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# Modern Renaissance: Challenging Siloed Learning with a Whole- Brain Approach to Educational Environments

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Modern Renaissance: Challenging Siloed Learning with a Whole-Brain Approach to Educational Environments

# Introductions



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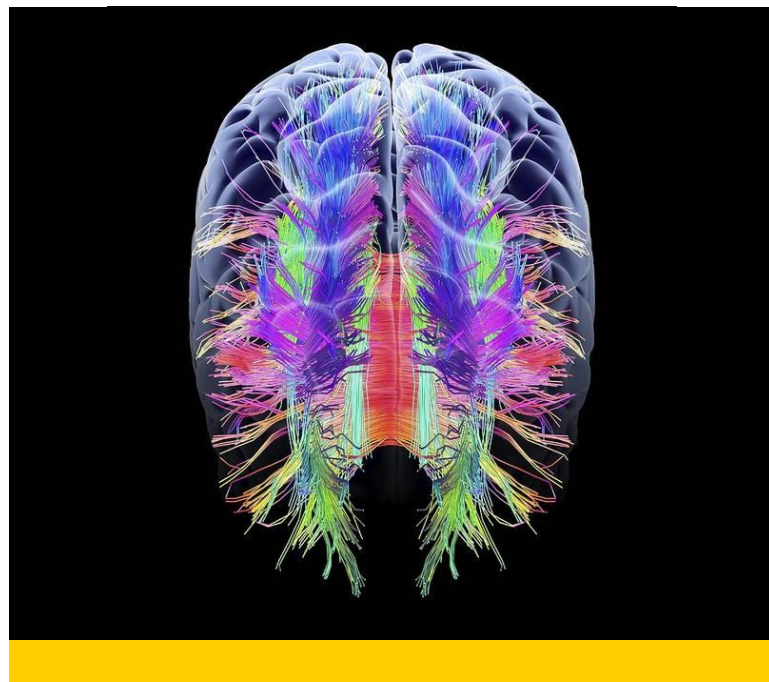
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# Learning Objectives



## 1 – The Science Behind Cognition and Learning

Explore insights from the behavioral and brain sciences and education to understand cognitive processes that underly information processing and learning.



## 2 – Integrated, Whole-Brain Approach to Learning

Challenge popular science concepts like right vs. left brain dominance theory to forward an integrated, whole-brain approach to facilitating impactful learning experiences.



## 3 – Innovation Through an Interdisciplinary Perspective

Connect forward-thinking learning models to an interdisciplinary perspective on education, bringing insights from art and science together to foster innovation.



## 4 – Design for a “Modern Renaissance” in Education

Apply a “modern renaissance” perspective to the design of learning environments to create spaces that create opportunity for growth, cross-pollinating ideas, and making meaningful connections.







WARM-UP ACTIVITY

# Hemispheric Dominance Quiz



Scan the QR code on your table or on this screen to take a quick Hemispheric Dominance Quiz.

Are you Right- or Left-Brained?

