Three Major Streams of Psychology Related to Learning

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In the previous article, we outlined the process of Digital Transformation (DX), which consists of three stages: efficiency improvement, new value creation, and continuous transformation. We then considered how these three stages could be applied to the field of education to explore the potential of utilizing digital technologies. Achieving transformation through digital technology requires more than simply introducing new tools; it is essential to examine and design how these technologies are applied in alignment with the fundamental goals of the task at hand. This applies equally to DX in education, where it is necessary to explore how digital technologies should be utilized and to design or redesign educational and training programs in order to enhance the effectiveness and appeal of learning.
From this point on, we will introduce psychological theories of learning and instructional design, which form the foundation for such considerations. In this installment, we will explain the three major psychological perspectives on learning: Behaviorism, Cognitivism, and Constructivism(1).

Behaviorism
Behaviorism is characterized by its shift away from introspective, psychoanalytic methods—which emphasize observing one's own consciousness—and toward building psychological theory based on externally observable behavior (2). From the behaviorist perspective, learning is defined as a change in behavior. One well-known theory within behaviorism is operant conditioning(3), which suggests that when a person engages in voluntary behavior, that behavior can be encouraged or discouraged through the use of rewards or punishments. For example, if a child studies on their own initiative and is praised for it (i.e., given a reward), the behavior of "studying" is reinforced. Conversely, if someone makes a mistake and is reprimanded (i.e., given a punishment), the frequency of that mistake may decrease. While this may sound like a simplistic “carrot and stick” approach, consider this: if your subordinate voluntarily reports or consults with you, and you respond promptly and attentively, it is likely that they will continue to engage in such proactive

behavior. This illustrates the practical logic behind the theory. Based on this idea, a set of instructional principles has been proposed to enhance learning effectiveness, such as the principle of immediate confirmation—providing learners with immediate feedback—and the principle of small steps, which involves breaking down learning into fine-grained steps to gradually build competence. These are part of what is known as the Five Principles of Programmed Learning(4). Although behaviorism gained prominence in the 1940s, it continues to be applied and refined in a wide range of fields today—not only in school education but also in sports, skill training, behavioral therapy, and rehabilitation.

Cognitivism

Whereas behaviorism focused on externally observable behavior, cognitivism sought to model the internal mental processes of the human mind(5). This perspective was influenced by the rise of computer science in the 1950s, particularly during the first wave of artificial intelligence research. Drawing analogies with computers, cognitive theorists proposed a model of the mind comprising a memory system for storing data and knowledge, and an information-processing system for manipulating it (for a more detailed explanation, see reference(5)).

For example, when solving a problem, a person might recall similar past experiences, analyze the underlying causes, devise possible solutions, and assess whether the problem is truly resolved. All of these mental processes can be understood as the interaction between memory and information processing.

Cognitivism defines learning as the expansion, refinement, and transformation of knowledge. A foundational concept in this view is the schema(6)(7). Humans are believed to have mental frameworks in which various concepts and pieces of knowledge are interrelated, and through which they interpret the world. These frameworks are referred to as schemas. Consider the sentence: "The sunlight is softening, the water in the stream is warming, and the trees are turning a vivid green." If someone asks, "What season is it?" "What color is the sky?" or "What is in the trees?"—even though these details are not explicitly mentioned in the text—you likely have answers in mind. This is how a schema functions in the human mind. While schemas are not as precise or universally valid as scientific laws, they are more general than isolated facts. Examples include hierarchical relations ("cars have steering wheels"), sequential relations ("dessert follows the main course"), and causal relations ("an egg breaks when dropped").

Schemas develop and expand through life experience and learning. For instance, consider the sentence: "The sunlight is softening, the water in the stream is warming, and the trees are turning a vivid green. A narcissus flycatcher was singing in the trees," and is then asked, "What is a narcissus flycatcher?", even someone unfamiliar with the term might guess, "It's probably a small bird." Upon confirming this through a web search, the information "a narcissus flycatcher is a type of small bird like a bush warbler or skylark" would be added to the person's schema. In this way, learning occurs by linking new knowledge to existing schemas. Learning is not a matter of writing information onto a blank slate, but rather of discovering how new knowledge fits meaningfully with prior knowledge. One might even say that we learn not because we lack knowledge, but because we already possess knowledge.

