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AUTHOR Reigeluth, Charles M.
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ABSTRACT

The Elaboration Theory of Instruction is an alternative to organizing instruction in terms of a hierarchical task analysis. The hierarchical organization results in an instructional sequence that begins with highly fragmented, small pieces of the subject-matter content, which many educators have found to be demotivating. The elaboration theory calls for beginning the instruction with a special kind of overview--one that epitomizes the instructional content rather than summarizing it. Then it calls for elaborating on that overview, by adding detail or complexity in "layers" across the entire breadth of the content, one layer at a time, until the desired level of detail or complexity is reached. A brief list of references is provided. (Author/RAO)

IN SEARCH OF A BETTER WAY TO ORGANIZE INSTRUCTION: THE ELABORATION THEORY

Charles M. Reigeluth

Syracuse University

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ABSTRACT

It is becoming increasingly evident that there are many deficiencies in the hierarchical task-analysis approach to designing instruction. The Elaboration Theory of Instruction was developed as an alternative that overcomes those deficiencies. The Elaboration Theory calls for beginning the instruction with a special kind of overview--one that epitomizes the instructional content rather than summarizing it. Then it calls for elaborating on that overview in a specific way==by adding detail or complexity in "layers" across the entire breadth of the content, one layer at a time, until the desired level of detail or complexity is reached.

In Search of a Better Way to Organize Instruction: The Elaboration Theory

The Elaboration Theory of Instruction is an alternative to the standard way of organizing instruction based on a hierarchical task analysis. The hierarchical organization results in an instructional sequence that begins with highly fragmented, small pieces of the subject-matter content. Many educators have found the fragmentation to be demotivating. Many educational psychologists have found the parts-to-whole sequence to be inconsistent with much knowledge about how learning occurs most effectively--namely schema theory and its predecessor, subsumption theory. And many instructional designers have found that learning hierarchies represent a very incomplete basis upon which to make decisions about sequencing the instruction, mostly because learning hierarchies are only one aspect of the structure of subject-matter content. All this is not to deny that learning prerequisites exist nor to negate that they are important--they do exist and they are important. Rather this affirms that learning prerequisites are not a sufficient basis for organizing a whole course: our knowledge must progress beyond the hierarchy.

Context

Instructional design theory is concerned with methods of instruction. It is helpful to conceptualize two different levels of methods for organizing instruction: micro strategies, which are methods for organizing the instruction on a single

topic (i.e., on a single concept, principle, etc.), such as generalities, examples, practice, and feedback; and macro strategies, which are methods for organizing those aspects of instruction which relate to more than one topic, such as sequencing (ordering), synthesizing (integrating), and summarizing (previewing and reviewing) all of the topics.

The Elaboration Theory of Instruction is a partial theory of instruction--it does not attempt to deal with all aspects of instruction. It does not deal with micro strategies for organizing instruction, although it can be and is being expanded to include such strategies (Reigeluth & Merrill, in preparation). For a good description of micro strategies, see Merrill's component display theory (Merrill, Reigeluth, & Faust, 1979; Merrill, Richards, Schmidt, & Wood, 1977). Also, the Elaboration Theory does not attempt to deal with strategies for delivering instruction (e.g., media selection), nor does it deal with strategies for managing instruction. Finally, most aspects of strategies for motivating students are not included within the present domain of the Elaboration Theory. But all of these aspects of instructional theory will be integrated with the Elaboration Theory in the foreseeable future. The Elaboration Theory of Instruction presently deals only with macro strategies for organizing instruction (see Figure 1).

