Monograph | Volume 2

Evidence-Based Practices: Optimizing Course Design & Instruction

INTERACT123

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"What you practice grows stronger"

- Shapiro, 2017

1 HOW THE BRAIN LEARNS: WHAT EDUCATORS NEED TO KNOW

The brain is a **complex and dynamic 3-pound organ**. According to Yale University's Colón-Ramos Lab, "The human brain consists of **100 billion neurons and over 100 trillion synaptic connections**. There are **more neurons in a single human brain than stars in the milky way**!" (2021, para. 1).

A neuron includes a **cell body, dendrites, and an axon** (see Figure 1). The cell body takes care of the neuron's basic cellular functioning. Dendrites are tree-like branches that receive signals from other neurons. The axon carries nerve impulses to other neurons. "Neurons communicate through synapses – contact points between the axon terminals on one side and dendrites or cell bodies on the other" (Queensland Brain Institute, 2019, para. 4). These nerve impulses are sent along the axon toward the axon terminals. Myelin sheath wraps around and insulates the axon, which speeds up impulse propagation (communication). Each neuron forms connections (synapses) with up to thousands of other neurons (nerve cells).

"**Memories are formed by neurons that fire in our brains, creating or changing networks of connections**" (Ikeda & Teasdale, 2019, para. 1). To form memories, The Harvard Gazette states that "the brain must **wire an experience into neurons** so that when these neurons are reactivated,

the initial experience can be recalled" (Jiang, 2020, para. 10). The brain changes based on experience and the environment. As shared by McTighe and Willis (2019):

> **Every class, assignment, and experience reshapes each student's brain through neuroplasticity**. Understanding how the brain processes information and changes in response to experiences provides keys to best strategies and interventions for guiding learners to sound understanding and durable, transferrable, long-term memory. (p. 20)

Deliberate practice through well-designed and substantive activities supports learning and the transfer of knowledge and skills across contexts. Dr. Shauna Shapiro, a clinical psychologist and professor of psychology, states "**What you practice grows stronger**." According to Dr. Norman Doidge, who is a psychiatrist, psychoanalyst, and researcher, "**You can sculpt your brain by the choices you make**" (Doidge, 2017). Hence, understanding neuroplasticity and how the brain learns is critical to instructional design and teaching.

Figure 1

Neuron

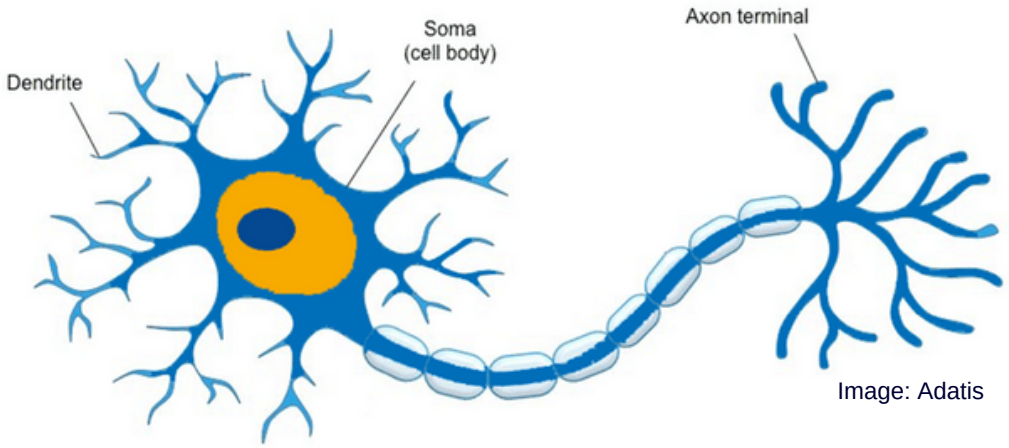
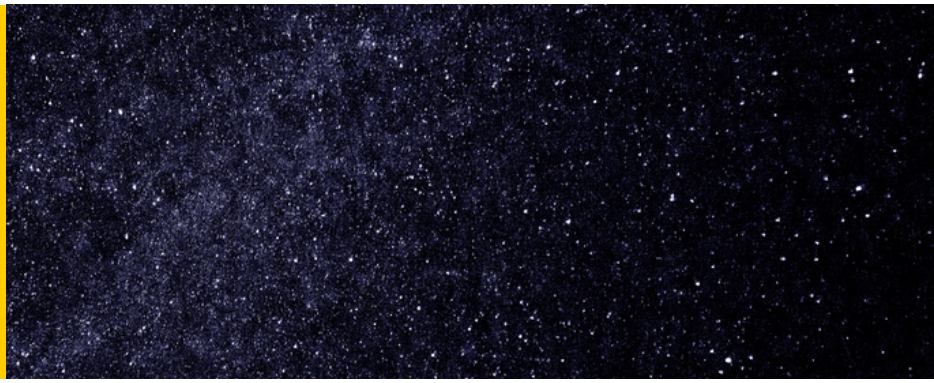


Image: Adatis

Learning is far from prior analogies of "the mind is a vessel to be filled" or "the brain is a bucket to fill with knowledge." According to Dr. Kenneth Wesson (2020), "When the brain learns, new dendrites grow" (para. 2). Therefore, educators are in incredible roles as brain changers. From course design to teaching, educators have the opportunity to design courses that engage students in learning experiences that support the human learning process. "**Understanding how the brain converts information into learning provides keys to the best instructional strategies and learning experiences**" (McTighe & Willis, 2019, p. 1). The more educators know about the brain and learning, the greater the opportunities to design courses that optimize learning and support neuroplasticity.

