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## How People Learn II: Learners, Contexts, and Cultures

Research that illuminates the processes by which people learn is continually advancing and offers the potential to improve teaching and learning in classrooms and beyond. A report from the National Academies of Sciences, Engineering, and Medicine, *How People Learn II: Learners, Contexts, and Cultures*, (2018) surveys research on learning from the past 15 years and identifies key advances in knowledge, including insights about the influence of culture in shaping how people learn, the dynamic nature of learning across the life span, and the importance of motivation in learning.

The report builds upon a 2000 National Research Council report, *How People Learn: Mind, Brain, Experience, and School*, which summarized research on learning from the 1980s and 1990s. This groundbreaking report was widely used by teacher educators and other postsecondary faculty in courses related to learning, and it has guided the practice of countless educators.

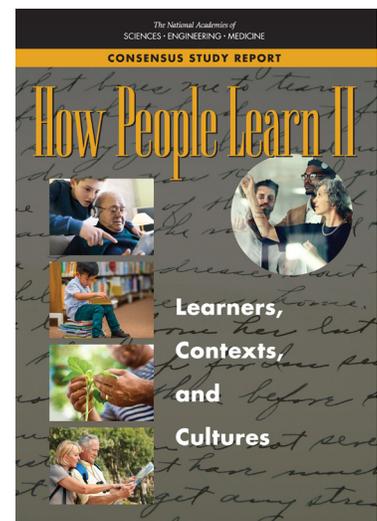
*How People Learn II* reviews and synthesizes advances in knowledge since the publication of the first volume, expanding its scope to include learning across the life span, educational technology, and other topics. The new report also discusses the implications of research for supporting learners of all ages and recommends areas for future research that can continue to advance the field.

### KEY INSIGHTS FROM RESEARCH

To develop *How People Learn II*, a committee of cognitive scientists, education researchers, psychologists, sociologists, and teacher educators examined research that spanned numerous disciplines, including laboratory-based neuropsychology and cognitive science, work from cultural and social psychology, classroom-based education research, and qualitative studies of adult learning and the workplace. The committee also held multiple public meetings to hear from experts in these and other areas, and then deliberated to identify key findings and advances.

The committee's report highlights several main themes and insights, including:

**Culture plays an important and complex role in shaping how people learn.** While humans share basic brain structures and processes, as well as fundamental experiences such as relationships with family,



age-related stages, and many more, each of these phenomena is shaped by an individual's experiences. Cultural influences shape individuals from the beginning of life. Research and theory from diverse fields have contributed to an evolving understanding that all learners grow and learn in culturally defined ways in culturally defined contexts.

For example, research has found that cultures vary in their expectations about whether a child should learn by observing or by being given individualized verbal instructions, and in whether instructional practices promote individual or collaborative learning. Studies have also explored how ideas of what is desirable to learn may vary across cultures; one study that compared parental expectations in the United States and Vanuatu, for instance, suggested that whereas U.S. parents tend to consider deviation from a model as showing creativity, parents in Vanuatu tend to equate precise imitation with intelligence.

**Learning is a dynamic process that continues across the life span.** Before birth and throughout life, learners adapt to experiences and their environment. Factors that are relevant to learning include influences from the microscopic level—for example, lead levels in the learner's blood—up to the macro level, such as characteristics in the learner's neighborhood, society, and culture. An individual's brain develops and is shaped by the set of experiences and influences unique to her, a process that occurs through the pruning of synapses and other neurological developments that take place through adolescence. The brain continues to adapt as the learner ages, through the continuous shaping and reshaping of neural connections in response to stimuli and demands. The individual learner continually integrates many types of learning, both deliberately and unconsciously, in response to the challenges and circumstances he encounters.

Learning changes the brain throughout the life span; at the same time, the brain develops throughout the life span in ways that influence learning. For example, both reasoning and the accumulation of knowledge increase up to early adulthood, when their paths begin to diverge. One's abilities to quickly generate, transform, and manipulate factual information begin to decline, while knowledge levels remain stable or increase. The brain adapts throughout life, recruiting and orchestrating its resources to compensate for declines and adapt to circumstances. Research identifies particular behaviors—including engagement with work (especially complex work that involves both intellectual and social demands), social engagement, physical exercise, and adequate sleep—that are all associated with lifelong learning and healthy aging.

**Mental models are key to developing knowledge.** Learners identify and establish relationships among pieces of information and develop increasingly complex structures for using and categorizing what they have learned. Accumulating bodies of knowledge and the capacity to reason about them are key cognitive assets throughout the life span.

