protocols project.

Cruickshank defines protocols as an original record of an event of educational significance, utilized in order to permit learners to interpret the event or solve the problem depicted in the event, with appropriate concepts from related fields of study. For clarity, he explains the term "events of educational significance" and distinguishes between protocols and field-based education. He discusses very briefly the development of protocols, then examines how the initiation of USOE support modified the original definition. (The USOE Master Coordinate System is appended.) Finally he questions whether the powerful notion of protocols as originally conceived will become lost as the individual projects move toward a less empirically based, more prescriptive concept.

Woodley and Driscoll describe the University of Colorado Protocol Project and show how an educational idea is translated into an instructional product. They detail the steps taken in developing, testing, and disseminating the protocol materials relevant to teacher-pupil classroom interaction and share the insights, methods, problems, mistakes, and successes of their project.

Hudgins responds to the need felt since the beginning of the protocol materials program for a conceptual map of the pedagogical domain of teacher education. This should aid in deciding which concepts, or at least which group of concepts, should be developed into protocols and should have two functions: (a) to identify appropriate concepts in the literature of teacher education and (b) to give salient and significant information to help portray the concept. Such a map has been under development under the direction of the author. While it features concepts pertaining to interactive teaching, the author recognizes that other concepts of teacher education will require future development. An extensive example of seeking out and classifying one concept is given, the format of the catalogue is explained, and samples from the catalogue are shown.

\* B. Othanel Smith and others, Teachers for the Real World (Washington, D.C.: American Association of Colleges for Teacher Education, 1969) pp. 52-53, 62-64, and 158.

Orlosky provides a history of the protocol materials and then discusses major developments, including the definition of protocols, development procedures, selection of concepts, protocols vs. observation, the master plan, the technical and educational criteria for the protocols, supplementary materials included in the packages, field testing, and dissemination. He concludes with a consideration of the current status of the program and summarizes the possible future for protocols.

Rentel analyzes protocol materials developed by Ohio State University College of Education to illustrate concepts of oral language. The author describes how the concepts were selected and briefly defines those developed as protocols. He discusses the method and procedure for revising the materials, based on the results of a questionnaire answered by those involved in the revisions. The author discusses the recommendations made by participants and instructors. In conclusion, he describes the method, procedure, instruments, and results of the product evaluation and discusses their meaning.

Cooper summarizes evidence of the effectiveness of protocol materials prepared in a number of institutions, including Utah State University, Michigan State University, the Far West Laboratory for Educational Research and Development, Indiana University, and Southern Illinois University at Edwardsville. He places this evaluation in the context of a brief review of protocol materials and concludes with some recommendations for the future.

Protocol Materials: Historical Notes on  
Protocols Development

*by Doris V. Gunderson*

Universities and school systems, the institutions that train educational personnel, recognize the need for material that will help teachers acquire the understanding and skills necessary to teaching. Although innumerable written materials exist in education and allied fields, little or no evidence indicates that these materials are tools capable of inducing desired behaviors in pre- or in-service teachers.

Traditionally, the teacher's primary function at any level has been to help students learn. If teachers are to help students learn, they must know how to teach so that teachers will learn. Teachers must know the subject matter, and they must know how to teach. The teacher must understand the student and understand the learning process. Individuals differ in learning rates and respond to teaching-learning situations in various ways.

Developing understandings about learning is not easy. Extensive observation of students is essential, yet observation without focus accomplishes little. The observation must be directed; the teacher must look for particular kinds of behaviors. There is no guarantee that a given stimulus will result in the behavior the teacher wishes to observe. Even if a particular behavior is exhibited, the instance may be fleeting, and the observer has only his recollection for considered study.

The observer's preparation for interpreting behavior usually consists of little more than courses presented in the traditional reading-lecture-discussion manner. The instruction is divorced from reality. One means of bridging the gap between theory and reality is to reproduce a variety of behaviors of students, teachers, and others in a permanently recallable form. A particular segment of behavior can thus be produced again and again to be studied, analyzed, and the concepts appropriate to its interpretation spotlighted, explained, learned, and reviewed. The concepts can be applied to the understanding of other behaviors. Instructional materials of this type are referred to as protocol materials.

Protocol materials constitute one of two general categories of instructional materials for teachers, namely, the materials that direct the pre- or in-service teacher in studying his and others' behavior. Materials that guide him in systematic practice of the skills he must acquire are called training materials and are designed to help the teacher in the acquisition of skills. They provide for (a) identification of skills, (b) description of behavior entailed by the skills, (c) performance of the behavior, and (d) feedback to the performer and further performance by him.

Cognitions are developed primarily through the use of protocol materials which provide (a) segments of behavior categorized for the purpose of teaching concepts and principles used in interpreting behavior as well as the social context in which the teacher works, (b) segments of behavior categorized for the purpose of teaching knowledge about knowledge, and (c) segments of behavior categorized for the purpose of teaching self-understanding.

Protocol materials are designed to bridge the gap between theory and the teaching-learning situation. Since they provide reproductions of behavior, they foster the teacher's interpretive and diagnostic competency.

A basic problem in preparing protocol materials is precision in defining a concept; a concept must be defined exactly and its attributes specified in terms which permit no misunderstanding. Concepts, according to Carroll, are properties of organismic experience, the "abstracted and often cognitively structured classes of mental experience learned by organisms in the course of their life histories." As the complexity of the concepts increases, the necessity for an appropriate sequencing of positive and negative instances to assure adequate learning of the concept becomes greater.<sup>1</sup>

Recognizing the demand for materials for teaching concepts in teacher education programs, the Bureau of Educational Personnel Development (USOE) in 1970 initiated an effort to train educational personnel to develop and use protocol materials. Materials developed for training teachers generally have been prepared in isolation with no field testing during the development stages. Since protocol materials should be "attuned" to the problems teachers encounter, the Office of Education insisted that people should be trained to develop protocol materials, with field testing and modification based on the field testing an integral part of the training program. In addition to the field testing carried out by each project director, the Florida State Department of Education, under a grant from the Office of Education, is conducting field tests of protocol materials developed in the various projects with pre- and in-service teachers in school systems and institutions of higher education in Florida.

The protocol materials effort is essentially a training program. Project directors are trained to develop and use protocol materials. The effort is under the direction of the Leadership Training Institute, a group of consultants outside the Office of Education, headed by B. Othanel Smith of the University of South Florida. The group is responsible for providing technical assistance to the project directors. The training involves several stages. The concepts to be exemplified in protocol materials must be selected and analyzed. The concepts must be critical to teacher education; that is, they must be concepts that teachers need to know. A paramount consideration is utility; the concepts to be portrayed in the materials will be useful at any institution or agency which trains or re-trains teachers.

The materials being produced, primarily films, cover diverse subject matter areas such as educational psychology, social psychology, reading, literature, language acquisition, Black English, teaching analysis, and social studies. The important result of this project to the future of teacher training lies in the fact that these leaders in the field of teacher education will themselves have acquired skills in the development of protocol materials.

NOTES

1. John B. Carroll, "Words, Meanings and Concepts," Harvard Educational Review, September 1964, pp. 178-202.

The Protocol Materials Movement: An Exemplar of  
Efforts To Wed Theory and Practice in Teacher  
Education

*by Donald R. Cruickshank*

## PROTOCOLS

My initial encounter with the term "protocol" in an educational context was confusing since I knew it only in the limited sense of describing a rigid, long-established deferential code practiced in government, especially diplomatic circles. Consequently, I brought an unsuitable meaning to the printed page which had to be corrected. In the sense in which it is used herein, at least initially, a protocol is an original record of an event of educational significance.

The rationale for creating and using protocols (or protocol materials) probably was first brought to the attention of the educational community at large by Smith and others.<sup>1</sup> This group inquired into the education of disadvantaged youth and teacher education and subsequently made several recommendations and proposals calling for change in the latter. Their report states:

Teachers fail because they have not been trained calmly to analyze new situations against a firm background of relevant theory. Typically they base their interpretations of behavior on intuition and common sense. . . . If the teacher is incapable of understanding classroom situations, the actions he takes will often increase his difficulties.<sup>2</sup>

This initial assertion that teachers need to be trained to analyze classroom situations against a firm background of relevant theory is amplified and supported as theoretical knowledge is defined,<sup>3</sup> and it is noted that such knowledge is becoming more abundant in the behavioral sciences.<sup>4</sup> Further, the Smith task force asserts that "the basic elements of theoretical knowledge are concepts."<sup>5</sup> Now we can begin to operationalize the earlier definition of protocols from *an original record of an event of educational significance* to *an original record of an event of educational significance utilized in order to permit learners to interpret the event or solve the problem depicted in the event using appropriate concepts from related fields of study including psychology, sociology, anthropology, philosophy, or others.*

It seems clear from the extended definition that at least two decisions are paramount for the developer and/or user of protocols. First, he must answer the question, "What is an event of educational significance?" Second, he must determine which available concepts are likely to increase the subject's capacity to interpret and understand the event recorded in the protocol. This one-two procedure is amplified elsewhere<sup>6</sup> and referred to as the "situation-first strategy."

### Events of Educational Significance

Smith equates an event of educational significance with situations the teacher most frequently encounters but notes that since no systematic analysis of the teacher's frequent work exists, the event must be selected from practical experience.<sup>7</sup> The following categories of events are suggested:

1. Classroom situations

- a. Instructional situations
- b. Situations of classroom management and control
- 2. Extraclassroom situations
  - a. Situations that arise in planning school programs, working with peers and the administration
  - b. Situations that occur in working with parents and other members of the community
  - c. Situations that occur in working in professional organizations.<sup>8</sup>

Following this "situations-first strategy," once events of educational significance are determined, they must be inspected to consider what theoretical notions--concepts--are needed to understand and interpret them. Indeed, Smith cautions, "No instruction should begin until the instructor has studied the [event] with extreme care."<sup>9</sup>

The following will help to clarify. It describes an example of what inner-city teachers consider to be frequent and bothersome classroom behavior, one criterion which could be applied in selecting events of educational significance. It probably falls in category 1b above.

The teacher has broken the sixth grade class into small groups each of which is experimenting with a pendulum. In one of the groups, one student is swinging the pendulum, another is keeping time using a stopwatch while a third is recording the time. Others are in the group but these three are prominent. During an interval between timing the period of the pendulum the recorder, Wesley, reaches over and abruptly takes the stopwatch from that student using it, Bradley. The teacher mildly admonishes Wesley and orders him to return the watch. Wesley does so reluctantly and the experiment continues. A child from another group approaches the teacher and a conversation ensues. Soon scuffling noises occur and a fight breaks out between Bradley and Wesley. The teacher intervenes verbally and the physical aggression changes to name-calling and accusations. Bradley holds up his watch which is broken and claims that Wesley is responsible. Wesley responds that "It was an accident." Bradley counters calling Wesley a liar. Wesley charges that Bradley stole the watch anyway and tells Bradley to just steal another one as the incident closes.<sup>10</sup>

If the above incident were used as a protocol, it follows that the teacher, alone or with the assistance of colleagues from the behavioral sciences, must inspect the event and consider what theoretical notions --concepts--are needed to understand and interpret it. To begin, one might identify or describe the phenomena observed. These seem to include sixth-grade class, grouping for instruction, experiment, pendulum, differentiation of labor, stopwatch, keeping time, recording, seizure, disapproval-reprimand, acquiescence, interruption, fighting, intervention, name-calling, accusation, destruction, informing-tattling, and so forth. It is significant that the teacher educator be able to help students select from among these phenomena those which may be of special interest and power in explaining, understanding, and interpreting the event. Which phenomena and/or related concepts do you see as most germane?

Up to this point it is clear that the protocol movement is concerned with finding out what teachers need to know in order to function more effectively in educationally significant situations. This is quite a departure from the usual method of teacher education which exposes the undergraduate to knowledge organized seemingly logically into courses in education! The usual method requires the learner to apply theory, explaining human behavior, for example, to the classroom. Conversely, the protocol way forces the teacher educator to begin with classroom events and show how certain concepts make those events more understandable.

### Protocols and/versus Field-based Education

Since recently there has been a big push toward field-based teacher education, a word of caution may be in order. Promoters of field-based programs are convinced that you learn about teaching by teaching and so naturally professional education should occur where teaching takes place--in the schools. The Smith task force makes this notion suspect, stating:

Teaching behavior is complex, involving interactions with both pupils and materials of instruction. It cannot be studied in the classroom because behavior perishes as it happens and nothing is left to analyze except the memory or a check sheet. The fidelity of the memory is questionable and not detailed enough. The information contained on check sheets is almost no record at all. To learn to interpret situations they must be held in situ or reproduced at will approximately as they occurred. It is then possible to study the situations at length and use concepts . . . to interpret them.<sup>11</sup>

If the protocol movement--an exemplar of theory into practice--is tenable, it behooves the field-based movement to explain how it is, or will be, taken into account therein. Quality of experience in a classroom may not be an adequate replacement for the kind of quality of experience the study of protocols could provide.

### Development of Protocols

What is the progression of steps suggested in developing a protocol program? As mentioned earlier, the Smith report equates an event of educational significance with situations the teacher most frequently encounters. Consequently "the first step in the formulation of a [protocol materials program] is to identify the most general categories of situations teachers face."<sup>12</sup> These situations become the objects of study and are recorded in some manner. They are then placed in pre-determined categories such as classroom instructional situations, classroom management situations, extraclassroom situations, or others. Next, the situations are studied intensely to determine what theoretical knowledge (especially concepts) is required in order to understand and interpret the phenomenon displayed in the situation. Finally, the protocols are arranged in courses of instruction.<sup>13</sup>

## SUPPORT AND REDIRECTION VIA WASHINGTON

The Smith task force recognized that building new teacher education programs based upon protocols would be a massive and expensive undertaking. It therefore recommended that "a number of institutions, federal and state agencies, and professional organizations could cooperate" in the endeavor.<sup>14</sup>

Since the U. S. Office of Education through the National Defense Education Act (NDEA) had financed the work of the Smith task force, it came as no great surprise that it would be interested in considering and supporting selected task force recommendations.

That support manifested itself in April 1970 when the former Bureau of Educational Personnel Development invited several selected institutions to submit proposals for the development of protocol materials. With USOE intervention and support, the protocol movement was given sanction by Washington and thereby given prominence for a large section of the education community which until that time probably was not well acquainted with the Smith report and its recommendations. (See "The Protocol Materials Program" by Orlosky, p. 69 for details of Washington's involvement. Herein, attention will be given only to the request for proposals (RFP) which was the universities' official invitation to partake in the protocol movement.)

### Guidelines

The RFP and especially the accompanying guidelines were to redefine the original notion of protocols and redirect materials development. Most agree that the redefined notion of protocols and the new direction were laudatory. In fact, recipients of protocol grants used less of the Smith report and more of the Washington guidelines in their work. A few argued and still maintain that although the Washington approach was acceptable and appropriate, Smith's original notion of protocols as exemplars of classroom situation-based teacher education has never been understood fully and certainly has not been implemented in the Washington-directed movement.

The RFP cover letter from Don Davies, then Associate Commissioner of Education, made clear (a) that USOE was supporting the notion of protocols per the Smith task force, (b) that the 40 persons receiving requests for proposals had been recommended by an ad hoc advisory committee, (c) that not more than a half million dollars of USOE first-year money would be involved, and (d) that the USOE protocol materials program was an "attempt to prepare and use such materials in order to help make the training of educational personnel more exact and real." Of the four enclosures accompanying Davies' letter, Attachment A which explained protocol materials and delineated the guidelines for submitting proposals is probably most germane to the program's history.

In Attachment A the following points were made:

1. Although teachers in training take courses intended to help them

interpret school-related phenomenon, this instruction is not meaningful nor as successful as it should be because typically it occurs divorced from reality.

2. As presently constituted, the brief periods of observation, participation, or other laboratory experience do not cause teachers in training to see the relationship of educational theory and classroom practice.
3. Educational technology is now available which would permit the reproduction of school-related events which can be used in teacher education programs wherein appropriate theory can be learned and its relationship to reality seen. (For example, a particular segment of classroom behavior can be reproduced and, as it is viewed, made more understandable through the study of specific related concepts.)

Further, a distinction was drawn between protocol materials used to interpret and understand classroom life and training materials intended to teach the prospective teacher skills.

The guidelines permitted significant alteration of Smith's definition for protocols, eliminating the requirement that proposals be "original records" and permitting them to be staged representations of reality,; more precisely, simulations, although the term is not mentioned. Henceforth, the concept of protocol could be attached to *any authentic representation of an educationally significant event which is utilized in order to permit learners to interpret or solve the problem depicted using appropriate concepts from related fields of study.* Clearly the emphasis turned more toward interpreting the event rather than capturing valid and correct ones, a problem which has eluded persons interested in research on teaching for some time.<sup>15</sup> Consequently, as pointed out elsewhere, already existing simulations or other forms of teaching materials which are used to increase the learner's analytic and interpretive powers through the use of theoretical knowledge suddenly became protocols, and the newer concept seemed to lose some of its newness and punch.<sup>16</sup>

### The Master Coordinate System

The guidelines further contained an intricate Master Coordinate System (see Appendix A) which was to be used to "develop protocol materials in an orderly way." In contrast to the Smith report wherein protocols were defined as original records of events of educational significance which would be made more understandable by the application of theory/concepts to them, the Washington guidelines and the Master Coordinate System operationally defined protocols as illustrations of concepts. (See "The University of Colorado Protocol Project: A Case Study" p. 36 and "A Protocol Materials Evaluation: The Language of Children" p. 83.) The Woodley group chose to illustrate concepts in the "pedagogical domain" of the Master Coordinate System. The Rentel group on the other hand worked in the "basic fields of knowledge." So, following the guidelines, "original records" were replaced by "authentic ones" and "events of educational significance" by "concepts of educational

significance." (Hudgins, on p. 69 describes how he is attempting to prepare a catalog of the latter.) Naturally the concepts must be selected with some educational event in mind but that event is given short shrift. Some reviewers of the protocol movement, as this one, fault it for failing to identify its proposed teacher education curriculum (concepts) *after* a careful analysis of the real world of teaching (educationally significant events). Instead, in a manner not well-suited to pedagogy, protocol developers were asked to behave as if there were a thoroughly explicated discipline of education which presented concepts or ideas of major magnitude and accepted validity.<sup>17</sup> All the developer had to do was to select an ornament (concept) from the Christmas tree (education discipline). Naturally only the most "illuminating" would be chosen. What happened in most cases was that developers fell back to looking through related disciplines for concepts. In the usual tradition, concepts were lifted from psychology, for example, and many protocol projects simply became projects to develop visual materials which illustrate concepts from the behavioral sciences. The concepts became the ends rather than the means, primary rather than secondary, as the Smith task force seemed to advocate.

### Concept Overkill?

Further, many projects seemed to forget that concepts often can be gained very quickly through definition. Projects seemed to run amok visually illustrating concepts. Concept overkill may have resulted. The above would suggest that although the Smith task force (directly or inadvertently) argued for the study of school life and the selection or development of theory to understand it, the protocol movement resorted to looking for some "neat" concepts which could be made visual and "colorful" via a protocol. Theory building and theory relating simply have not reached their potential yet in the movement.

On June 1, 1970 the winners of the protocol competition were announced in a letter to members of Congress, and eleven projects in ten states were funded for the first year.

The projects were to be overseen by a Leadership Training Institute (LTI)<sup>18</sup> led by Smith. Orlosky (p.XXX) describes LTI, its membership, and function. A thorough description of the individual protocol projects and the materials produced through 1971 is found in Kincaid.<sup>19</sup>

### A MAGNIFICANT OBSESSION?

Probably when the protocol program is recorded in American educational history, it will be remembered as a magnificent attempt (perhaps an obsession) to relate theory to practice. Since at least another year of federal sponsorship remains, it is not appropriate to consider whether or not the movement will achieve this hoped-for result. At this writing, however, several things are becoming clearer and are worthy of comment. Individual protocol projects have moved away from the situation-first, analytic, interpretive strategy suggested by the Smith task force toward a less empirically based and more prescriptive

concept-first approach based upon the Master Coordinate System. In effect, there seems to be a considerable difference between the original notion and hoped-for result of protocols and what seems to be evolving.

Additionally, in their effort to identify concepts to undergird material development, project personnel seem to have either selected some which are not as acceptable to teacher educators or, as suggested earlier, concept overkill has occurred. Since the concepts which have been visualized are not new or uncommon, most likely the latter has occurred. Developers may have treated the concepts to be illustrated too similarly, assuming that all learners had no advanced organizers, preinformation, or experience which would facilitate learning the concept. Certainly some concepts are learned more easily than others and must be learned differently by different people.

If a concept-first approach continues to be followed, each concept considered for illustration should be placed in juxtaposition with the very useful "cone of experience" to determine whether it is best learned and necessarily learned in the context of an elaborate visual experience. Films illustrating concepts should be used only when somewhat more direct, concrete forms of learning are required. There is little reason to develop elaborate and extensive visuals for use in concept formation when simpler, less expensive, or less time-consuming approaches are available and justifiable. Teacher educators simply will not spend more time or money to teach a concept than is necessary. All things being equal, given the choice of defining a concept such as "peer group" or having preservice teachers learn the concept by seeing an illustrative film or filmstrip, the teacher is likely to use the more efficient, parsimonious means. In several instances, in order to learn a very few concepts the learner must engage in protocol study for a disproportionate amount of time. Consequently, as noted above, publishers do not seem to be excited about the possibility of the adoption of protocols into the professional curriculum. Of course, cost is another deterrent not to be underestimated.

#### POINT OF VIEW

In conclusion, the Smith task force suggested a powerful notion which, if we are not careful, may become lost. It is possible that the sole difference between the way educational theory is learned now and the way it would be learned utilizing a protocol is that in the latter the concepts are illustrated more elaborately. Elaborate illustration may not be related to the teacher's ability to recall that concept when necessary in order to better analyze and interpret a classroom event. I tend to agree that the concept must be learned *in situ*. To me the protocol should illustrate the significant educational event rather than the concepts used to interpret it. It seems somehow we have gotten the cart before the horse. Once we have recorded these events we have, perhaps for the first time, an opportunity empirically to develop a classroom situation-based curriculum for teachers. Concepts, skills, and attitudes will be found to understand and interpret those situations. They will be learned or discovered in and used in relation to these events. These concepts can be illustrated as necessary. It is only from events that theory can be derived and to them

that it takes on utility. It seems we may end up with concepts but no educationally significant events to which they can be readily applied. Are the concepts educationally significant events in themselves? Where is the real world of teaching called for in *Teachers for the Real World*?

## APPENDIX A

### MASTER COORDINATE SYSTEM

#### COMPONENTS OF THE GENERAL PLAN

In order to develop protocol materials in an orderly way, it is necessary to follow a general plan. The plan should be as comprehensive as possible and free of doctrines about what teachers are to be prepared to do and how they are to be prepared to do it. If these conditions are satisfied, those who are engaged in teacher education would be able to take part in a national effort to develop materials without being framed by theories and doctrines to which they cannot subscribe.

The general plan consists of two basic interrelated components or sub-plans: one for the pedagogical domain and one for the basic fields of knowledge. Each sub-plan will be presented in the form of a coordinate system comprised of three dimensions. Essentially, protocol materials to be developed in the pedagogical domain should be concerned with the act of teaching and of learning, with the *behavior* of teachers, learners, and teachers and learners in interaction. In contrast, protocol materials in the domain of basic fields of knowledge should be concerned with the content of what is taught--or, more specifically, with the *knowledge about* the knowledge that is taught.

