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ABSTRACT

Elaboration theory is a prescriptive model of instruction which focuses on how to structure and organize subject matter while attempting to be consistent with cognitive theories of human learning. In this system, instruction in the subject matter should proceed sequentially, from the general to the specific, with each part explained and related to the general context. Although current writings on elaboration theory agree with the research on cognition, some criticisms can be made: (1) The writings often lack clarity and specificity; (2) Empirical support is needed, especially in the area of elaboration techniques; and (3) Elaborationists should focus on the learner rather than on the learning stimulus. Elaboration theorists can use relevant elements of assimilation theory as guidelines for developing their general learning theory, particularly in describing the effects of elaboration techniques and the roles of epitomes and advance organizers. (FG)

An Evaluation of the Elaboration Model of Instruction from the Perspective of Assimilation Theory

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Introduction

When I was asked to participate in this symposium I was happy to agree. It seems that Charlie Reigeluth and Dave Merrill and I have an informal discussion on the nature of instructional theory each year in the corridors of AERA. Thus, this symposium seemed like an excellent way to formalize this year's discussion and to force me to do my homework.

I must confess, however, that I was a bit surprised when papers concerning elaboration theory began to appear in my mailbox. In all I received well over a dozen documents, totally between 400 to 500 pages. You can imagine me walking around with a 4-inch thick set of papers and reading them in spare moments in airports, dentists' offices, and late at night in bed. From this mass of information about elaboration theory my first conclusion was that elaboration theory is indeed a weighty matter.

I have taken as my task in this symposium to deal with four questions: (1) What is elaboration theory? (2) What are the positive features of the theory? (3) What features need further development? (4) How does the theory fit in with cognitive theories of human learning? I will now address each of these questions in turn.

Definition of Elaboration Theory

After receiving my packet of papers about elaboration theory, my first goal was to try to understand what elaboration theory had to say. One of the first things I learned was that the theory had three general characteristics: (1) Elaboration theory is a prescriptive theory of instruction rather than a descriptive theory of learning. Thus it is aimed at telling "how to" instruct, rather than at telling "how" people learn. (2) Also, elaboration theory focuses on how to structure and organize subject matters. Thus it is a theory about the structure and organization of material rather than the specific material itself. (3) Finally, elaboration theory attempts to be consistant with existing research findings concerning human learning, memory and cognition. It attempts to be consistent with cognitive psychology. As I gleened these points from the papers on elaboration theory I said to myself, "These are fine general characteristics, now lets get some details."

Two principal features of elaboration theory seem to be mentioned repeatedly in the writings. First, instruction should proceed from the general to the specific. The general context should be presented first. The authors refer to this issue as "sequencing." Second, each part needs to be elaborated upon. For example, each part should be related to the general context and with other parts. This issue is referred to as "synthesizing." A typical quote from the authors shows the importance of sequencing and synthesizing: "The elaboration model of instruction starts the student with a very broad, general view of the subject matter to be taught. Then it divides the subject matter into parts, elaborates on each of those parts, divides those parts into parts, elaborates on each of those subparts, and so on until the knowledge has reached the desired level of detail and complexity."

I am particularly interested in these two ideas of general-to-be-detailed sequencing and synthesizing. In describing the sequencing procedure, the authors introduce the epitome--a very general and brief summary of the to-be-presented content area. In some ways the epitome seemed like an advance organizer because it is intended to provide a general context for all new incoming information. In any case, the authors leave one with the impression that generating epitomes for subject matter is a crucial step.

In describing the process of synthesizing, there was emphasis on learning by understanding--that is on learning by mapping new information into existing knowledge. For example, the systhesizing procedure "makes parts of subject matter more meaningful to the student by showing their context, that is by showing how they fit into a larger picture." The emphasis on "fitting into a larger picture" is, thus, a powerful and central idea.

I was also particularly struck by the authors' claims that elaboration techniques would result in "meaningful learning." For example, in various papers elaboration theory is proported to enhance long-term retention, students' enjoyment, and students' motivation.

Useful Aspects of Elabortion Theory

Elaboration Theory provides many potentially useful distinctions and taxonomies, such as the distinction between sequencing and synthesizing. I also agree with the authors that the creation of a general theory of instruction would be a great aid to teachers, curriculum designers, and others. These authors are to be applauded for their attempts to mold a general theory of instruction. I also was pleased to see that the authors have attempted to base the theory on existing psychological literature; apparently, psychology has something useful to say. Thus, in general, I think the authors have their collective heart in the right place.