Insert Figure 1 about here

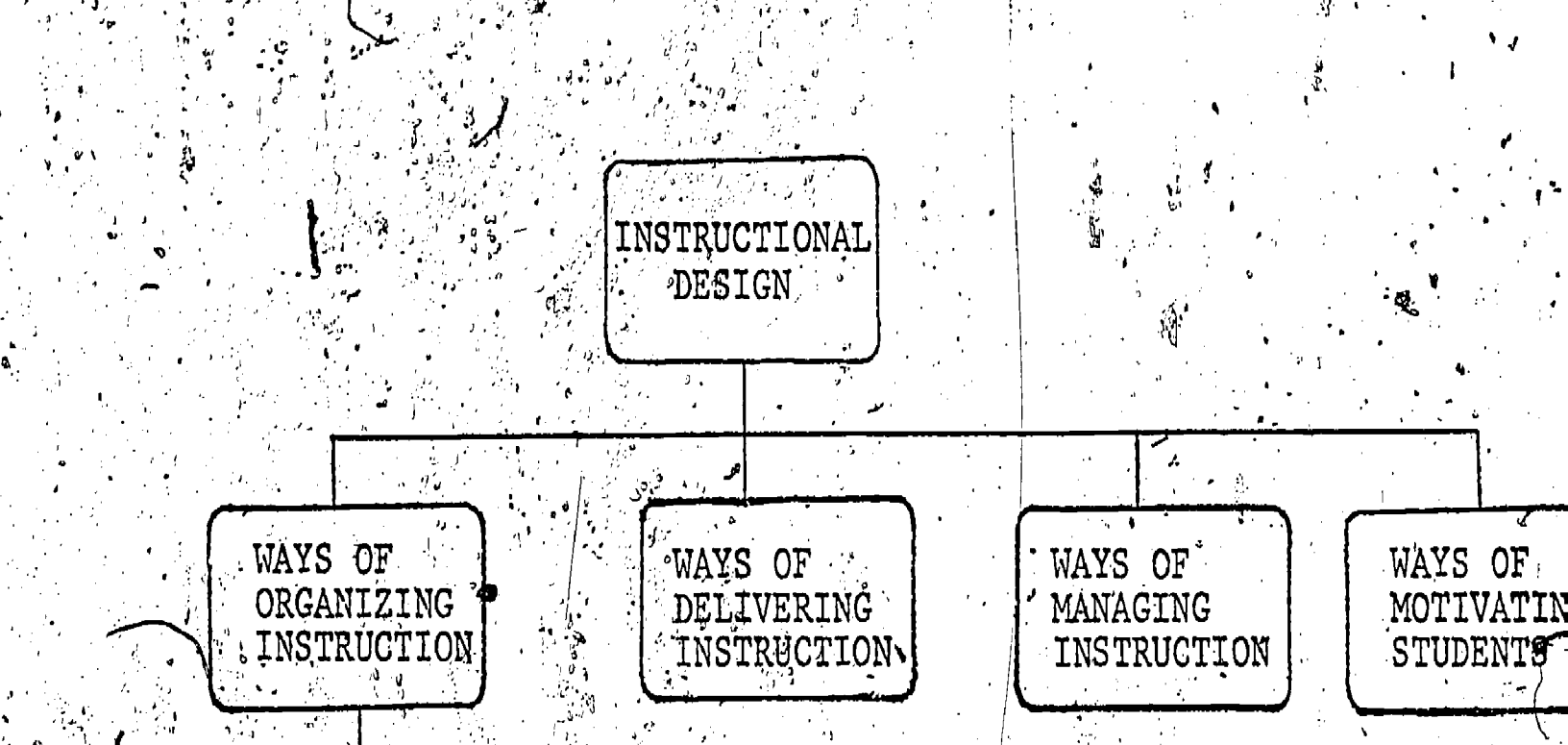


Figure 1. The context of the Elaboration Theory in relation to other aspects of instructional design theory.

An Analogy

A good introduction to the nature of the Elaboration Theory of Instruction is an analogy with a zoom lens. Taking a look at a subject matter "through" the Elaboration Theory approach to organizing instruction is similar in many respects to looking at a picture through a zoom lens on a movie camera.

A person starts with a wide-angle view, which allows one to see the major parts of the picture and the major relationships among those parts (e.g., the composition or balance of the picture), but without any detail.

The person then zooms in on a part of the picture. Assume that, instead of being continuous, the zoom operates in steps or discrete levels. Zooming in one level on a given part of the picture allows the person to see the major subparts of that part and the major relationships among those subparts. After having studied those subparts and their interrelationships, the person could then zoom back out to the wide-angle view to review the other parts of the whole picture and to review the context of this part within the whole picture.

The person continues this pattern of zooming in one level to see the major subparts of a part and zooming back out for context and review, until the whole picture has been seen at the first level of detail. Then the person can follow the

same zoom-in/zoom-out pattern for the second level of detail, the third level, and so on, until the desired level of detail is reached.

In a similar way the Elaboration Theory of Instruction starts the student with an overview of the major parts of the subject matter, it elaborates on one of those parts to a certain level of detail (the first level of elaboration), it reviews the overview and shows the context of that part within the overview (an expanded overview), it continues this pattern of elaboration/expanded overview for each part of the overview until all parts have been elaborated one level, and it follows the same pattern for further levels of elaboration. Of course, it must be remembered that the zoom-lens analogy is just an analogy and therefore that it has non-analogous aspects. One such dissimilarity is that all the detail of the picture is actually present (although usually not noticed) in the wide-angle view, whereas the detail is not there at all in the overview of the subject matter.

The general-to-detailed organization prescribed by the Elaboration Theory helps to insure that the learner is always aware of the context and importance of the different topics that are being taught. It allows the learner to learn at the level of detail that is most appropriate and meaningful to him or her at any given state in the development of one's knowledge. And the learner never has to struggle through

a series of learning prerequisites that are on too deep a level of detail to be interesting or meaningful at the initial stages of instruction. Very few learning prerequisites (if any) exist at the level of the overview. As a learner works one's way to deeper levels of detail, increasingly complex prerequisites will need to be introduced. But if they are only introduced at the level of detail at which they are necessary, then there will only be a few prerequisites at each level; and the learner will want to learn those prerequisites because he or she will see their importance for learning at the level of detail that now interests him or her.