"There are more neurons in a single human brain than stars in the milky way"

- Colón-Ramos Lab
Yale University



2 UNIVERSAL DESIGN FOR LEARNING: DESIGNING LEARNING EXPERIENCES

Universal Design for Learning (UDL) is a transformational framework for teaching and learning. Historically, it is connected to the architectural concept of universal design. Ron Mace is recognized as the pioneer and visionary of Universal Design, even coining the term "universal design" (NC State University, 2008). The Center for Applied Special Technology (CAST), which was founded in 1984, is recognized for applying the concept of universal design to a framework for curriculum reform in education. Within education, the UDL framework is often associated with accessibility and special education. However, the UDL framework is designed to **support all learners across all learning contexts** within higher education, PK-12 education, and beyond education. One of the core foci of CAST is to **make learning inclusive and transformative for everyone** (CAST, n.d.).

The UDL framework aligns with what is known about the brain and based on "scientific insight into how humans learn" (CAST, para. 1). The guidelines focus on three networks that include:

- **Affective network:** engagement with the learning task
- **Recognition network:** recognition of the information to be learned
- **Strategic network:** application of strategies to process information

"Like fingerprints, no two brains are alike"

- CAST, 2018

The UDL framework recognizes that no two brains are the same and supports neuro-variability. CAST emphasizes the importance for educators to acknowledge variability in learner background knowledge and experience since "each learner brings a unique blend of experiences and expectations to each learning event" (CAST, 2018, p. 2). Recognizing "there is no single way a brain will perceive, engage with, or execute a task," CAST provides UDL guidelines that consider differences in learners to support the design of learning experiences through **multiple means of**:

Engagement: (the **why** of learning, which aligns with affective networks): interest, effort and persistence, and self-regulation

Representation: (the **what** of learning, which aligns with recognition networks): perception, language and symbols, and comprehension

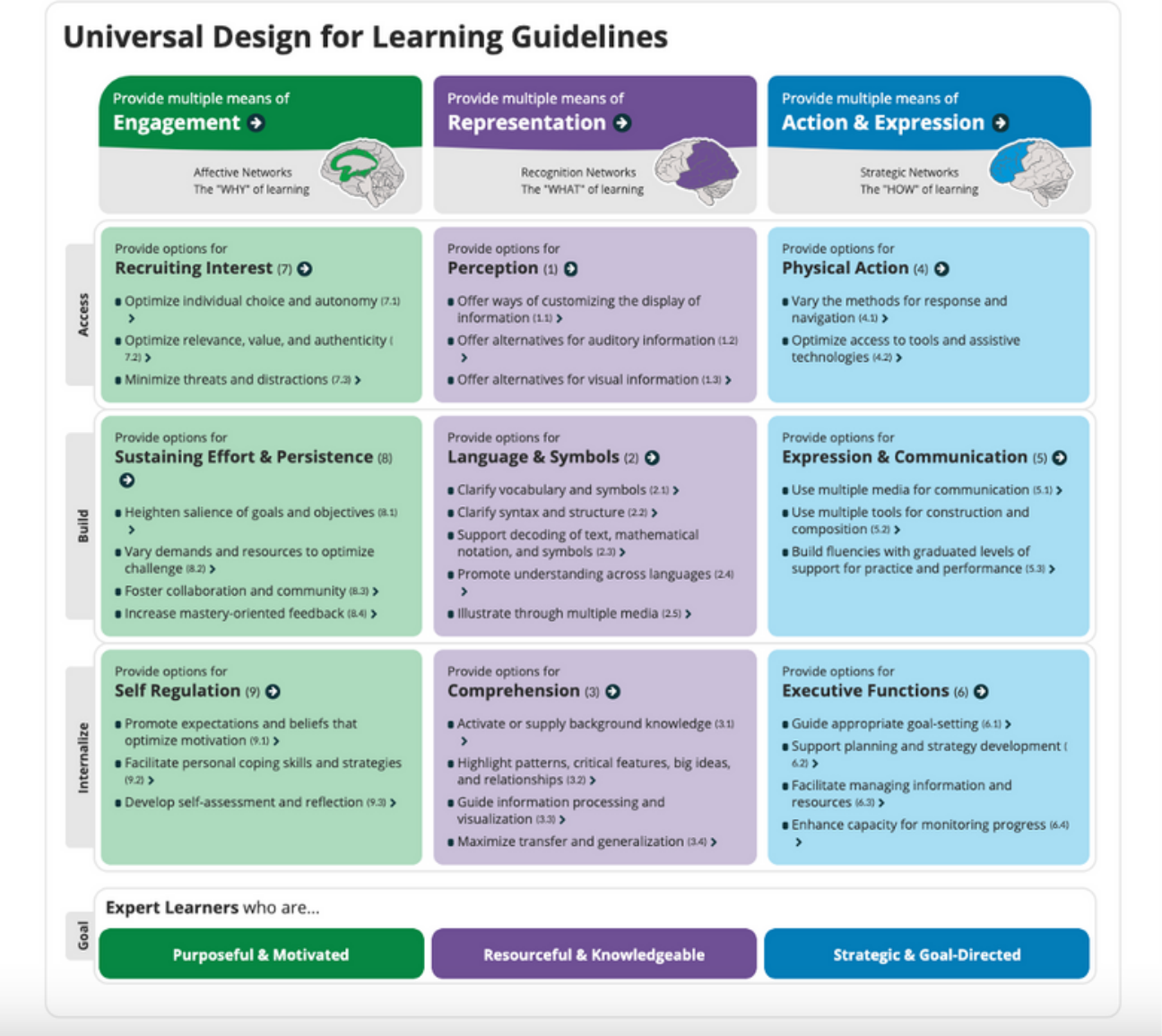
Action & Expression: (the **how** of learning, which aligns with strategic networks): physical action, expression and communication, and executive function (CAST, 2018, pp. 1-2)