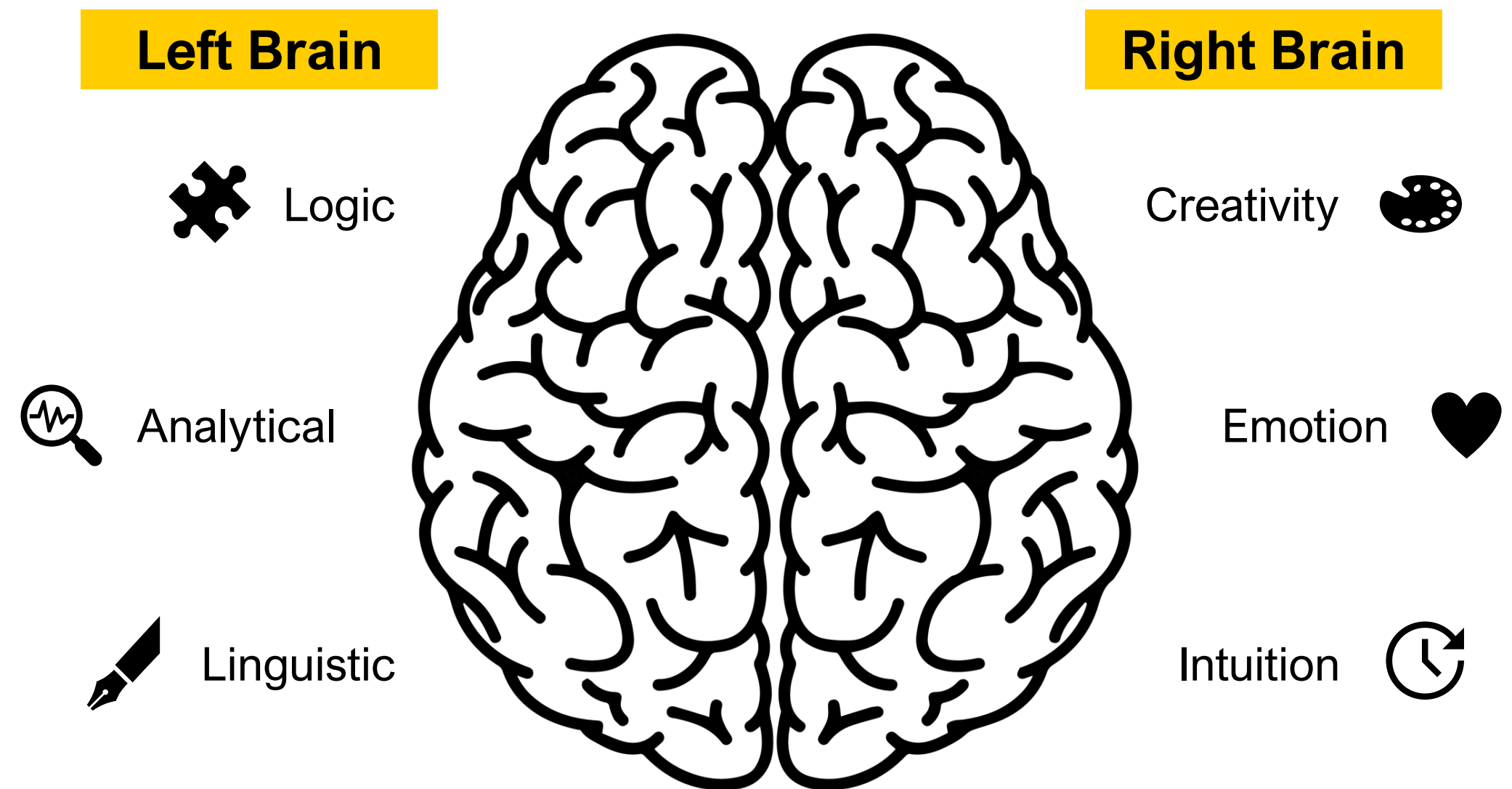




## Right- vs. Left-Brain Dominance Theory

*The idea that an individual's **personality and cognitive style** can be mapped to **hemispheric dominance** in the brain.*

- This theory is based in real research findings dating back to the 1860's
- While the two hemispheres of the brain do specialize in different tasks, more recent research indicates **this theory is oversimplified and exaggerated, some even call it a myth**