Unfortunately, the zoom lens approach has not been used much in instruction, in spite of its fundamental simplicity and intuitive rationale. Many textbooks begin with the "lens" zoomed in to the level of detail deemed appropriate for the intended student population, and they proceed--with the "lens" locked on that level of detail--to pan across the entire subject matter. This has had unfortunate consequences for synthesis, retention, and motivation. Many instructional developers begin with the lens zoomed all the way in and proceed in a highly fragmented manner to pan across a small part and zoom out a bit on that part, pan across another small part and zoom out a bit on it, and so on until the whole scene has been covered and to some limited degree integrated. This has also had unfortunate consequences for synthesis, retention, and motivation. And some educators have intu-

itively groped for an elaboration-type approach with no guidelines on how to do it. This has resulted in a good deal less effectiveness than is possible for maximizing synthesis, retention, and motivation.

The major reason for the lack of utilization of the zoom lens approach in instruction is probably that the hierarchical approach was well-articulated and was a natural outgrowth of a strong behavioral orientation in educational psychology. This in effect put "blinders" on most of the few people who were working on instructional design strategies and methodology.

THE ELABORATION THEORY

The elaboration theory of instruction states that if cognitive instruction is organized in a certain specified way, then that instruction will result in higher levels of learning, synthesis, retention, and affect, all other things being equal. There is one limitation to this theory: the smaller the amount of interrelated subject-matter content, the less difference it will make. With a small enough number of topics, it doesn't make any difference how you sequence them, whether you synthesize them, or whether you summarize them (as long as there are no learning prerequisite relationships among them). The following is a description of that "certain specified way" of organizing instruction, which is called the Elaboration Model of Instruction.

The Elaboration Model of Instruction starts by presenting knowledge at a very general or simplified level--in the form of a special kind of overview. Then it proceeds to add

detail or complexity in "layers" across the entire breadth of the content of the course (or curriculum), one layer at a time, until the desired level of detail or complexity is reached. It is important to emphasize that the Elaboration Model prescribes a special kind of overview, and it prescribes a special way in which the elaboration is to occur.

The Epitome

We do not like to use the word "overview" because its meaning is very vague--it means different things to different people. Also, we believe that a certain specific kind of overview is superior to other kinds. Among other things, our overview must epitomize the subject matter that is to be taught, rather than summarizing it. Hence, we have named it the epitome (ē·pĭt´ō·mē). An epitome has two "critical characteristics" which distinguish it from other types of overviews: (1) it epitomizes the subject matter of the course (or curriculum) rather than summarizing it, and (2) it has a single "orientation"--it emphasizes a single type of content.

With respect to epitomizing the subject matter of the course (or curriculum), an epitome is formed by "boiling down" the course content to its essence. It does not preview all of the course content; rather it presents a few fundamental topics that convey the essence of the entire content. Those topics are chosen or derived in such a way that all the remaining course content provides more detail or more complex

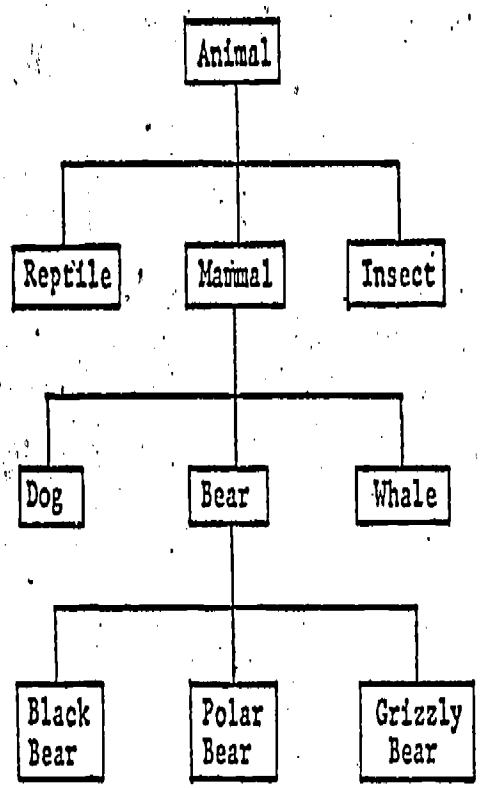
knowledge about the epitome. Although an epitome is very general, it is not purely abstract. Since "general" and "abstract" are often confused, this distinction will be discussed in greater detail shortly.

With respect to having an orientation, the epitome emphasizes any one of three types of content: concepts, procedures, or principles. A concept is a set of objects, events, or ideas that have certain characteristics in common. Knowing a concept entails being able to identify, recognize, classify, or describe what something is. A procedure is a set of actions that are intended to achieve an end. It is often referred to as a skill, a technique, or a method. Knowing a procedure entails knowing how to do something. A principle is a change relationship--it indicates the relationship between a change in one thing and a change in something else. It describes causes or effects by identifying what will happen as a result of a given change (the effect) or why something happens (the cause). These three different emphases are referred to as a conceptual orientation, a procedural orientation, and a theoretical orientation, respectively; and the orientation is selected on the basis of the general goals or purpose of the course (or curriculum). All three types of content may appear in the epitome, but one type receives primary emphasis; and the epitome is formed by epitomizing the orientation content and then introducing whatever of the other two types of content are highly relevant. More will be said about this below.