The protocol materials to be developed in either plan should be seen initially in terms of the master coordinate system for that plan (see Figures 1 and 5). That is, in the pedagogical plan, a decision should be made about the levels, behaviors, and settings to be portrayed in the protocol materials. In the basic-fields-of-knowledge plan, decisions must be made about the levels, types of knowledge about knowledge, and areas of knowledge to be portrayed in the protocol material. Following this procedure will help "chart" the kinds of protocol materials needed as part of a large-scale effort in developing a variety of such materials.

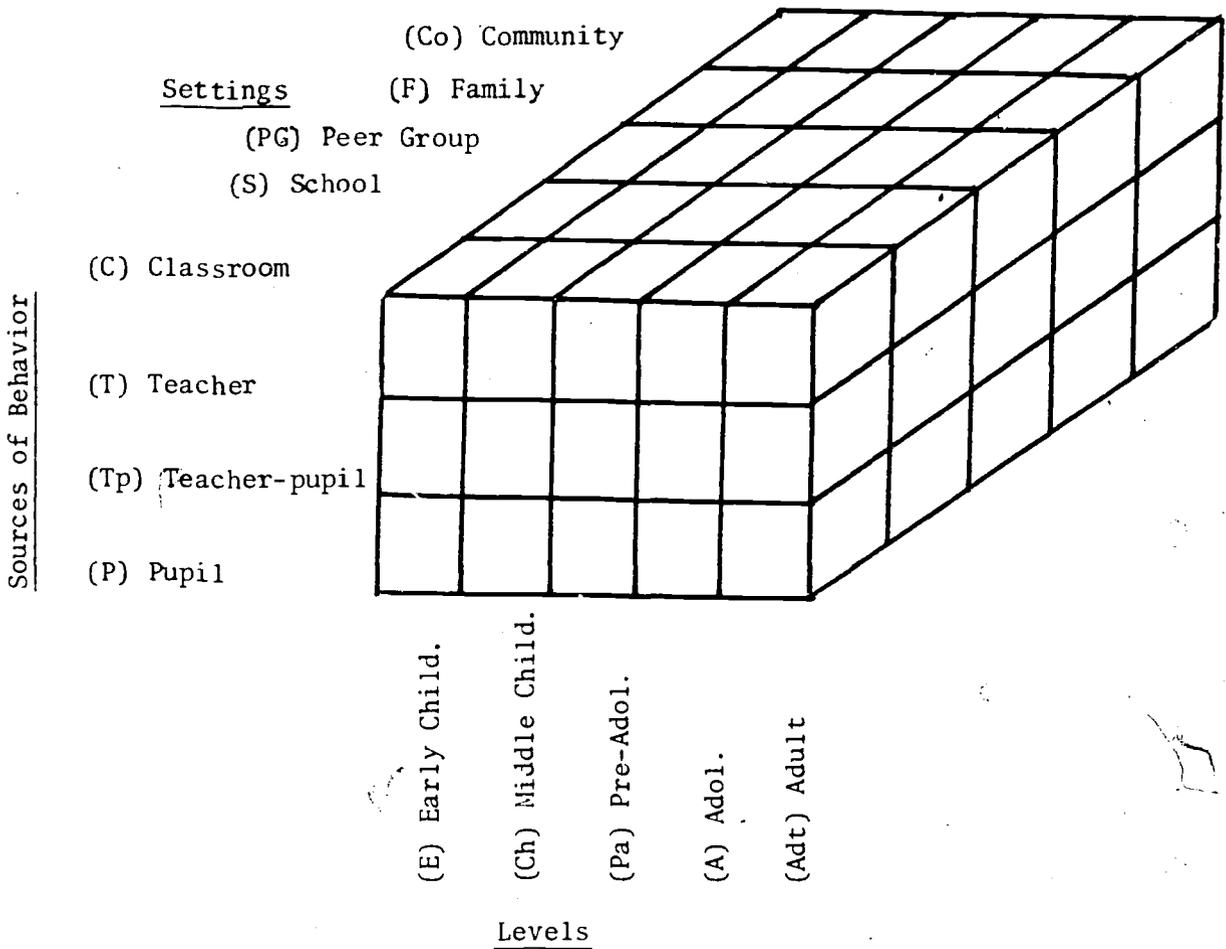
#### PEDAGOGICAL PLAN

The pedagogical plan is a coordinate system comprised of three generic categories: setting, level, and behavior. These terms will be defined later, but for immediate purposes "setting" refers to the context in which behavior occurs, "level" stands for the stage of a person's general development, and "behavior" for observable activities. Figure 1 depicts the system which is described in detail in the pages following.

In order to indicate the various types of protocol materials that can be developed in accordance with the master plan, it is necessary to derive subordinate systems. These will be set forth after the master plan has been presented. The categories and sub-categories in the system below are purposely general. The lack of specificity under the category "Teacher-Pupil" or sub-category "Instructional: Skill," for example, allows the developer a high degree of flexibility in deciding

Figure 1

Master Coordinate System of Settings, Behaviors, and Levels



upon the specific behaviors he wishes to record. It should be remembered that the categories are intended to help assure an adequate coverage of settings, behaviors, and levels in the protocol materials to be developed in all projects taken collectively. They are *not* intended to be a framework for retrieval or for dissemination of materials.

## 1. Definitions.

The major categories are named in Figure 1. We shall first define the kinds of settings, and then the kinds of levels, and finally the sorts of behaviors.

A. Settings. The context from which the protocol material is taken.

- (1) Classroom. Any room in a school building in which the activities carried on are intended to promote learning, or more generally, any place where the activities are conducted with that intention.
- (2) School. Any establishment for teaching and learning.
- (3) Peer Group. A number of individuals of approximately the same age forming a recognizable unit either in school or out.
- (4) Family. Any group made up of parents and their children.
- (5) Community. The people who live in a district or city under the same laws and institutions.

B. Levels. The periods or phases of a person's growth from birth to adulthood.

- (1) Early Childhood. The period from infancy to the time the child begins school.
- (2) Middle Childhood. The period between early childhood and the beginning of adolescence. Roughly, the elementary school years.
- (3) Pre-Adolescence. The transition period between middle childhood and the adolescent period. Roughly, the junior high school years.
- (4) Adolescence. The period immediately preceding adulthood. Roughly, the high school and early college years.
- (5) Adult. Post-adolescent years.

C. Sources of Behavior. The observable actions of a person, verbal and non-verbal.

- (1) Teacher Behavior. Any behavior that a person exhibits as he engages in performing the tasks of a teacher, such as questioning, explaining, assigning, conferring, and managing a classroom or as he takes part in extra-classroom activities.
- (2) Teacher-Pupil Behavior. Any behavior that involves interaction between a pupil and a teacher.
- (3) Pupil Behavior. Any behavior that a child or adolescent exhibits as he attempts to meet the situations that face him from moment-to-moment throughout the day.

## 2. How To Interpret the Master System.

By identifying each category with code letters, we can indicate each three-dimensional cell. In Figure 1, letters CAT identify a cell. The first of the three letters (C), stands for the kind of setting, the second (A) for the level of development of the pupil, and the third (T) for the source of the behavior. The protocol materials for this cell would consist of reproductions of teacher behavior in classrooms at the high school level. By the same token, the protocol materials that depict pupil behavior at the adolescent level in a family setting can be indicated by the letters FAP.

### SUBORDINATE SYSTEMS

#### 1. How the Sub-Cells Were Derived.

The subordinate systems in Figures 2, 3, and 4 result from expanding each of the behavior categories in Figure 1, while leaving the "setting categories" and the "level categories" unanalyzed. In Figure 2, category P has been expanded into behaviors that allow the development of pupils. In Figures 3 and 4 respectively, categories Tp and T have been expanded into kinds of teacher behavior. Figure 3 represents a model in which teacher-pupil behavior is included, while Figure 4 represents the behavior of the teacher as he interacts with peers and others.

#### 2. Definitions.

The definitions of "levels" and "setting" and their sub-terms for Figures 2, 3, and 4 are the same as the definitions of these terms and sub-terms for Figure 1.

##### A. Types of Behavior in Figure 2.

- (1) Cognitive Behavior. The behavior of pupils that entails the acquisition of knowledge: perceiving, conceptualizing, inferring, classifying, etc.
- (2) Affective Behavior. Pupil behavior in the areas of motivation, valuing, commitment, personal choice, etc.

- (3) Social Behavior. Pupil behavior characterized by such processes as social cooperation, competition, authority relationships, etc.
- (4) Skills. Such cognitive or psycho-motor behaviors as spelling, penmanship, typing, woodworking, gymnastics, etc.

B. Types of Teacher-Pupil Interaction in Figure 3.

- (1) Instructional: Cognitive--Interactions in the cognitive realm, such as conveying information, building concepts, explaining, diagnosing of difficulty in understanding.
- (2) Instructional: Affective--Interactions in the affective realm, such as motivating, attitude formation and reformation, influencing techniques.
- (3) Instructional: Skill--Interactions in the realm of cognitive skills (such as word analysis, spelling) and physical-coordinate skills (such as typing, woodworking, gymnastics).
- (4) Classroom Control and Management--Interactions involving classroom control and discipline, especially social and physical control.
- (5) Personal-Social Development--Interactions involving personal development of pupils in such areas as responsibility, personal concerns, social relationships.

C. Types of Teacher Behavior in Figure 4.

- (1) Teacher-Civic Groups. The behavior of one or more teachers in community groups where educational policies, programs, etc., are being considered: parent-teacher groups, open sessions of boards of education, special interest groups, etc.
- (2) Teacher-Adults. The behavior of a teacher in conference with a parent or other adults of the community about the education and welfare of pupils.
- (3) Teacher-Colleagues. Teacher behavior in situations involving other teachers, school psychologists, social workers, or counselors where pupil problems, school programs, etc., are being considered.
- (4) Teacher-Administrators. Teacher behavior in conference with principals, supervisors, department heads, and the like.

Figure 2

Expansion of P Category for All Settings and Levels

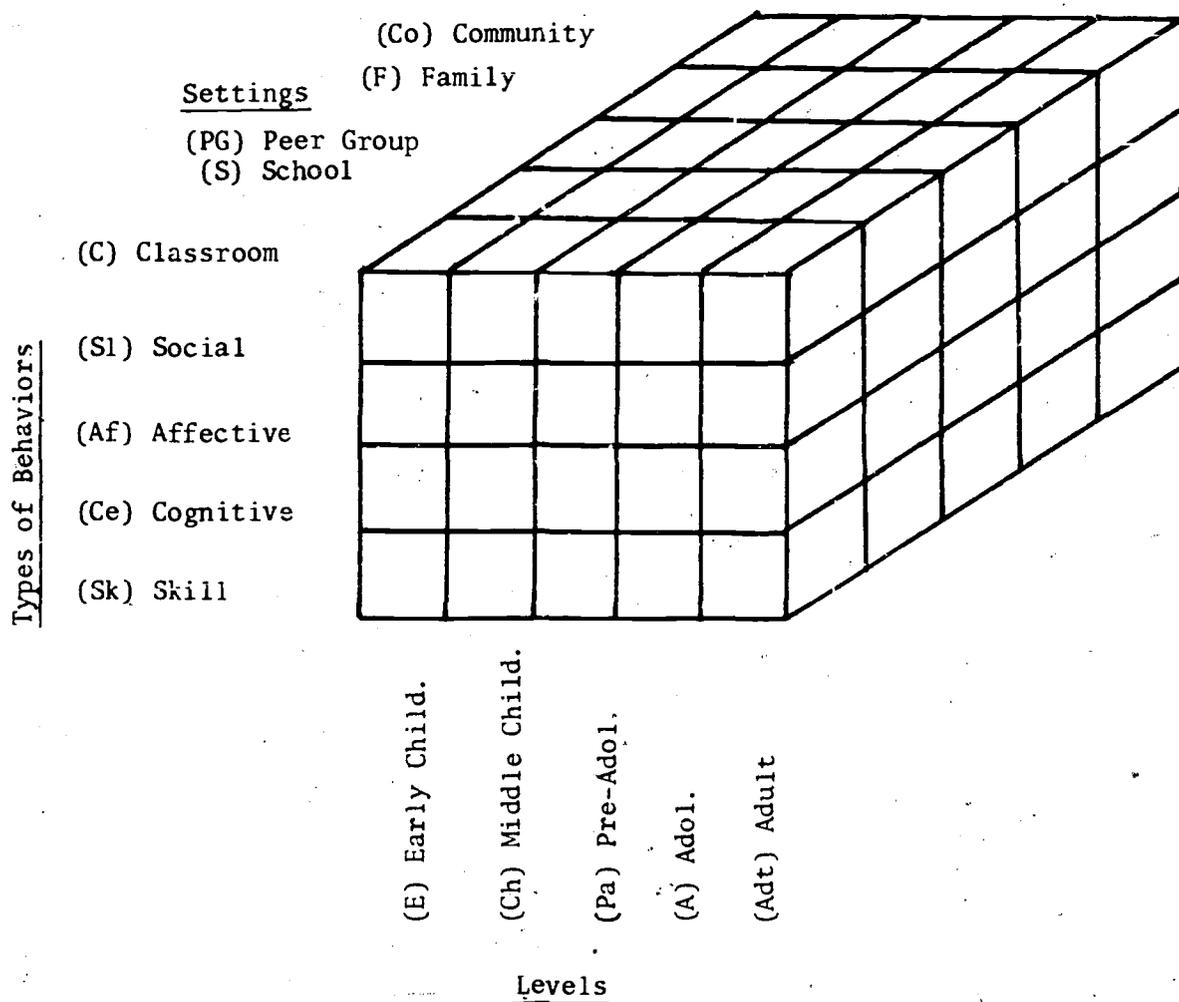


Figure 3

Expansion of Tp Category for All Settings and Levels

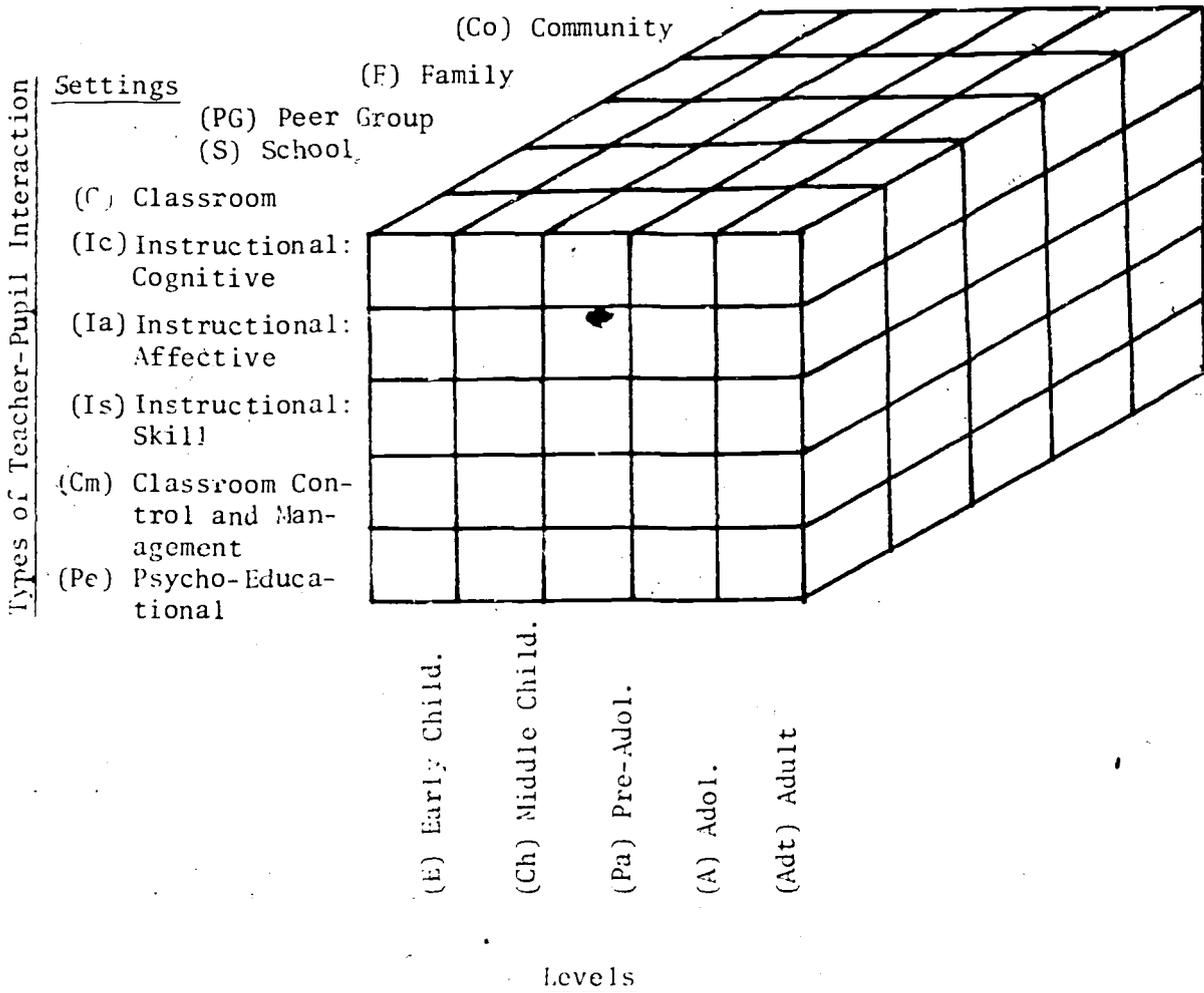
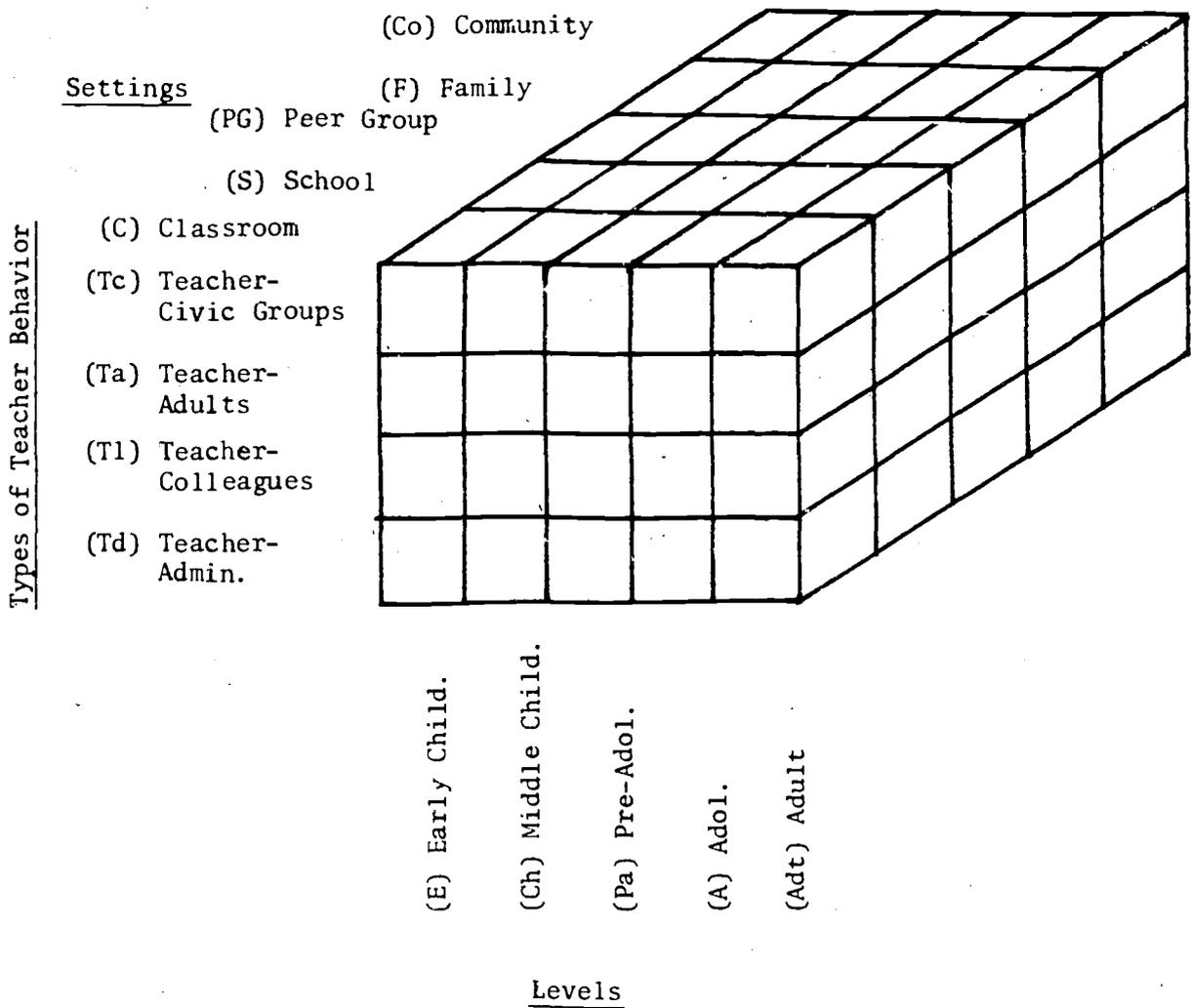


Figure 4

Expansion of T Category for All Settings and Levels



### 3. How to Interpret the Subordinate Systems.

Using the code letters of each category, we can see by references to Figure 2 that protocol materials that depict cognitive behavior at the pre-adolescent level in a classroom can be indicated by the letters CPaCe. In Figure 3, protocol materials showing concept building at the pre-adolescent level can be designated by CPalc. In Figure 4, protocol materials that depict teacher behavior in a civic group concerned with high school pupils in the community can be designated by CoATc.

It should be noted that there are no empty cells in category P, Figure 2, because each type of pupil behavior can be studied in every setting for each level of development. Nevertheless, it is likely that some types of behavior are more appropriately studied in some settings than in others. For example, cognitive behaviors can be studied perhaps more appropriately in the school room or family than in the broader community setting.

The Teacher-Pupil category, Figure 3, may have a number of empty cells. This is so because teacher-pupil interaction is typically limited to classroom and school settings. All the cells bounded by peer group, family, and community dimensions are likely to be empty.

Likewise, there are empty cells in category T, Figure 4. For example, no protocol materials are likely to be developed in cell PgETc because Teacher-Civic group behavior is not ordinarily exhibited in pupil peer groups. It is easy to identify other empty cells in Figure 4 by the same criterion.

#### PLAN FOR THE BASIC FIELDS OF KNOWLEDGE

The term "basic fields of knowledge" refers to all subjects of instruction except those in pedagogy. It covers vocational and technological subjects, arts, and the conventional disciplines such as physics, history, and mathematics. The plan set forth here provides for the development of protocol materials to teach certain things, not ordinarily taught in courses, about the content of these subjects. For example, the content of a course in history may be biased against a minority group or it may be composed of certain elements of knowledge--concepts, values, generalizations--and yet the teacher-in-training may miss these aspects. The development of protocol materials will help to provide instruction in these neglected aspects of the subjects of instruction.