In "UDL & the Learning Brain," CAST (2018) provides key facts about the brain from a UDL perspective to support the understanding of neuroplasticity, learner variability, and how learning happens. As shared by CAST (2018), "**Understanding the plasticity of the brain is important for educators**, **because it helps us recognize that learning is a constant growth process constructed over time**" (p. 2).

CAST has designed an interactive table that can be used to learn more about the three principles of **Engagement, Representation, and Action & Expression.** The UDL framework provides detailed information about each of the principles and how to align course design, teaching, learning, and assessment with the UDL framework and the brain networks (see Figure 2).

Figure 2

UDL Framework (CAST, 2022)



As educators, it is important to be familiar with the UDL framework to foster expert learners. These guidelines, which build upon scientific insights about learning, the brain, and research informed practices, provide a comprehensive framework that supports inclusion, engagement, regular and substantive interaction, practice, and transfer of learning.

3 CULTURALLY RESPONSIVE TEACHING: STUDENT-CENTERED APPROACH

Students in PK-12 education through higher education bring to the classroom diverse learning needs as well as cultural experiences and identities. Understanding **Culturally Responsive Teaching** (CRT) is important to creating educational experiences that support success for all students across all learning formats (face-to-face, hybrid, online). CRT provides a research and student-centered approach to course design and teaching that **acknowledges students' diverse backgrounds, cultures, languages, and life experiences as strengths** to be nurtured and relevant to what students learn within educational environments and their lives.

Dr. Gloria Ladson-Billings, Dr. Geneva Gay, and Zaretta Hammond have and continue to make transformational contributions to education through their work with CRT. Ladson-Billings, a pioneer in cultural inclusion, is recognized for introducing the concept of Culturally Relevant Teaching. Ladson-Billings defined Culturally Responsive Teaching in *The Dreamkeepers: Successful Teachers of African American Children*, as "**a pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes**" (1994, p. 382).

In the article "Teaching To and Through Cultural Diversity," Gay (2013) examines CRT through her own writings, including publications from 1972 and 2010. In 1972, Gay stated, "Education must be specifically designed to perpetuate and enrich the culture of the people and equip them with the tools to become functional participants in society, if they so choose" (2013, p. 50). In 2010, Gay defined CRT as "using the cultural knowledge, prior experiences, frames of references, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (2013, pp. 49-50).

In 2015, Hammond published *Culturally Responsive Teaching & The Brain*. In this book, Hammond states, "A systemic approach to culturally responsive teaching is the perfect catalyst to stimulate the brain's neuroplasticity" (p. 15) and that culturally responsive pedagogy has the ability to help students build intellective capacity and intellective competence (p. 16).

Hammond's book introduces the "Ready for Rigor Framework" that includes four core areas: (a) Awareness, (b) Learning Partnerships, (c) Information Procession, and (d) Community Building. As shared by Hammond (2015), "When the tools and strategies of each area are blended together, they create the **social, emotional, and cognitive conditions** that allow students to more actively engage and take ownership of their learning process" (p. 18).

CRT can be transformational for teaching and learning. There are many open-access resources that provide strategies to support CRT and how to integrate practices into course design and instruction. There are also resources that explore the overlap between CRT and Universal Design for Learning.