We mentioned above that an epitome is very general but is not purely abstract. The terms "general" and "abstract" are often confused. It is helpful to think of three continua: (1) general to detailed, (2) simple to complex, and (3) abstract to concrete. The first two are very similar to each other, but the third is very different (see Figure 2).

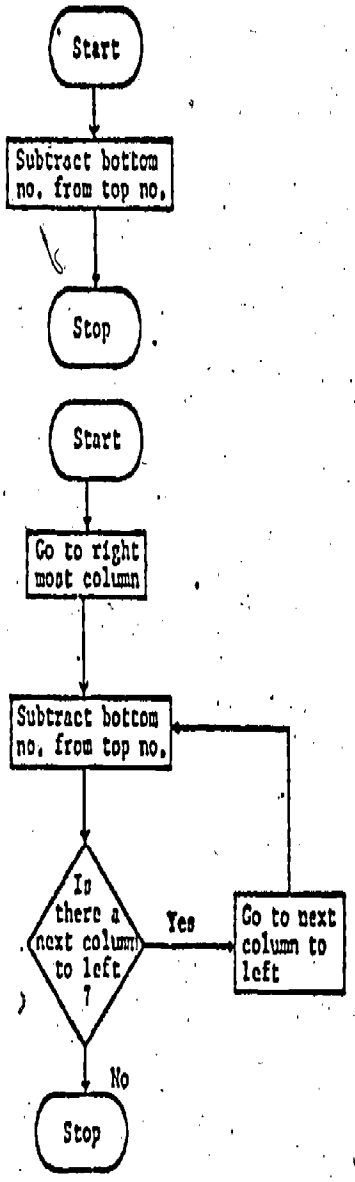
Insert Figure 2 about here

The general-to-detailed continuum refers primarily to a continuum formed by subdividing things (concepts or procedures) or by lumping things (concepts or procedures) together. "General" has breadth (things lumped together), while "detailed" is usually narrow (subdivisions). In Figure 2a "polar bear" is a more detailed concept than "animal." The simple-to-complex continuum refers primarily to a continuum formed by adding or removing things (principles or procedures). "Simple" has few things, while "complex" has many things. In figure 2b, the procedure for subtracting multi-digit numbers is more complex than the procedure for subtracting single-digit numbers. Additional complexity can be added by introducing sub-procedures for "borrowing" when the top number is smaller than the bottom number. The abstract-to-concrete continuum refers to tangibility, and there are two major types of tangibility. First, generalities are abstract, and instances are usually concrete--the definition of a tree is abstract, while a specific tree (an object) is con-



General-to-detailed continuum

(a)



Note: These are just two points on the continuum. For others, see Merrill, P.F. (1978).

Simple-to-complex continuum

(b)

Generalities

1. A rise in the supply of a good causes a drop in the price of the good in a free market.
2. A pen is an instrument that is used for writing with ink.
3. A German finite verb is placed at the end of a subordinate clause.

Instances

1. The record potato harvest this fall caused a drop in the price of potatos. +
2. (Teacher holds up a pen and says to class, "This object is a pen.")*
3. Er sagt, dab er das nicht tun will.

+Technically, this is a statement about the instance and is not the instance itself.

*Unlike No. 3, the instance is not actually present here on this page.

Abstract-to-concrete continuum

(c)

Figure 2. Illustrations of three continua that are often confused.

crete. This is the most important abstract-to-concrete continuum for instructional theory. Second, some concepts are considered abstract because their instances are not tangible. "Intelligence" is a good example of an abstract concept. This second abstract-to-concrete continuum is largely irrelevant for our purposes.

On the basis of these distinctions, an epitome is always either very general or very simple--it must be, in order to epitomize the instructional content. But it should never be purely abstract. According to Merrill's Component Display Theory, it should contain the following for each topic it presents: a generality (e.g., the definition of a concept), some instances of that generality (e.g., examples of the concept), and some practice for the student in applying the generality to new instances. An epitome usually contains about six (plus or minus three) topics--that is, about six different generalities, along with their instances and practice items. These topics may be any combination of concepts, procedures, and/or principles.

Figure 3 illustrates the nature of a theoretical epitome and of a conceptual epitome for an introductory course in ecomonics, and Figure 4 illustrates the nature of a procedural epitome for a course in literature.

Insert Figures 3 and 4 about here

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1. The law (principle) of supply and demand.
   a. The principle of what causes changes to occur in the quantity demanded and the quantity supplied (price changes).
   b. The principle of why prices change in a free market economy.
2. The principle of why changes occur in supply schedules or demand schedules.
3. The concepts of supply, supply schedule, and supply curve.
4. The concepts of demand, demand schedule, and demand curve.
5. The concept of changes in quantity supplied or demanded.
6. The concept of changes in supply schedules or demand schedules.
7. The concept of equilibrium price.

Practically all principles of economics can be viewed as elaborations on the law of supply and demand, including those that relate to monopoly, regulation, price fixing, and planned economies.

Figure 3a. The instructional content for a theoretical epitome for an introductory course in economics.