The basic-skills-of-knowledge plan is a system of coordinates made of three generic categories: Areas of Knowledge, Levels, and Types of Knowledge about Knowledge. Figure 5 represents this system's coordinates. The expressions used in Figure 5 are defined below.

#### 1. Definitions.

We shall give the uses of the expressions "Areas of Knowledge" and "Types of Knowledge about Knowledge" and then define the terms designating the sub-categories.

- A. Areas of Knowledge. This expression refers to the various classes of arts and sciences. (Over 350 subjects are offered in the public schools. To represent these in a three-dimensional grid requires that they be reduced to a few categories, as is attempted in the following definitions adapted from Tykociner's *Zetetics*.)
- (1) Symbolics. An area of knowledge that includes language arts, mathematics, and logic.
  - (2) Arts. The area that includes dramatics, graphic arts, music, painting, sculpture, literature, industrial design, choreography, and architecture.
  - (3) Science of Matter and Energy. The group made up principally of physics and chemistry, but also including astronomy, geology (earth sciences), and mineralogy, all of which are unified by the principle of equivalence of matter and energy.
  - (4) Biological Sciences. The group treating living things, as exhibited in growth and reproduction including botany, zoology, morphology, genetics, and cytology, and related to 3 above by biophysics and biochemistry, and to psychological sciences by physiology.
  - (5) Psychological Sciences. The sciences of behavior of living things including principally individual psychology, group psychology, and social psychology.
  - (6) Sociological Sciences. The sciences which deal with the various facts about, and forms of, group life--demography, geography, social institutions and ethnology, related to the historical studies by anthropology.
  - (7) Developmental Sciences. Those disciplines which are concerned with the past, including cosmic evolution and history and pre-history of cultures. Among these are cosmogony, certain aspects of geology and biology, and the history of mankind.
  - (8) Sustaining Sciences. The studies aimed at maintaining life and advancing its welfare including health, physical education, public hygiene, and, at a more sophisticated level, agriculture, medicine, engineering, and technologies (manual arts, home economics, metal working, and other vocational subjects).
  - (9) Regulative Sciences. The areas of knowledge concerned with sustaining cooperation among men as they strive to satisfy their individual and collective needs. They attempt to keep the various elements of society adjusted to one another. Among these sciences are economics, political science, jurisprudence, and management (Business Education).

- (10) Disseminative Sciences. Those sciences which are concerned with the task of transmitting information accumulated from generation to generation. Among these are library science, pedagogy, and journalism.
- (11) Integrative Sciences. The studies attempting to bring knowledge to bear upon such questions as consistency of knowledge, man's purpose, and his destiny. Among these disciplines are philosophy, theology, and ideologies.

B. Levels. This term has been defined on p. 19.

C. Types of Knowledge about Knowledge.

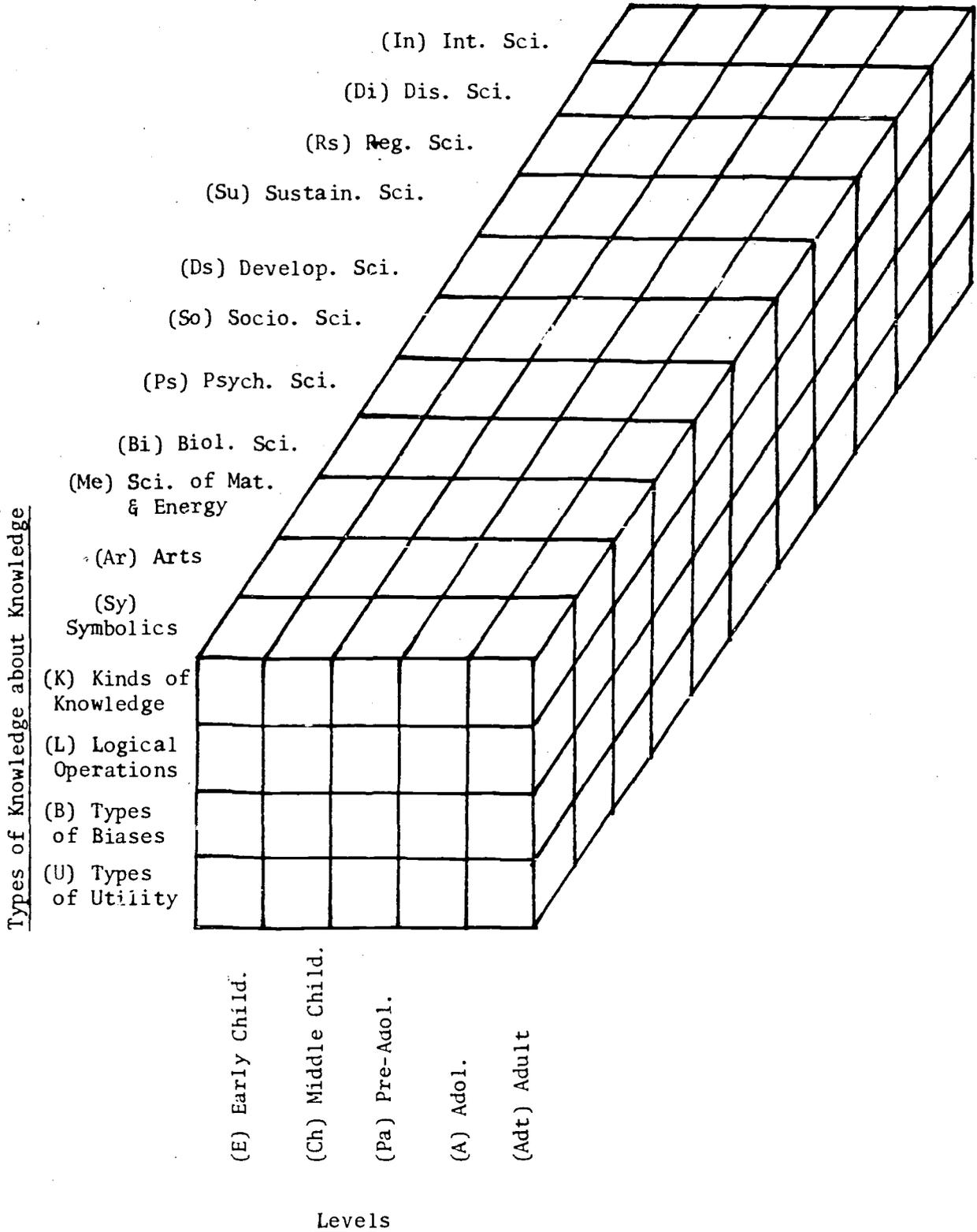
- (1) Kinds of Knowledge. The epistemological elements of instructional content such as laws, concepts, rules, values, procedures and facts.
- (2) Logical Operations. Logical relations and such operations as defining, explaining, classifying, and valuing.
- (3) Types of Biases. Adherence to a point of view in the selection and interpretation of the content of instruction. (In some cases, the point of view may be socially neutral as in the so-called new math, or in the different approaches to biology, chemistry, and physics. In other cases, it may be socially deleterious. For example, biases about races, social classes, labor, management, and the like, can be injurious to the well-being of certain groups or to the public welfare.)
- (4) Types of Utility. The uses to which the various kinds of knowledge and logical operations can be put by pupils and adults as they carry on the normal activities of life. For example, knowledge may be used in repetitive, associative, applicative, or interpretive ways or in making decisions or in justifying actions.

2. Settings. It should be noted that this category has been replaced in the basic fields schema by the category "Areas of Knowledge." This means that no settings are indicated for the development of protocol materials in Figure 5, for "Areas of Knowledge" are not settings but realms of content.

In what settings may materials concerned with the content of instruction be developed? A few settings are suggested here as examples. Some may be taken from the classroom. Others from public school textbooks, and still others from newspapers, magazines, and radio and television broadcasts. For example, protocol materials to show the utility of certain elements of scientific knowledge may be taken from articles in newspapers where such knowledge is being used. The analysis of the protocols would attempt to show how the knowledge is used in an article as well as how the reader

Figure 5

Master Coordinate System of Areas of Knowledge, Knowledge about Knowledge, and Levels



uses his own knowledge as he reads it. Similarly, protocol materials to depict elements of knowledge--concepts, values, generalizations, etc.--in history may be taken from classroom discourse where the content of history is being discussed. The analysis of the protocols would help the teacher-in-training to identify the elements as they appear in teacher-pupil interaction.

3. How To Interpret the Basic-Fields-of-Knowledge Plan. Protocol materials developed to show how economic knowledge studied in high school is used in out-of-school life are placed (Figure 5) in cell RsAU. Similarly, materials that are to be used to show the racial biases of classroom discourse in a junior high school course in history are placed in cell DsPaB. If protocol materials are developed to show the elements of knowledge in elementary school geography, they would be located in cell SoChK. Other materials can be distributed in their proper cell by reference to the various categories in Figure 5.

#### ILLUSTRATIONS OF THE USE OF THE MASTER COORDINATE SYSTEMS

It might be helpful to illustrate the use of each of the two master coordinate systems, that in the pedagogical domain and that in the basic-fields-of-knowledge domain, by citing the development of two fictitious protocol projects, one for each of the domains above.

1. A Proposed Project in the Pedagogical Plan. A developer decides in terms of his own criteria, that protocol material is needed to provide experience in the interpretation of group relationships in the classroom. He must first decide upon the precise group concepts that he wishes to have reflected in his protocol material. He next defines the concepts of reference group, group norm, and group reinforcement. He must then decide upon the level at which his protocol material will be made. Since group relationships are so significant at the adolescent level, he decides to develop material portraying students in interaction at the high school level. Thus, in Figure 1, he has chosen to work at the adolescent level (A). He has, of course, already decided upon the source of behavior in Figure 1--pupil behavior (P) since it involves relationships among adolescent students. He next must decide upon the setting for this interaction. He vacillates between showing this interaction in the peer group outside of school or in the classroom. Because he is anxious to have this interaction directly related to teaching, he decides upon the classroom as a setting. He has chosen the classroom category (C) in Figure 1.

He next must decide more specifically on the kind of behavior that he wants to occur. Since he is dealing with pupil behavior, Figure 2, in which pupil behavior is further specified, is most pertinent for him.\* In considering the possible behaviors, he decides that

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\*Figures 3 and 4 are not pertinent because they deal with refinements of teacher behavior and of teacher-pupil interaction.

both the affective (AF) and social (S1) aspects of behavior are likely to be involved in the type of group interactions he intends to portray. These, then, are the types of behaviors which will be significant in his protocol material.

In this process of planning by the coordinate system, the developer of protocol materials has become highly specific about the concepts, the levels, the settings, and the types of behavior that his material will portray. In turn, such specification will aid in the national effort to develop a variety of protocol materials without extensive overlapping and repetition.

2. A Proposed Project in the Basic-Fields-of-Knowledge Plan. A professor of education becomes concerned about the kinds of biases (racial, social class, etc.) that are often reinforced in the public schools. He particularly wants his teachers-in-training to become aware of the frequency with which teachers unintentionally convey biases to students in their classes. Referring to Figure 5, he may first decide upon the area of knowledge in which such biases are likely to be conveyed. The sociological area would be an obvious choice, but the systematic presentation of certain biases through the selection and discussion of literary material interests him more. Thus, he has decided on the symbolic category (Sy) as the area of knowledge the teaching of which will be portrayed in his protocol material. He next decides that he would like to show this at the elementary level when many biases are being formed. Thus, he selects the level of middle childhood (Ch). He has, of course, already determined that types of biases (B) will be the knowledge about knowledge that will be portrayed in his protocol materials.

Once again, the developer of materials has necessarily and desirably become highly specific about the dimensions that will be portrayed in his protocol material. Once again, this will help future developers to determine what areas in the basic-fields-of-knowledge plan still have not been sufficiently developed in the form of protocol materials.

#### PRIORITIES IN THE PEDAGOGICAL PLAN

Since the cells that include teacher-pupil interaction in the classroom at all levels are primarily those in which most teaching problems fall, these cells shall be given top priority for the next year (1971-72). The second priority should be given to any of the remaining cells in the pedagogical plan, but with the provision that not more than 20 percent of the new projects can be assigned to the second level.

<u>Priority Level</u>	<u>Setting</u>	<u>Behavior</u>	<u>Level</u>
1	Classroom (C)	Teacher-pupil (Tp)	All levels
2	Peer-group (Pg)	Pupil (P)	Any (E, Ch, Pa, A, Adt)
2	Family (F)	Pupil (P)	Any (E, Ch, Pa, A, Adt)

<u>Priority Level</u>	<u>Setting</u>	<u>Behavior</u>	<u>Level</u>
2	School (S)	Teacher (T)	Any (E,Ch,Pa,A,Adt)
2	Community (Co)	Teacher (T)	Any (E,Ch,Pa,A,Adt)

#### PRIORITIES IN THE PLAN FOR BASIC FIELDS OF KNOWLEDGE

In the first phase of this program to develop protocol materials on a nationwide scale, it appears that some arbitrarily determined distribution for the two plans would be appropriate. Accordingly, it is proposed that twenty-five percent of the funded projects be allocated to the basic-fields-of-knowledge plan, and that proposals in any cell of the plan for the basic fields be considered.

## NOTES

1. B. Othanel Smith and others, Teachers for the Real World (Washington, D.C.: American Association of Colleges for Teacher Education, 1969).
2. Ibid., pp. 28-29
3. Ibid., p. 42.
4. Ibid., p. 43.
5. Ibid., p. 44.
6. Donald R. Cruickshank, "The Developing Notion of Protocol Materials," Journal of Teacher Education 23, no. 3 (Fall 1972): 281-85.
7. Smith and others, op. cit., p. 48.
8. Ibid., p. 52.
9. Ibid., p. 53.
10. Donald R. Cruickshank, The Inner-City Simulation Laboratory (Chicago: Science Research Associates, 1969). A description of filmed incident 7.
11. Smith and others, op. cit., p. 54.
12. Ibid., p. 52.
13. Ibid., pp. 64-65.
14. Ibid., p. 53. Smith also supports the need for a national storehouse of protocol materials. Presently one exists at Indiana University under the supervision of David Gleissman.
15. Robert Howsam, Who's A Good Teacher? (Burlingame, Calif.: California School Boards Association, 1960).
16. Cruickshank, "The Developing Notion of Protocol Materials," p. 282.
17. Philip H. Phenix, Realms of Meaning: Philosophy of the Curriculum for General Education (New York: McGraw-Hill, 1964).
18. For more information on LTIs see James W. Kelley, "Leadership Training Institutes," Journal of Teacher Education 23, no. 3 (Fall 1972): 277-80.
19. George H. Kincaid, "A Catalogue of 'Protocol' Materials in Teacher Education" (Tallahassee: Department of Education, State of Florida, July 1971). Mimeographed.

The University of Colorado Protocol Project: A  
Case Study

*by Celeste P. Woodley and Laura A. Driscoll*

## INTRODUCTION

The Romans cast grain for birds to scratch to guide their moves in public affairs or to predict outcomes of an undertaking. The patterns of grain left by the birds were interpreted as good or bad omens. Had we followed that old Roman custom, the hen-scratchings might have augured three years of very interesting, challenging, and often frustrating work in the development of multi-media protocol materials.

The justification for writing a case study of the University of Colorado Protocol Project is not that the work was interesting or that we finally produced something with 3 years of federal money. What warrants reporting are the ways in which the project staff came to understand a new and sophisticated idea in teacher education and the experiences of the staff in developing, testing, and disseminating protocol materials. We will share the insights, the methods, the problems, mistakes, and successes of the University of Colorado Protocol Project with readers who might wish to develop similar materials and with those who are curious about how an educational idea gets translated into an instructional product.

Some brief mention of who we are and what resources we had to work with may be helpful since the backgrounds and experience of the staff and the amount of the U.S. Office of Education grant were to influence decisions during the life of the project. The academic interests of the staff suggested the general conceptual framework within which we worked and the specific concepts we chose to develop. Our inexperience with media techniques and technicians accounted partly for the many fumbles with videotape, 35mm slides, and 16mm color sound film.

The total grant for the 42 months, July 1, 1970 through December 1973, was about \$165,000, averaging just under \$4,000 a month. No more than two persons ever worked full-time at once on the project, although part-time clerical and professional assistance came from several persons during the 3 1/2 years. In the long run, a relatively low budget, some poor luck with contract technicians, and a resolve to complete the materials and get them out turned the Colorado project into a "do-it-yourself" operation with the project staff doing much of the technical work and all of the dissemination.

The director of the project, Celeste Woodley, and the assistant directors, Ina Mullis (1970-72) and Laura Driscoll (1972-73) were responsible for the development, testing, and dissemination of the University of Colorado protocol materials. Woodley is a member of the faculty of the School of Education; Mullis is currently in the Research and Analysis Division of National Assessment of Educational Progress, Denver; and Driscoll is a doctoral student in Educational Research and Evaluation at the University of Colorado. The academic backgrounds of the three are in social science education or research and evaluation; their working experiences are in teaching, the analysis of teaching, curriculum development, product and program evaluation, and administration of teacher education programs. When the project began, the staff's direct experience with media was limited to classroom video-taping and threading old movie projectors.

The university agency which holds the USOE grant is the Center for Education in the Social Sciences, University of Colorado, an organization interested in improving education at all levels, particularly social science education, by strengthening the ties and the dialogue between the School of Education and academic departments in the College of Arts and Sciences. The background, experience, and organizational affiliations of the staff contributed to the frame of reference and to the content of Colorado's protocol materials and to the style and format of the final products.

## BEGINNINGS

To begin, we had to understand protocol materials. From there we chose our concepts and finally learned about technical quality the hard way.

### Scrambling for a Referent

The USOE request for proposals (RFP) that came to the Center in April 1970 contained ideas and phrases that were not common in our repertoire: protocol, behavioral specimens, segments of behavior, protocol materials, authentic representations of educationally relevant behaviors, the distinction between protocol materials and training materials. Uncertainty about the nature of the materials described in the RFP caused us to read many times those few pages of description and definition. We studied *Teachers for the Real World* in which B. Othanel Smith had described protocol materials and set them in the context of a much larger instructional scheme, and we spent a lot of time discussing and refining our own interpretations of the nature and meaning of protocol materials. The initial struggle to understand the concept "protocol materials" gave us an appreciation of the task of concept analysis that was to become central in product development. To begin to understand protocol materials for ourselves, we needed a definition or rough idea of the concept. We profited from knowing what protocol materials were not; more examples would have been helpful, and delineation of specific characteristics or attributes might have provided good clues as to the nature of protocol materials. By the time we began to develop materials in the summer of 1970 we knew that protocol materials linked concepts with their behavioral referents, as represented in filmed or video vignettes. It was clear that the two critical aspects of development were concept selection and analysis and the reproduction and representation of descriptive behaviors in an appropriate media.

Conceptual Dimension. From the several areas suggested for protocol development, we chose to work with concepts relevant to teacher-pupil classroom interaction. Initially we had proposed to illustrate concepts such as "motivation," "involvement," "ethnocentricity," "cognitive style," "value formation," "classroom climate," "concept attainment," "hypothesizing," "resolution of conflict," and "evaluation." These concepts were chosen because they were referred to frequently in teacher education texts. This smorgasbord seemed plausible at the time, but by the fall of 1970 it was difficult to justify the shot-gun

approach. It was also apparent that we would have to drop plans to use, in final product, vignettes from our large collection of 1/2-inch video tapes of classroom teaching. Earlier it had seemed reasonable that behaviors exemplifying all of the concepts we chose to portray would occur somewhere in the 60 hours of video footage. That idea was not inconsistent with the notion of protocols as "slices of life" that was pervasive early in the program. It seemed practical to select those slices from existing resources. We had begun to catalogue the tapes by segments according to conceptual content, noting quality of sound and quality of picture. The next step, we thought, would be editing the segments into a flow of examples emphasizing the behavioral attributes of a particular concept, adding some titles and music, converting to kinescope, writing a guide, and Voila! protocol materials. It was not quite that simple. Figuring out just what we were supposed to be doing and how we were to do it took a while.

The quarterly meetings of the protocol directors and members of the Leadership Training Institute (LTI) provided the feedback necessary for us to find out, if somewhat indirectly, how we were doing with the two major criteria of protocol materials production, i.e., the conceptual validity and technical quality. These "show and tell" sessions provided important verbal and non-verbal clues. A viewer's question-- "What is the concept?"--immediately following a presentation, was a pretty good indication that conceptual quality was doubtful. After three or four wrong guesses from others in the audience, one might prudently consider beginning all over again.

Technical Dimension. The real meaning of technical quality gradually emerged from the reactions of the directors and LTI audience to jumpy cameras, stereotyped acting, blurred visuals, and slurred sound. All these flaws were tolerable when the products were viewed as rough draft films or video tapes, but whatever delusions we had about preserving the home-made look in a final product were laughed away. The criterion "Commercial Broadcast Quality" became the word of the day by late 1970, and the implications of what that meant in terms of time, money, and precision also prompted a reassessment of our production plans.

Steps in Development. The trial and error process of the early months of the project indicated the following steps as basic in protocol material development:

1. Developing a conceptual framework that has utility for understanding the teaching-learning process;
2. Selecting from the framework and further defining concepts for protocol development;
3. Identifying the properties and behavioral attributes of the concepts;
4. Deciding on the appropriate media;
5. Loosely scripting classroom episodes exemplifying both instances and non-instances of the concepts;
6. Filming or taping the vignettes;
7. Editing the footage;
8. Adding appropriate titles, credits, music definitions, questions, and models;
9. Writing supplementary teacher's and student's guides.

## REASSESSMENT: STRATEGIES AND TACTICS OF SURVIVAL

The skirmishes of 1970 gave us a better look at our target and suggested some strategies for attack. The target, it turned out, was a formidable task, more complex and sophisticated than we had realized. Precise exemplification of well-defined concepts in various media forms of high technical quality was required.