CRT Resources:

- Culturally Relevant and Culturally Responsive: Two Theories of Practice for Science Teaching, National Science Teacher Association (Mensah, 2021)
- Culturally Responsive Teaching: Four Misconceptions, Cult of Pedagogy (Gonzalez, 2017)
- Culturally Responsive Teaching & UDL (Bass & Lawrence-Riddell, 2020)
- Ten Culturally Responsive Teaching Strategies for the Science Classroom, Education Week (Ferlazzo, 2021)
- Culturally Responsive Teaching Knowledge and Practices of Online Faculty (Heitner & Jennings, 2016)
- Culturally Responsive Teaching & The Brain (Hammond, 2014)
- Culturally Responsive Teaching and UDL (Bass & Lawrence-Riddell, 2020)
- Connecting Universal Design for Learning with Culturally Responsive Teaching (Kieran & Anderson, 2019)

4 HIGHER EDUCATION FRAMEWORK & PEN PRINCIPLES

The learning sciences bring together research from transdisciplinary fields to provide critical insight to support instructional design, teaching, and learning within PK-12 education and higher education. Through research and collaboration, educational institutions and centers are developing frameworks to support student success building upon the learning sciences.

The Science of Learning Research Centre (SLRC), which was founded in 2013 and funded by the Australian Research Council Special Research Initiative, provides extensive resources for pre-school, primary, secondary, and tertiary levels that build upon scientifically-validated learning tools and strategies for educators and students. As shared by the SLRC, they have brought together "more than 100 neuroscientists, psychologists, and education researchers" from across Australia to collaborate on programs to better understand learning.

There are **two key resources** published by SLRC that are recommended to review.

The **first SLRC resource** is the **Higher Education Learning Framework (HELF)** which provides an evidence-informed model for university learning. According to the HELF handbook, "A **science of learning lens** was applied during development, threading together the often-disparate thinking in education, neuroscience, and psychology, to offer a convergent framework on effective learning in higher education" (Nugent et al., 2019, p. 1). The framework can be broken up into the seven principles of learning that build upon the science of learning. The HELF handbook includes seven chapters that align with each of the principles. All of the seven chapters include (a) an explanation of the principle, (b) implications for teachers, students, and assessment, and (c) a discussion of the current literature relating to the principle.

HELF: Seven Principles of Learning

1. Learning as becoming
2. Contextual learning
3. Emotions and learning
4. Interactive learning
5. Learning to learn and higher-order thinking
6. Learning challenge and difficulty
7. Deep and meaningful learning

(Nugent et al., 2019, p. 1)

The **second SLRC resource** provides **twelve Psychology, Education, and Neuroscience (PEN) principles.** The PEN Principles were developed by SLRC researchers to support teaching and learning. Each principle includes supporting research, videos, podcasts, and an infographic that can be used by educators and students (see Figure 3).

Figure 3

PEN Principles (SLRC, 2022)

It should be noted that the principles are inter-related and not hierarchical. The strategies provided are suggestive and not exhaustive. The authors also note that the HELF can be "adopted and adapted" to create a personalized framework for other contexts.

5 TRANSFER OF LEARNING & REAL-WORLD CONTEXTS

The ability to transfer learning across real-world contexts is critical in a knowledge-driven economy and shifting global landscape. However, transferring newly learned knowledge and skills can be complex. Therefore, the concept of transfer of learning must be integrated into instruction and supported with evidence-based practices across all course formats.

Transfer of learning, as defined by Perkins and Salomon (1992) occurs "when learning in one context or with one set of materials impacts on performance in another context or with other related materials" (p. 3). Often referenced in the literature are examples of near and far transfer. **Near transfer** refers to transfer between similar contexts, such as learning a new theory that is applied to practice problems in class, homework, a quiz/exam, or a related context in another course. **Far transfer** refers to transfer between dissimilar contexts, such as applying the theory beyond the classroom to real-life situations or professionally. Pan and Agarwal (2020) provide a table in *Retrieval Practice and Transfer of Learning: Foster Students' Application of Knowledge* referencing near and far transfer (see Table 1). The table provides an excellent overview of near and far transfer across contexts.

Table 1

Near and Far Transfer (Pan & Agarwal, 2020, p. 4)

	NEAR TRANSFER ←			→ FAR TRANSFER
Knowledge	Ancient Egypt in 1330 BC vs. 1325 BC	Ancient Egypt vs. Ancient China	Ancient Egypt vs. Modern United States	Ancient Egypt vs. Romantic Literature
Physical	Same classroom	Different classroom at same school	Different schools	School vs. everyday life
Time	In the same lesson	In the same day	Weeks or months later	Years later
Task	Pythagorean calculation vs. calculation with new numbers	Pythagorean calculation vs. calculation with diagrams	Pythagorean calculation vs. calculation with word problems	Pythagorean calculation vs. calculation with authentic problems
Functional	Solely academic	Academic vs. assessment	Academic vs. professional	Academic vs. personal
Format	Same format as before	Multiple-choice vs. short answer	Written vs. oral responses	Verbal vs. non-verbal