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1. Definition of economics
2. Definitions of subdivisions of economics:
   a. Definition of macro economics
   b. Definition of micro economics
   c. Definition of comparative economics
   d. Definition of international economics
   e. Definition of labor economics
   f. Definition of managerial economics.

Practically all concepts in economics can be viewed as elaborations on these concepts (i.e., as further subdivisions--either parts or kinds--of these concepts).

Figure 3b. The instructional content for a conceptual epitome for an introductory course in economics.

1. There are three major stages in the multidimensional analysis and interpretation of creative literature:
   a. Identifying the elements of the dramatic framework--character and plot.
   b. Combining the elements into composites appropriate for analysis of their literal meaning--analysis of character in terms of plot.
   c. Figuratively interpreting the elements--symbolism through character, mood, tone.
   d. Making a judgment of worth--personal relevance, universality.

(This procedure is simplified by introducing only two elements for the analyses in a and b, three in c, and two in d. It is further simplified by introducing only those procedures and concepts necessary for the analysis and interpretation of a short poem. Complexity is later added by increasing the number of elements used in each stage of analysis or interpretation and by introducing procedures and concepts needed for analyzing and interpreting more complicated types of creative literature.)

2. Concepts necessary for performing the procedure in 1.
   a. character
   b. plot
   c. symbolism
   d. mood
   e. tone
   f. universality

Figure 4. The instructional content for a procedural epitome for an introductory course in literature.

A Level-1 Elaboration

A level-1 elaboration is a part of the instruction that provides some more detailed or complex knowledge on a topic (or set of topics) that was introduced to the student in the epitome. It should not include all of the more detailed or complex knowledge on that topic. Rather, a level-1 elaboration should be an epitome of all of the more detailed or complex knowledge on that topic, just as zooming in one level provides a slightly more detailed wide-angle view of one part of the whole picture. There may be as many level-1 elaborations as there are topics in the epitome, but there does not have to be a one-to-one correspondence. It is possible that each of the topics in a level-1 elaboration may elaborate to some extent on all of the topics in the epitome or perhaps even on a relationship among those topics.

The depth to which a level-1 elaboration should elaborate on a part of the epitome is somewhat variable (i.e., the discrete levels on the zoom lens are variable, not always constant and equal in the amount of detail added). The most important factor for deciding on the depth of a given level-1 elaboration is student learning load. It is important that the student learning load be neither too large nor too small, for either will impede the instruction's efficiency, effectiveness (especially for retention), and appeal. The number of topics that represent the optimal student learning load will vary with

such factors as student ability, the complexity of the subject-matter topics, and student prefamiliarity with the topics. The breadth of a level-1 elaboration will usually be fairly difficult to adjust. Hence optimizing the student learning load in a given elaboration can often be done only by varying the depth of that elaboration.

Figure 5 illustrates the nature of a level-1 elaboration on the theoretical epitome in Figure 3, and Figure 6 illustrates the nature of a level-1 elaboration on the procedural epitome in Figure 4.

Insert Figures 5 and 6 about here

Other Elaborations

A level-2 elaboration is identical to a level-1 elaboration except that it elaborates on a topic (or set of topics) introduced in a level-1 elaboration rather than in the epitome. In a similar manner, a level-3 elaboration provides more detail or complexity on a topic (or set of topics) introduced in a level-2 elaboration, and so on for elaborations at deeper levels of detail/complexity. In all cases, an elaboration at one level of detail/complexity should be an epitome for all the elaborations that elaborate on it.

According to this kind of organization, elaborations that are on the same level are very different from each other

1. Principle of increasing marginal costs as an explanation for the shape of the supply curve.
2. Principle of profit maximization for individual firms.
3. Procedure of marginal analysis to arrive at profit maximization.
4. Concepts of fixed and variable costs.
5. Concepts of total, average, and marginal costs.
6. Concepts of break-even point and shut-down point.

Figure 5. The instructional content for a level-1 elaboration on the theoretical epitome in Figure 3a. It elaborates on the supply aspect of the law of supply and demand by presenting more complex principles that relate to supply.

1. How to identify other elements of the dramatic framework--setting, perspective, and language.
2. How to combine the elements into composites appropriate for analysis of their literal meaning--(1) analysis of character, plot, and setting, (2) analysis of perspective, character, and plot, and (3) analysis of language.
3. Concepts of setting, perspective, and language.
4. Concepts of types and patterns of imagery (in language).
5. Procedure for analyzing imagery.
6. Concept of prosody.
7. Procedure for analyzing prosody.

Figure 6. The instructional content for a level-1 elaboration on the procedural epitome in Figure 4. It elaborates on stages a and b (which must be elaborated at the same time because of their interrelatedness) by adding elements that need to be identified (in stage a) and analyzed in combination (in stage b).

with respect to the instructional content they contain (i.e., their topics are very different from each other); but elaborations that are on different levels are very similar to each other with respect to their instructional content (i.e., their topics are very similar) because each level has the same content as the previous levels, only at a level of greater detail/complexity.

