The science of adult learning:
Understanding the whole learner

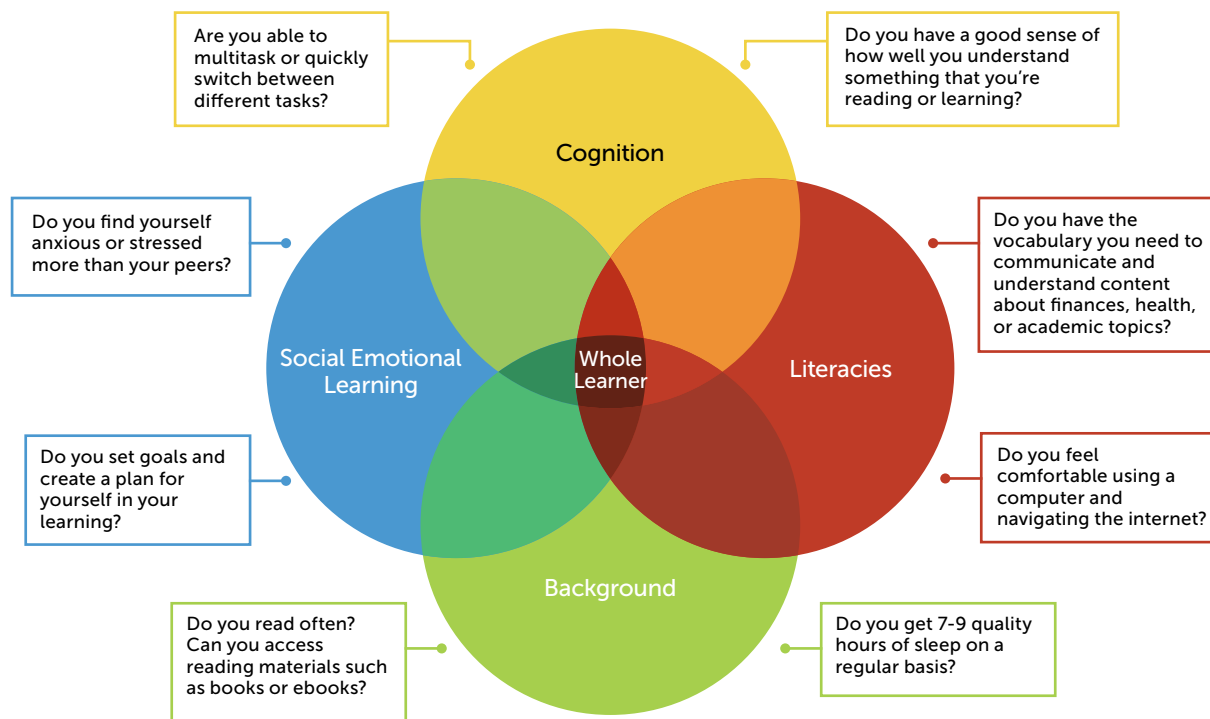Medha Tare, Ph.D., Sarah Cacicio, & Alison R. Shell, Ph.D.

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How well do you focus when reading new information? How much sleep do you get on a daily basis? Would you say you have a supportive community? In what ways has your age, gender, or racial identity impacted your education or job opportunities? These are just some of the many factors that research shows can affect how adults learn and adapt in different environments. That is, people are complex and so are their experiences.

Continuous learning is part of our everyday lives, including at work, and requires agility to keep up with the current and changing demands of the marketplace. With technology predicted to replace 25 percent of U.S. jobs, especially those that require routine tasks in office administration, transportation, and food preparation,[1] people are exploring education and training opportunities like never before. They need to develop and demonstrate new foundational skills that employers increasingly demand, such as critical thinking, communication, and analytical skills.[2] Today's workers hold an average of 12 jobs between ages 18 and 52, with nearly half of those jobs held before the age of 25.[3] While learning takes place throughout these transitions in both formal and informal settings, the experience of learning is different for each person. The global COVID-19 pandemic has only accelerated changes in the way we work, learn, and interact with one other.

Building a sustainable career now requires flexibility and self-directed lifelong learning.[4] But what is lifelong learning? How do individuals learn to adapt, acquire new skills, and interpret information to achieve their personal and professional goals? Research is clear that learner variability exists and plays a strong role in learning for adults. We have found that adult learners, much like their younger counterparts, vary greatly in terms of their cognitive abilities, social and emotional considerations, and unique background situations. When taken together, along with content-specific factors, education and training programs can better target what each learner requires to best meet their potential.