### The Conceptual Framework and Selection of Concepts

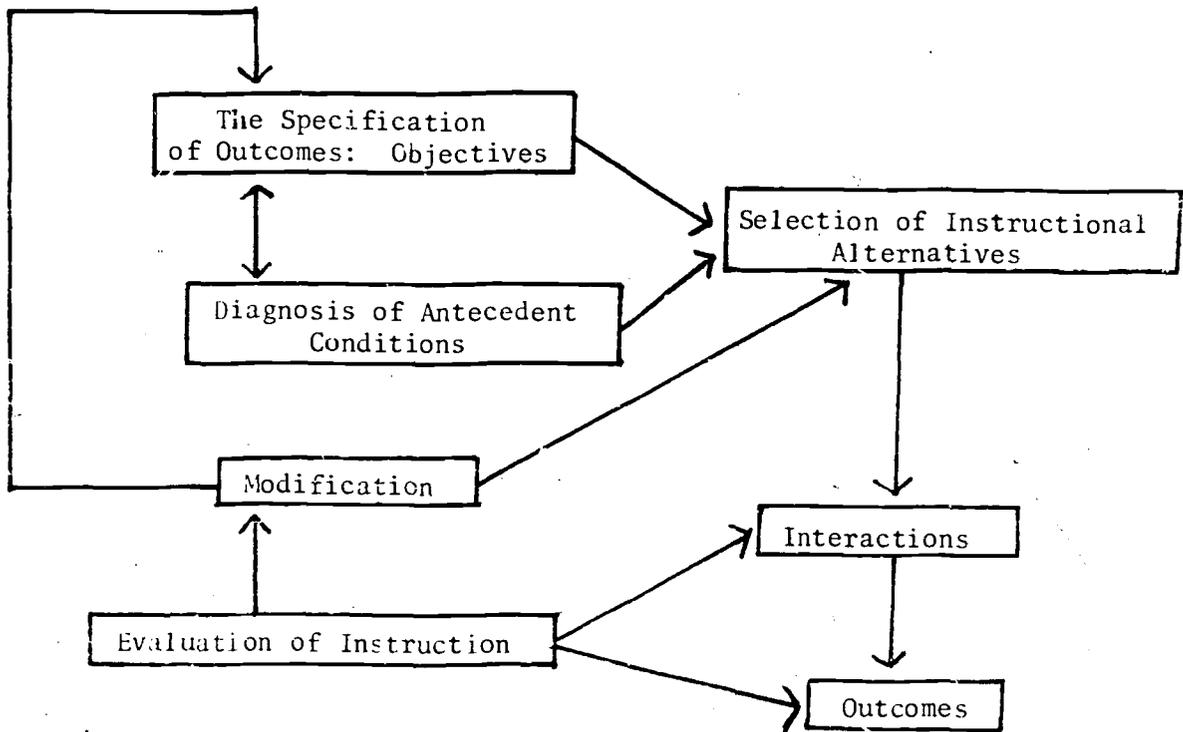
The selection of concepts was the first concern in our assessment. We wanted to stay with teacher-pupil interaction in the classroom because we were comfortable in that area and we felt we could successfully portray concept-behavior linkages there. It was also an area of high priority for the entire protocol program. We were convinced, however, that producing protocols for concepts like "questioning" or "punishment and reward" or "probing" did not get at what is basically and crucially missing in a teacher's ability to interpret classroom interaction. The rejection of specific, skill-related concepts was not a denial of the significance or validity of such concepts, just a disagreement with the level and scope of conceptual focus. Furthermore, other projects were dealing successfully with many of those concepts. There was no need to be redundant.

We were interested in equipping teachers with the conceptual and analytic tools to change their own behaviors. It seemed to us that teachers first needed an understanding of a theoretical framework that made sense of the instructional process itself. Then the meaning of any particular specific concept and the interpretation of associated behaviors could be placed in a theoretical, as well as in a situational, context. There would be much greater opportunity for teachers to comprehend what was happening in teacher-pupil interaction and to go beyond the specific behaviors to some idea of why they were happening. Referring to a conceptual model, teachers could modify their decisions at the point where most impact on consequent interactional behaviors might be made.

We derived two models to guide our thinking and selection of concepts. One, derived primarily from the work of Stake<sup>1</sup> and G<sup>2</sup>, is a decision-making model of the process of instruction (Figure ) which indicates major conceptual components of a theory of instructional decision making and suggests the sequential and functional interrelationships of these components. The concepts we chose to exemplify are related to one another functionally and sequentially in this conceptual model as generally indicated by the arrows between components. We had wished to analyze and illustrate at least one concept identifiable in each of the major components, but we had neither the time, the money, nor the talent for so large an undertaking. We chose to illustrate six concepts, one related to the entire process of instruction, one to antecedent conditions, one to selection of instructional alternatives, and three to interaction. (Two were later combined in one unit.)

Figure 1

Basic Model of Instruction Guiding  
Development of Protocol Materials  
University of Colorado



Before we selected specific concepts and defined those concepts, we had to resolve the question of the level of specificity of concepts with which we would work. Concepts can be arranged in a hierarchy of complexity depending upon the number of discrete attributes that characterize them and the logical linkages and dependencies among the attributes. There are large and complex concepts, middle-level concepts, and specific and simple concepts pertinent to instructional theory. At what level in the conceptual hierarchy was it useful and practical for us to work? Our frame of reference dictated a focus on middle-level concepts that provided, we believed, context for understanding and interpreting the more specific behaviors that characterize more narrowly defined concepts. We were not unaware of the risk of ambiguity and the difficulty of representing specific behavioral attributes when we decided to portray these more general middle-level concepts. The truncated outline in Figure 2 indicates, in relation to some other conceptual categories, the concepts portrayed in the set of products developed in 1971 and 1972 by the Colorado project. The specific titles of the five products and the concepts exemplified follow.

Title	Concept
1. Conceptualizing the Process of Instruction	Process of Instruction
2. Learners and Their Characteristics: Implications for Instructional Decision-Making	Attitudes toward School Aptitudes Personological Variables
3. Verbal Interaction in the Cognitive Dimension	Verbal Interaction (Cognitive)
4. Fair Verbal Behavior	Fairness
5. Organizing Facts To Teach Meaningful Relationships	Concept Teaching

The middle-level designation of these concepts is relative, e.g., "Process of Instruction" is a less general, less complex concept than "Education" and is subsumed under it. "Fair Verbal Behavior" is more general, more complex than "Initiating and Reacting Behaviors" and encompasses them and the even more specific "Accepting," "Encouraging," and "Task-Oriented Behaviors," for example.

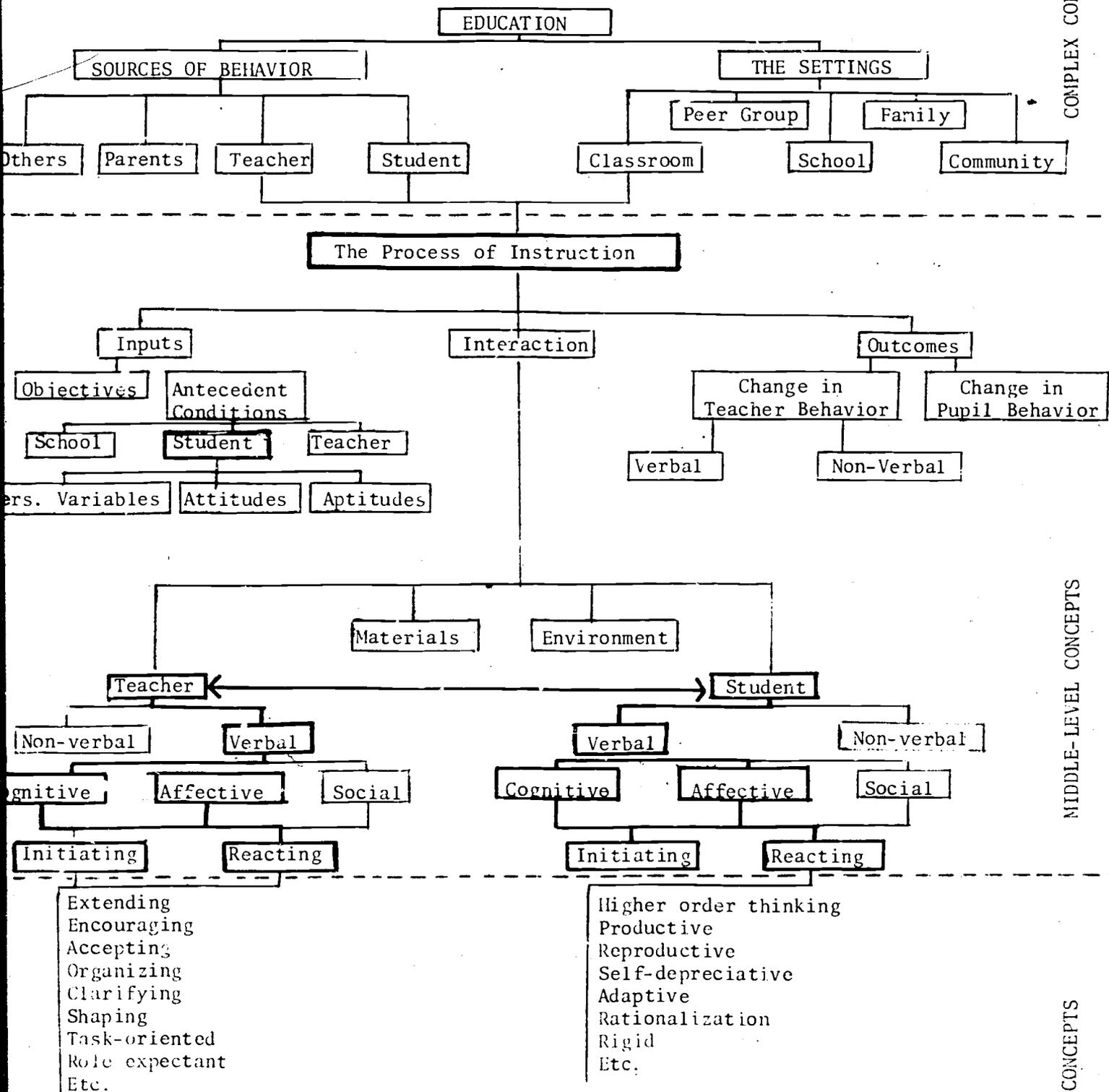
#### Linking Concepts to Observable Behaviors

We discovered that middle-level concepts become quite a mouthful when verbalized--"process of instruction," "attitudes toward school," "verbal interaction in the cognitive dimension," "fair verbal behavior," "concept teaching." They are also unwieldy and hard to pin down to specific, unambiguous indicators.

The process of analyzing concepts, defining them, and listing their behavioral attributes was the most difficult and critical task of protocol materials development. It is the essential step between

Figure 2

A Partial Model of Conceptual Categories in Education Arranged in a Hierarchy of Complexity



NOTE: The heavy outlines indicate categories in which protocol materials were developed by the Colorado Project.

selection of the concepts and the technical work with media. Analysis of the selected concepts must yield definitions and characterizing behavioral attributes. (See "A Catalogue of Concepts in the Pedagogical Domain of Teacher Education," p. 54.) It is the behavioral attributes or indicators of the concept that are observable and able to be captured on film or tape. We defined "Fair Verbal Behavior" for example, as teacher verbal behavior that follows a consistent standard toward all students and is free from bias, dishonesty, and injustice. That definition was derived from student descriptions of teachers and classroom experiences available in general and research literature on classroom teaching. Students have a concept of fairness, and how a teacher measures up as fair or unfair seems to affect student behaviors. To treat "Fair Verbal Behavior" as an aspect of classroom interaction and as a significant concept seemed justified. The behavioral indicators of "Fair Verbal Behavior" were identified from the definition and from specific student perceptions. A fair teacher:

1. Praises students' ideas rather than students personally.
2. Praises students when they deserve it and corrects them when they make a mistake or misbehave.
3. Explains the mistake or misbehavior rather than criticizes the student personally.
4. Asks students to clarify statements or defend actions in order to determine whether to praise or correct students.
5. Is not capricious and arbitrary in dispensing praise or correcting students.

It was helpful to us to list also negative instances of "Fair Verbal Behavior," e.g., praises students who don't deserve it. This analytical aspect of development required a heavy investment of time.

Once the observable behavioral characteristics of any concept were delineated, we had to decide on the appropriate vehicle for media representation. Our deliberations were not terribly complex. They were based in some cases on LTI advice and sometimes on experience. The thinking went something like this: If continuous flow of dialogue and physical movement are both necessary to identify the behavioral indicators of the concept, use video tape or film. If non-verbal expression or symbolic records convey the attributes of a concept, use slides (or filmstrip). If the subjects' verbal behaviors add a necessary dimension, use cassette or audio tape, but add slides for interest or clarity. If the behaviors are difficult to distinguish initially without some help, use overprint, arrows, or other focusing aids. Since 1/2-inch video converted to kinescope looks like reruns of "Our Gang" comedies, use 2-inch tape for video. Since good sound is critical, use a studio set-up and plenty of microphones when filming. Since there are difficulties with the compatibility of the various video formats, 16mm film is preferred. Since color film is usually more attractive to the viewer, use color. Since teacher's guides are often a drag, keep them

brief and put instructions on the film where feasible. What actually happened on the technical end of protocol materials production at Colorado is another story.

### The Root of All Evil: Technical Incompetence

All great dreams have sub-themes that run under the main plot. In our case, the sub-plot almost overwhelmed the serious theme of producing conceptually sound protocol materials. The struggle in the wings with a varied assortment of incompetent media specialists almost closed the show. The judgmental errors in selecting these persons were ours, and we have vowed to give a lie detector test in the future to every applicant who claims to know anything about media. Some highlights from our experiences may forewarn the reader who contemplates a multi-media venture.

### Where Is the Picture? A Video Vignette

The VTR is on and reels are turning; camera is on; two plugs are in the wall. Students and teacher are engaging in behaviors perfect for the protocol.

"Everything set? Are you getting a good picture?"

"Don't worry about a thing." (Peers into camera.)

"Picture is just great!"

Twenty minutes go by. Kids can hardly wait to see themselves on the monitor. Rewind. Switch to play.

"Where's the picture? Where's the picture?"

"Ooops. Forgot to plug the camera to the VTR."

### A Study in Gray and Gray

"What this kine needs is some sharp title cards and music under the introduction. I'll pick out the mood music for you. I know the beat to look for. You just take your titles over to Murph; he'll shoot them with his Boley."

Murph is stuck away in the basement of the oldest building in town. The "Boley" has no tripod, but "My hand is steady." The poor light and the steadily shaking hand produced a piece of film that the processor tried to expose twice.

But the viewer hardly notices it go by at all; he is in shock from the variation of "Babes in Toyland" that "sets the mood" for "Conceptualizing the Process of Instruction."

### The Sound of Speed and All That

"Glad you decided to go to 16 mill. Queen of the media . . . I'll get on the phone to my contacts in the morning and put in the order for everything we need . . . Ship it by Air Cargo the next day . . . Let's see: positive-negative, double reversal, optical sound and a double-sync projector, edge markings and the Movieola, crystal sync recorder and three Nagras, Bolex, Eclair, and Aeroflex, booms and wireless . . ."

"Wait a minute. You just lost us."

"You've got to remember. With me as producer-director you move with the sound of speed."

("Sound of speed? Is that -- CRASH?")

Lest you be afraid to buy a roll of film from now on, be advised that we were trying to keep our expenses down and had not taken our business to well-established film companies. Their prices were in the range of \$1,000 a minute for 16mm color film and \$20.00 an hour for 35mm work. Much later we did find some very able professional people to help us whose charges for high quality work were minimal.

### "Do-It-Yourself": The Last Resort

There were many times in the last 3 years that the three of us felt we had embarked on new careers as graphic artists, paste-up experts, script writers, film editors, sound women, and recording artists. We made almost all of the title and credit cards for copy stand photography and for revision of black and white films. We used press-on letters, 9x12 negatives and colored gel or acrylic, enlarged color prints, and poster paints. The selection and sequencing of slides for filmstrips, the scripting of the dialogue for the filmstrips, the selection of music and special effects, the locating of subjects to be in the films or filmstrips were all part of the job. The sessions with the Movieola, sync'ing lips with sound, lasted far into many nights. We had 6,000 feet of color film and 8,000 feet of sound tape that we had to see and hear together in order to select the most illustrative instances for two of the products. Once we had identified the segments, we searched for and found a competent film editor who didn't mind us working right with him until we were satisfied that we had what we wanted.

"Do-it-yourself" is not quite right. There were many persons who donated time and talent to help us out. Cooperation and interest were demonstrated by students, teachers, school administrators, professionals and employees of film sound studios, amateur actors in a local theatre group, and many persons whom we talked with but never saw. The generosity of the Boulder Valley District Re-2 and Adams County District #50 schools in allowing us to use their classroom facilities for filming made much of the work possible. With all of this help, our color films cost not more than \$500 per minute instead of the usually quoted price of \$1,000 per minute.

### TESTING, EVALUATION, REVISION

Testing, evaluation, and revision of the protocol materials were ongoing processes that began as early as the fall of 1970.

### Pilot Testing

Pilot tests provided information on student and instructor perceptions of technical quality and on the clarity and significance of concepts.

These early trials were instrumental in revising the films and in writing the instructor guides and student materials.

In late 1970, the first film unit, "Conceptualizing the Process of Instruction," was piloted in education classes at the University of Colorado, Colorado State University, and at sites in Florida. The 200 students who used the materials at that time reacted positively to the idea of protocols, but were negative about the quality of the film and the structured presentations. "You're forcing us to see something in this that we just can't (or don't) see" was a typical comment. This kind of student reaction was given much weight in revising the film and instructor's guide.

The revised unit on the "Process of Instruction" was again pilot tested under similar circumstances in the spring of 1971 along with two new protocol materials units, "Verbal Interaction in the Cognitive Dimension" and Part I of "Learners and Their Characteristics," a film-strip on attitudes toward school. We learned that instructors did not always understand the suggested uses and often had different ideas about the most advantageous way to present the materials. Their comments and reactions led us to write a more detailed rationale for the units, more explicit directions, and suggest alternative teaching procedures for each unit. All five products were readied for the major field test in this way.

### Field Testing

In the spring of 1972 our five multi-media protocol products were field tested at 15 colleges and universities around the country.

The Subjects. Five social science methods classes served as a control group; the ten experimental classes consisted of five general methods and five social science methods classes. The 15 different test sites represented a diversity of urban and rural regions. The instructors were selected from among willing persons suggested by friends around the country.

The Instruments. The evaluation instruments were constructed by Ina Mullis, with assistance from Gene V Glass of the Laboratory of Educational Research at the University of Colorado. The instruments were drawn up according to the objectives of the project and in order to answer two evaluative questions: "How effective did the participants judge each product to be?" and "Is the protocol materials approach more interesting than conventional approaches in teacher education courses?" The questionnaires included a pre- and post-test, intended to measure concept acquisition; instructor and student background information forms, which yielded such data as years of teaching experience, degrees obtained in specific areas, age, sex, number of hours taken in different subject areas, previous non-teaching experiences, and future plans; separate criterion tests for each product; and instructor and student evaluation forms for each of the five products. The purpose of the criterion tests was to assess whether or not the objectives of each product had been met. They differed in form from one product to another, depending upon the nature of the activities prescribed for

each unit. The evaluation questionnaires were similar for all five products. The 15 Likert scale items on each form were intended to measure the interest and perception of the significance, clarity, sufficiency, and effectiveness of each unit.

The Instructions. All of the field test materials and instructions were air expressed to the instructors during the last week in March 1972. Complete instructions and an inventory of contents of the testing box were included with the shipment. For every instrument administered a large, stamped return envelope was provided for immediate return of questionnaires or tests. Instructors in the experimental classes had the prerogative to decide when and in what order to teach the protocol units.

Problems. The field testing procedure could have been improved. We were fortunate that we found instructors to participate at all considering the late date. We should have sent the materials a month earlier than we did. Some instructors did not have enough time to complete all the units before the end of the semester. Confusion about the nature of protocol materials might have been avoided had we conducted an orientation session for the instructors before they used the materials.

#### Evaluation

Returns of the data were disappointing. Two instructors returned the box of materials unopened. Only two instructors returned all of the data; there were partial returns from the others. More than half of the students did not take all the criterion tests, mostly because the tests were too long and too difficult. Incomplete returns prevented us from analyzing the relationships between the background information data and achievement or attitude scores. We were able to compute an analysis of co-variance on post-test scores using pre-test scores as a covariate for experimental and control groups and to obtain mean scores for criterion tests for the two experimental groups and mean scores for instructor and student groups by product.

The staff worked with an outside evaluator, Mary Lee Smith of the University of Colorado, on the scoring and tabulation of the data. Smith analyzed the data and prepared the evaluation report.

The results of the field testing can best be summarized by examining the responses, generally speaking, to the two primary evaluative questions which were embodied in the instruments. In answer to "How effective did the participants judge each product to be?" it can be said that both the concepts and the activities used in the units were considered worthwhile and significant by both students and instructors for all five products. The interest level of all units but one was rated as "more" or "much more" interesting than what "normally takes place in my education classes." Two units suffered somewhat from a lack of clarity, according to the respondents.

In order to measure the difference between the protocol approach and conventional approaches to teacher education, the responses of the two experimental groups and the responses of the control group to the post-test were statistically compared. The questionnaire was divided into five sub-sets (groups of three or four items) which related to different instructional objectives. Also used to judge the difference were some of the items on the evaluation questionnaires. Both students and instructors apparently perceived that "Verbal Interaction in the Cognitive Dimension" and "Fair Verbal Behavior" taught the students more than they would have ordinarily learned in a teacher education course. Instructors thought that "Learners and Their Characteristics" offered a better approach than the traditional, but students did not. Students thought that "Organizing Facts To Teach Meaningful Relationships" (on concept teaching) was an improvement on conventional approaches, but instructors thought it was no better.

### Judgments

The responses were studied by the evaluator, the project director, and a social studies methods instructor. Each wrote an independent judgment of the implications of the data for revising, disseminating, and using the five products. The judgments reflected agreement that revisions had to be made, but also indicated that the materials were essentially useful and should be disseminated as widely as possible.

### Revision

Final revision of the materials according to the directions inferred from the data was undertaken in the fall of 1972. All black and white films, for example, were converted to color effect by tinting the kinescope in printing and by adding new color titles. Some of the episodes were shortened, and some clarifying questions or instructions were added. All of the instructor's guides and student handouts were re-written and shortened. The main emphasis there was on revising the criterion tests, included in the guide to make them less time consuming, easier to understand and use, and more uniform.

The field test results showed the materials to be generally worthwhile and interesting. Better products had resulted from revision, and there was no reason not to disseminate the materials as quickly and as inexpensively as possible.

### DISSEMINATION

It was a great feeling to survey a shelf full of finished materials that were apparently useful and wanted. By the spring of 1973, the materials were ready for a publisher and distributor, and contacts were made with the publishing industry. The responses of the commercial publishers were less enthusiastic than anticipated and probably for good reason. Although publishers responded favorably to the content and technical quality of the materials, they had concerns and questions about the size of the market, cost and time problems of reproducing

and marketing multi-media materials, the packaging and warehousing problems, and the high mark-up price which would prohibit many potential customers from purchasing the materials. The prospect of any commercial publisher marketing the products looked extremely bleak. Although the market was small by commercial standards, materials like these were much in demand. To spend more time trying to find a commercial publisher seemed ill-advised. We wanted to get the protocols out while they were still relevant and up-to-date. This looked like a time for the "try-it-yourself" strategy.

Authorization to secure final copyright and to make the University of Colorado the publisher and disseminator of the materials was applied for from USOE. Such authorization was granted for a 5-year period, with permission to sell the materials on a non-profit basis.

### It Pays To Advertise

An advertising campaign was launched on May 1, 1973 by sending out 10,000 one-page brochures announcing the availability and cost of the materials. These were sent to persons on the mailing lists of the American Association of Colleges for Teacher Education, the ERIC Clearinghouse on Social Studies/Social Science Education, and the Social Science Education Consortium. The cost of printing, mailing lists, and mailing was about \$650.

In anticipation of requests for preview, rental, and sale, we ordered 25 prints made of each film and filmstrip. The total expense for the prints and the appropriate sets of written materials came to about \$5,500. The selling price of each protocol materials unit was set to cover expenses, including mailing and packaging costs, and to provide for replacement of the unit.

The response from advertising has been very gratifying. Requests have come from agencies at all levels of education. As of the end of December 1973, there had been about 500 mail and telephone contacts. There had been over 100 requests for more information; 200 requests for previews; 50 rental orders (at \$5.00 per unit); and 75 sale orders. The total dollar value of orders by the end of December was just over \$7,000.

### Production Goes On . . .

With the dissemination problem temporarily under control, the staff turned attention back to development of protocol materials in a new area in the third year of the grant from USOE.