Expanded Epitome

After each elaboration, the instruction presents a summarizer and an expanded epitome, equivalent to the zoom-out-for-context-and-review activity in the zoom lens analogy. The summarizer is comprised of a concise generality for each topic presented in the elaboration. The expanded epitome (a) synthesizes the topics presented within the elaboration (internal synthesis) and (b) shows the relationship of those topics (and relationships) to the rest of the topics (and relationships) that have been taught (external synthesis).

Summary of the Elaboration Model

In summary, the Elaboration Model is as follows (see Figure 7). First, the epitome is presented to the student. Then a level-1 elaboration is presented to provide more detail on an aspect of the orientation content in the epitome (that aspect which is most important or contributes most to an understanding of the whole orientation structure). Next a summarizer and an expanded epitome are presented. Another level-1 elaboration and its summarizer and expanded epitome are presented. This

pattern of level-1 elaboration followed by its summarizer and expanded epitome continues until all aspects of the orientation content that were presented in the epitome have been elaborated one level. Then a level-2 elaboration is presented to provide more detail on an aspect of the orientation content that was presented in one of the level-1 elaborations. As always, this elaboration is followed by a summarizer and an expanded epitome. This pattern continues until all of the aspects of the orientation content presented in all of the level-1 elaborations have been elaborated one level (unless the objectives of the course or the nature of the subject matter exempt a level-1 elaboration from being further elaborated). Additional levels of elaboration are provided in the same manner--an elaboration followed by a summarizer and an expanded epitome--until the level of detail/complexity specified by the objectives is attained in all aspects of the orientation structure (and supporting structures) of the course.

Insert Figure 7 about here

USING THE ELABORATION MODEL

We have developed a fairly detailed set of procedures for designing instruction according to the Elaboration Model (Reigeluth, et al, 1978). A major part of those procedures is analyzing the instructional content as to four different types

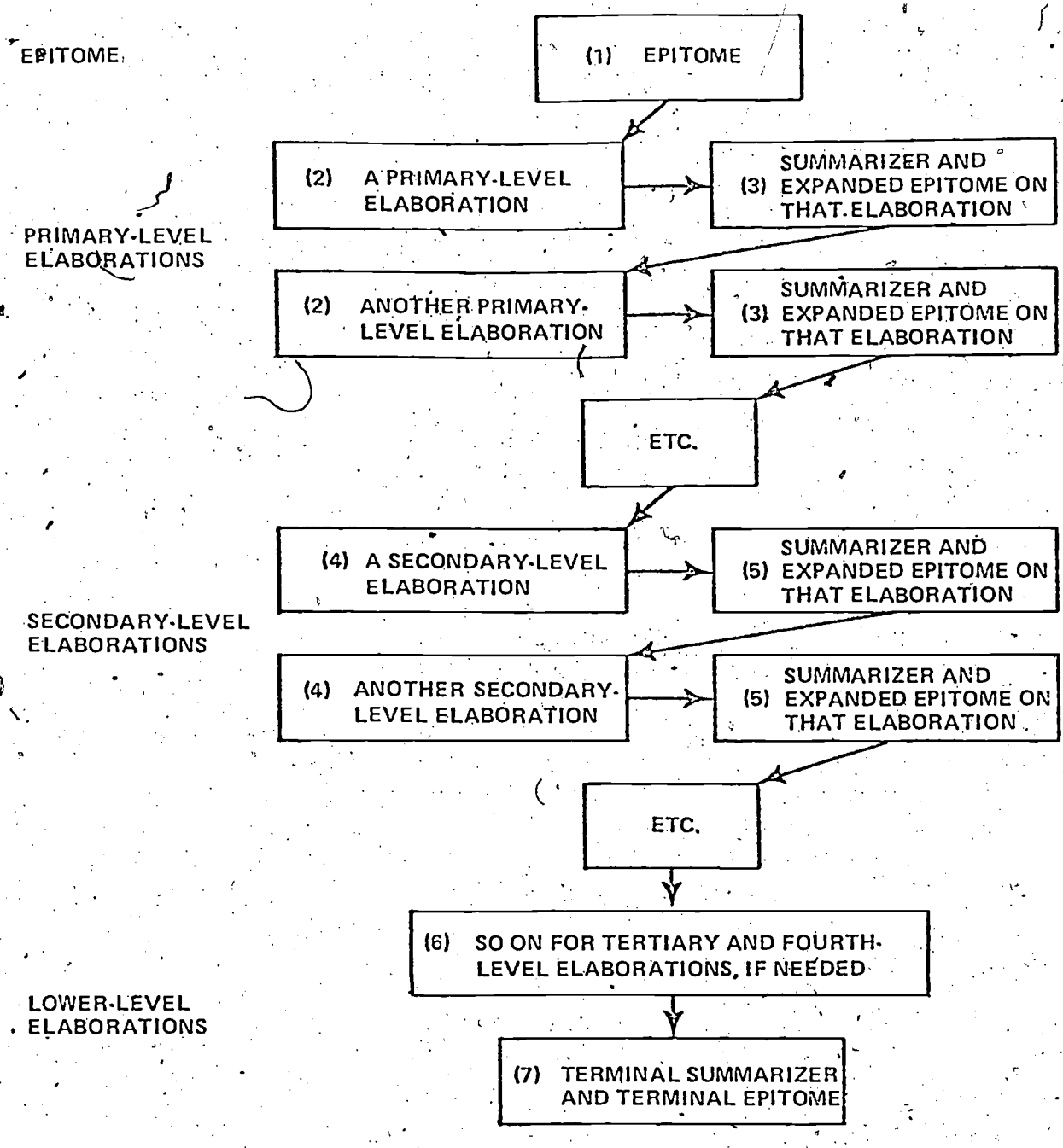

Figure 7. A diagramatic representation of the Elaboration Model of Instruction.

