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Retrieval Practice as Process in Self-Directed Learning: New Philosophical Directions for Self-Directed Learning

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Abstract: *We explain retrieval practice and its potential benefits for adult self-directed learners. Moreover, we argue functional contextualism as an alternative research philosophy to self-directed learning's humanist assumptions.*

Keywords: functional contextualism, adult learning strategies, SDL, learning sciences

Self-directed learning (SDL) is a core area of interest for adult learning researchers. But while many SDL researchers focus on readiness to learn and descriptions of learners' self-directed experiences, few study effective strategies for SDL. We argue SDL's humanist foundation has narrowed the scope of its research, resulting in dwindling interest outside the field and a belief among some within the field that research has been exhausted on the topic. Here, we argue for reinvigorating SDL research by broadening its philosophical assumptions, encouraging interdisciplinary communication, and using diverse methods. We suggest examining SDL learning strategies as a start. Borrowing from cognitive psychology and the learning sciences, we examine retrieval practice as one such strategy for self-directed learners.

Retrieval practice is “the act of calling information to mind rather than rereading it or hearing it” (Roediger & Butler, 2011, p. 20). It is often referred to as “the testing effect.” Although a cognitive phenomenon, retrieval practice shares some similarities with motor learning. For example, a person repeatedly recalling French words will increase proficiency in vocabulary similarly to the way a person repeatedly practicing finger exercises on the piano will increase finger dexterity. While a person can still learn by repeated exposure—such as re-reading a French textbook—repeatedly recalling the French words and syntax leads to even greater learning. Retrieval practice has proven effective across numerous studies (Brown, Roediger, & McDaniel, 2014), especially when paired with strategies such as feedback, interleaving, and spacing across testing. Gates (1917) is credited as conducting the first large scale study into the phenomenon, but it has experienced a revival of interest since the mid-2000s (Roediger & Karpicke, 2006). For a self-directed learner, retrieval practice holds promise as an effective learning strategy because it can be conducted without the presence or guidance of an educator. As such, it has considerable potential for application and research in adult education.

The philosophical basis of retrieval practice, cognitivism, considers mentalistic phenomena the principal unit of analysis and the distal cause of behavior. This position diverges from the common philosophical basis of SDL in adult education, humanism, which sees the learner as the unit of analysis and the learner's “will” as the distal cause of behavior. As a result, SDL researchers working from humanistic assumptions but seeking research from other disciplines face a dilemma. They can ignore philosophical assumptions—although a philosophical basis is implied by the research itself—or adopt a different philosophical basis for their research. SDL researchers with strong humanist leanings, however, will likely buck the mentalistic and reductionist worldview of cognitivism. Unsurprisingly, few have adopted cognitive assumptions (e.g. Garrison, 1997), although some argue reconciliation is possible through cognitivism's self-regulated learning concept (Pilling-Cormick & Garrison, 2013).

We suggest functional contextualism as a way toward rapprochement. While functional contextualism is a behavior-analytic philosophy, it takes a pragmatic perspective on science and, like humanism, recognizes that a person must be studied holistically as an agent learning within a context. But like cognitivism it identifies causal factors for behavior beyond a person's "will." We see functional contextualism as a means for expanding self-directed learning research into the realm of scientific, generalizable studies on adult learning.

In the sections that follow, we explore SDL's humanistic roots, the development of retrieval practice and its applicability to adult learning. We conclude by discussing how the two can be reconciled using functional contextualism as a philosophical basis

Rogers, Knowles, and Humanism in SDL

Among SDL scholars, Tough and Houle are considered pioneers in SDL research (Brockett & Donaghy, 2005); but in the broader field SDL's philosophical and theoretical roots are commonly attributed to Knowles. Merriam (2001) has described Knowles's andragogy and its closely related phenomenon SDL as pillars of adult learning theory. An analysis of Knowles's work, though, shows that his ideas were largely applications of the humanist assumptions of Carl Rogers.

Rogers created a humanist philosophy of psychology that emphasized human dignity, experience as knowledge, and an intrinsic motivation to become a "fully-functioning person". He saw a fully functioning person as one who is open to new experiences, lives in the present, and has confidence in one's experiences as lived truth. To reach this goal in education, Rogers claimed that learning requires authenticity and openness between learners and facilitators, an introspective evaluation of values, and freedom to pursue goals without external motivators (Rogers, 1959).

In *Freedom to Learn*, Rogers (1969) applied humanistic psychology to classroom education. He believed learners could not be taught but must instead learn through experience. In order to become fully functioning, they must engage in self-inquiry. He summarized his philosophy of learning as follows:

Such self-discovered learning, truth that has been personally appropriated and assimilated in experience, cannot be directly communicated to another [emphasis in original]. As soon as an individual tries to communicate such experience directly, often with a quite natural enthusiasm, it becomes teaching, and its results are inconsequential. (p. 153).

For Rogers, then, learning lies within one's own experiences and must be discovered independently. This notion of experience as truth underlies much of the writings within the field on SDL, particularly those of Knowles.

Knowles (1970) saw SDL as a central tenet of andragogy. He saw learning as an internal process where adults identify their own learning needs, establish their own goals, and engage in self-inquiry. Like Rogers, an experiential thread wove through his writing. Knowles claimed "[the] central dynamic of the learning process is thus perceived to be the experience of the learner, experience being defined as the interactions between an individual and his environment" (p. 68). In *Self-directed Learning*, Knowles (1975) discussed experience as the essence of adult learning, something that cannot be taught. While not excluding educators from the learning process, he considered them more as guides and facilitators—resources to be used by the learner in his or her inquiry. For example, when facilitating self-directed learning in a classroom,

educators should build a climate of trust through authentic communication built on respecting and valuing the dignity of learners within the group.