**If the human brain were so simple that we could understand it, we would be so simple that we couldn't.**

— *Physicist Emerson M. Pugh in 1938*



**FRONTAL LOBE**

Executive Functions, Concentration,  
Creativity, Planning

**PARIETAL LOBE**

Sensory Integration, Object Recognition

**OCCIPITAL LOBE**

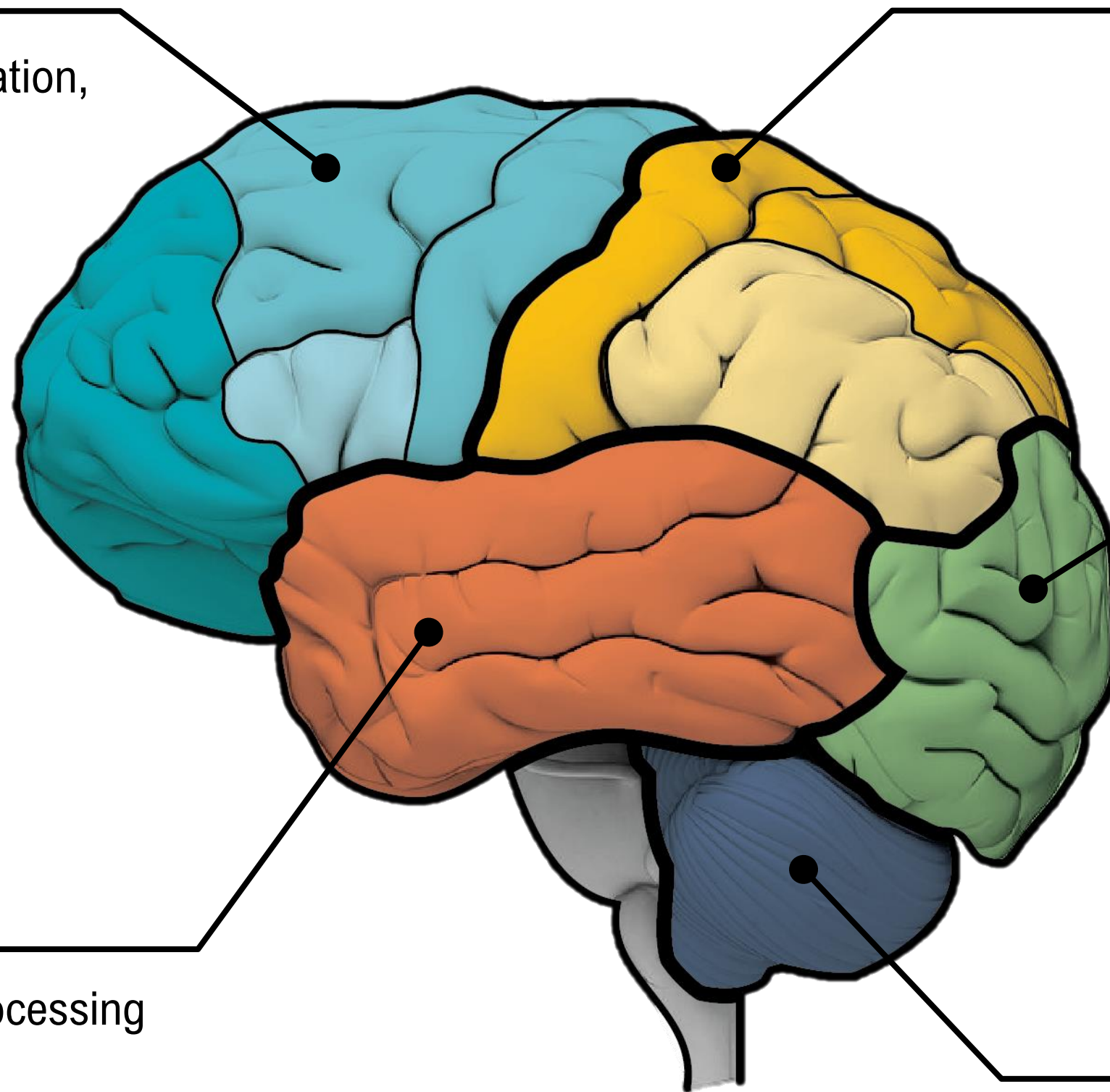