Transfer of learning goes beyond near and far transfer. For example, **positive transfer** occurs when learning in one context enhances or improves a related performance in a different context. **Negative transfer** occurs when learning in one context interferes or negatively impacts performance in different context. **Low road transfer** occurs when the initial learning task and the transfer task are sufficiently similar in context and conditions so there is a high level of automaticity. **High road transfer** requires being able to identify mindful abstractions and connections from the initial learning task and the transfer task. Other types of transfer include vertical and lateral, literal and figural, and specific and non-specific. Galoyan and Betts (2021) provide a table in the article "Integrative Transfer of Learning Model and Implications for Higher Education" that includes types, models, and taxonomies of transfer with descriptions and foci (see Table 2). The authors also provide an **integrative model of transfer of learning** for teaching across educational formats (see Figure 4).

Table 2

Traditional Models and Taxonomies of Transfer (Galoyan & Betts, 2021, p. 9)

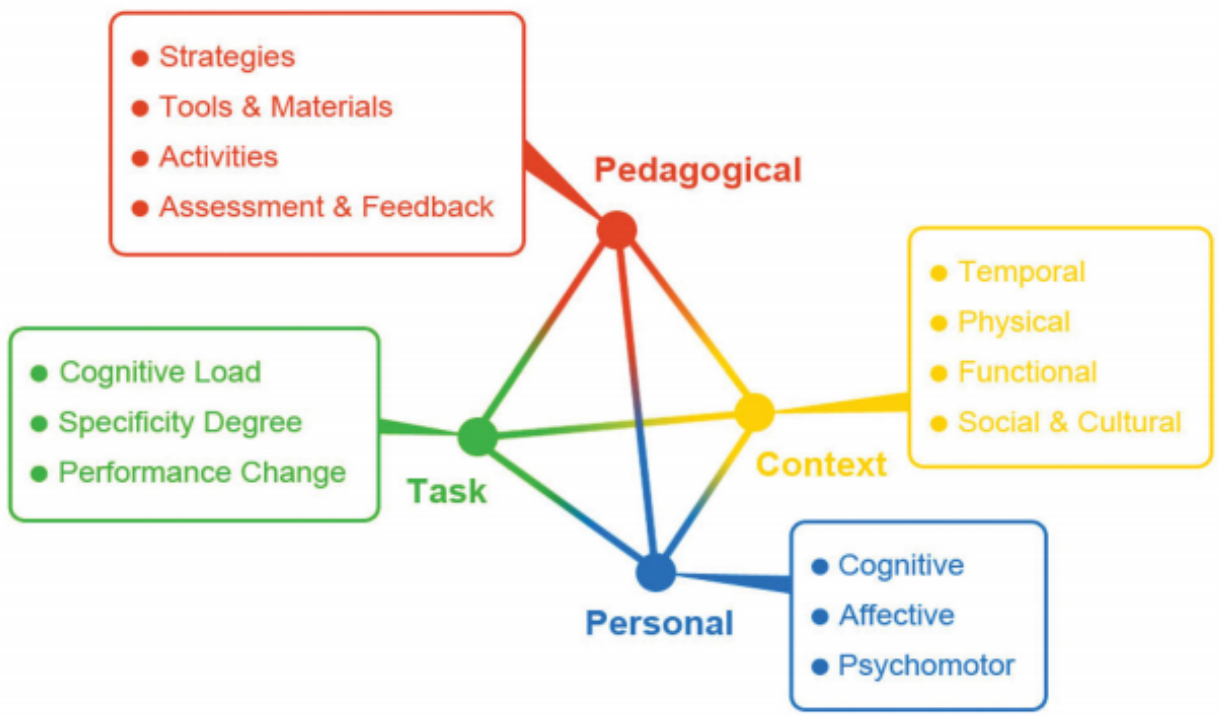
Models & Taxonomies	Description	Citation	Focus
Near vs. Far	Near transfer occurs between closely similar contexts. Far transfer occurs between contexts that share little similarity.	Detterman & Sternberg, 1993	Focused on the contextual similarity between transfer tasks.
High- vs. Low-Road Transfer	High-road transfer is mindful and involves deliberate abstraction and search for connections across transfer tasks. Low-road transfer involves stimulus conditions that trigger well-practiced, automated responses acquired in the prior learning context.	Perkins & Salomon, 2012	Focused on the amount of cognitive effort required from a subject to learn and transfer