Promising strategies for promoting learning help learners to develop the mental models they need to retain knowledge so that they can use it adaptively and flexibly in making inferences and solving new problems. Examples of effective strategies include encouraging students to summarize and explain the material they are learning, as well as encouraging learners to enrich their mental representation of information by calling it up and applying it in various contexts.

While drawing upon prior knowledge can yield many benefits for learners, recent research also highlights a pitfall: Prior knowledge can lead to bias by causing people to not pay attention to new information and to rely on existing schema to solve new problems, even when the new problems have relevant differences from previous ones. These biases can be overcome but only through conscious effort.

**Motivation is essential to learning.** To learn, people must want to learn and must see the value in accomplishing what is being asked of them. Numerous factors and circumstances influence an individual's desire to learn and the decision to expend effort on learning. Engagement and intrinsic motivation develop and change over time; they are not properties of the individual or the environment alone, and they are strongly influenced by cultural and developmental processes. Motivation to learn is fostered for learners of all ages when they perceive the school or learning environment is a place where they "belong" and when the environment promotes their sense of agency and purpose.

Educators can support learners' motivation by attending to their engagement, persistence, and performance by:

- helping them to set desired learning goals, as well as goals for performance that are appropriately challenging;

- creating learning experiences that learners value;
- supporting learners' sense of control and autonomy;
- developing learners' sense of competency by helping them to recognize, monitor, and strategize about their learning progress; and
- creating an emotionally supportive and nonthreatening learning environment where learners feel safe and valued.

## IMPLICATIONS FOR CLASSROOMS

The report focuses on learning that occurs throughout life and beyond formal educational settings, but it has profound implications for school:

- Understanding the cultural nature of learning and development means that what takes place in every classroom—including the influence of educators and all students' experience of school—cannot be fully understood without attention to cultural influences.
- Part of what is accomplished when educators attend to the influences of culture on the classroom environment and the perspectives students bring to their learning is that learners are better supported in taking charge of their own learning. Many strategies for fostering learning support the learner in actively making progress for himself.
- There is a growing body of research that examines learning in academic content areas that can provide guidance to educators.
- Assessing learning is a central part of education in school and can be informed by understanding how learning occurs.

## LEARNING TECHNOLOGY

The committee also examined research on the use of technologies in helping students learn. Whether technology is effective in helping people learn depends on a range of factors, including the characteristics of the learner, the type of learning being targeted, and the sociocultural context. Effective use of technologies in formal education and training requires careful planning for implementation that addresses factors known to affect learning: the alignment of the technology with learning goals, the provision of professional development and other supports for instructors and learners, and equitable access to the technology. Ongoing assessment of student learning and evaluation of implementation are critical to ensuring that a particular area of technology is optimal and to identifying needed improvements.

## PRIORITIES FOR FUTURE RESEARCH

The report identifies specific research objectives in two main areas in order to guide researchers and funders and spur work that integrates levels of analysis, methods, and theoretical frameworks across the diverse disciplines that make contributions to the study of how people learn.

One area for research should explore how to meet the needs of all learners by connecting research on internal mechanisms of learning with the shaping forces of contextual variation, including culture, social context, instruction, and time of life. Specifically, it is now possible to move beyond the idea of an "average" learner to embrace and explain variation among individuals. It will be valuable to have more interdisciplinary research that examines how individual variation and developmental and contextual factors, including social, emotional, environmental, institutional, and experiential factors, influence the lifelong learning process and learning outcomes.

A second area for research should examine the implications of the science of learning for the design of technology to support learning across the life span; the complex interactions between characteristics of the learner, the content to be learned, and the learning environment; how technology may be influencing the nature of what people need to learn and the psychology of learners; and potential drawbacks. Among the topics on which further research is needed are whether a technology is well suited to the ecological learning niche in which it may be used, the effects of engagement in self-selected online activities on academic learning, and ways to improve the suite of learning technologies available.

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**For More Information . . .** This Consensus Study Report Highlights was prepared by the Board on Behavioral, Cognitive, and Sensory Sciences based on the Consensus Study Report *How People Learn II: Learners, Contexts, and Cultures* (2018). The study was sponsored by the Alfred P. Sloan Foundation; the American Educational Research Association; the Bill & Melinda Gates Foundation; the Institute of Education Sciences of the U.S. Department of Education; the Teagle Foundation; the William and Flora Hewlett Foundation; with additional support from the National Academy of Sciences W.K. Kellogg Fund and the National Academies of Sciences, Engineering, and Medicine Presidents’ Circle Fund. Support for the work of the Board on Behavioral, Cognitive, and Sensory Sciences is provided primarily by a grant from the National Science Foundation. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of any organization or agency that provided support for the project. Copies of the Consensus Study Report are available from the National Academies Press, (800) 624-6242; <http://www.nas.edu/HowPeopleLearn2>.

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