In the fall of 1972, while still evaluating and revising the earlier products, we began to plan production of four filmstrips dealing with social science concepts. The goal for 1973 was to select and portray concepts significant for developing an understanding of social behavior as it related to the phenomena of social stability and social change. The search for a theoretical and integrating framework within which to locate and explore concepts related to social conduct directed us to role theory as the general area in which to work. The role

orientation appealed because it offers an interdisciplinary approach to the several social sciences. The concepts selected for protocol development are "role conflict," "conformity," "consensus," and "position, identity, status, and role." These concepts are useful in exploring the "fit" between individual behavior and group behavior, and they have important implications for examining the nature of social change or social stability.

At this writing "Role Conflict" and "Conformity" have been completed. "Role Conflict" is a filmstrip and cassette unit, using six vignettes to illustrate expectations, positions, and behaviors and their relationships in the dilemma of conflict. "Conformity" is also presented on filmstrip and cassette. The concept is treated according to its various definitions, each of which is illustrated by one or more episodes in the filmstrip. There are no instructor's guides for the materials; directions and definitions are part of the filmstrip. Research has been completed for "Consensus" and the script is in preparation. The last unit on "Position, Identity, Status, and Role" will be prepared in February. Field testing on all four units will be carried out in the spring of 1974. In the preparation of the four units on concepts from role theory, the Colorado project has been fortunate to have had as consultants Bruce J. Biddle and Barbara J. Bank of the Center for Research in Social Behavior, University of Missouri.

#### APPRECIATION

No project has been more interesting and more challenging for this staff than the Protocol Materials Development Project. The opportunity to be part of the USOE Protocol Materials Development Program is much appreciated.

## NOTES

1. Robert Stake, "The Countenance of Educational Evaluation," Teachers College Record 68, no. 7 (April 1967).
2. Robert Glaser, Evaluation of Instruction and Changing Educational Models (Los Angeles: Center for the Study of Evaluation, UCLA, 1968), p. 5.

A Catalogue of Concepts in the Pedagogical  
Domain of Teacher Education

*by Bryce B. Hudgins*

51/52

## INTRODUCTION

If protocol materials are to make a programmatic contribution to the improvement of teacher education on a nationwide basis, certain objectives must be realized. Other papers in this publication deal with some of those objectives; for example, technical criteria for production of materials must be specified and demanded. Individual protocols must teach concepts. The pedagogical and technical knowledge necessary to achieve criteria associated with both of these general goals has been growing during the past 4 years. Protocol materials which are being developed at the present time appear to be far superior on both these dimensions than were the prototypes of 1970.

Despite these real and sizeable advances in the program, however, much must be accomplished to reach the original goals concerning national impact on teacher education programs. From the earliest planning stages of the protocol program, the need for conceptual mapping of the pedagogical domain of teacher education was recognized. Such a map would presumably aid in making decisions about which concepts, or at least which groups of concepts, should be developed into protocols. Through that mapping effort and, it is hoped, through other similar efforts still to be planned, protocol materials developers would receive guidance about undeveloped concepts in the pedagogical domain. From the outset, this conceptual mapping was conceived as a catalogue of concepts about teacher education that would contribute to the execution of two principal functions. First, it should identify appropriate concepts in the literature of teacher education, estimating the overlap or redundancy among such concepts and identifying ostensible gaps and the kinds of concepts needed to fill those gaps. Secondly, statements about individual concepts should give the developer salient and significant information to help portray the concept. These statements must define the concepts, specify their essential attributes, and give brief examples that might serve as preliminary sketches for concept portrayal.

During 1973, a project to develop this catalogue was housed in the Graduate Institute of Education, Washington University, under the direction of the author. This paper is a preliminary statement of the rationale developed to execute the two primary, catalogue functions.

## CONCEPTS IN TEACHER EDUCATION

Concepts are the building blocks of thought. They outline the content of disciplines and undergird their structure. Thus the psychologist thinks in terms of "stimuli" and "responses"; of "reinforcement" and "extinction"; of "learning," "forgetting," "retention," and "interference." For the sociologist, his thinking and work are delineated by concepts such as "group," "norm," "interaction," and so forth. It is the specialized concepts a group employs to draw attention to its issues and phenomena that distinguish its discourse from that of another group or from laymen. Of course much of the potency of a shared and specialized vocabulary lies not only in the individual

concepts themselves, but in the increased analytical power obtained when relationships among sets of those concepts can be established. Relationships of this order are to be found in all areas of human inquiry that involve logical, propositional, and theoretical thinking. Nor is this generalization restricted to the provinces of the purely academic and theoretical. Great strides in the technological base of professions such as medicine and engineering have been accompanied by vast increments in their level of conceptual and relational sophistication. Practitioners are thus able to identify and solve complex problems which were perhaps incapable even of formulation prior to appropriate conceptual and theoretical development.

Shifting to the field of teaching, and particularly to teacher education, we discover that relatively little is available by way of a specialized vocabulary or set of concepts about teaching and that virtually no propositional knowledge has been generated. Furthermore, individual concepts about teaching are not widely shared among practitioners. Finally, numerous education scholars have pointed to the paucity of technical language available to teachers for discussing issues that occur in the classroom (and therefore have some chance of defining and solving problems). In short, no language of teaching exists that provides a set of intellectual tools by which practitioners can isolate areas of difficulty and subsequently comprehend and interpret them. Most concepts that teachers possess are not universal and may be quite personal. Those teaching concepts that are available are often so limited in scope that the individual teacher is left with nothing but his own powers of insight and innovation to survive in the classroom and to try to improve the instruction he gives his students.

The author believes this characterization of teacher education as a field in conceptual disarray to be substantially accurate. The principal question that we must confront, then, concerns the nature and extent of the contribution to be made by a catalogue of concepts in teacher education. Clearly, no catalogue of concepts can altogether eliminate the conceptual problems of teacher education. It can facilitate the process of conceptual clarity, however, if two major objectives can be achieved. First, it must specify and delineate the definition of the "pedagogical domain of teacher education." Secondly, it must identify, define, and exemplify appropriate concepts (organized according to their functions) within the broader domain of pedagogy.

#### PEDAGOGICAL DOMAIN

An analysis of the phrase "pedagogical domain" was significant in the preliminary effort to organize the catalogue. No clear and widely shared referents exist for the term.

#### Definition

We construed it broadly, suggesting that the pedagogical domain encompasses *those settings and those people that bear upon the content which is to be taught to pupils, and the methods or procedures employed for purposes of conveying content.* The domain includes decisions about

the choice and communication of content. Thus, not only are concepts about the teacher, teaching, or the pupils included in the definition of pedagogical domain, but also concepts about relationships between teachers and their peers, teachers and administrators, and teachers and boards of education and other community groups. Figure 1 portrays the major layers of concepts required to exhaust this conceptual domain.

### Selection and Delineation

The pedagogical domain is much more extensive than had been anticipated prior to our analysis of it, and priorities had to be set to guide the selection and delineation of some portion of the domain as opposed to its totality. Since teaching practice is more likely to be guided by concepts with an ostensible immediate application to the daily tasks of teaching than by more remote concepts, the decision was made to develop a catalogue of concepts pertaining to interactive teaching. This decision was based upon the belief that the preponderance of concepts most central to the day-to-day activity of teachers and pupils are found in that ring. Thus one criterion established for the selection of concepts in the catalogue was that they should have proximity to the ongoing classroom activities both of teachers and pupils.

Regardless of this decision, concepts that lie within the other rings will also, in the future, require conceptual development. For example, the ring labelled "teacher collegial relationships" might be expected to contain relatively few concepts, but they are concepts of considerable importance and explanatory power. To our knowledge, these concepts have not been systematically collected and analyzed. At a guess, however, the concepts in that ring should clarify relationships among teachers and their peers. Teachers manifestly or subtly communicate to one another their ideas on treatment of children, maintenance of discipline, amounts and kinds of content, and communicating content. The intriguing analyses of groups other than teachers strongly imply that the use of sanctions and rewards occurs in all sorts of peer working relationships to control both quality and quantity of work accomplished and to govern relationships among workers, clientele, and superiors. Books such as Waller's classic *Sociology of Teaching*<sup>1</sup> and the recent monograph *Small Town Teacher*<sup>2</sup> by MacPherson suggest that these principles and their component concepts are applicable to teaching as well.

The point of this discussion is to illustrate that concepts about interactive teaching, as crucial and as central as they are to the domain of pedagogical concepts, do not exhaust it. Nor can any such catalogue developed around a fraction of the domain begin to show the integrated richness of the domain, as all concept levels influence and are influenced by each other. However, with the present catalogue of concepts about interactive teaching to serve as a prototype, other areas of the domain should be more easily and more quickly developed.

## Table 1

A Sample Concept To Appear in the Catalogue: From the Cognitive Section of Categories of Content, Reception Learning

### Comparison

#### Definition

A pupil statement indicating the similarities and/or differences between two or more items. The statement is recalled or reconstructed from a prior instructional presentation.

#### Indicators

1. The verbal content of a comparison is similar to that of the concept "comparing" (q.v.), which is subclassified under productive thinking. The distinction between the two concepts is that in reception learning the pupil does not produce the comparison himself.
2. The term "comparison" is used to represent statements by pupils that contain only comparisons, or only contrasts, or which may contain both.

#### Illustration

As a response to the teacher's question, following a presentation by the teacher on closed plane figures, a pupil says, "A triangle has only three sides, but a square has four." Any illustration of the concept must include the fact that the original comparison was expressed in the teacher's presentation.

#### Source

Smith, B. Othanel, and Milton Meux. *A Study of the Logic of Teaching*. Urbana: University of Illinois Press, 1970. pp. 116-21.

## Interactive Teaching

The decision to use concepts pertaining to interactive teaching demanded that we analyze the term "interactive teaching." From that analysis ultimately emerged the basic categories of pupil outcomes and teacher behaviors that guided the development of the catalogue. Interactive teaching denotes *all the events and transactions that occur in the classroom during the time that the teacher and his pupils are mutually engaged in implementing the educational program.* These transactions may in part be based upon plans and objectives that have been worked out in advance, but interactive teaching refers only to the transactions themselves. Conceived in this way, interactive teaching occurs within a social system composed of four mutually dependent elements: (a) the teacher, (b) the content which represents the curriculum or the materials to be learned, (c) the pupils as a social group or series of social subgroups, and (d) the pupils considered as individuals operating within a social context. Of course, pupils as a group or series of subgroups and pupils as individuals are simply different perspectives adopted for thinking about the same people, but alternative perspectives of this sort are quite indispensable for the teacher. Another qualification in our delineation of the elements as constituting a social system needs to be made. When we say that the elements are mutually dependent, we do not mean that they are of equal weight in the system. Common observation as well as the weight of research evidence about classroom functioning both testify to the major domination of the classroom that is built into the teacher's role. The proportion of concepts in the catalogue that reflect what teachers do and how they influence pupil outcomes is great. Nonetheless, the teacher's behavior is dependent upon the other elements. If group morale sags, the teacher must restore it. If an explanation of a scientific principle is not clear to the pupils, the teacher must communicate more meaningfully. If a particular body of content bores the pupils, the teacher must omit it, make it more stimulating, compel the pupils to endure the dullness, etc. All the specific ways in which the teacher's interactive role with pupils is modified by them are virtually countless.

Although it is appropriate to picture interactive teaching as embedded in a social system of the kind described here, the interrelationships and the mutual dependencies among concepts and variables implied by such a system far outdistance our current ability to identify and define them or to specify their empirical values. The store of propositional knowledge about interactive teaching is meager. Therefore, in developing the catalogue, we disregarded issues of propositional knowledge and the question of whether the behavior represented by one concept is a function of another. Instead we concentrated upon identifying and developing concepts about the behavior of the teacher in interactive teaching and about the behavior of pupils, either as givens or as outcomes, in three major subdivisions: content, groups, and individuals in a classroom context. The fourth element, the teacher, pervades all three of the major subdivisions. How this scheme generates the broad rubrics of the catalogue can be seen in Figure 2.

Table 2

A Sample Concept To Appear in the Catalogue: From the Cognitive Section of Categories of Content, Productive Thinking

Comparing

Definition

A cognitive process in which pupils note and indicate similarities and/or differences between two or more items on the basis of the pupils' original analysis of the item.

Indicators

1. Comparing often involves a twofold process and results in two kinds of products: comparisons and contrasts.
2. The outcomes of comparing may be very similar to those of "comparison" (q.v.). The fundamental differences reside in the source of the comparison. In comparing, the product is the result of the pupils' productive thinking. Comparison, on the other hand, simply involves restatement by the pupil of an intellectual product that he has heard or read.
3. The character and complexity of the comparison that results from comparing may vary in several ways, depending upon the structure of the pedagogical control that brought about the comparing behavior. For example, such controls, whether those of the teacher or of the textbook, may
  - a. provide one or more bases of comparison,
  - b. provide no basis of comparison, or
  - c. provide one item and a basis for comparison and request that the pupil provide a comparable or contrasting item.

Illustrations

1. Sixth graders have constructed a table to compare two explorations. The columns of the table are headed "Columbus" and "Apollo 11" respectively. Rows are labeled "size of crew," "type of vehicle," "source of energy," "average speed," "distance traveled," "cost of voyage," and "significant discoveries." The pupils are formulating comparisons and contrasts, using the data.

2. Two of the variations indicated in Indicator #3 above are illustrated here.

- a. When asked whether Chicago or Detroit is larger, a pupil refers to a population table and responds, "Chicago." The control in this case provides a basis of comparison: size. Note that the pupil's single word response is the end product of the process of comparison.
- b. When asked to compare Hamlet and Macbeth, a student responds: "They were both royalty. Macbeth was motivated by ambition, Hamlet by revenge. Both were troubled by their consciences. Each was killed, but in different ways. . ." Here no basis of comparison is provided.

### Sources

Smith, B. Othanel, and Milton Meux. *A Study of the Logic of Teaching*. Urbana: University of Illinois Press, 1970. pp. 116-21.

Aschner, Mary Jane, and J. J. Gallagher. "A System for Classifying Thought Processes in the Context of Classroom Verbal Interaction." Champaign, Ill.: Institute for Research on Exceptional Children, 1965.

Taba, Hilda. "Teaching Strategies and Cognitive Functioning in Elementary School Children." Washington, D.C.: U.S. Department of Health, Education and Welfare; San Francisco: San Francisco State College, 1966. p. 39.

The major source is Smith and Meux. Aschner and Gallagher classify the concept under "Association." Taba discusses "Identifying Common Properties" as a process involved in "Grouping."

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The material that appears in Tables 1 and 2 was developed for the catalogue by Joseph Gore.

The bottom branches of Figure 2 indicate the major categorical subdivisions of the catalogue, but in most instances those categories are further elaborated. Without suggesting that the catalogue has taxonomic properties, we tried to group concepts within the broader categories. For example, concepts about pupil groups are organized, with some exceptions, according to whether they deal with issues of group morale, group productivity, or the control (in a social sense) of groups.

Concepts pertaining to how teachers control content in interactive teaching are grouped depending upon whether they refer to broad approaches or styles of controlling content; whether their function is principally one of regulating rate, amount, or intellectual level of the content flow; or whether the concept involves evaluation of ideas in the content, or as expressed by participants.

### COGNITIVE CONTENT CATEGORIES

A similar principle has been utilized in organizing concepts that deal with pupil content outcomes. Following is the rationale developed for seeking out and classifying one major dimension of such concepts, those having to do with cognitive outcomes that may be achieved by pupils.

Concepts pertaining to cognitive content are construed as indicative of objectives about content or as representing pupil content outcomes. It is hoped that these concepts will have two functions: first, to suggest to the teacher or prospective teacher a range of cognitive outcomes that appears possible for pupils to achieve and, second, to define and illustrate the outcomes carefully in the context of interactive teaching. In this way, it is hoped, teachers may extend and deepen their comprehension of what various cognitive outcomes may look like in pupil behavior in the classroom.

Concepts about content have been subdivided into two principal components: reception learning and productive thinking. The reception learning component is further subdivided into reproductive learning and comprehension. We are indebted to the writings of at least three individuals, groups, or schools: Ausubel (1968),<sup>3</sup> Bloom and his colleagues (1956),<sup>4</sup> and Wertheimer (1959),<sup>5</sup> for these labels and the conceptual structure that guided the development of the component.

#### Reception Learning

Reception learning outcomes result principally from transactions by the learner with instructional materials, including communications from the teacher. Ordinarily there is not a great demand that the pupil add his original thinking to the ideas or information imparted by these materials. On the contrary, the objectives typically require him to remember what he has learned. (Ausubel's conception of reception learning and the category identified as "knowledge" in the "Bloom taxonomy" are instructive on this score.) The learner may either paraphrase the central elements of what he has been told or he may respond

more faithfully to the original information. This type of pupil outcomes or responses is called "reproductive" and is included as a first classification under "reception learning." "Comprehension," on the other hand, requires the learner to demonstrate something in addition to the simple ability to reproduce a communicate previously learned.

The term "understanding," except for all the ambiguities with which it has been charged, begins to approximate our use of comprehension. We need to add to it, however, the stipulation by Bloom that the learner is acting upon the material. That is, in the language of the *Taxonomy of Educational Objectives: Cognitive Domain*,<sup>6</sup> comprehension is reflected by the student's ability to translate, interpret, or extrapolate from a given body of material. We have chosen to classify comprehension under the broader rubric of reception learning because of the dependence of such outcomes upon a given message, passage, or communication. The learner is not asked to create what is essentially a new product. Instead his actions reflect his ability to develop in a fuller sense what the meaning and implications of the message may be.

The importance of concepts about reception learning classified under interactive teaching is obvious. Without wishing to guess at percentages, it is apparent that a very large proportion of interactions in the classroom that deal with content do so at the level of reception learning as we have defined it. Thus, the frequency with which teachers will generate and encounter behaviors of these types and their pervasiveness in classroom interaction constitute important criteria for their inclusion.

### Productive Thinking

Productive thinking occurs, no doubt, with significantly less frequency than does reception learning. The principal criterion used to include concepts about this area in the catalogue is that pupil outcomes of productive thinking are vital in the achievement of most educational objectives pertaining to the improvement of students' intellectual skills and abilities, and the more teachers learn about such outcomes as they are manifested through interactive teaching, the more likely they are to identify appropriate pupil behaviors when they occur, and to arrange a classroom that is conducive to increased productive thinking by their students. Although we do not wish to stretch the similarity too far, there are some parallels between reception learning and productive thinking. For example, reception learning includes the concept of "explanation." According to this meaning, the learner would be able to explain an event, process, or phenomenon when the explanation had been given to him. Although not original in any fundamental sense, the explanation would presumably be complete and accurate. One kind of behavior involved in productive thinking is "explaining." In this case the student is confronted with an event, and although details about how much direction he is given may vary, he is given something less than a full explanation. The construction and communication of an explanation become his principal intellectual tasks. Suchmann<sup>7</sup> provides excellent illustrations of explaining. Pupils, in this case in intermediate grades, are shown simple physics demonstrations. These brief films end with the question,

"Why [did such an event occur]?" The process through which children learn to provide explanations is a lengthy and complex one, but the point is that in the end, the learner must construct the explanation. One is not given to him. This is exactly the case for what we call productive thinking.

### Producing the Concepts

We mentioned earlier that much of the conceptual argument for the organization of this section of the catalogue came from the writings of Ausubel, Bloom, and perhaps others. Similarly, for the concepts that we identified and defined in the body of the section, we are indebted to a group of investigators who have studied interactive teaching in ongoing classrooms and whose fundamental attention has been to what we call the cognitive components of such interaction. The scholars to whose work we refer include, but are not restricted to, Smith (1962, 1967),<sup>8</sup> Bellack and others (1966),<sup>9</sup> Taba (1964, 1966),<sup>10</sup> and Aschner and Gallagher (1963, 1965).<sup>11</sup> These works have provided us with valid models of cognitive teacher-pupil interaction.

Our task in producing concepts for this section consisted of several elements: First was the need to construct a conceptual framework to help identify concepts to be included in the category and organize the presentation of those concepts. Secondly, we had to compare concepts across systems (e.g., between Smith and Bellack) and make an initial effort at integrating these concepts rather than simply collecting them. The latter tactic would have contributed little to an integrated view of concepts about teaching. The tactic we chose, of attempting a preliminary integration of concepts with an eye toward reducing the number to be developed, has been successful only to a limited degree. Such efforts, however, seem to be desperately needed in discussions of education, and we would hope that subsequent workers would follow the spirit of our intention and surpass the failings of our execution. Finally, our effort included attempts to define, delineate, and illustrate the various concepts settled upon. We intended to provide a maximum amount of beginning assistance to the materials developer or the general teacher educator who wishes to expand upon these concepts and incorporate them into the curriculum of teacher education. This latter effort has been materially aided by the existence of countless examples and illustrations included in the monographs about interactive teaching to which we earlier alluded. We have drawn freely from these materials, and in each case we have cited the sources, partly as an acknowledgement, but also as a reference for the user to consult the original material for additional examples or meanings beyond those used in the limited confines of the catalogue.

### FORMAT OF CONCEPTS WITHIN THE CATALOGUE

The preceding discussion has focused on the chain of reasoning used to limit and define the conceptual domain represented in the catalogue. By defining the domain, we included the specification of the concepts which it contains. We now turn to the descriptions of

concept in the catalogue. Once the developer of protocol materials has located the concept(s) he wishes to develop, the dimensions and magnitude of the problems confronting him undergo a shift. He must be concerned with the production of protocol materials or what has earlier been referred to as "the portrayal of concepts" (Hudgins, 1972).<sup>12</sup> In that monograph, three basic issues that the developer must contend with as he translates abstract labels into vital protocol materials for teacher education were established. The first two were salient to the format adopted for descriptions of concepts in the catalogue; the third remains essentially a matter to be determined by individual developers. The issues referred to are (a) analytic issues, (b) didactic issues, and (c) issues of outcomes.

### Analytic Issues

Analytic issues pertain principally to the clarity and comprehensiveness of statements of the concept. Attention to concept analysis is a first and critical stage in the production process. Little or no attention is paid to arranging conceptual displays for purposes of teaching; rather, emphasis is on explaining as fully and as clearly as possible the meaning of the concept and including the elements or attributes necessary to ensure its comprehensiveness. The definition and the presentation of indicators contained in the descriptions of each concept included in the catalogue attend to the analytic issues. Tables 1 and 2 illustrate two concepts in the Content dimension of the catalogue. The first concept, "comparison," assumes only recall by the pupil of what he has previously heard or read. In "comparing," pupils must act upon a given body or item of content in order to draw from it explicit statements about similarities and differences between it and some other event or phenomenon.

### Didactic Issues

Didactic issues involve the developer in considerations of portraying a concept in order to maximize its effectiveness as a teaching material. At a minimum, didactic issues demand that the developer present scenes or episodes that are clear and relatively simple examples of the concept. Since the concepts with which teachers have to deal in class are seldom so simple, the developer ordinarily needs to work out strategies for producing lifelike protocol materials. A rationale for this procedure and suggestions for achieving didactic success are treated extensively in Hudgins (1972).<sup>13</sup> In the catalogue, didactic issues are treated by one or more brief illustrations of the concept in a classroom setting. When confusion with closely related concepts appears imminent, examples have been added to aid discrimination between the two. These examples are not intended to be prescriptive or in any way limit the conceptual or artistic freedom of the developer. Presumably most of these concepts could be illustrated in almost limitless ways. The intention is simply to portray faithfully the concept in one or two ways.

