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According to Elaboration Theory (ET), the way instructional content is organized has an effect on learning. Based on cognitive psychology, the theory provides a set of guidelines for organizing instruction to maximize student learning. In contrast to common parts-to-whole sequences, such as hierarchical and procedural sequences, ET recommends holistic sequences to foster the formation of stable cognitive structures. A zoom lens is a simple yet effective analogy to understand how the theory works. From the perspective of a person visiting an art gallery there are multiple possible views of a painting:

1. Wide-angle view: First, the person looks at the whole painting from a distance, sees the primary parts of the painting, and understands the major relationships among those parts.
2. Zoomed-in view: Next, the person chooses any one of the primary parts of the painting to zoom-in one level. This helps the person to identify sub-parts of this primary part and the interrelationships among those sub-parts.
3. Zoomed-out view: After investigating the details for that specific part, the person can zoom-out to the wide-angle view to re-contextualize (or synthesize) the investigated part within the whole painting.

This pattern is repeated as the person either picks another primary part to zoom in on or picks a part of the sub-part already viewed to zoom in one more level, and it continues until the person has viewed all of the parts of this painting at the desired level of detail.

To apply this scenario to a learning context, the instructional content is analogous to the painting and a learner is analogous to a person viewing the painting. In this context, the learner is provided with a wide-angle view of instructional content to learn about its primary parts, and uses a zoom-in-and-out pattern to master each primary part and its sub-parts at the desired level of detail or complexity. This approach entails using a blended method for organizing instructional content: from whole to parts (i.e., analytical) and from parts to whole (i.e., contextual). This has two major benefits: (1) defragmentation and contextualization to aid the formation of stable cognitive structures, and (2) choice for learners to decide what part of the picture to study next, thereby increasing learner empowerment.

Types of Elaboration Sequences

According to ET, this holistic approach to organizing and sequencing instructional content is operationalized differently depending on the kind of content to be learned. The most important distinction is between domain expertise and task expertise.

Domain expertise entails understanding *descriptive knowledge*, primarily such subject areas as the natural sciences and social studies. It may focus on concepts (e.g., learning about different kinds of animals in biology) and/or principles and theories (e.g., learning about genetic variation and natural selection in biology). ET uses the *Conceptual Elaboration Sequence* for conceptual domain expertise and the *Theoretical Elaboration Sequence* for theoretical domain expertise.

Task expertise entails the ability to *perform a task,* such as solving a mathematical problem, designing an office building, and writing an argumentative essay. Task expertise covers both procedural tasks, in which experts think in terms of steps (e.g., adding fractions in math), and heuristics tasks, in which experts think in terms of principles, causal models, and rules of

thumb (e.g., providing psychological counseling). Most tasks have both procedural and heuristic elements to some degree. For all kinds of tasks, ET uses the *Simplifying Conditions Method* to create an elaboration sequence.

Of course, domain and task expertise are often related. For example, biology (primarily domain expertise) is related to medicine (primarily task expertise), physics is related to engineering, and learning theory is related to instructional theory. Therefore, the different types of elaboration sequences are often interrelated. The remainder of this paper provides more details about three different elaboration sequences: (1) the conceptual elaboration sequence, (2) the theoretical elaboration sequence, and (3) the simplifying conditions method.

Conceptual elaboration sequence

To help learners develop domain expertise that is primarily conceptual, such as in a biology course that teaches different kinds of plants and animals or kinds of ecosystems or parts of the human body, the sequence starts with the broadest, most inclusive concepts (called the epitome because it epitomizes the content) and gradually teaches narrower, more detailed concepts, as recommended by David Ausubel. The learner can be given control over which concept to elaborate upon next in the instructional sequence (particularly for computer-based instruction), or it could be decided by a teacher or computer system. The concepts comprise the "organizing content" that serves as the skeleton of the instruction; then other kinds of content are added onto different parts of the skeleton where they are most relevant, including learning prerequisites, which are taught "just in time" for when they are needed.

ET also offers guidelines for analyzing the content, beginning with a conceptual analysis that identifies the major concepts to be taught and the elaborative relationships among them, primarily superordinate, coordinate, and subordinate kinds and parts (e.g., kinds of plants and parts of each kind of plant). This is followed by an analysis of other relevant kinds of content, called the "supporting content," plus identifying the concepts that are most relevant to each.

Theoretical elaboration sequence

For domain expertise focused on theoretical knowledge, ET provides guidelines for sequencing principles or theories (primarily cause-effect relationships). The wide-angle view entails teaching the most basic and simplest principles first – the *epitome* – and then teaching ever more complex content and principles. An example would be to teach the law of supply and demand in economics, and then elaborate by teaching the most fundamental principles for the supply side and for the demand side. In this case, the principles are the organizing content that serves as the skeleton of the instruction, and other related content (primarily concepts and procedures) are added just-in-time where they are relevant. Again, the learner can be given control over which principles to elaborate upon first when that seems appropriate for a given learner and situation.

ET offers different guidelines for analyzing the content for this sequence, beginning with a theoretical analysis that identifies the major principles to be taught (cause-effect and natural-process relationships) and the elaborative relationships among them. This is followed by an analysis of other relevant kinds of content (supporting content) and where in the skeleton of the instruction each should be learned.

Simplifying conditions method

For task expertise ET offers the Simplifying Conditions Method (SCM) as a sequencing strategy. All complex cognitive tasks have some versions that are simpler than others. For example, driving a vehicle is easier if it is a small car, with automatic shift, no traffic, good weather, familiar roads, no distractions inside the car, and so forth. An SCM sequence begins with the simplest real-world version of the task until it is mastered, then the simplifying conditions are

removed one at a time, which requires teaching progressively more complex versions of the task. Again, the learner can be given control over the order for removing the simplifying conditions. Whatever procedures and/or heuristics are involved in each version of the task are the organizing content, and other related content is added just in time where relevant. This kind of sequence is ideally suited to project-based learning (defined broadly here as all kinds of learning-by-doing, including problem-based and inquiry-based learning), as a way to sequence many projects in a course or curriculum. It can be used in a highly constructivist approach (very little instruction is provided to students) or a more supportive approach (extensive tutorials and guidance are provided to students).

Again, ET offers different guidelines for analyzing the content for this sequence. It is called a heuristic task analysis and entails identifying both procedural and heuristic elements of the task, including methods for explicating tacit knowledge that experts possess. It also includes methods for identifying supporting content and when to teach such content just-in-time during instruction in the task.

Multiple-Strand Sequencing

Sometimes, more than one kind of content is taught extensively in a course or curriculum. Therefore, ET also offers guidelines for designing a "multiple-strand sequence" that includes integrating the sequence of two or more kinds of organizing content. For example, Beissner designed three elaboration sequences for a physical therapy course, compared them, and found significant parallels that allowed them to integrated with minor adjustments.

Conclusion

The major benefit of ET is that it offers a holistic rather than fragmented approach to instruction, thereby enhancing student motivation, allowing more self-directed learning, and providing for student construction of more stable cognitive structures (schemata).

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See also Cognitive Task Analysis, Four Component Instructional Design, Knowledge and Skill Hierarchies, Knowledge Elicitation, Skill Decomposition

Further Readings

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