The general principles they seem to have based elaboration theory upon resonate well with our current understanding of human learning and cognition. For example, three themes are: (1) emphasis on the context of learning, (2) emphasis on elaboration or connections with cognitive structure, and (3) emphasis on "fitting into a larger picture." All of these ideas are consistent with current emphasis in cognitive psychology on the role of organization and structure, the role of rehearsal and elaborative processes, the relation between new knowledge and prior knowledge.

These general ideas are also consistent with a long history of research on the psychology of meaningful learning. Many of the general comments I read in the documents that were sent to me could have been written by a Bartlett or a Katona. For example, Bartlett's famous emphasis on "effort after meaning" is based on the idea that learning involves "connecting something that is given with something other than itself." Or, Katona's famous distinction between learning by memorizing and learning by understanding plays on allowing the learner to build "structural relations"--i.e., to see how each part fits into larger structure.

Criticisms of Elaboration Theory

One cannot read a developing theory like elaboration theory without coming away with some constructive criticisms. I have tried to limit myself to my favorite four criticisms rather than produce an exhaustive list.

Vagueness. My first comment concerns the level of specificity of elaboration theory. It is difficult to know how to evaluate a theory as broad as elaboration theory. There is a sense in which the authors are working against the zeitgeist because they are building a general theory at a time when most psychologists have opted for building very small theories for very limited domains. Thus, elaboration theory, though it does define each term--such as epitome or synthesizing--still does not achieve a level of clarity and spec-

ificity that one would prefer. The general ideas sound reasonable at a general level but it gets hard to pin down what is meant by things like "fitting into a larger picture" or "providing a general structure." Thus, I would like to see the theory become far more clear and specific.

Empirical tests. A second comment concerns the need for empirical support of aspects of the theory. I do not object to a general theory, but it should be possible to derive some testable predictions of the theory. Many of the terms that are defined with such a sense of authority--such as "general-to-detailed" sequencing or providing epitomes--can really be thought of as empirical questions. What is an epitome? What is sythesizing? What effects do they have on learning? Empirical questions such as these require much greater attention.

Theoretical mechanisms. We also need to know how and why elaboration techniques work. What are the cognitive mechanisms which underlie the effectiveness of the instructional techniques? We do not really have an elaboration theory or model until we can specify the mechanisms. For now, it is more properly called elaboration technology--a "how to do it" procedure. We would have a far more powerful instructional technology if we could get a better handle on the underlying cognitive mechanisms.

Analysis of stimulus. Finally, there is a sense in which this theory focuses more on an analysis of the stimulus than on an analysis of the learner's information processes. This theory seems to fit within the task analysis tradition. Task analysis has proven to be a powerful tool and a useful tool. However, it would be an even more useful tool if it focused on the learner. A theory of instruction should be based on analysis of the information processing of the learner as well as an analysis of the stimulus materials. I am suggesting that the theory focus more on the learner and what is going on in the learner's head.

In summary my reading of the "basic" papers of elaboration theory to date suggest that the technology of elaboration is running far ahead of the science of elaboration. By this I mean that elaboration theory seems to do a better job of telling us "how to do" than of telling us "why to do." This problem can be attacked on each of the fronts I have outlined above: by being more specific (e.g., by telling what "fitting into a larger picture" means, or what defines a "general context," or what is the nature of "meaningful learning"), by providing empirical tests of the predictions of elaboration theory, by specifying the cognitive mechanisms which underlie elaboration theory, and by focusing on internal cognitive processes and states. In short, we need to know how and why elaboration techniques influence learning.

Comparison with Cognitive Learning Theories

My fourth task in this presentation is to compare the elaboration theory of instruction with existing cognitive theories of human learning, and in particular, with what has been called "assimilation theory." How are cognitive theories of instruction (such as elaboration theory) similar to cognitive theories of learning (such as assimilation theory)? Both deal with how information is acquired, stored, and retrieved by a person. Both deal with factors which influence the outcome of learning. However, the two types of theories also differ in important ways. Elaboration theory focuses on a technology for how to present the stimulus material for various desired outcome performances. Cognitive theories of learning focus on the information processes and structures which are involved in learning new information. If we view the main variables as the stimulus, the response, and the internal cognitive activity, then the present version of elaboration theory focuses on the stimulus while cognitive theories of learning focus on the internal activity.