Positive vs. Negative Transfer	In Positive transfer, previous learning complements the new context. In Negative transfer, previous learning interferes with new learning.	Leberman et al., 2006	Focused on the learner's background knowledge (schema) and analysis of internal cognitive processes
Literal vs. Figural Transfer	Literal transfer occurs when an intact segment of knowledge is applied to a new learning context. Figural transfer occurs when a bit of world knowledge is applied as a tool for learning about a new problem.	Royer, 1979	Focused on the contextual similarity
Vertical and Lateral Transfer	Vertical transfer occurs when a skill or knowledge learned in one situation directly influences the acquisition of a more complex skill or knowledge learned at a later point in time. Lateral transfer is a type of generalization that extends over a broad set of situations sharing roughly the same level of complexity.	Gagne, 1968	Focused on the contextual similarity
Common Elements Model	Transfer is determined by the common elements shared by two learning contexts.	Thorndike & Woodworth, 1901	Focused on external, contextual features
General Principle Model	Transfer depends on understanding the abstract general principle.	Judd, 1908	Focused on mental abstract principles

Information-Processing Model	Transfer is mediated by abstract symbolic mental representations.	Singley & Anderson, 1989	Focused on mental functions
Haskell's Taxonomies of Transfer of Learning	Transfer includes six levels: nonspecific transfer, application transfer, context transfer, near transfer, far transfer, and displacement transfer.	Haskell, 2000	Focused on the degree of similarity between transfer tasks

Figure 4

Integrative Transfer of Learning Model (Galoyan & Betts, 2021, p. 12)



Three critical challenges for students with transfer of learning include the following: (a) prior knowledge, (b) understanding how to transfer knowledge and skills beyond well-structured problems to ill-structured problems and across real-world contexts, and (c) time to practice transfer. Understanding the prospects and conditions that support transfer of learning is critical in supporting pedagogical practice and lifelong learning.

As indicated by Yale University's Poorvu Center for Teaching and Learning (n.d.), "**Students develop the ability to transfer their learning by practicing transfer**" (para. 10). Therefore, integrating transfer of learning into course design and instruction is foundational to the learning process.

6 PIVOTAL PEDAGOGY & EVIDENCE-BASED PRACTICES

Rapid shifts over the past couple of years from face-to-face to online and hybrid environments have brought greater attention to the need for educators to be able to pivot seamlessly across formats. It has also raised awareness of the importance of integrating evidence-based practices to support instruction and transfer of learning. Recognizing that the global economic landscape will not be the same post-pandemic, PK-12 and higher education graduates must be prepared to learn and work in increasingly competitive and dynamic work environments.

The article "Post-Pandemic, the Office will Now Have a Whole New Look" shares data from multiple studies in the United States on future shifts within the work environment. In one study by McKinsey, **9 out of 10 organizations** stated they will be **combining remote and onsite work post-pandemic** (Dickler, 2021). Similarly, in another study Mercer shared that **70% of companies**, with plans in place, stated they will **adopt a hybrid model** (Dickler, 2021). In the United Kingdom, a 2021 study by Owl Labs found that **84% of UK businesses** plan on having a **hybrid, flexible, or remote workforce post-pandemic** (Shepherd, 2021). Highlights from a Deloitte 2021 study shared in "Planning for the World of Hybrid Work" (Girzadas, 2021) that corporations plan to be creative in reimagining physical spaces, hybrid work models, and **even integrating augmented and virtual reality**. While onsite employment will always be a part of the workforce, having the skills and experience to learn and work in hybrid, flexible, and online environments will expand potential employment opportunities for future graduates.

The ability to pivot seamlessly and successfully in education is as important as it is in the corporate sector. Students are increasingly seeking courses offered across formats from face-to-face and hybrid to HyFlex and online. Educators have the opportunity to design and teach courses across formats. Through pivotal pedagogy, educators can engage students in innovative and real-world learning experiences that align with program and course outcomes as well as support regular and substantive interaction.

Pivotal pedagogy is defined as follows:

> Pedagogical practices that engage learners in educational experiences through instruction, active learning, assessment (e.g., formative, summative, etc.), and feedback building upon theory, research, and authentic contexts supporting comprehension, application, and transfer of learning seamlessly across learning formats (e.g., in-class/onsite, blended, online) in alignment with learner needs and learning outcomes. (Betts et al., 2021, p. 31)

The definition for pivotal pedagogy brings attention to the importance of building upon theory, research, and authentic contexts to support transfer of learning. The following three resources provide outstanding open-access content for evidence-based practices that can be used by educators to support teaching and learning across formats.

The University of Arizona

The **Learning to Learn (L2L) Series**, which falls under Academic Affairs at the University of Arizona, includes six strategies that support learning. Each strategy builds upon theory and research as shared in Figure 5. You can click on links on the L2L webpage to "explore" each strategy and access definitions of terms, videos, and application examples across different contexts. Additionally, there is a Strategy Toolkit for Instructors with videos, a blog, PowerPoint slides, and additional resources.

Figure 5

Learning to Learn Series (University of Arizona)

RETRIEVAL PRACTICE:

The process of recalling information from memory--one's effort to remember what has been learned previously and to actively bring it to the forefront of one's mind. Practice implies that retrieval reoccurs periodically after the information, concepts or ideas are initially learned...