Digital Promise set out to examine the factors that underlie adult literacies and lifelong learning—and how they intertwine. Building on PreK-12 models from the Learner Variability Project (LVP), we created the Adult Learner Model to synthesize learning sciences research for adult learners with essential skills in mind.[5] The framework is organized into four key categories—literacies, cognition, social-emotional, and learner background—and reveals how these categories interact to create a complex but meaningful picture of the whole learner (see Figure 1). We explain factors such as digital literacy, working memory, motivation, and adverse experiences, and we source instructional and product design strategies that span active learning, collaboration, multisensory, and metacognitive supports to promote the development of high-quality, personalized learning experiences.

Are you able to multitask or quickly switch between different tasks?

Do you have a good sense of how well you understand something that you're reading or learning?

Do you find yourself anxious or stressed more than your peers?

Do you have the vocabulary you need to communicate and understand content about finances, health, or academic topics?

Cognition

Social Emotional Learning

Whole Learner

Literacies

Do you set goals and create a plan for yourself in your learning?

Do you feel comfortable using a computer and navigating the internet?

Background

Do you read often? Can you access reading materials such as books or ebooks?

Do you get 7-9 quality hours of sleep on a regular basis?

Illuminating the factors that contribute to adult literacies and how they interconnect over the course of adulthood can deepen collective knowledge of how to support learning over a wide range of contexts. This work is vital as our nation grapples with building an inclusive economic recovery for those who have been most directly impacted by the health and economic crises caused by the pandemic, including people of color, immigrants, and workers with a high school diploma or less.[6] The Learner Variability Project's work provides insights into how people learn and strategies to help them achieve their goals at any stage in their life.

The goals of the Adult Learner Model on the Learner Variability Navigator are to:

1. Represent the whole learner in our factors and strategies

2. Provide nuance for how factors cross-connect given adults' complex personal and learning histories

3. Provide actionable strategies that support these factors across learning contexts: classrooms, online, and self-directed study

Understanding the context of adult learning

Adults are uniquely motivated to learn and develop skills at work and in life. They bring significant insights, experiences, and connections from prior learning to new learning opportunities. For example, research shows that some immigrant mothers are motivated to develop numeracy to support not only their own real world needs, but also their children's math learning in school.[7] It is critical to center adults' unique backgrounds, such as motivations, prior schooling experiences, and linguistic and cultural resources, at the foundation of our work to understand how they learn best. Research on adult learning exists across learners and learning contexts; however, this research has rarely been synthesized to show the complexity of lifelong learning.

The Adult Learner Model synthesizes this research by bringing together findings from cognitive psychology, sociology, basic and continuing education, higher education, adult literacy, workforce training, digital literacy, and English language acquisition. While we recognize that people are constantly learning new skills across content areas, our work focuses on the acquisition of foundational skills for individuals, including those who have experienced significant and prevailing opportunity gaps. We aim to understand adult learner variability within the broader context of systemic inequities in American society, such as unequal access to high quality K-12 education, income and wealth gaps, and digital inclusion.[8] This includes culling research related to an estimated 37 million adults who have not completed a high school credential,[9] including a significant number of English learners.[10] Our model also takes into account the estimated one-third of working adults who have limited to no digital skills, including workers of color who are disproportionately impacted by skill gaps due to longstanding inequities.[11]

It is critical to note that none of the factors, on their own, determine a person's outcome. Rather, our model aims to show how these factors interact with each other to influence a person's learning experience over their lifetime. Below we share some examples of how individual factors may positively or negatively impact adult learning and performance.

Factors that can positively influence learning in adults:

- Social supports: Adults are more likely to persist in their education when they have strong social supports.[12]

- Community resources: Local resources, such as libraries, play a critical role in building adults' digital literacy skills, which in turn allow them greater access to learning materials.[13]

- Motivation: Adults can develop digital literacy skills, particularly if they are motivated and see value in digital technology.[14]

- Social awareness and Emotion: Older adults can use social technology to reduce loneliness which impacts emotional and physical health.[15]

Factors that can negatively influence learning in adults:

- Adverse childhood experiences: Adults who experienced abuse as children are at greater risk for having working memory deficits.[16]

- Housing insecurity: Poor housing conditions, often due to poverty, are associated with poorer sleep quality in adults, which in turn impacts the ability to focus on learning.[17]

