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Schemas

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Although no universally agreed-upon definition of schemas exists, *schemas* are generally considered to be well-learned cognitive patterns of domain-specific information that are used as templates by individuals to help them explain, interpret, perceive, encode, and respond to complex tasks and experiences. Schemas also allow for predictions about what to expect in future situations relevant to the particular schema. They create meaning from situations, data, and events by organizing and determining the patterns in complex sets of information. Schemas actually have a reciprocal relationship with data in that schemas may modify the meaning of information, but information or data may also lead to modifications in schemas. Both educators and counselors have interest in schemas because schemas help them understand how both informational and emotional learning occur.

Various types of schemas have been postulated, such as schemas about other people (including *role* and *person schemas*), one's self (*self-schemas*), the sequence of various events (*script schemas*), context (*place* or *location schemas*), and the meaning of data (*information schemas*). All of the various types of schemas facilitate the efficient understanding and interpretation of information by organizing and assigning meaning to that information. As a concrete example, suppose you heard someone talking about seemingly highly disparate pieces of information, such as arranging things into groupings; making decisions about color; dealing with tedium; deciding about capacity and facilities to employ; avoiding mistakes; timing of mechanisms; sorting types; determining what could not be dealt with by one's current equipment, which necessitates outsourcing; setting temperatures in such a way as to avoid catastrophe; dealing with voluminous output; enlisting aid from others; and making measurements of necessary additives. This list might sound rather convoluted, meaningless, and difficult to remember unless you were first told that the pieces of information all concerned “doing laundry.”

During the initial learning process, deliberate construction of schemas requires the use of significant amounts of working memory (WM) resources. Working memory represents the brain's capacity to temporarily hold limited amounts of information while manipulating that information. However, with practice and repetition, the use of schemas constructed during the learning process becomes virtually automatic. Thus, the development of schemas allows for a substantial reduction in required WM resources as the schemas direct and guide individuals' attention and focus. The result is often an increase in expertise or skill level within a particular knowledge domain.

Schemas also provide an overall executive guidance system during high-level cognitive processing. Without this guidance (or without external instruction), individuals often default to weak problem-solving strategies, such as trial and error and means-ends analysis. Strategies such as these can be both time consuming and inefficient, and thus interfere with the construction of new schemas because of the workload imposed on WM resources.

Schemas are stored in long-term memory (LTM), which is virtually unlimited in both its capacity and duration and allows individuals to process, organize, and retrieve vast reservoirs of knowledge. Once schemas are formed and stored in LTM, working memory is freed up to process, interpret, and ultimately store new schemas into LTM. By and large, when schemas are needed in WM, they are dealt with as a single piece of information, although they contain a rich array of data. Therefore, many educators

consider schema formation to be an important focus for instructional design.

The concept of schema acquisition has significant applicability to instructional design. Often, it is recommended that one assess students' current knowledge and activate relevant schemas prior to teaching new information. Analogies, metaphors, and comparisons can be useful in this regard. Schema acquisition is also facilitated by providing already completed, worked-out examples prior to asking students to work out entirely new problems all on their own. Consideration should also be given to the cultures from which students have come, in that culture provides a backdrop and context for their existing schemas. Thus, asking a student to learn new material in a highly individualized, competitive atmosphere might impede schema development for a student who comes from a culture that emphasizes cooperation, mutuality, and group membership.

Optimally, one wishes to develop schemas that have maximal flexibility and applicability to a wide range of situations and contexts. Therefore, it is often recommended that one attempt to facilitate the development of schemas that are not overly constricted to specific situations. Such flexible schemas may be acquired through exposure to similar knowledge that is applied to a range of contexts other than the one in which learning originally occurred.

The development of more flexible schemas also has relevance to the emotional responses of students. Thus, students' inflexible *self-schemas* (which have also been referred to as *early maladaptive schemas*) tend to be associated with stronger negative affect, which can readily interfere with learning. By using a schema-based approach to students' dysfunctional schemas and subsequent behaviors, the school counselor can create an atmosphere based on a nonpathological model and focus on the ways in which a student has learned inflexible, intensely emotional responses to certain types of situations. Inflexible schemas can be examined and moderate, flexible schemas developed to take their place. Such moderate, flexible schemas are likely to be associated with less intense emotions and improved learning.

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See also

- Cognitive Behavior Modification
- Cognitive View of Learning
- Culture
- Long-Term Memory
- Working Memory

Further Readings

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