Analytic issues and didactic issues go far beyond the introduction to them included in our descriptions within the catalogue. They play important and continuing roles throughout the developmental process. On the other hand, the descriptions that we have provided ought to

assist the developer in his preliminary consideration of these issues and in his first attempts at portraying the concept.

Finally, in most instances, we have cited the major references or sources consulted in the development of illustrations. The developer should be materially assisted by having a brief but highly pertinent set of references for more extensive analytic and didactic guides.

#### ASPIRATIONS FOR THE CATALOGUE: ELABORATING THE CONCEPTUAL MAPS OF TEACHERS

We hold two major aspirations for the utilization of this catalogue of concepts about interactive teaching. First, if protocols of the approximately one hundred concepts in the catalogue are eventually produced, a new, systematic, and potentially powerful set of instructional materials will be available to teacher educators on a wide scale. If the concepts that our analysis of the domain of interactive teaching has led to are productive in that they help teachers in training or in-service to more fully understand and interpret significant events as they occur in the classroom, then the basic purpose for which the catalogue project was originated will have been adequately achieved. The catalogue itself is an inert object, and the viability of that aspiration can be tested only when a sufficiently large proportion of the concepts identified therein have been developed and utilized in ongoing programs of teacher education. Whether such development is to occur must, of course, be decided by others. We would hope that the catalogue will stimulate rather than inhibit such development. If it does, the catalogue may make some contribution toward helping to extend and deepen the conceptual base that teachers have for the explanation and interpretation of classroom events.

The second aspiration has a broader scope and involves two elements: one pertaining to the utilization of the catalogue and the other to the interpretation of the catalogue as a stimulus to the generation of concepts. Throughout this discussion we have attempted to comment upon the applicability of the catalogue to the work of protocol developers. However, the conceptual framework of the catalogue as well as the content of individual concepts may also have applicability for many teacher educators who are not formal materials developers, but who are responsible for the construction of teacher education programs and courses. Finally, the catalogue is not intended to be used in a purely prescriptive fashion, despite the fact that great thought and effort have been poured into both the classificatory system and the development of individual concepts. The concepts identified are important and defensible ones for delineating the interactive teaching subdomain; however, we have no basis to certify that the concepts so identified exhaust the subdomain or the categories which we have established within it. Were our work to spur others on to extend what we have begun, or even to supplant it with better reasoned and more productive formulations of the domain, we would be happy to conclude that our efforts had contributed toward the more intellectually rigorous education of teachers which is, after all, the fundamental objective which all of us share.

## ACKNOWLEDGEMENTS

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## NOTES

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The Protocol Materials Program

*by Donald E. Orlosky*

## HISTORY

Personnel training for the production of protocol materials in teacher education began in 1970 with support from the Bureau of Educational Personnel Development (BEPD) of the U. S. Office of Education (USOE). The first meeting with protocol project directors was held in Chicago during the summer of that year and chaired by B. Othanel Smith whose description of protocol materials in *Teachers for the Real World*<sup>1</sup> stimulated interest and support that enabled the program to begin. Don Davies and Don Bigelow from USOE made presentations at this meeting and added the weight of their convictions favoring the development of protocol materials to the initial plans in the program. Doris Gunderson, BEPD program director, assisted in establishing procedures to be followed by project directors.

Three groups were combined to provide the support necessary to develop protocol materials. These three groups were BEPD, the Leadership Training Institute on Protocol Materials (LTI), and the project directors. The interdependence of these three groups proved to be essential to the success of the program. A brief description of each supplies the foundation and context within which the program operates.

BEPD supported the training of personnel in the production of protocol materials as part of a comprehensive design to improve the performance of educational personnel. Teacher performance is dependent on a teacher's knowledge and his ability to employ his knowledge. Providing materials that decrease the dissonance between vicarious learning and contact with pupils aids in the acquisition of knowledge. Textbooks provide instruction about teaching, but they cannot actualize behavior for study. Classroom behavior provides actual behavior for study, but it is unpredictable, vanishes after it occurs, and is impossible to study completely from memory. A compromise between these two approaches is offered by protocol materials.

During the spring of 1970, BEPD screened responses to requests for proposals. The 11 sites designated to train personnel and develop protocol materials began their work that fall. Since the first year of the program, support from BEPD and, more recently, the National Center for the Improvement of Educational Systems (NCIES) has continued; briefings on protocol materials have been given to personnel at USOE. LTI has received continued support to service the program, promote the training of personnel, and disseminate and publicize protocol materials to advance personnel training throughout the country. As LTI expanded its responsibilities, significant support for the program continued from the program director, Doris Gunderson, and from other USOE officials, particularly William Smith and Allen Schmieder.

LTI was formulated to give technical assistance to the protocol projects, provide liaison between projects and BEPD, coordinate the protocol projects, and relate protocol materials to other federally funded training programs. It was created when the projects were funded and is directed by B. Othanel Smith. Based at the University of South Florida in Tampa, it utilizes personnel from throughout the nation whose training and experience qualify them to give technical assistance.<sup>2</sup>

The major activities of LTI have been to plan the overall development of the program; meet with project directors to discuss and solve production problems; arrange consultant services for project directors; and assume responsibility for standards of production, publicity, training of additional personnel, field testing, and development of dissemination procedures.

One of the original 11 sites designed to train personnel was the Florida State Department of Education. Its responsibility was different from that of the other 10 locations.<sup>3</sup> During the first year, the Florida project was responsible for producing protocol materials and forming a consortium of institutions of higher education whose combined efforts would produce and field test the materials. The production of protocol materials through a consortium proved to be unrealistic, but the Florida project continued to serve as a field test site for the other projects. The project also trained personnel in the public schools and the institutions of higher education in field test procedures and the use of protocol materials.

## MAJOR DEVELOPMENTS

Considerable progress has been made since the beginning of the program. The issues and answers that arose can be understood best by those who were engaged in the program. However, a description of the major concerns and their solutions can give some idea of the progress in development of techniques to resolve production and training problems and the procedures that grew out of the experience of those involved in the program. Following is a discussion of the major developments in the program including (a) the definition of protocol materials and the selection of concepts, (b) technical requirements and criteria, (c) supplementary materials, and (d) field testing and dissemination.

### Definition

A general definition of protocol materials served to guide those who submitted proposals to BEPD. The basis on which the program began can be found in the following statement:

Until the development of educational technology, it was difficult to reproduce teaching behavior. But today audio and video recordings of behavior can be made and studied in detail. They make it possible to teach theoretical knowledge of pedagogy in the context of its use as well as in formal courses.

To follow this mode of instruction it is necessary to have available an extensive supply of audio and video recordings of home, street, playground and classroom situations, of committee meetings, and interviews. These recordings will be referred to here as protocol materials, behavioral situations, or simply situations. Protocol materials should represent the most poverty-stricken and most affluent rural and urban communities, as well as all minority groups. They should also represent all grade levels and teaching procedures such as problem-solving, question-and-answer, and group discussion.<sup>4</sup>

Refinements in this description were needed before production could actually begin. Based on the definition that a protocol is an original draft, minute, or record of a document or transaction,<sup>5</sup> protocol materials are records of behavior portraying school events. The developers had to obtain a record of behavior on film or some other appropriate medium that would give the viewer an episode to further his conceptual knowledge. This task introduced numerous questions requiring precise answers.

### Development Procedures

The developers and LTI followed certain procedures. The behavior illustrating the concept in each protocol occurred frequently enough to enable the observer to see numerous behavioral indicators of the concept. The number of unrelated behaviors that might distract the viewer from seeing the intended behavior was held to a minimum. Each episode lasted 5 to 10 minutes to economize the production and instructional and viewing time. Although the episodes were to be a "slice of reality," some staging and scripting was allowed to guarantee that the behavior illustrating the concept would occur. It was initially regarded as inappropriate for protocol films to include any pointers or cues to help the viewer with his observation. This requirement was eventually relaxed to allow experimentation in determining how much help should be given to a viewer. In some cases, numbered frames were allowed as references to parts of a film. Under no circumstances was it acceptable to give the viewer a descriptive narrative on the behavior depicted. A narrative would remove the burden of interpretation from the viewer and violate this fundamental principle of protocol materials. Within these general operating procedures, the protocol developers were able to proceed with planning and producing protocol films.

### Interpretive Role of Teacher

A problem arose in respect to the concepts to be exemplified in protocol films. A teacher should be able to make accurate diagnoses if he is to cope effectively with the events he faces. Concepts are the organizing tools that enable the teacher to classify behavior or events according to a given type.

Suppose that a student throws an object and subsequently wanders around the room. How are these actions to be understood? They could be indications of either attention seeking or "critical dissension." The teacher will not understand these acts correctly unless he is able to classify them correctly. If these actions are associated with others that are clearly in the category of attention seeking, the teacher is apt to be correct if he classifies these actions in that category also. On the other hand, they are apt to be signs of critical dissension if they occur in a context of other acts that clearly belong to this particular class. In any event, the teacher understands behavior by classifying it, and the accuracy of his categorizing will determine the correctness of his understanding and partly the adequacy of the subsequent treatment.<sup>6</sup>

This emphasizes the interpretive role of the teacher and points out the advantage the teacher has if he can diagnose and classify behavior. Protocol materials should provide the observer with examples of behavior that will help him acquire the conceptual knowledge necessary to interpret pedagogical events.

Most preservice instruction on concepts has been conducted in the lecture hall or through discussions describing instances to illustrate a concept. Students who learn about concepts this way may do very well on paper-pencil tests; however, when confronted with the behavior in the classroom, they are often unable to classify and accurately interpret it. This inability of the beginning or student teacher to interpret accurately results in the complaint that there is little relationship between theory and practice. Actually, there is a close relationship between the two; the usual methods of relating them have simply been ineffective. Words alone are inadequate to describe behavior.

### Protocols vs. Observation

The protocol materials program supports the premise that if behavior could be captured on film, students in training could see the behavior exemplifying a given concept and be better prepared to recognize and classify behavior. Why bother filming behavior when the same behavior can be observed first hand in the classroom? Protocol materials offer some advantages not found in direct classroom observation. Anyone who has faced the logistical problems in arranging and supervising classroom observation experiences must ask if it is a worthwhile use of the time and efforts of the university and public school personnel.

Apart from the administrative details that accompany such arrangements, there are other even more important factors. If an observer visits a classroom to observe specific activities, there is little assurance that the given activities will take place. It is not uncommon for students who visit a school not to see a typical class because of scheduled standardized testing, a school assembly, or a disruption in the expected lesson of the day. The time spent in travel, sitting through a school assembly, or watching students complete an examination is all too frequent to rely on observation as a predictable part of the teacher training program. Additionally, even though the school may be operating normally, events that are productive for the observer may not actually occur. The phenomena an observer wishes to see in the behavior of the teacher or pupils may not be portrayed during the time of the visit. And even if the observer is in the classroom when certain behavior occurs, being untrained, he may miss it. If he does see it, the behavior vanishes as soon as it happens; it cannot be restaged for further study and analysis.

It is apparent that theory taught in the college or university is not very useful to most students who attempt to use their knowledge in the classroom. Student placement as observers or student teachers offers no assurance that the events they encounter will serve any purpose for their training and eventual teaching responsibilities. Today's

teachers capable of making proper diagnoses have acquired their ability through time, exposure to the events in the classroom, and interpretation of behavior by trial and error. Protocol materials are designed to enable the beginning teacher to be better prepared to interpret and diagnose behavior. In addition, protocol materials are beneficial to the experienced teacher who has not been sufficiently analytical or sufficiently schooled in interpreting behavior. Protocol materials should enable preservice and in-service teachers to acquire a better organizing network of concepts, the vocabulary necessary to describe behavior, and the observational and diagnostic ability to make accurate interpretations of behavior.

### Master Plan

A master plan was developed to guide the protocol program (see Appendix in Cruickshank's paper). The plan provided for concepts to be selected in the pedagogical domain and in the basic fields of study. About one-third of the first projects were in the basic fields, the remainder in the pedagogical domain. The master plan provided for concepts to be selected in different settings such as the classroom, school, or community; different age levels such as early childhood or adolescence; and different sources of behavior such as the teacher, pupil, or teacher-pupil interaction. It was recommended that the classroom setting receive highest priority and that the developer be free to select the source of behavior and the level he preferred.

The master plan gave broad direction to the program; the specific concepts to be portrayed remained to be chosen. Shortly after the program began, it became evident that the literature on concepts is vague; more precision and rigor were needed in naming and defining concepts. The definition of concepts being prerequisite to the production of materials, LTI concentrated on recommendations to help in the development of workable definitions.

Concepts are not all of the same order. Different definitional forms are necessary to account for the variety of concepts that can be portrayed in protocol materials. In developing protocol materials, it was suggested that concepts be expressed in one of four possible forms: classification, equivalent-expression, open-context, and conditional. The classification form of a definition provides for the association of a concept with a category and discriminating criteria to distinguish one concept from others. In the equivalent-expression form, a concept is set forth by an expression that is equivalent to the word or words used to name that concept. The open-context form expresses concepts whose definitions are imprecise because the boundaries of the term are not rigidly limited. The interpretation of behavior may vary according to the conditions that precede the behavior; the conditions are a part of the definition of a term, and the conditional form then becomes appropriate.

### Selection of Concepts

The developer was confronted with the question of whether he should first film behavior and then determine the concepts that would provide

for the interpretation of the recording or if he should choose the concepts first and then control situations to elicit the desired behavior. The developer chose to select the concepts first to assure success in their recordings. (See "The Protocol Materials Movement: An Exemplar of Efforts To Wed Theory and Practice in Teacher Education" by Cruickshank, p. 9, for another point of view.)

In selecting concepts, the developer first entered the master plan and selected a level, setting, and source of behavior in which he wished to portray behavior. His second step was to name the concept he planned to exemplify. Finally, he defined the concept according to one of the linguistic forms provided. Subsequent steps remained for the developer to specify the behavior required for the protocol, communicate his decisions to the technical staff, and arrange all the logistics and editing that remained. All of his later decisions were related to the work done in selecting and defining concepts.

The project directors were given considerable latitude in selecting the concepts which they wished to portray. Each project had listed the concepts it intended to illustrate, but the level of understanding at the time the proposals were prepared and the improvement in that understanding after the projects were underway necessitated revision of the original proposals in many instances. In some cases different concepts were chosen; in other cases the selected concepts were modified either in respect to their definition or in the number of concepts to be included in the final products. Project directors were understandably ambitious in estimating the amount of work they could complete; more realistic plans emerged as they gained more experience in the production of materials. The concepts selected were originally those concepts that most nearly coincided with the developers' own background and knowledge. Eventually the project directors related the concepts they chose to a taxonomic or nomothetic system and sharpened their definitions to attain a clearer understanding and distinction between the concepts they were illustrating and other concepts that were related. As work progressed, the initial choices held up well, but the amount of clarifying and support information required increased considerably. After several years in the project, developers have learned to identify concepts that are part of a system rather than isolated ones.

### Standards

The LTI committee on field testing, utilization, and dissemination met with four project directors selected by their peers to determine the standards for protocol materials. The committee was to supply standards of acceptability to guide directors and to protect the users of protocol materials from inferior products. Requirements developed by the committee included technical and educational standards. The technical criteria selected were related to audio quality, visual quality, instruction, format, and copyright procedures. The educational criteria applied to standards of concept attainment, learner reactions, and user satisfaction.

As far as technical quality was concerned, the developer was advised to use a double-sound system and to produce audio quality at

such a standard that fewer than 10 percent of the viewers would report unfavorable perceptions. The visual quality was required to have such sharpness of detail that virtually any viewer under normal classroom projection conditions would be able to distinguish the critical features of the images presented. The producer was advised to protect his first answer print by preparing a master from the conformed original for duplication of subsequent prints. The format recommended depended on the nature of the concept, but the acceptable media listed were 16mm film or EBR transfer film, slides in 35mm or filmstrip, and cassettes rather than reel tapes for audio protocols. Each package was to include a rationale for the use of the media and guides for instructors and students. The guides were to contain suggestions for using protocols, ways for viewers to record observations, means to measure acquisition of concepts, and recommendations for relating material to prior learning and practical situations. The instructional package was to be organized and packed for easy storage and shipping.

The recommendations about copyright provisions were that written releases should be obtained from all persons and for all materials used in the protocols in addition to written releases for background music, sound effects, lyrics, and other audio materials. The usual copyright application and notice was listed as a requirement for protection of the overall design and treatment of the material and its copyrightable components.

The educational criteria specified that 80 percent of the learners completing the unit be able to identify 80 percent or more of the examples of the concept. Since it is difficult to establish criterion-referenced standards with new materials, an alternate standard was given. A statistically significant difference in favor of the performance of groups who studied concepts with protocols was required in comparison with groups who studied the concept under conventional methods. Learner reactions should be shown through field testing to be positive to the extent that fewer than 10 percent of the learners would report unfavorable reaction to the protocol unit. Learner reactions were to be obtained on the interest level of the materials, perceived relevance to teaching, desire for additional protocol materials, and willingness to recommend protocol materials to other students. The standard of user satisfaction was aimed at getting information from the instructor using protocol materials in his work with pupils. Field test data were requested particularly the users' reaction to the importance of the concepts, the ease of using protocols in the instructional program, and the appropriateness of the concept to be taught.

As a consequence of the work of the committee on protocol standards, the developers had guidelines at their disposal that would enable them to tailor their production to criteria for acceptability. The users were assured field test information about the protocol materials that would help them make a judgment about selection and utilization of protocol materials.

## Supplementary Materials

In addition to the record of behavior, the protocol package contains written material: teacher guides, pupil guides, and general information. One issue at stake in the preparation of supplementary materials was whether the producer could impose on the eventual user the instructional method to use with the protocol. The user can ignore the written materials and use a film or audio tape according to his own preference. In the case of protocol materials, the user may regard behavior as exemplary and use a film to instruct in teaching skills. Or, since the behavior recorded may be considered good teaching technique, the user may employ the protocol materials as training materials. There is no guarantee that the user will not use the materials to improve behavioral abilities rather than to improve interpretive abilities. Another consideration in the use of supplementary materials was whether a given instructional method should be recommended. Some instructors may prefer a didactic approach; others may favor an inductive or inquiry approach; and still others may feel that a heuristic approach should be utilized. The developer may provide materials according to one bias, and the user may use the materials according to another. A third issue was how to assure that the instructor would read the printed materials, benefit from the experience of the developer, and use the approaches recommended for instructing with protocol materials. None of these issues were adequately resolved.

It was recommended that the developer supply written materials giving the evidence from field testing and present the procedures used and recommended by the developer. In some cases, the developer might suggest several approaches for the user to employ. For example, he might recommend that the protocol materials could be used in large-group, small-group, or individual instruction according to the discretion of the instructor. He may have field test data to show that any organization of the students will yield about the same results; the user should not feel bound to a given approach. In other cases, a varied sequence might be appropriate. However, the only obligation the developer can have for the eventual use of his materials is to present the information about procedures he used, present the field test data from that procedure, and suggest to the user that any deviation from the recommended procedure might yield different results. The developer must make supplementary materials readable, brief, and comprehensive. Brevity should encourage the user to read them and comprehensive coverage should assist in answering questions about every aspect of the use of the materials.

## Field Testing

A requirement imposed on project directors was that all materials should be field tested at two levels before they were made available for general consumption. One level of field testing, completed under the direction of the producer, was primarily to assist in the production of the materials. If local field testing revealed that the criteria established for acceptable materials were not being met, then the developer could revise his product until it met the standards. The second

level of field testing, under the direction of the project in the Florida State Department of Education, provided trials at neutral sites and in a variety of settings giving an objective report on the standards in universities or public schools at the preservice and in-service level. After completion of field testing in Florida, changes in the product were completed prior to release. After all standards are met, the products are ready for dissemination.

### Dissemination

The dissemination of products is an unfinished task at the moment. Part of this effort is to inform the market of the existence of protocol materials. LTI and the developers have shared responsibility for publicizing their work. Presentations about protocol materials have been made at the annual meeting of the American Association of Colleges for Teacher Education and the American Educational Research Association. Several workshops have been conducted by LTI or project directors at the state, university, and local level. Until projects were ready for use, publicity about their production was premature. Thus, the first two years of production were completed without much publicity. Now that the program has been underway long enough for some products to be completed, the mechanics of dissemination are being developed.

### CURRENT STATUS

During the 1973-74 academic year, the project directors have three major tasks. First is to complete the remaining details so that all products underway are finished. Some products are in final form and are being distributed; others are too inadequate to salvage; and others are nearly completed but require some additional work to meet standards. The second task is the establishment and implementation of procedures to disseminate products. The dissemination process is just beginning. It may be necessary to publicize the work further in order to instruct users in the employment of protocol materials and to contact professional organizations, state departments, universities, local schools, and other federally funded projects. Finally, developers must continue with the production of the additional materials they have contracted to produce.

Most of the protocol materials have been developed in the pedagogical field, and the concepts chosen have been selected by the individual developer. An expansion of both of these efforts is taking place. Nine additional trainees have been chosen from the fields of mathematics, social sciences, and English to learn how to produce protocol materials and to compile a list of appropriate concepts for protocol materials production. At the end of the current year, these trainees should be able to carry on the development of protocol materials in their basic fields of study. They should also produce a catalog of appropriate concepts for the preparation of teachers in their fields. A subcontract has been used by LTI to organize the concepts in the pedagogical field. Consequently, the selection of concepts for protocol materials production should become more systematic and be based on concepts of greatest need

and importance to the teacher. This is not to suggest that concepts that have been developed are not especially useful; it only means that a systematic study of the field was lacking at the inception of the program.

Considerable improvement in production techniques has occurred. Future developers will benefit from these early experiences. A list of concepts in the pedagogical domain will increase the usefulness of the concepts selected for protocol development. The training of additional personnel and the organization of the concepts in the basic fields of study will provide the foundation for expansion of protocol development across a wider spectrum of the total field of teacher preparation. The efforts at dissemination that will be carried forth should yield information that will open effective channels for distribution and use of protocol materials.

#### SUMMARY

The protocol materials program has come on the scene at a fortuitous time. The schools have failed to capitalize on the technology and research potential that would improve them, but there appears to be a receptive climate for remedying this lack. The emergence of the National Institute of Education (NIE) is one concrete illustration of recent change in promotion of research in teacher education. The adequacy of NIE remains to be seen, but clearly the potential to start a comprehensive national effort in educational research is at hand. The miniaturization and the refinements in recording behavior make the potential of technology in the schools plausible and effective. Protocol materials provide the means to capitalize on these research and technical developments and employ them in the development of new materials for the instruction of preservice and in-service teachers.

Another illustration of the timeliness of the protocol program is that the schools are faced with demands for accountability such as the movement towards competency-based certification of classroom teachers. One of the critical areas of competence for the teacher is his interpretive ability to diagnose situations. Protocol materials provide the means to assess teacher competence in the conceptual knowledge he possesses.

When the protocol materials program began, it was impossible to anticipate the numerous problems that would arise. The project directors and LTI have combined forces with federal support to solve most of the major ones. Protocol materials meet standards that protect the user and guide the developer. The analysis of concepts and the rigorous demands placed on the developer to clarify his work is bringing better order to the pedagogical and basic fields of study. Materials that provide research opportunities and also respond to the demands for teacher competence are now being developed in the program. The training of teachers can be carried out with protocol materials as a bridge between theory and practice heretofore not possible.