Explore This Strategy

SPACED PRACTICE:

The process of distributing multiple study sessions over a period of time to improve long-term retention--refers to breaking up the time allocated to study into shorter sessions rather than devoting a large amount of time to a subject in a single sitting...

Explore This Strategy

ELABORATION:

The process of making associations between new information, concepts and ideas and what is already known in order to achieve superior learning and performance. When engaged in elaboration, learners call on preexisting knowledge and synthesize it with...

Explore This Strategy

INTERLEAVING:

The process of mixing up materials studied or skills practiced in a study session rather than focusing on a single topic or skill; long-term retention + the ability to apply what is known to new situations improve when related concepts or skills are studied in parallel.

Explore This Strategy

METACOGNITION:

The understanding of how one thinks and learns. It involves planning, monitoring, assessing and adapting one's efforts to learn, understand and perform. Metacognition practices increase one's level of awareness of his/her/their strengths and weaknesses.

Explore This Strategy

GROWTH MINDSET:

People believe that their cognitive abilities are not innate or "fixed" but instead can develop through dedication and hard work. When students develop a growth mindset, they are more willing to take on challenges and learn from both their successes and their failures.

Explore This Strategy

RetrievalPractice.org

RetrievalPractice.org is an educational hub that provides research, resources, and strategies that build upon the **science of learning**. They provide six practice guides that can be downloaded which span PK-12 and higher education as shared in Figure 6. These resources are also available in Spanish, Portuguese, Dutch, and Mandarin. RetrievalPractice.org also offers Weekly Teaching Tips through a free online subscription that provides innovative strategies and resources to support teaching and learning.

Figure 6

Practice Guides (RetrievalPractice.org)

The Learning Scientists

The Learning Scientists includes cognitive scientists who provide scientific research and resources for educators that build upon the **science of learning.** The Learning Scientists provides six strategies to support instruction and transfer of learning as shared in Figure 7. Each strategy provides access to posters, PowerPoint slides, bookmarks, videos, and blogs related to each of the six strategies. The Learning Scientists has a free online subscription that provides updates on new blogs and podcast episodes.

Figure 7

Six Strategies (The Learning Scientists)

Educators are encouraged to explore the extensive resources available online that support teaching and learning from PK-12 education through higher education. The knowledge, skills, and experience gained by students across all course formats (face-to-face, hybrid, HyFlex online) support critical lifelong skills needed in the global workforce.

7 FUTURE & OPPORTUNITIES IN EDUCATION

The educational landscape continues to shift as educators have adjusted to ongoing changes related to the global pandemic. Many institutions of higher education (IHE) have been greatly impacted by the pandemic seeing decreases in enrollments, particularly on campus. Although many IHEs have returned to offering courses face-to-face, many faculty and students have elected to continue with online, hybrid, and Hy-Flex options. With so much uncertainty, one of the greatest challenges that has emerged, as indicated by University Professional and Continuing Education Association (UPCEA, 2021), is that "**past predictions and forecasts are no longer relevant**."

In the article, "The Domino Effect: Pandemic Impacts to Higher Education that will Ultimately Reach PCO," Jim Fong, the founding Director of UPCEA's Center for Research and Strategy, highlights seven predictions within higher education ranging from enrollments to content.

Seven Predictions within Higher Education

1. We are likely to see an enrollment rollercoaster.
2. We are likely to see a surge in demand for online adoption as an alternative.
3. We are seeing widespread financial instability.
4. We will need a more fluid, frictionless, and engaging student experience.
5. We are going to have IT as a critical mission partner and not just an afterthought.
6. We will need to prepare graduates for migration to an elastic workforce.
7. Content will change, but so will the credential and dependence on degrees.

(Fong, 2021, para. 9-15)

These predictions, which stem from what has occurred during 2020 and 2021, will have a profound effect on IHEs going into 2022 and beyond. Returning to the "new normal" may not be realistic. Enrollment will most likely not go back to where it was prior to the pandemic for many IHEs. Many traditional institutions may not reach prior on-campus enrollment targets requiring more diversified format offerings to support long-term sustainability. Furthermore, changes in the workforce due to the pandemic are requiring institutions to re-examine curricula for alignment.

Within PK-12 education, the pandemic is predicted to have many long-term effects. According to a report by McKinsey & Company:

> The fallout from the pandemic threatens to depress this generation's prospects and constrict their opportunities far into adulthood. The ripple effects may undermine their chances of attending college and ultimately finding a fulfilling job that enables them to support a family. (Dorn et al., 2021, para. 3)