of subject-matter structures[1]: conceptual, procedural, theoretical, and learning. (Learning structures show learning prerequisite relations within the subject matter.) It is beyond the scope of this paper to describe and illustrate each of these four types of structures. The interested reader is referred to Reigeluth, Merrill, & Bunderson, 1978.

There are six major steps for designing instruction according to the Elaboration Model (see Figure 8). First, one must select an orientation--either conceptual, procedural, or theoretical--on the basis of the goals or purpose of the instruction. Second, one must develop an orientation structure for that orientation. It depicts the orientation content (either concepts, procedures, or principles) in the most detailed/complex version that the student needs to learn. This is a form of content analysis or task description. Then the orientation structure is analyzed in a systematic manner to determine which aspect(s) of the orientation content will be presented in the epitome and which aspects will be presented in each level of elaboration. In this way the "skeleton" of the instruction is developed on the basis of epitomizing and elaborating a single type of content.

Insert Figure 8 about here

The fourth major step is to embellish the "skeleton" by

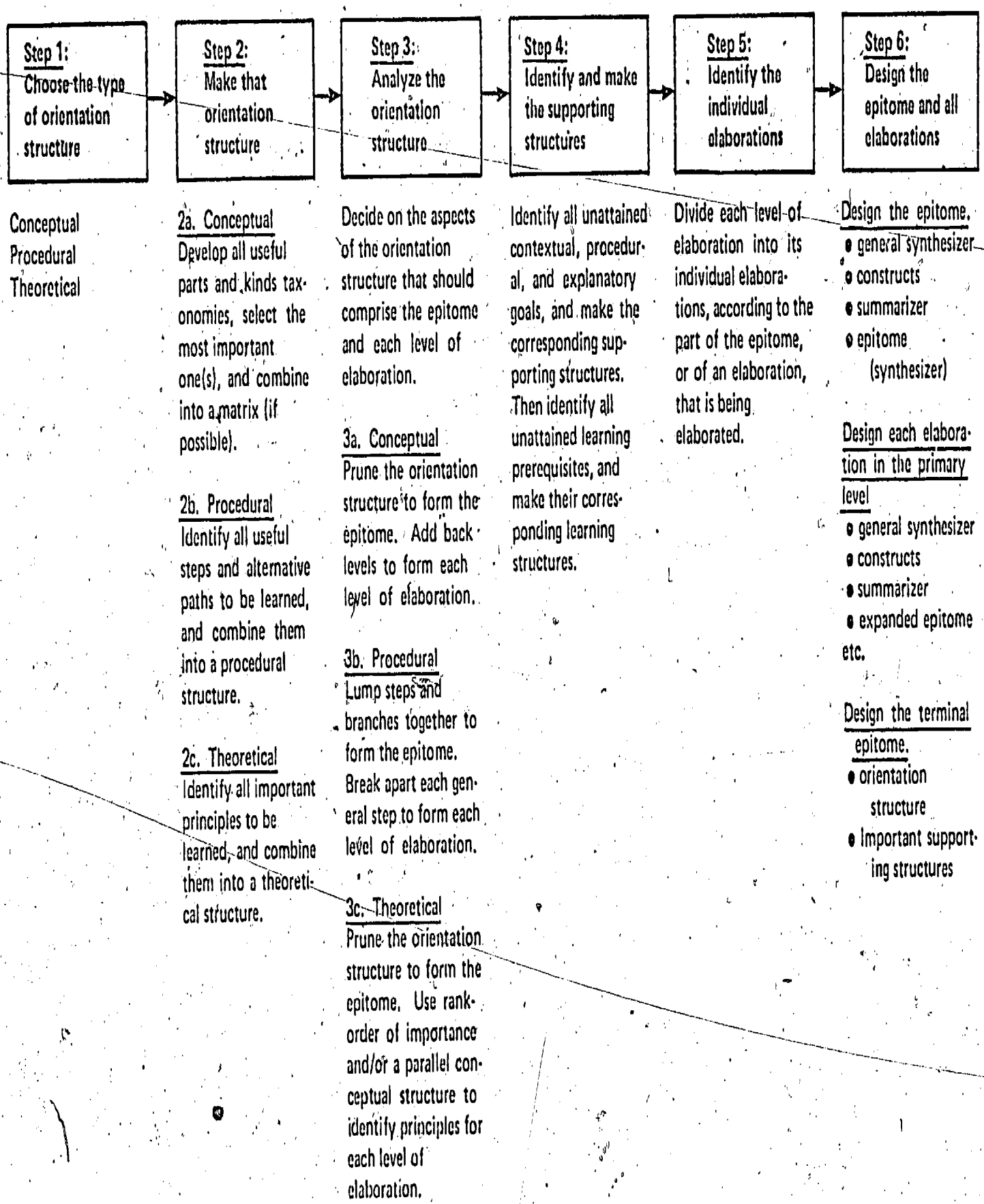

Figure 8. The six-step design procedure for structuring the instruction in any course entailing cognitive subject matter.