The future of protocol materials development is dependent on adequate financing, successful use of materials, and a cadre of people who are willing to devote their time and energies to this difficult assignment of recording behavior under rigorous standards. The program has proven that it is possible to produce protocol materials. Field test data reveal that the materials are effective. The additional knowledge about the preparation of teachers is a substantial contribution. The time is ripe for building on the foundation that has been laid and developing a collection of protocol materials that will elevate the training of teachers to the higher level that the current state of knowledge makes possible.

## NOTES

1. B. Othanel Smith and others, Teachers for the Real World (Washington, D.C.: American Association of Colleges for Teacher Education, 1969).
2. LTI Membership: B. Othanel Smith, director; Donald E. Orlosky, associate director. Panel Members: James A. Banks, James M. Cooper, William Drummond, Ned Flanders, Vern Haubrich, Charles J. Modiste, Irving Morrissett, Allen C. Purves, Frederick A. Rodgers, H. Del Schalock, Charles Schuller, Charles Scruggs, Roger Shuy, and Richard L. Turner.
3. The locations and directors who assumed responsibility during the first year of production were David Berliner, Far West Laboratory; Paul Twelker, Teaching Research, Oregon State System of Higher Education; Celeste Woodley, University of Colorado; Bryce Hudgins, Washington University; David Gliessman, Indiana University; Judith Henderson and J. Bruce Burke, Michigan State University; Donald Cruickshank, Ohio State University; William Heiner, Bucknell University; Peter Dow and Anita Mishler, Education Development Center; Richard W. Lid, San Fernando Valley State College (now California State University at Northridge); and Pauline Masterson, Florida State Department of Education. During the second year, Walter Borg at Utah State University, Theresa Love at Southern Illinois University, and Patricia Heffernan-Cabrera and William Tikunoff at the University of Southern California were added. Washington University of St. Louis discontinued after one year due to the difficulty in acquiring adequate media production personnel. Throughout the program some of the original personnel have been replaced; currently, the directors listed above have continued with the following exceptions: R. E. Myers at Teaching Research at Oregon, Frank Zidonis at Ohio State University, Edward Martin and Susan Bernstein at Educational Development Center, Greta Morine and Gloria Golden at the Far West Laboratory, and G. Michael Kuhn at the Florida State Department of Education Project.
4. Smith, op. cit., pp. 52-53.
5. Webster's New Collegiate Dictionary (Springfield, Mass.: G. & C. Merriam Co., 1973), p. 327.
6. B. Othanel Smith and Donald E. Orlosky, The Development of Protocol Materials, Acquiring Teaching Competencies Report No. 3 (Bloomington: Indiana University, School of Education, January 1973), p. 12.

A Protocol Materials Evaluation: The  
Language of Children

*by Victor M. Rentel*

## INTRODUCTION

In April 1970, several faculty members from the Ohio State University College of Education discussed the possibility of responding to a U.S. Office of Education (USOE) Request for Proposal for a series of protocol materials.<sup>1</sup> Few of us had more than a slim notion of what protocol materials were, our only knowledge coming mainly from *Teachers for the Real World*.<sup>2</sup> According to this, protocol materials are visual, auditory, or printed reproductions of relevant situations occurring in an educational context.<sup>3</sup> These episodic records provide teachers in training with the opportunity to observe and study classroom situations against a backdrop of educational theory. Repeated observation and interpretation of these slices of classroom life, according to Smith, should lead to the acquisition of concepts which serve as a basis for interpreting new teaching experiences.<sup>4</sup> The Request for Proposal further defined and described these protocol materials, and the project staff was not without experience in developing materials roughly similar to them. Cruickshank had done extensive work in creating simulation materials for teacher education while other members of the project group had been involved in various aspects of research in language development. This combination of experience led the group to propose a series of protocol materials to illustrate concepts of children's oral language acquisition. (For a detailed discussion of protocol materials and the theoretical issues surrounding their development, see Cruickshank's and Orlosky's papers).

The rationale for illustrating concepts of oral language acquisition was rather straightforward. The staff reasoned that teachers would more readily accept children's oral language if given opportunities to observe language development and discover underlying linguistic concepts. As with most decisions, however, this one had its problems. Implicit in the decision was the presumption that teachers are unaware of the developmental implications of children's oral language even though immersed in it daily. Additionally, linguistic theory applicable to developmental interpretation of children's everyday talk has been and remains in a state of flux. Linguists themselves are unable to agree on the analysis of English let alone schooling and language development. The decision to illustrate oral language development put the staff in a position of choosing among a variety of language models available to us (tagmemic; transformational-generative in its MIT, Pennsylvania, and other forms; stratificational; and so on), or of picking and choosing on the basis of needs and disposition.

These two problems presented our first evaluation questions. To what extent are practicing teachers aware of the developmental implications of children's oral language? How could the concepts to be selected be authenticated? Finally, in a technical sense, how effective were the materials? These questions were examined in what we labeled a process evaluation (or formative evaluation).

## PROCESS EVALUATION

In most respects the protocol materials we had chosen to develop bore more directly on the theoretical knowledge teachers need to interpret classroom settings rather than on samples of teaching itself. As such, the selection of concepts to be illustrated had to be made within the domain of linguistic and psycholinguistic science. A major literature search was conducted, and a bibliography of over 200 entries was assembled. This literature search produced 115 major findings which, when organized in a taxonomy, clustered logically around eight categories. As might be expected, arranging our findings in a taxonomy suggested several important relationships among the categories. We referred to these relationships as a "soft theory" which may be briefly stated as follows: Children process linguistic information they encounter, discovering and revising implicit rules and regularities within their language, passing through progressive but overlapping stages of linguistic complexity. Order of acquisition appears to be the only invariant presently observable within this process of development.

It is important to understand that none of the literature reviewed by the staff stated or implied in a direct way the conclusions we drew regarding this view of oral language development. While we owe a great debt to the intellectual work of a variety of linguists and psycholinguists, our understandings and conclusions should not be taken as a direct reflection of current theory nor as a reflection of the individual works we drew upon. Responsibility rests with the project staff. Indeed, it is probably immodest to refer to these relationships as a soft theory for we intended no contribution of this sort, but were interested mainly in describing a coherent set of principles and assumptions which might give direction and dimension to our efforts. Most generously, David Stampe, a linguist whom we consulted, referred to our conclusions as a soft theory, and more out of convenience than anything else, the designation stuck.<sup>5</sup>

Clearly evident across a wide variety of studies reviewed in the first phase of the project was the notion that children acquired linguistic structures in a particular order. Berko's work on the acquisition of morphology, Carol Chomsky's on the acquisition of selected syntactic structures, and particularly, the rich naturalistic work of Brown and his associates at Harvard strongly supported the position that children may vary in the rate at which they acquire particular structures, but the order in which they do so will be invariant.<sup>6,7,8,9,10,11</sup> Variation of another sort stemming from socioeconomic, group, or racial status of children was also well-documented in the literature.<sup>12,13</sup> Known technically as sociolects or social class dialects, these variations derive from group membership and should be regarded as distinct from regional dialects. Finally, varying social contexts appear related to variations in grammatical and lexical features as well as differences in field, mode, and style of discourse.<sup>14</sup> These variations are known as registers.

This brief summary of our exhaustive literature review highlights several of the major findings out of which a theoretical framework was created. Ultimately, from this framework, concepts were selected and

protocol materials developed. But, before that happened, the staff decided that an independent authoritative review of our soft theory was necessary if subsequent materials were to be regarded as valid and authentic.

#### AUTHENTICATION

Four subject-matter consultants were invited at intervals to validate both the theory and later the concepts under consideration. Roger Shuy, Fred Williams, and Courtney Cazden each visited the project and not only suggested content revisions in the conceptual framework but identified language situations they felt would illustrate particular concepts as well. David Stampe from the Ohio State University Department of Linguistics reviewed and basically agreed with the soft theoretical account of how these concepts related to one another. Cazden paid a second visit to the project during the period when video tapes were edited and helped to remove extraneous material and sharpen concepts under consideration. This phase of the process evaluation provided corrective feedback which was used to validate and sharpen the conceptual or theoretical framework for the project.

#### CONCEPT SELECTION

As noted above, our literature search produced a bibliography of over 200 entries from which 70 were considered. The original taxonomy of 115 major findings was reduced to eight categories: performance-competence, selection-production, variability, sequential acquisition, innateness, role, culture specific, and systematic. Reclassification yielded the final two categories and five subcategories. The second phase of the process evaluation thus completed provided essential information that not only facilitated the selection of concepts for video taping but suggested as well that these concepts comprised an important subject-matter for teacher education. These categories were then reproduced and a panel of teachers, subject matter specialists, and teacher educators designated the concepts most salient to their field of activity. The panel was instructed to apply the following criteria to the selection of a concept for inclusion in the taping matrix:

1. Universality of acceptance
2. Support of theory and/or research
3. Utility
4. Applicability
5. Learnability
6. Timeliness
7. Power (importance)
8. Subject's lack of prior knowledge

9. Technical feasibility of taping
10. Potential for obtaining natural language
11. Potential for changing teacher behavior
12. Interpretability
13. Current effectiveness in teacher education
14. Fulfillment of central purpose of project

## THE CONCEPTS

Following is a brief definition of each of the concepts selected for development as protocol materials. The major concepts identified are divided into two main categories: the "process of acquisition" and "variations within acquisition."

### I. THE PROCESS OF ACQUISITION

Children progressively develop and revise sets of rules about their language unconsciously by drawing upon their linguistic environment.

#### A. Sequence

The process of acquisition is evident in the predictable order of acquisition of sets of rules with variations in rate of acquisition.

##### 1. *Concept of specific syntactic structures:*

- a. Promise/tell. Structures in which "promise" is followed by a noun and an infinitive will be more difficult to interpret than those in which "tell" is followed by a noun and an infinitive. The "promise" structures depart from the minimal distance principle in English, which predicts that the noun closer to the infinitive will serve as its subject. In the "promise" structures, the subject of "promise" also serves as the subject of the following infinitive.
- b. Easy/hard to see. In the sentence,

The clown is easy to see

the relationship between "to see" and "clown" is that of verb and object rather than subject and verb. The "easy to see" structure somewhat obscures this relationship whereas in a sentence like

The clown is eager to see

the relationship between "clown" and "to see" is that of subject and verb. Consequently, the "easy/hard to see" structure is more likely to be misunderstood by young children until they learn to sort out the grammatical relationships of subject and verb.

## 2. *Concept of morphological development:*

- a. Noun inflections and derived forms. Children progressively develop and revise sets of morphological rules in the following predictable order: (a) occasional use of a rule for an inflected form, (b) overgeneralization of the rule to other forms, and (c) refined and accurate application of the rule to appropriate forms.
- b. Verb inflections and adjective order. Children progressively develop and revise sets of morphological rules in the following predictable order: (a) occasional use of a rule for an inflected form, (b) overgeneralization of the rule to other forms, and (c) refined and accurate application of the rule to appropriate forms.

## B. Complexity

There are developmental increases in the number as well as the kinds of syntactic structures produced or understood.

### 1. *Syntactic Acquisition*

The complexity level of a sentence is indicated by the number and kinds of syntactic structures used in it; that is, the more structures and the more kinds of structures used in a sentence, the more complex that sentence is.

### 2. *Concept of embedding as revealed in T-unit*

The complexity level of a response can be reflected through T-unit word length. A longer average T-unit length indicates syntactic maturity. T-units by definition consist of a main clause plus all subordinate clauses. Garbles, words which do not add information to the utterance, are deleted from T-unit word count. An exception to this are those words used to claim attention such as "well," "see," and "you see."

## C. Fluency

There are progressive increases in the ease and the fullness with which children speak. The fewer the number of hesitations, garbles, and fillers per utterance, and the greater the amount of language in each individual's response, the more fluent the speaker.

## II. THE VARIATIONS WITHIN ACQUISITION

Language acquisition involves not only the common sets of rules developed by speakers of the language, but variations that occur within both individuals and social situations.

## A. Individual Variability

Individuals vary in their use of specific structures.

### 1. *Variation in acquisition*

Morphology. Children of the same age differ in the kind and number of basic morphological structures they learn to use. While there appears to be a highly predictable sequence of acquisition, the rate at which children acquire a specific structure varies considerably.

### 2. *Variation in acquisition*

Derived forms and adjective order. Children of the same age differ in the kind and number of basic morphological structures they learn to use. While there appears to be a highly predictable sequence of acquisition, the rate at which given children acquire a specific structure varies considerably.

## B. Social Variability

Individuals and groups develop registers of language--  
or language appropriate for particular social situations--  
which may vary in phonology, syntax, lexicon, and para-  
linguistics.

## PROTOCOL MATERIALS REVISION

Before final versions of video tapes, guide materials, and instructor's manual were completed, prototypes of each were field tested with in-service teachers in a nearby school district to provide corrective feedback regarding the quality of each protocol episode.

### Method

One hundred teachers from the Franklin County (Ohio) School District taking a course for graduate or undergraduate credit at Ohio State participated in the study. They were told that all students would receive a passing grade in order to obtain candid opinions regarding the method of instruction employed in the course. Eight 3-hour classes were held, during which two protocol episodes were shown and related activities completed. After the completion of each protocol episode, a questionnaire was administered to each subject.

### Procedure

For each protocol episode, subjects read a short introductory passage summarizing conclusions from research undergirding the concept. A short discussion followed. Subjects were then asked to examine the behavioral objectives for the episode and were allowed to raise questions related to the objectives. They were instructed how to view the

videotaped episode, what data to record in their participant's guide, and how to record and summarize the data. A discussion followed each viewing, and summarized data from the protocol were described with labels, categories, generalizations, and principles. After completing activities in the guide materials, subjects responded to a questionnaire. These results are summarized in Figure 1.

## RECOMMENDATIONS AND REVISIONS

Recommendations came from both participants and instructors.

### Participants

The majority of protocol episodes were seen as both interesting and informative. Visually, the protocols elicited few negative reactions; however, several of the episodes were plagued by deficiencies in audio quality, particularly those dealing with the promise/tell structure, pronominalization, and the easy/hard-to-see structure in children's language. Audio deterioration stemmed largely from transcribing these episodes from film to one-inch video tape. Some reduction of audio distortion was possible, however, through an attenuation technique that was developed subsequent to the process evaluation and resulted in considerable improvement.

Minor revision was recommended for one of the protocol episodes, " 'Play-Talk' in Kindergarten." Specifically, discussion questions were revised to state the intent of the questions more explicitly, and two worksheets were combined. The protocols dealing with the acquisition of morphology were edited to eliminate unnecessary instances, and inconsistencies were eliminated.

### Instructor

Generally, guide materials were in need of slight revision. Those dealing with morphology required further coordination with the video portions of the protocol episodes. In nearly every instance, objectives were considered clear, and the materials appeared to relate directly to the objectives. New learnings were presented at an appropriate rate, and, with the exception of episodes dealing with individual variations in the acquisition of derived forms and adjective order, tapes and guide materials seemed to match the participant's learning capabilities. Expository material was easily grasped, and content was seen to be closely integrated with videotaped illustrations. Difficulties experienced with the acquisition of syntax were noted by all instructors. Instructor ratings were basically positive regarding content, but again some technical difficulties were encountered.

## PRODUCT EVALUATION

Only a painfully small sample of protocol materials has been studied to date; thus, great caution should be observed in generalizing from the results of this and other early attempts to evaluate the protocol notion.

Figure 1

## Summary of Process Evaluation for Protocol Episodes

Questions	Concepts													
	Sequence of Acquisition	Acquisition of Syntactic Structures (Pronominalization)	Acquisition of Syntactic Structures (Promise-Tell)	Acquisition of Syntactic Structures (Minimal Distance)	Acquisition of Syntactic Structures (Variability)	Acquisition of Syntactic Structures (Complexity)	Acquisition of Morphological Structures (Verbs)	Acquisition of Morphological Structures (Nouns)	Group Variation (Register)	Individual Variation				
1. Objectives were clear.	90	60	93	97	76	97	80	70	73	60	57	100	97	100
2. Materials were attractive and interesting.	70	30	87	76	64	89	64	60	80	47	57	83	93	73
3. Materials built on my previous knowledge.	80	53	70	77	74	89	63	50	70	50	53	93	86	90
4. Content was well organized.	87	67	94	87	80	87	83	60	73	37	76	90	97	90
5. Learnings were clearly presented.	94	40	86	73	54	86	67	43	60	44	53	90	94	74
6. Repetition of important content was adequate.	84	50	93	73	64	89	63	57	57	67	53	83	96	74
7. Learning tasks were easy.	84	50	87	90	64	95	80	40	73	33	46	90	90	83
8. Learning tasks were at my level of understanding.	84	60	94	87	63	86	90	46	76	57	60	97	90	70
9. Protocol was visually clear.	60	43	77	70	76	80	83	64	70	80	53	80	87	70
10. Sound track was clearly audible.	63	3	73	3	57	35	66	7	54	70	36	100	57	26
11. Guide materials were easy to use.	86	77	87	90	94	85	90	57	63	35	33	100	96	93
12. Ideas presented were worth learning.	87	43	97	77	80	93	63	63	60	43	56	80	93	74

Figure 1. Percent of Subjects Agreeing with Statements:

## Method

Two groups of 61 subjects each were drawn at random from a reading-language arts methods course and randomly assigned to equal treatments. Two instructors were assigned in random order to an equal number of class sessions for both conditions. The protocol materials condition was compared with a treatment in which subjects were taught the same concepts through the lecture method coupled with classroom observations of children's oral language. Posttest means were compared using a t test with significance set at the .05 level in a simple randomized design.

## Procedure

Subjects in the protocol materials condition completed 14 episodes in which five concepts were illustrated in a variety of oral language activities depicting aspects of the acquisition of syntax, register, and morphology as well as individual differences in development. As stated previously, during each protocol segment, subjects read a short summary of research conclusions about the concept being illustrated. Following a short discussion, subjects read behavioral objectives for the protocol segment and asked any questions about the objectives. Subjects were then given directions on viewing the protocol, instructions on how to record data in their guidebooks, and opportunities to work through examples before viewing the video tape. After viewing each tape, subjects discussed their observations. Finally, each subject described the data collected in terms of labels, categories, generalizations and principles.

Subjects in the lecture condition were provided with similar information regarding each concept illustrated in the protocol materials. They were also provided with written materials but had no opportunity to observe films or video tapes of children in various stages of language acquisition. Instead, subjects in this treatment observed children in public school classrooms and in informal play situations independent of the lecture class itself.

Both groups received approximately the same number of hours of instruction. The lecture condition group received slightly over 10 hours of instruction and 2 hours of observation while the protocol treatment group received 12 hours of instruction.

## Instrument

A 46-item test was constructed with an equal number of items for all but one of the concepts illustrated in the protocol materials. Items were constructed from behavioral objectives for each protocol segment and judged for their concept validity by a 6-member panel from the project staff. Items that did not receive full acceptance by the panel were rewritten or rejected. Two reliability coefficients were obtained using the Kuder-Richardson methods 20 (.77) and 21 (.70). The standard error of measurement for the instrument was 3.04 while the mean item difficulty coefficient obtained was .30, and the mean item discrimination coefficient obtained was .28. Tests of skewness revealed

only a slight negatively skewed distribution (.86) while tests of kurtosis indicated some peakedness in the distribution (1.21).

### Results

Posttest means between the protocol treatment (33.76; S.D.=4.71) and the lecture treatment (33.08; S.D.=4.40) were not significantly different ( $t=.75$ ).

### Discussion

Protocol materials have been suggested as a means of overcoming the weakness of unstructured observation and many theoretical inadequacies characteristic of teacher education. Yet, protocol materials demonstrated no advantage over lecture and classroom observation where the criterion was a written achievement test administered 7 days following the completion of all protocol episodes. It can be argued, and perhaps convincingly, that, for protocol materials, a straightforward achievement test lacks construct validity. If, indeed, protocol materials have as their ultimate end improving a student's ability to abstract and transform raw data from a classroom into salient concepts about, in this case, language condition, then a different sort of criterion measure should be contemplated. A more desirable measure would at least make use of protocol-like instances of the specified behavior as the criterion task. This sort of measure would more nearly approach the logic of protocol materials as well as the sort of learner response anticipated in the notion. Hypothetically, at least, it has been suggested that protocols may engender a learning-to-learn set as well as numerous specific learnings that may transfer readily to new responses or stimuli. Before firm conclusions are drawn regarding the effectiveness of protocol materials as a medium of instruction, these estimates of both specific and general transfer should be obtained.

The finding of no difference between treatments, while not exactly what a development team would prefer, loses much of its sting when viewed in the context of subjects' perceptions of these materials. Generally enthusiastic responses from subjects who were asked to compare protocols with other instructional techniques indicate that protocol materials are interesting and attractive, that they are well-organized and clear in their presentation of concepts, and that they incorporate a body of learnings that students consider worth learning. To the developer, the no-difference result should suggest evaluation procedures that are as interesting, precise, and clear as the materials themselves, and a component within the development plan that is, if not as sizable, at least as significant as the materials package.

## NOTES

1. At its outset the project staff included Donald Cruickshank (director), Robert Emans, Carol Fisher, Martha King, Victor Rentel, and Frank Zidonis. Sharon Fox and Johanna DeStefano have since joined the staff as have several graduate assistants, Pat Lyons, Alice Swinger, Tony Goeree, and Mary Kuhner. Technical development has been the responsibility of The Ohio State University Telecommunications Center and the Department of Cinema and Photography. Frank Zidonis now directs the project. Emans, Fisher, Lyons, and Swinger are no longer with the project.
2. B. Othanel Smith and others, Teachers for the Real World (Washington, D.C.: American Association of Colleges for Teacher Education, 1966).
3. Smith and others, Ibid., pp. 52-53.
4. Smith and others, Ibid., p. 52.
5. David Stampe, a member of the Department of Linguistics at Ohio State, served as a consultant during the project's first year.
6. Jean Berko, "The Child's Learning of English Morphology," Word 14 (August 1958):150-77.
7. Carol Chomsky, The Acquisition of Syntax in Children from Five to Ten (Cambridge, Mass.: MIT Press, 1970).
8. Roger Brown and Colin Fraser, "The Acquisition of Syntax," in Verbal Behavior and Learning: Problems and Processes, eds. Charles N. Gofer and Barbara Musgrave (New York: McGraw-Hill, 1963), pp. 158-201.
9. Roger Brown and Camille Hanion, "Derivational Complexity and Order of Acquisition of Child Speech," in Cognition and the Development of Language, ed. John R. Hayes (New York: John Wiley and Sons, 1970), pp. 11-53.
10. Courtney B. Cazden, "The Acquisition of Noun and Verb Inflections," Child Development 39 (June 1968):433-48.
11. Colin Fraser and others, "Control of Grammar in Imitation, Comprehension, and Production," Journal of Verbal Learning and Verbal Behavior 2 (September 1963):121-35.
12. William Labov, The Social Stratification of English in New York City (Washington, D.C.: Center for Applied Linguistics, 1966).
13. ---, "Contraction, Deletion, and Inherent Variability of the English Copula," Language 4 (December 1969):115-62.
14. M. A. K. Halliday and others, The Linguistic Science and Language Teaching (Bloomington, Ind.: Indiana University Press, 1969).