These humanist ideals continue to permeate thought and research in SDL, including the works of such popular modern SDL theorists as Hiemstra, Brockett, and Grow. While Guglielmino (1977) and Oddi (1986) introduced a cognitive element to SDL by measuring related personality traits, their research on these instruments still tends to follow a humanist paradigm as they seek to holistically describe self-directed learners, focusing on attributes of “will” as an explanation of self-directed learning behavior.

Retrieval Practice

Since the early 19th century, studies have illustrated retrieval practice’s effectiveness, but it has been slow to catch on in adult education—despite clear applications to learner-led practices such as SDL. Retrieval practice is deceptively simple, yet may be difficult for novice learners. Unlike such traditional strategies as re-reading, notetaking, and highlighting—which often feel effective, but aren’t—the act of repeatedly recalling information is less intuitive and more demanding, resulting in learners feeling unsure about its effectiveness (Karpicke & Grimaldi, 2012).

The philosophical and theoretical basis for retrieval practice derives from cognitivism and is grounded in memory research. Since Ebbinghaus (1913) memory studies have been a part of the learning sciences, but they began to proliferate during the 1960s and 1970s with the rise of the cognitivist paradigm. Researchers envisioned memory as a component of an information processing system. Tulving (1972, 1985) proposed two memory systems: semantic memory and episodic memory. With semantic memory information is encoded by pairing it to a related memory and retrieved by an associative cue, while episodic memory proposes there is a temporal component. Episodes of memory throughout time are encoded, connected, and retrieved by contextual cues. Autobiographical memory, such as recalling a fond family vacation, is an example of episodic memory. Two prominent theories of retrieval practice in cognitive psychology have developed based on these two memory systems. A semantic theory states retrieval practice works by the mediation of semantic cues (Carpenter, 2011; Pyc & Rawson, 2010), whereas an episodic theory states that retrieval practice works through memory cues of contextual factors in episodic memory (Karpicke, Lehman, & Aue, 2014; Lehman, Smith, & Karpicke, 2014).

Recent research in retrieval practice has found that it is more effective than traditional methods of learning. In a meta-analysis of retrieval practice, Adesope, Trevisan, and Sundararajan (2017) found repeated testing had a medium effect size (Hedge’s $g = .51$) compared to restudying on final test performance. Retrieval practice also has been found to be more effective when combined with other learning strategies such as test spacing, interleaving of similar content, and feedback (Karpicke & Roediger, 2007, 2008; Pereira, Taylor, & Jones, 2009; Roediger & Butler, 2011). While initially retrieval practice may seem suited to rote learning, multiple studies suggest it also aids transfer of learning (Butler, 2010; Butler, Black-Maier, Raley, & Marsh, 2017; Carpenter, 2012; van Eersel, Verkoeijen, Povilenaite, & Rikers, 2016) and learning higher order skills (e.g., applying, analyzing, evaluating, and creating) (Agarwal, 2019).

Potential areas of application for self-directed learners are in workforce and professional development (e.g., IT professionals who take certification exams). Many professions require state or national board exams, and workforce development efforts often encourage adults to take

the GED exam or basic skills examinations. These are prime research and application areas for retrieval practice. Before SDL and retrieval practice are applied to these areas, though, researchers must consider alternative assumptions and methods of study to connect the disparate phenomena. We suggest functional contextualism as a suitable foundation, combining the holistic, contextual features of humanism along with the scientific aims of cognitivism.

Functional Contextualism

Functional contextualism (FC) is a philosophy of science emphasizing the contextual nature of actions. Like humanism, FC adopts a molar or holistic view of the person, seeing her or him as an indivisible agent with idiosyncratic experiences to draw on in learning. But unlike humanism, FC rejects the idea that the learner's "will" is the cause of her or his past, current, and future learning. Instead, it sees the learner as a part of a causal chain. But whereas other scientifically minded philosophies like cognitivism begin this chain with the mentalistic constructs of the mind, FC focuses on the current and historical context, specifically the antecedents and consequences that give rise to an act-in-context. The *act-in-context*, then, is the principal unit of analysis and its causes the subject of inquiry.

Adopting a pragmatic epistemology, FC views the scientific method as useful for creating knowledge that allows us to predict and influence the act-in-context, not to reveal objective truths about the world. In doing so, it adopts a pragmatic truth criterion (i.e., what is true is what works toward attaining a particular analytic aim) and remains ontologically agnostic. Its researchers are not concerned with debates over realism or anti-realism, as it serves no practical utility to the study of behavior (Hayes, Barnes-Holmes, & Wilson, 2012). Similarly, it embraces a plurality of methods, as long as they further its analytic aims: prediction and influence.

Functional contextualist researchers can impact the study of SDL in numerous ways. Although only a few in adult learning have published under its assumptions (see Roessger, 2017; Roessger, Daley, & Hafez, 2018), there is potential to progress a new research agenda. Researchers can focus on SDL as a series of acts-in context, and identify the contextual factors that give rise to them. In doing so it can consider contextual variables, focus on outcomes rather than mentalistic explanations, and use the scientific method without positivist assumptions. This has the potential to further evidence-informed practices (e.g., retrieval practice) that aid in the prediction and influence of SDL rather than simply the description and understanding of it.

Conclusion

While most SDL research is based on a humanist foundation, ideas from other disciplines can be integrated into SDL research by adopting different philosophical assumptions. We advocate functional contextualism as an ideal philosophy of science to progress research in SDL and other areas of adult learning. We specifically examined retrieval practice, a learning strategy studied extensively in cognitive psychology, as part of the learning process for self-directed learners. Not only does this provide a new research direction, but practitioners and lifelong learners can use retrieval practice to further learning.

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