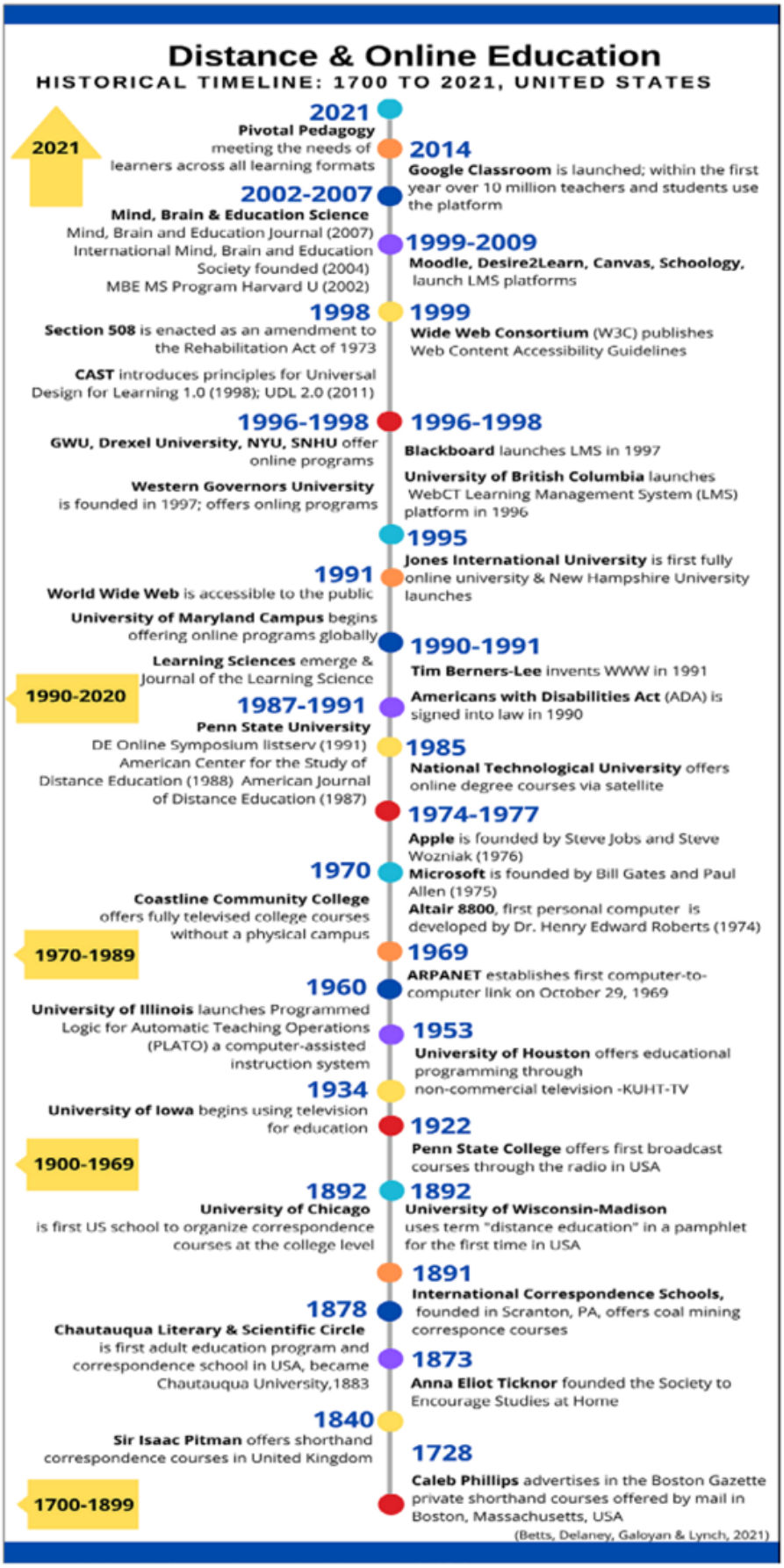
One of the areas of most affected has been mental health with "more than 35 percent of parents very or extremely concerned about their children's mental health" (Dorn, 2021, para. 2). Headlines throughout 2021 continued to bring national attention to learning loss and "unfinished learning" due to the pandemic, which only adds to the anxiety and stress that many students already experience.

Disruption brings opportunity. According to Fong (2021), "As the pandemic caused many of us to pause and reevaluate, millions of students across all levels began to question the value of their education. Students began to consider other options" (para. 2). Examining the value of education and other options is critical to how education moves forward in providing programs and courses across formats (face-to-face, hybrid, Hy-Flex, online). These are questions that all educators should be asking annually. Educators, within PK-12 education and higher education, have been creative, innovative, and resilient throughout the pandemic. There are new opportunities for deeper collaboration between PK-12 education, higher education, and the workforce. There is opportunity to examine the effects of content, curriculum, and cognitive load on academic performance as it relates to learning, memory, and transfer of learning.

A comprehensive overview of educational shifts in higher education covering course formats and pedagogical practices is provided in the article "**Historical Review of Distance and Online Education from 1700s to 2021 in the United States: Instructional Design and Pivotal Pedagogy in Higher Education**" (Betts et al., 2021). While reading the article and reviewing the infographic timeline (see Figure 8), it is important to reflect on the future of education and the many opportunities for innovation and change that can positively impact students and learning in the future.

Figure 8

Distance and Online Education in the United States 1700 to 2021 (Betts et al, 2021)



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