Elaboration theory is designed to become a general theory of instruction which is consistent with cognitive theories of human learning. As such, many of the criticisms I raised in the previous section could be alleviated if elaboration theory could be related to a correspondingly broad theory of learning. Unfortunately, cognitive psychology has not yet developed a general theory of learning. The closest we have come to developing general cognitive theories of learning are what the organizers of this symposium call "assimilation theory" and "schema theory." Since my fellow panel member, Andrew Ortony, has already discussed "schema theory," I will focus on what has been called "assimilation theory."

I must begin by suggesting that there is no one "assimilation theory." The term has been used by Bartlett to describe learning and memory for pictures and folk stories, by Piaget to describe the process by which knowledge grows in developing humans, by Ausubel to describe expository learning from prose, by myself to describe "meaningful learning" processes that result in creative problem solving, and by many others. Unfortunately, there has not been universal agreement, however, on what process of learning is reflected in the term "assimilation." Since the work of each of the relevant authors is readily available, I will focus my discussion of assimilation theory on my own version.

There are several basic ideas in an assimilation theory of learning which are most relevant for an elaboration theory of instruction. (1) Meaningful learning involves the following cognitive processes: the to-be-learned information must be received by the learner (e.g., the learner must pay attention), the learner must possess a relevant set of existing concepts which can be used to assimilate the new material (e.g., the learner must possess an assimilative set), the learner must actively use the assimilative set and integrate new information with existing knowledge. (2) Instructional variables may influence any one or more of these processes. For example, behavioral objectives and

adjunct questions may affect what incoming information the learner pays attention to; advance organizers may serve to provide an assimilative set; and discovery or student elaboration activities may serve to encourage active integration of old and new knowledge. These all are, of course, empirical questions which must continue to be tested and clarified. (3) Differences in the process of learning can result in structurally different learning outcomes even when identical information is presented. Since the outcome of learning involves both the stimulus materials and the cognitive structures to which the materials are assimilated, it is possible that some learners may use one assimilative set while others use another. In this case structurally different outcomes would result. Structural differences can be indicated not by differences in overall amount retained but rather by differences in the pattern of transfer or the pattern of recall performance by type of information.

The foregoing brief summary of assimilation theory provides an agenda for work on elaboration theory. First, it would be useful for elaboration theorists to explicitly describe the information processing variables (such as attention, availability assimilative set, integration, etc.) that are affected by various elaboration techniques such as sequencing and synthesizing. Next, a description of the predicted learning outcome could be generated for cases in which the technique is or is not present. Predicted differences in learning outcomes should be measured not only in a quantitative way but also in a qualitative way--by this I mean that if elaboration theory allows for broader more integrated outcomes these should be manifested in the pattern of transfer performance and pattern of recall by type of information. To date, it appears that the authors of elaboration theory have focused mainly on how much is learned rather than on what is learned under elaboration techniques. Assimilation theory, provides very specific predictions concerning interactions involving the degree of transfer, the ability of the learners, and the familiarity of the material. These may also be applicable to tests of elaboration theory.

One final important link between elaboration theory and assimilation theory concerns the respective roles of epitomes and advance organizers. Much of the work on assimilation theory has involved a study of the effects of advance organizers on prose learning. In our own studies we have attempted to test the claims that concrete analogical models provide an assimilative context and encourage learners to map new information onto this context. The relation between these two ideas and elaboration theory's "sequencing" and "synthesizing" need to be explored in more detail. For example, one major research question in assimilation theory concerns what are the features of a good advance organizer. Ausubel argues that an outline is not a good advance organizer, for example. It strikes me that the definition of a epitome should be consistent with what we know about the characteristics of advance organizers, and should be tested in the same ways.

Conclusion

I very much appreciate the opportunity to participate in this symposium. Participating in this discussion has made me even more keenly aware of the need for a cognitive theory of instruction (as well as a cognitive theory of learning). I encourage the developers of elaboration theory to continue their worthwhile efforts and hope that there will be increased communication among all concerned.