> *"Understanding the factors that impact adult language learners is instrumental in student success. These learners have a lifetime of learning and experience to build upon, advanced cognitive skills to take advantage of, and perhaps most importantly, complicated lives to balance outside of the classroom, all of which have a major impact on their learning both positively and negatively."*
>
> *— Todd Windisch, Assistant Professor,*
> *English as a Second Language, College of San Mateo*

- **Trauma:** English learners who are refugees may have experienced trauma in the process of their resettlement.[18]

Importantly, our understanding of these factors and how they influence each other within different contexts to benefit or impede performance is crucial to supporting adult learning more broadly. This knowledge is essential to designing instruction and technology-enabled learning products that meet the increasingly diverse needs of learners in adult basic and continuing education and training programs across the nation.

What have we learned about adult learner variability?

The Learner Variability Project (LVP) team works at the intersection of researchers, educators, and education technology (edtech) developers to design and develop a more rich and equitable education for each learner. We recognize that learning sciences research provides insights into how best to engage our full diversity of learners. Consequently, we translate this ever-growing research into easily accessible factors and strategies that can inform both product design and instructional practices. The research-based factors and strategies together comprise our interactive Learner Models on the Learner Variability Navigator. These models are free, open-source, and based on a holistic framework.

Adult learners span a large range of backgrounds, including their language, education, and personal experiences. Individual differences and needs continue to affect learners as they age. In fact, many changes occur over time in adults' skills, cognition, social-emotional states, and personal backgrounds that should be taken into account when designing their learning environments. Experts on adult learning reiterate the need to connect research from across these areas in an actionable format.

> *"What Digital Promise has done is groundbreaking work. Beginning to bring together researchers, practitioners, and policymakers, who often operate in silos, encourages us to be influenced by each other's knowledge base and to consider the adult learner in a holistic way, instead of seeing only fragments of the person's skills, abilities, and considerations."*
>
> *— Dr. Daphne Greenberg, LVP Advisor and Distinguished Professor, Georgia State University Adult Literacy Research Center*

In conducting our literature reviews of peer-reviewed articles and reports, we uncovered several themes and synergies across the different areas of research on fundamental questions of how people learn and practitioner-oriented strategies on how to best support adult learners. The goals for adult learning include being able to use the foundational skills of literacy, numeracy, problem solving, communication, and digital competence effectively across contexts. Understanding the learner factors and strategies that impact adult literacies and how they connect to each other can help organizations build tools and lessons that support all learners.

Importantly, the strategies in the model can support in-person and online instruction, synchronous and asynchronous models, and informal and formal learning contexts. Three major themes are discussed below with reference to some of the factors and strategies that are fully explained in the Adult Learner Model.

1. Adults need a variety of 21st century foundational skills to survive and thrive.

Digital literacy and oral communication skills are critical to pursuing opportunities in the workforce and everyday life. Digital literacy helps adults access and navigate digital resources in their personal and professional lives and can impact their career and job trajectories. Oral communication skills, including both speaking and listening comprehension, allow adults to communicate with a variety of people in academic, workplace, personal, and peer contexts. In both cases, collaborative learning strategies such as peer feedback can strengthen these skills as well as learners' content knowledge.

Problem solving skills encompass both critical thinking and creativity, which allow adults to evaluate evidence and generate novel solutions. These skills also require an understanding of how to interpret multimedia texts in new digital environments. Encouraging learners to use this new technology and create multimedia projects themselves builds confidence in these skills.

2. Adults must see the benefit of learning tasks to fully engage.

Adults are independent learners who may have complex reasons for setting and persisting at learning goals, including self-improvement, supporting their children financially and in school, or obtaining a better job. Due to many competing pressures, adults must continually adapt their goals over time. To maintain their motivation in learning, addressing authentic scenarios and purposes allows them to see how new information can be used in the real world.

Adults also bring many assets to their learning, including extensive background knowledge, but they may not recognize the value of that knowledge or have a strong self-concept as a learner. Incorporating learners' lived experiences and cultural practices into course materials and instruction can support building their learner mindset while also appreciating their everyday and academic prior knowledge.

3. Engaging in lifelong learning activities is interconnected with general well-being.

Having greater emotional, cognitive, and physical well-being can positively impact learning; in turn, engaging in learning can improve adults' life satisfaction and outcomes such as income and social capital. Strategies that reduce stress such as mindfulness and physical activity can also improve attention and reduce cognitive decline.