A Survey of Protocol Materials Evaluation

*by John E. Cooper*

## A BRIEF HISTORY OF PROTOCOL MATERIALS

There is no shortage of instructional materials in teacher education. Even a cursory review of *Books in Print*, recent publications announced by book companies, and audiovisual catalogs will impress the reader with the proliferation of instructional materials for teacher education. Probing beyond the facts of volume productions, however, will reveal that most of these materials are informational in nature.<sup>1</sup> They address subject matter such as educational anthropology and child development; methodology, e.g., reading instruction and pupil control; concepts such as transfer of learning and motivation; operations like constructing a sociogram or finding the median; and educational issues such as federal aid to parochial schools and national testing.

While there is an impressive store of informational materials in teacher education, little can be found which is based on organized theory. If teaching is to rise above the level of a craft, teachers must be able to respond in some way other than through dependence on trial and error, common sense, and the practical. Theoretical knowledge is required for interpreting and solving problems.

Concepts provide the basic elements of theoretical knowledge. Concept acquisition is a sine qua non for the exercise of expertise in any learned profession. Therefore, the preparation of the professional should provide sufficient attention to concepts crucial to the nature of the profession.

The need for placing fundamental concepts at the center of teacher education programs was emphasized in *Teachers for the Real World*<sup>2</sup> which called for the development of protocol materials to illustrate key concepts drawn from psychology, sociology, and philosophy which would reproduce behaviors in life-like situations. In this connection, Smith differentiated between protocol materials and training materials. While the former deal with theoretical or conceptual elements, the latter address methodological or skill components.

By January 1974, approximately 140 protocol products had been developed as part of the Protocol Materials Project of the U. S. Office of Education. With the support of the National Center for the Improvement of Educational Systems (NCIES), approximately nine units of training materials had been produced at Indiana University under the auspices of the National Center for the Development of Training Materials in Teacher Education.

## STATEMENT OF THE PROBLEM

The primary purpose of this report is to summarize evidence of the effectiveness of protocol materials in the improvement of teaching. A secondary objective is to place this evaluation in the context of a brief review of protocol materials as an educational innovation. It should be pointed out that the greatest proportion of funds and energies has been directed at training personnel in the development of protocol materials rather than at the evaluation of this effort.

## LIMITATIONS OF PAST EVALUATIONS

Even though Protocol Materials Project directors have attempted to field test their products before distribution, relatively little attention has been given to large-scale evaluation, dissemination, and preparation of trainers of preservice and in-service teachers for using the materials.

There are several explanations for the relative neglect of these essential considerations. Foremost is that projects are funded for a brief term, generally one year. This forces project directors to concentrate on developing materials, to the neglect of those elements which come after production, e.g., try-out, evaluation, training, and dissemination. Secondly, the resources required for executing those phases are not always available to protocol producers.

## METHODS OF ANALYSIS

In reviewing evaluation, 73 pieces of evidence were examined, inventoried, and classified (see Appendix A). These items came from 12 protocol locations. They included professional articles, manuscripts of addresses, summaries of studies, project reports, and letters and instruments for collecting data. The investigator limited his review to material in his possession at the time of the study. Some protocol project directors may have collected evidence of the effectiveness of their products that was not available to the investigator at the time this report was written.

A matrix was devised for classifying the kinds of evidence represented by the documents (see Figure 1 and Appendix A). Twenty-one of the reviewed items did not contain information directly related to instructional effectiveness; they are listed in Appendix B. Certain cells which are not applicable or which have little if any possibility of revealing evidence are blocked out in the matrix.

The most powerful evidence of the effectiveness of protocol materials would reveal changes in the behavior of students. Since protocols are designed for use in teacher training rather than for the education of children, it is not surprising to find that to date no project has tried to gather this kind of evidence. To do this it would be necessary to demonstrate that children who were taught by teachers trained with

Figure 1. Protocol Evaluation: Evidence and Materials

- No evidence
- Not applicable
- 1,2 Sources listed in Appendix A

Kinds of Evidence

1. Changed behavior of children  
 2. Changed on-the-job performance of trainees  
 3. Learning by trainees other than job performance  
 4. Reactions of trainees to protocols  
 5. Reactions of teachers of trainees to protocols  
 6. Volume of requests and extent of use of protocols

Nature of the Materials	1.	2.	3.	4.	5.	6.
A. Films, tests, diaries, etc. to measure #1						
B. Films, panel judgments, anecdotal records etc. to measure #2						
C. Test results to measure #3			3, 4, 5, 6, 7, 8, 9, 18, 19, 20, 21, 22, 27, 44, 50			
D. Questionnaires, interviews, commentaries, etc. to measure #4				3, 4, 5, 7, 8, 9, 17, 18, 19, 20, 21, 22, 25, 26, 27, 44, 50		
E. Questionnaires, interviews, commentaries, etc. to measure #5					44	
F. Letters from users, lists of users, testimonials, etc.					2, 27	29, 45, 47
G. Professional articles, manuscripts of speeches, tapes, etc.		52	5, 49	5, 49		48
H. Summaries of studies including field tests		52	3, 4, 18, 19, 20, 21, 22, 44, 50	3, 4, 17, 19, 20, 21, 22, 25, 26, 44, 50	17, 44	
I. Project reports			27, 51	27, 51	1, 27	46
J. Materials designed to facilitate acquisition of concepts for #2						
K. Materials designed to facilitate acquisition of concepts for #3 or #4			6, 7, 8, 9, 23, 24, 28, 52	6, 7, 8, 9,		
L. Evaluative instruments			3, 4, 5, 6, 7, 8, 9, 15, 16, 18, 22, 28, 33, 44	4, 5, 6, 7, 8, 9, 10, 12, 14, 17, 18, 21, 22, 27, 30, 32, 35, 37, 39, 41, 43, 44, 51	11, 15, 34, 36, 38, 40, 42, 44	

protocol materials performed significantly better than those taught by teachers who did not have access to these materials. It would also be necessary to show that there were no other significant differences between groups of pupils, teachers, or learning settings than the isolated variable of use of the protocol materials.

A second level of evidence would show differences in teaching behavior resulting from teacher exposure to protocol materials. Obviously this, too, requires considerable effort to obtain, necessitating evidence of favorable differences in teacher performance before and after the introduction of protocols. Despite the difficulty of obtaining this information, one item of such evidence is revealed in this report.

Other types of evidence of the impact of protocols are easier to acquire. They include concept acquisition, reactions to the materials by trainees, and volume of demand for protocols. These kinds of evidence were collected for this report.

## FINDINGS

### Evidence of Changed Teacher Behavior

Borg and Stone (52) \* selected two of six protocol modules--"Encouragement" and "Extension"--developed at Utah State University during 1971-72 and tested their impact on the classroom behavior of 19 in-service elementary teachers of the Weber (Utah) School District. These teachers had received approximately 16 hours of training over a period of 2 weeks. Training involved reading descriptions of the concepts; completing practice lessons; viewing protocol films; and completing recognition tests, application practice lessons, application tests, and self-practice lessons using audio tape recorders.

Specific behaviors accompanying "Encouragement" included general praise, specific praise, and use of student ideas. Those relating to "Extension" were prompting, seeking further clarification, refocusing, and redirection.

Pre- and post-training audio tapes of 20 minutes duration were made of each teacher performing in her classroom. These tapes were coded and scored by trained raters who did not know whether a particular tape was recorded prior to or after training.

Virtually no difference was found in the amount of general praise given before and after training; however, 17 of the 19 teachers increased their use of specific praise. The average use of student ideas approximately doubled.

Prompting, which is a strategy for improving pupil response to teacher questions, more than doubled following training. The average teacher also nearly doubled the use of further clarification.

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\*Numbers in this section of the report refer to those items listed in the Protocol Materials Evaluation Exhibit Inventory (see Appendix A).

Refocusing is an attempt to enable the student to generalize his knowledge through questioning that locates common elements drawn from diverse subjects. It is a relatively uncommon teaching technique. Eleven of the 19 subjects showed gains on this variable.

There was no significant change in the use of redirection, a strategy employed to increase the number of discussion participants. This variable was found to be a common teaching behavior at the pretraining level.

### Evidence of Concept Acquisition

Utah State University tested six protocol modules dealing with important concepts related to teacher language (49,50,51). They included extension, encouragement, clarity, emphasis, feedback, and organization. A criterion level calling for 80 percent mastery by 80 percent of the subjects for each module was established. Three criteria were selected for evaluating each module: (a) recognition of teacher use of the concept on film, (b) recognition of teacher use of the concept in typed manuscripts of class discussions, and (c) application of the concept to typed transcripts of classroom discussion lessons. On the final field test more than 80 percent of the learners reached the criterion level of mastery on all 18 of the criterion measures used to evaluate the six modules.

Protocol films and guides entitled "Tasks of Teaching" have been produced at Michigan State University. They cover assessment, goal setting, strategies, and evaluation. The protocol materials were evaluated by using 429 Michigan State University undergraduate education majors (20). They were randomly divided into an experimental group of 215 subjects and a control group of 214. The experimental group received instruction using the protocols while students in the control group received parallel instruction without the use of these materials.

Two measures of concept acquisition were selected, one of concept recall and the other, a measure of the ability to identify the concepts as part of a teaching vignette. The results showed the clear superiority in concept growth of the experimental group.

Michigan State University has also been involved in the development of protocol materials, including filmed and written aids, for respondent learning. Concept acquisition and transfer of the concept to a simulated teaching situation were tested, using more than 600 Michigan State University education majors (22). Six different treatment conditions were established in the experiment. The results produced strong evidence of the effectiveness of protocol materials on concept acquisition and its transfer.

Four video tape protocols at the Far West Laboratory for Educational Research and Development were designed to aid in interpreting group process in the classroom. Acquisition tests were administered on three of the protocols: task roles, unifying roles, and antigroup roles to instructed and noninstructed groups (4,5). The results showed the ability of the protocols to teach concepts. Differences in concept attainment favored instructed groups over the noninstructed group at the .01 level. The fourth protocol, stages of group growth, was not fully evaluated in the field test.

Recently, protocols were completed and field tested by the Far West Laboratory on using student ideas, questioning, praise and corrective feedback, and lesson organization (6,7,8,9). Although different measurement techniques were employed to field test concept attainment for each of the four protocols, early positive results of the effectiveness of the protocol materials were attained.

Indiana University produced four protocols, on film and in print, on cognitive interaction, affective interaction, classroom management, and counseling. An early evaluation report of these materials showed that significant learning occurred from use of each of the four units (18). Since this report, the Protocol Materials Project at Indiana University has developed and tested more thoroughly additional protocols on teacher-pupil interaction. Studies conducted on learning outcomes have yielded pre- and post-treatment data on a single group and post-treatment data for comparison with results of an untrained group. Results document significant growth on the acquisition of tested concepts (19).

The findings of one doctoral study at Indiana University, on the effects of protocol and training materials on concept acquisition and skill acquisition on teacher trainees, suggest "that either materials expressly designed as protocol materials or materials expressly designed as training materials lead to the acquisition of both interpretive concepts and teaching skills. The finding that viewing protocol films instancing concepts about teaching behavior leads to a demonstrable acquisition of those behaviors (as well as the acquisition of concepts about those behaviors) should be of interest to future investigators" (19).

Protocol materials developed at Southern Illinois University at Edwardsville were in audio tape and printed form and dealt with morphological and syntactic features of Black Dialect. These materials were field tested in several states, using both education majors at the preservice level and in-service teachers (27). Twelve concept acquisition tests were administered on various concepts related to the linguistic content. The criterion level of 80 percent mastery by 80 percent of the subjects was satisfactorily achieved on each of the 12 tests.

#### Evidence of Reaction to the Materials

Many Protocol Materials Project directors designed methods for measuring the attitude of trainees to protocol materials. A smaller number also designed instruments to ascertain the attitude of teachers of trainees to protocols.

User reactions to protocols falls into two broad categories: (a) impressions about the technical quality of the protocol, e.g., sound quality of a film, and (b) value judgments about the usefulness of the content for improving teaching. The most common instruments employed to collect both kinds of information were rating scales.

Summaries of student reactions to the technical quality of the protocol are found in the reports of Utah State University (51), Michigan State University (20,21), Indiana University (17,19), and Southern Illinois University (27).

Summaries of student reactions to the relevancy of the protocol to teaching can be obtained from Utah State University (51), Michigan State University (20,21,22), the Far West Laboratory (5,6,7,8,9), Indiana University (17,19), and Southern Illinois University (27).

Instructor reactions were gathered at Indiana University (17) and Southern Illinois University (27). Six instructors from several institutions tried out Indiana University protocols and gave positive responses to their quality, appropriateness of content, and utility in promoting intended concepts.

Evaluation of the Southern Illinois University audio tapes in Black Dialect by eight specialists in fields such as speech, linguistics, and anthropology appears in narrative form (27).

#### Evidence of Demand for the Materials

The Protocol Materials Project director at the University of Colorado is giving considerable attention to the subject of dissemination of protocols produced at that institution. The decision to publish and disseminate University of Colorado protocol materials was made in April 1973. Ten thousand brochures describing the materials were printed with the first mailing on May 1, 1973 (46). By November 15, 1973, more than 300 requests had been received for previewing, renting, or purchasing or for further information about the materials (45,48).

#### SUMMARY OF THE FINDINGS AND RECOMMENDATIONS

A review of research on the effectiveness of protocol materials in improving teaching and learning shows that no attempt has been made as yet to discover the influence, if any, on the behavior of pupils. One study reveals that protocols result in favorable changes of teaching behavior. Positive results have been obtained on the acquisition of concepts by preservice and in-service teachers. There is also evidence of the reactions of both trainees and their teachers to the technical qualities and relevance of protocol materials. While little attention has been directed to dissemination, there is a growing evidence of demand for protocol materials by preservice and in-service educators.

The following recommendations relate to future evaluations of protocol materials:

1. As theory is related to practice, so are concepts related to skills. Concerted attention should be given to identifying and searching for relationships between instructional concepts and skills which influence teaching and learning. The work of Hudgins in cataloging concepts and Turner in cataloging skills should be supported as an important contribution to this work.

2. Protocol and training products are essential instructional materials for preservice and in-service competency-based teacher education programs. In view of the national transition to competency-based teacher education, financial support is needed to assist the development of these materials.

3. Ultimately, the question of whether or not protocol and training materials used in competency-based teacher education programs make any difference to pupil performance should be researched. This question cannot be answered finally and fairly, however, until materials have been developed which exemplify the full range of essential concepts and skills, until teacher educators have been properly trained in their use, and until trainees have completed competency-based programs that have relied on these tools.

4. In the meantime, the field testing and consequent revision of new protocol materials should be encouraged. While collecting user reactions to the materials serves a legitimate purpose, it cannot take the place of tests of concept attainment. These should be conducted as realistically as possible. Audio- and video-taped evidence of trainee learning, when feasible, is superior to the evidence produced by paper-and-pencil tests. Similarly, information gathered from responses to filmed testing should be a more accurate indicator of conceptual power than information collected from a written simulation.

## NOTES

1. David Gliessman, "What Are Protocols: Their Nature and Purpose?" in Handbook on the Development and Use of Protocol Materials for Teacher Education (Chipley, Fla.: Panhandle Area Educational Cooperative, 1973).
2. B. Othanel Smith and others, Teachers for the Real World (Washington, D.C.: American Association of Colleges for Teacher Education, 1969).

APPENDIX A

Protocol Materials Evaluation Exhibit  
Inventory

<u>Source</u>	<u>Number</u>	<u>Classification</u>	<u>Title</u>
Bucknell University	1	5I	Protocols in Developmental Reading: May 1970, September 1973
California State University at Northridge	2	5F	Letter to John Cooper, Dec. 12, 1973
Far West Laboratory	3	3C, 3H, 3L 4D, 4H	Protocols on Group Process, Instructor's Manual
	4	3C, 3H, 3L 4D, 4H, 4L	Learning Concepts about Group Process: An Evaluation of Protocol Materials
	5	3C, 3G, 3L 4D, 4G, 4L	The Group Process Protocols: The 1971-72 Protocol Project Report for AERA Meeting Feb. 25-Mar. 2, 1973
	6	3C, 3K, 3L 4D, 4K, 4L	Lesson Organization: Protocol Materials for Teachers, 1973
	7	3C, 3K, 3L 4D, 4K, 4L	Praise and Corrective Feedback: Protocol Materials for Teachers, 1973
	8	3C, 3K, 3L 4D, 4K, 4L	Questioning: Protocol Materials for Teachers, 1973
	9	3C, 3K, 3L 4D, 4K, 4L	Using Student Ideas: Protocol Materials for Teachers, 1973
Florida Department of Education	10	4L	Student Analysis Form for Field Trial Evaluation of Protocol Materials for Teacher Education
	11	5L	Analysis Form for Instruction and Specialists for Field Trial Evaluation of Protocol Materials for Teacher Education

<u>Source</u>	<u>Number</u>	<u>Classification</u>	<u>Title</u>
Florida Department of Education	12	4L	Trainee Analysis Form for Protocol Materials for Teacher Education
Indiana University	13	5L	Instructor's Evaluation Form: Concepts and Patterns in Teacher-Pupil Interaction
	14	4L	Student's Evaluation Form: Concepts and Patterns in Teacher-Pupil Interaction
	15	3L	Inventory IC (Revision 5/17/73)
	16	3L	Inventory D. Part I (Revision 9/17/73)
	17	4D, 4H, 4L 5H	Reaction to Protocol Materials: A Survey of Students and Faculty Users
	18	3C, 3H, 3L 4D, 4H, 4L	A Preliminary Evaluation Report on the Development and Use of Filmed Protocol Materials within Two Instructional Strategies
	19	3C, 3H 4D, 4H	An Evaluation Summary and Dissertation Abstract on the Effectiveness of Protocol Materials
Michigan State University	20	3C, 3H 4D, 4H	Experimental and Field Evaluation of Protocol Materials Developed To Teach "Tasks of Teaching" Concepts, Report #2
	21	3C, 3H 4D, 4H, 4L	University of South Florida Field Test of the Michigan State University Protocol Materials on Learning, Jan. 1973
	22	3C, 3H, 3L 4D, 4H, 4L	MSU Research and Evaluation, Report #1, May 1972
	23	3K	Carrel Lesson One: The Tasks of Teaching

<u>Source</u>	<u>Number</u>	<u>Classification</u>	<u>Title</u>
Michigan State University	24	3K	Education 200, Unit IV, Teaching Task #3: The Process of Strategy Selection
Ohio State University	25	4D, 4H	A Protocol Materials Evaluation: The Language of Children
	26	4D, 4H	Field Trial Report: The Language of Children
Southern Illinois University	27	3C, 3I 4D, 4I, 4L 5F, 5I	Final Report: Protocol Materials Development Project, SIU at Edwardsville
	28	3K, 3L	Identifying the Morphological and Syntactic Features of Black Dialect
	29	6F	Telephone conversation with Theresa Love, Protocol Materials Project Director, SIU, January 2, 1974
SUNY at Buffalo	30	4L	Field Test Evaluation Forms, Fredonia, N.Y.
Teaching Research	31	4L, 5L	Protocol Materials for Teacher Education, Learner Outcomes, Field Trial Evaluation Guide, March 1971
	32	3K, 4L	Untitled (Important Definition)
University of Colorado	33	3L	Student Background Information and Questionnaires for Concepts about Teaching
	34	5L	Instructor Evaluation Questionnaire for Conceptualizing the Process of Instruction
	35	4L	Student Evaluation Questionnaire for Conceptualizing the Process of Instruction
	36	5L	Instructor Evaluation-Questionnaire for Learners and Their Characteristics

<u>Source</u>	<u>Number</u>	<u>Classification</u>	<u>Title</u>
University of Colorado	37	4L	Student Evaluation Questionnaire for Learners and Their Characteristics
	38	5L	Instructor Evaluation Questionnaire for Verbal Interaction in the Cognitive Dimension
	39	4L	Student Evaluation Questionnaire for Verbal Interaction in the Cognitive Dimension
	40	5L	Instructor Evaluation Questionnaire for Organizing Facts To Teach Meaningful Relationships
	41	4L	Student Evaluation Questionnaire for Organizing Facts To Teach Meaningful Relationships
	42	5L	Instructor Evaluation Questionnaire for Fair Verbal Behavior
	43	4L	Student Evaluation Questionnaire for Fair Verbal Behavior
	44	3C, 3H, 3L 4D, 4H, 4L 5E, 5H, 5L	Evaluation Report of the 1970-72 Protocol Materials Units Developed by the Protocols Materials Development Project, University of Colorado
	45	6F	Dissemination Report: List of Persons Ordering Material for Preview, Rental or Sale, August 1-November 15, 1973
	46	6I	The Dissemination of Protocol Materials: One Project's Answer
	47	6F	Letters from Users of University of Colorado Protocol Materials

<u>Source</u>	<u>Number</u>	<u>Classification</u>	<u>Title</u>
University of Colorado	48	6G	The University of Colorado Protocol Project: A Case Study
Utah State University	49	3G, 4G	Protocols: Competency Based Teacher Education Modules, By Walter Borg in <u>Educational Technology</u> 12, no. 10 (October 1973)
	50	3C, 3H 4D, 4H	Field Testing and Evaluation in the Utah State University Protocol Project
	51	3C, 3I 4D, 4I, 4L	The USU Protocol Project: Final Report, 1971-72
	52	2G, 2H	What are Protocol Materials?

APPENDIX B

Materials Reviewed but Not Applicable to the Study

<u>Source</u>	<u>Number</u>	<u>Title</u>
Far West Laboratory	53	Introduction to Protocols
	54	Field Test: Protocol Materials on Group Process
Florida Department of Education	55	Florida Protocol Materials Project, Sept. 19, 20, 21, 22
	56	(Untitled paper) Review of 1971-72 Activities and a Summary of 1972-73 Activities
	57	Memo; Subject: Agenda Item for LTI and Directors Meeting in Tampa, January 23-25, '73
	58	Protocol Materials Review Inventory
	59	Protocol Materials Review Inventory and Written Materials Form
Indiana University	60	Concepts and Patterns in Teacher-Pupil Interaction: Categorizing Classroom Behavior. Filmed Version
	61	Categorizing Teacher Behavior, Part 1
Michigan State University	62	Protocol Materials Evaluation Plan for Michigan State University, 1973-74
Southern Illinois University	63	Protocol Materials Development Project: Notes for Instructors
SUNY at Buffalo	64	Project in Ethnography in Education
	65	Project in Ethnography in Education Training. Materials: A Description
	66	Some Specifics on Field Testing and Training Activities
Teaching Research	67	Progress Report, March 21, 1973
	68	Protocol Materials for Teacher Education: Learner Outcomes User's Guide, April 1971

<u>Source</u>	<u>Number</u>	<u>Title</u>
University of Colorado	69	Progress Report: Development of Protocols of Social Science Concepts and Proposed Design for Testing and Evaluation of the 1973 Products
	70	Field Testing, Evaluation, Revision and Dissemination of Protocol Materials Produced during 1970-72 by the Protocol Materials Development Project, University of Colorado
	71	Protocol Materials Development Project: A Summary Report, 1970-1973
	72	Instructor Background Information
	73	Protocol Materials Development Project: A Summary Report, 1970-1972

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