At the same time, existing schemas can sometimes interfere with the learning of new knowledge. For example, in high school physics, students learn the equation $F = ma$, where F is force, m is mass, and a is acceleration. According to this formula, if an object is accelerating, then a force is acting on it; if acceleration is zero, as in cases of rest or uniform motion, no net force is present. In curling, for example, the stone is pushed with force, but once released, if friction is negligible, it continues sliding at a constant speed without any force acting upon it. However, it is well known that not only children but even high school and university students who have studied physics often retain a schema in which they believe that a force continues to act in the direction of motion for an object moving at constant velocity[6]. Such schemas that contradict scientific theories are referred to as naïve theories or misconceptions[6][9]. This can be attributed to the fact that scientific theories often run counter to our intuitive understanding of how the world works, making them difficult to grasp. In fact, before Newton established in the 17th century the concept that force is proportional to acceleration, the dominant belief was that a moving object must have a force acting on it. The process of correcting such misconceptions is called conceptual change. Studies have also compared how learners undergo conceptual change with how conceptual shifts occur within the development of scientific theories[9].

To promote effective learning, it is essential to pay attention to the learner's existing schemas. When new information aligns with prior schemas and experiences, activating and linking that knowledge can enhance learning. On the other hand, if learners are likely to hold misconceptions, they may need to experience situations that challenge those beliefs or receive logical and carefully structured explanations based on what they already know. In either case, the focus should not be on imposing new knowledge, but on helping learners relate it meaningfully to what they already understand.

Another important idea in cognitivism is metacognition[6][8][9]—the ability to

monitor and regulate one's own cognitive processes, such as thinking and learning. For instance, when solving a problem, thinking "This approach might work" or "This isn't going well, I should try a different method" are examples of metacognition. In our earlier example about the seasonal changes and the bird, thinking "What is a narcissus flycatcher? I've never heard of it," reflects metacognitive monitoring, and deciding "I'll look it up online since I don't know" reflects metacognitive control.
Metacognition helps learners become aware of their own understanding, guiding them to seek missing knowledge on their own or improve their approach to problem-solving. It can also enhance motivation—for example, when one recognizes a problem as familiar or recalls a previously successful strategy. In this way, metacognition supports autonomous learning and contributes to improving the quality of learning.

Constructivism

Constructivism is the view that gaining knowledge involves actively constructing meaning within oneself[1]. Unlike behaviorism and cognitivism—which consider learning as the acquisition of objectively measurable knowledge—constructivism sees learning as a subjective process in which individuals build their own unique understanding. From this perspective, constructivism emphasizes learning through autonomous experiences and activities in realistic contexts. It also values collaborative learning based on the idea that learning occurs in social interaction with others. Many of us have likely experienced that by listening to different perspectives, or by explaining our own understanding to others, our ideas become clearer and more organized.
One influential constructivist view is the concept of legitimate peripheral participation[10], which describes learning as increasing participation in a community of practice. Beginners are formally accepted into the community, but because they lack experience or expertise, they initially participate peripherally in apprentice-like roles. Over time, by observing and imitating experts, they gradually take on more central and responsible tasks. This kind of learning occurs naturally in everyday settings like workplaces or school club activities. Recently, approaches such as Project-Based Learning (PBL)[9] in universities and inquiry-based learning in primary and secondary education have introduced constructivist principles into formal schooling. These approaches encourage active, dialogic, and deep learning[11] through collaborative, real-world problem-solving and student-driven engagement.
However, even if we accept that learning involves constructing meaning internally,

this does not imply a rejection of structured education and training in schools or workplaces[1][8]. A naïve interpretation of constructivism might lead to the misconception that “teachers should not teach new knowledge, but only allow learners to construct it on their own.” In reality, even if learners are constructing their own knowledge, it remains critically important to consider how educational environments can support this process.

So far, we have discussed three major psychological perspectives on learning: Behaviorism, Cognitivism, and Constructivism. In the next installment, we will explore how these psychological frameworks can inform the design of effective learning strategies through the lens of instructional design.

References

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