Adults can face barriers to learning that stem from their socioeconomic status, lack of social supports, or adverse experiences, including negative past experiences with schooling. Building self-advocacy and metacognitive skills allows learners to understand their own learning process and what they need to succeed.

These themes are fully developed in our comprehensive framework on the Learner Variability Navigator (see Figure 2).

Figure 2 Factors explained in the Adult Learner Model

FACTORS

Adult Literacies	Cognition	Social and Emotional Learning	Learner Background
Background Knowledge	Attention	Emotion	Adverse Experiences
Composition	Auditory Processing	Learner Mindset	Hearing
Digital Literacy	Cognitive Flexibility	Motivation	Literacy Environment
Disciplinary Literacy	Inhibition	Self regulation	Physical Well being
Foundational Reading Skills	Long term Memory	Social Awareness & Relationship Skills	Primary Language
Numeracy	Metacognition	Stereotype Threat	Safety
Oral Communication Skills	Reasoning		Sleep
Problem Solving	Short term Memory		Social Supports
	Speed of Processing		Socioeconomic Status
	Visual Processing		Vision
	Working Memory		

How can we use this model to support adult learner variability?

Today's adult learners need access to affordable, accessible, and high-quality learning opportunities that meet their individual needs. Community colleges are increasingly taking the lead to support learners through the expansion of adult and continuing education programs, including basic skills and high school equivalency, college skills preparation, English language instruction, and workforce training and credentialing. We know that understanding the whole learner is critical to designing curriculum, providing resources, and integrating research-based strategies that support learner variability. But how can we use the findings from this model to meet individual learner needs?

To explore the real world application of this work, we held focus groups with practitioners who specialize in adult education, workforce development, higher education, digital literacy, English language instruction, and edtech. We discussed some of the barriers that may impede adult learners' ability to persist in education or training, including limited time, economic resources, and reliable internet, often exacerbated by the health and economic crises. At the same time, we heard how some of the typical logistical barriers to retention and completion, like access to transportation or childcare, had become less burdensome as learners shifted to virtual classes during the pandemic. The expansion of virtual learning in adult education provides opportunities to connect with adult learners in new ways. The concept of knowing your students takes on an entirely new meaning when instruction takes place virtually at kitchen tables, next to children who may be able to set up an internet hotspot or support with online course navigation. Addressing challenges related to digital literacy, connectivity, and learner confidence to learn new tools were key themes throughout our conversations. But the need to understand each learner's goals, abilities, struggles, and experiences was ever present. These are the factors.

Our conversations with practitioners in our focus group brought these research-based factors and strategies in the Adult Learner Model to life. Notably, practitioners said that it was valuable to be able to access all of this information in one place, on one platform. Higher education institutions and professional development organizations discussed the use of the Adult Learner Model as a rich training resource for their practitioners and entry point for research in adult education and related fields. Above all, we collectively affirmed the need to create more inclusive learning communities with accessible academic, digital, and social supports.

> "The Adult Learner Model is an invaluable tool for helping us design the onboarding and mentoring support that learners need to successfully complete their soft skills training."
> — Rajinder Gill, CEO, Essential Skills Program

> "As instructors work to formalize how they deliver remote instruction, they are seeing the importance of prioritizing strategies over tools. Building off of Digital Promise's timely work, we plan to link to the research-based instructional strategies presented in the LVN within a tech integration toolkit. This toolkit will support instructors in making connections between evidence-based technology routines and the research-based strategies used within them."
> — The EdTech Center @ World Education

Next steps

The work of the Learner Variability Project aims to increase awareness and understanding of all learners, children and adults, so they can reach their potential. Equity and learner success are key goals for the project. In collaboration with partners, we aspire to ensure that all learners are listened to, understood, and provided with high quality education, technology, tools, and services based on learning sciences research to support how they learn best. For adult learners, given all their complexities, it is important to illuminate the unique assets and challenges they bring to their learning tasks and expand the breadth of practitioners' strategies to support different learner needs.

This critical synthesis of research across adult learner populations and contexts comes in the form of a free interactive web tool that is user-friendly and offers actionable recommendations and resources to practitioners. We recognize that this work is iterative, collaborative, and ongoing, and will continue adding to the model as new research and resources emerge. We envision the Adult Learner Model as a conversation starter, a meeting place, and an opportunity for broader community engagement in the learning sciences. Above all, we will continue expanding our network of research partners, practitioners, and adult learners to advocate for learner variability and ensure that each adult learner is set up to thrive over their lifespan.

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