adding the other two types of content at the lowest appropriate levels of detail. This is usually done by "nesting" the remaining subject-matter structures within different parts of the skeleton. (This may include some isolated structures or topics in the orientation content that did not fit in with the orientation structure in forming the skeleton.) Learning prerequisites are one of the considerations that enter in at this point.

Having allocated all of the instructional content to the different levels of elaboration, it is now important to establish the scope and depth of each individual elaboration that will comprise each level. The scope is usually predetermined by the orientation topic and its necessary supporting topics, although two orientation topics can be lumped together into a single elaboration, and it would be possible (though not advisable) to add extra supporting topics. The depth is then determined on the basis of achieving an optimal student learning load, as described above.

Sixth and finally, some of the internal structure of each elaboration within each level can be planned. The sequence of topics within an elaboration is decided on the basis on contribution to an understanding of the whole orientation structure (but within the constraints of learning prerequisites), and the locations of synthesizers and summarizers are also

determined.

This concludes the "macro" design process, at which point the "micro" design process begins--decisions as to how to organize the instruction on a single topic.

THE NEED FOR RESEARCH

The model and procedures as described above have undergone very limited field-testing and virtually no research. It may turn out that having a complete expanded epitome after every single elaboration is inefficient and unnecessary (especially after lower-level elaborations). It may also turn out that it is unnecessary for a student to study all level-1 elaborations before proceeding to a level-2 elaboration. This would have important implications for learner-controlled selection and sequencing of topics--a student could now truly follow one's interests in approaching a subject matter. This would be particularly valuable in adult and continuing education contexts.

It is also likely that a large, full-scale field test of the design procedures will reveal more effective and efficient ways to design instruction according to the model.

The Elaboration Model as developed to date is a tentative move in a much-needed direction. It does not yet have the maturity and validation of the currently used approaches to instructional design, but the need for alternatives should be clear. And there is great potential for the Elaboration Model to meet that need.

SUMMARY

It is becoming increasingly evident that there are many deficiencies in the hierarchical task analysis approach to organizing instruction on the macro level. The resulting instructional designs are usually fragmented, demotivating, inconsistent with learning theory, and at best a very incomplete basis for organizing instruction. The Elaboration Theory of Instruction was developed as an alternative that overcomes these deficiencies. But it is emphasized that it is but a partial theory of instruction--it only deals with macro strategies for organizing instruction (see Figure 1 above).

The zoom-lens analogy was presented as an introduction to the nature of the Elaboration Theory of Instruction. A person starts with a wide-angle view and then proceeds to zoom in one level for detail on a part of the picture and zoom out for review and context. After the whole first level has been studied, the same zoom-in/zoom-out pattern is followed for the second level of detail, and so on until the whole picture has been studied at the desired level of detail. Alternative approaches to designing instruction were contrasted in terms of this analogy, and their deficiencies were mentioned.

Next, the Elaboration Model of Instruction was described. It starts by presenting a special kind of overview, called the "epitome", which (1) epitomizes the instructional content rather than summarizing it and (2) has a single "orientation" (a single type of content). The single orientation may be

either conceptual, procedural, or theoretical. And to epitomize the content, the epitome contains one or two very general/simple topics from the orientation content; but the epitome should not be purely abstract--the epitome should be formed in such a way that concrete instances and practice can be presented on each topic. Some of the other two types of content may also be included in the epitome if they are highly relevant to the orientation content topic(s).

After presenting the epitome, the model calls for adding detail or complexity in "layers" across the entire breadth of the content, one layer at a time, until the desired level of detail/complexity is reached. First, level-1 elaborations are presented, each of which provides more detail/complexity on one aspect of the epitome. After all aspects of the epitome have been elaborated in this manner, level-2 elaborations are presented. Each of them elaborates on one aspect of a level-1 elaboration. Additional levels of elaborations are added as necessary to reach the level of detail/complexity called for by the objectives. The amount of content in each elaboration must be carefully planned so as to represent an optimal student learning load. Also, each elaboration, regardless of level, is followed by a summarizer and an expanded epitome.

Next the procedure for using the elaboration model in the design of new instruction was summarized. The six major steps are shown in Figure 8 above.

Finally, the need for continued research, field-testing, and development of the Elaboration Model was emphasized. The Elaboration Model as developed to date is a tentative move in a much-needed direction. The need for alternatives to the hierarchical approach should be clear, and there is great potential for the Elaboration Model to meet that need.

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FOOTNOTE

[1]A subject matter structure is something which shows a single kind of relationship that exists within a subject matter. Figure 2a shows part of a subject-matter structure.