

Five Foundational Ideas on Learning

- Learning is an active process of engaging and manipulating objects, experiences, and conversations to construct mental models of the world (1-3). Learners build knowledge as they explore the world around them, observe and interact with phenomena, converse and engage with others, struggle to articulate explanations, and make connections between new ideas and prior understandings.
- Learning builds on prior knowledge, and involves enriching, connecting, and changing existing mental models, where “one’s knowledge base is a scaffold that supports the construction of all future learning” (4). Neural connections are made and strengthened, as well as weakened and disassociated, as memories are retrieved, encoded, and consolidated (5).
- Learning that is authentic to the learner leads to deeper understanding. Situating in authentic context makes the experience meaningful to the learner, and invites them to engage with specific concepts on a need-to-know or want-to-know basis (6, 7). Enacting authentic interactions with and between learners cultivates trust and appeals to emotions and attitudes towards learning (8).
- Learning is a social activity involving people, the things they use, the words they speak, the cultural context they’re in, and the actions they take (9, 10); knowledge is built by members in the activity (11). Learning occurs in complex social environments, which in turn, shape how our brain organizes the information and responds to future experiences (12, 13).
- Learning complex ideas deeply involves considerable mental effort and persistence, which requires sustaining learners’ motivation and engagement. It is necessary for learners to be engaged in and committed to the experience, task, or activity (14). Motivation and engagement are multi-faceted and malleable, and affected by interactions between people and the context.

References

1. J. Dewey, *Experience and education*. (Touchstone, New York, 1938).
2. J. Piaget, Cognitive development in children: Piaget development and learning, Part 1. *JRST* **2**, 176-186 (1964).
3. L. Vygotsky, *Thought and language*. (Harvard University Press, Cambridge, MA, 1986).
4. P. A. Alexander, The past, the present and future of knowledge research: A reexamination of the role of knowledge in learning and instruction. *Educational Psychologist* **31**, 89-92 (1996).
5. D. A. Sousa, *How the brain learns*. (Corwin Press, 2016).
6. J. G. Greeno, in *The Cambridge Handbook of the Learning Sciences*, R. K. Sawyer, Ed. (Cambridge University Press, New York, NY, 2006), pp. 79-96.

(continues)

Five Foundational Ideas on Learning (continued)

.....

7. J. L. Kolodner, in *The Cambridge Handbook of the Learning Sciences*, R. K. Sawyer, Ed. (Cambridge University Press, New York, NY, 2006), pp. 225-242.
8. L. Cozolino, *The social neuroscience of education: Optimizing attachment and learning in the classroom*. (W.W. Norton & Company, Inc., New York, NY, 2013).
9. J. D. Bransford et al., in *Handbook of Educational Psychology*, P. A. Alexander, P. Winne, Eds. (Erlbaum, Mahwah, NJ, 2006).
10. B. Rogoff, in *Cognition, perception and language: Handbook of child psychology*, D. Kuhn, R. S. Siegler, Eds. (John Wiley & Sons, New York, 1998), vol. 2.
11. M. Scardamalia, C. Bereiter, in *The Cambridge Handbook of the Learning Sciences*, R. K. Sawyer, Ed. (Cambridge University Press, Cambridge, UK, 2006), chap. 7, pp. 97-118.
12. D. C. Park, C.-M. Huang, Culture wires the brain: A cognitive neuroscience perspective. *Perspectives on Psychological Science* **5**, 391-400 (2010).
13. M. D. Lieberman, *Social: Why our brains are wired to connect*. (Broadway Books, New York, NY, 2013).
14. J. A. Fredricks, P. C. Blumenfeld, A. H. Paris, School engagement: Potential of the concept, state of the evidence. *Review of Educational Research* **74**, 59-109 (2004).