Visual Processing

**TEMPORAL LOBE**

Auditory, High-Level Visual Processing

**CEREBELLUM**

Balance and Motor Coordination





# Left Hemisphere

## *Lateralized Functions*

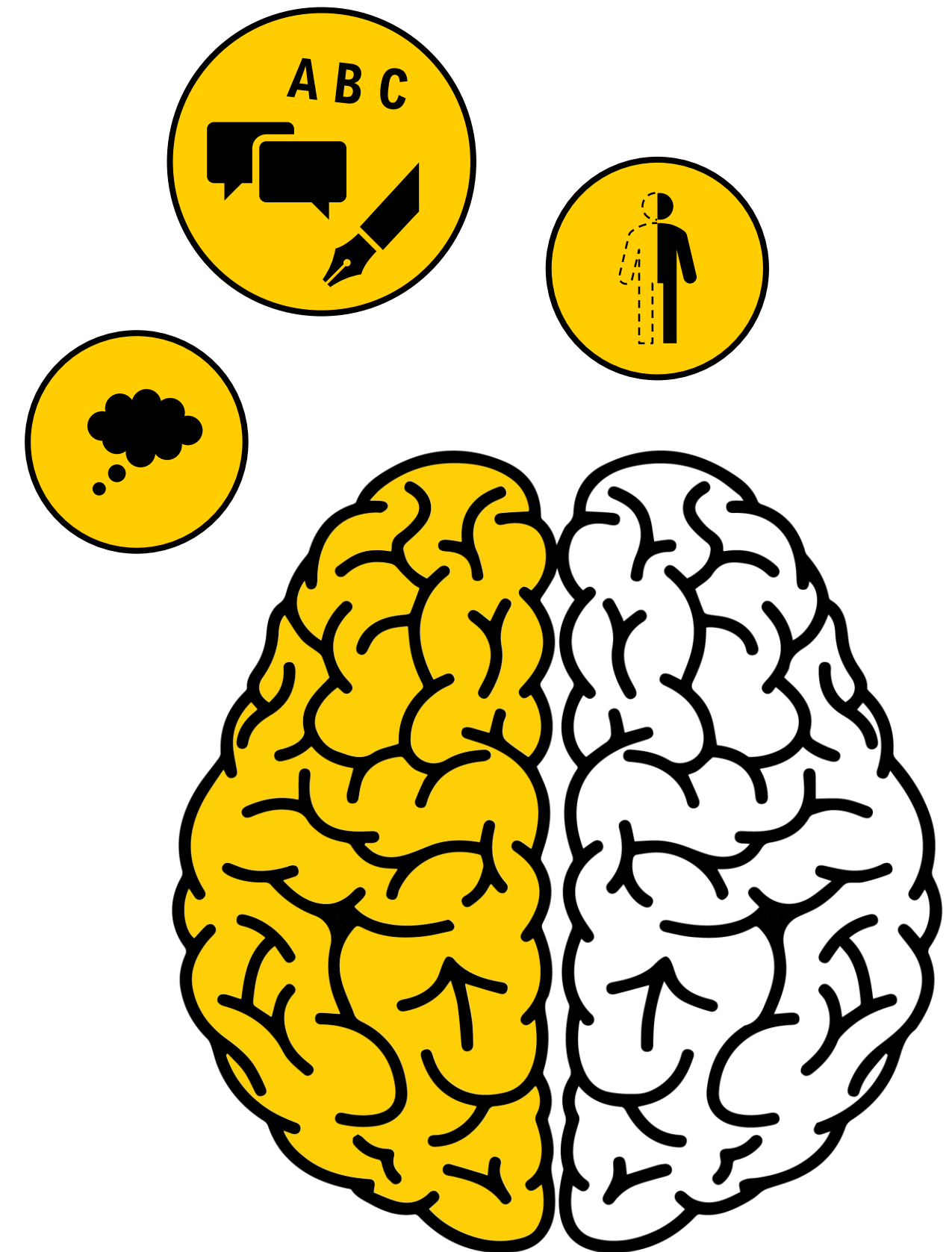
### Physiological differences

- More gray matter
- **Connections are more local, less extensive connectivity**

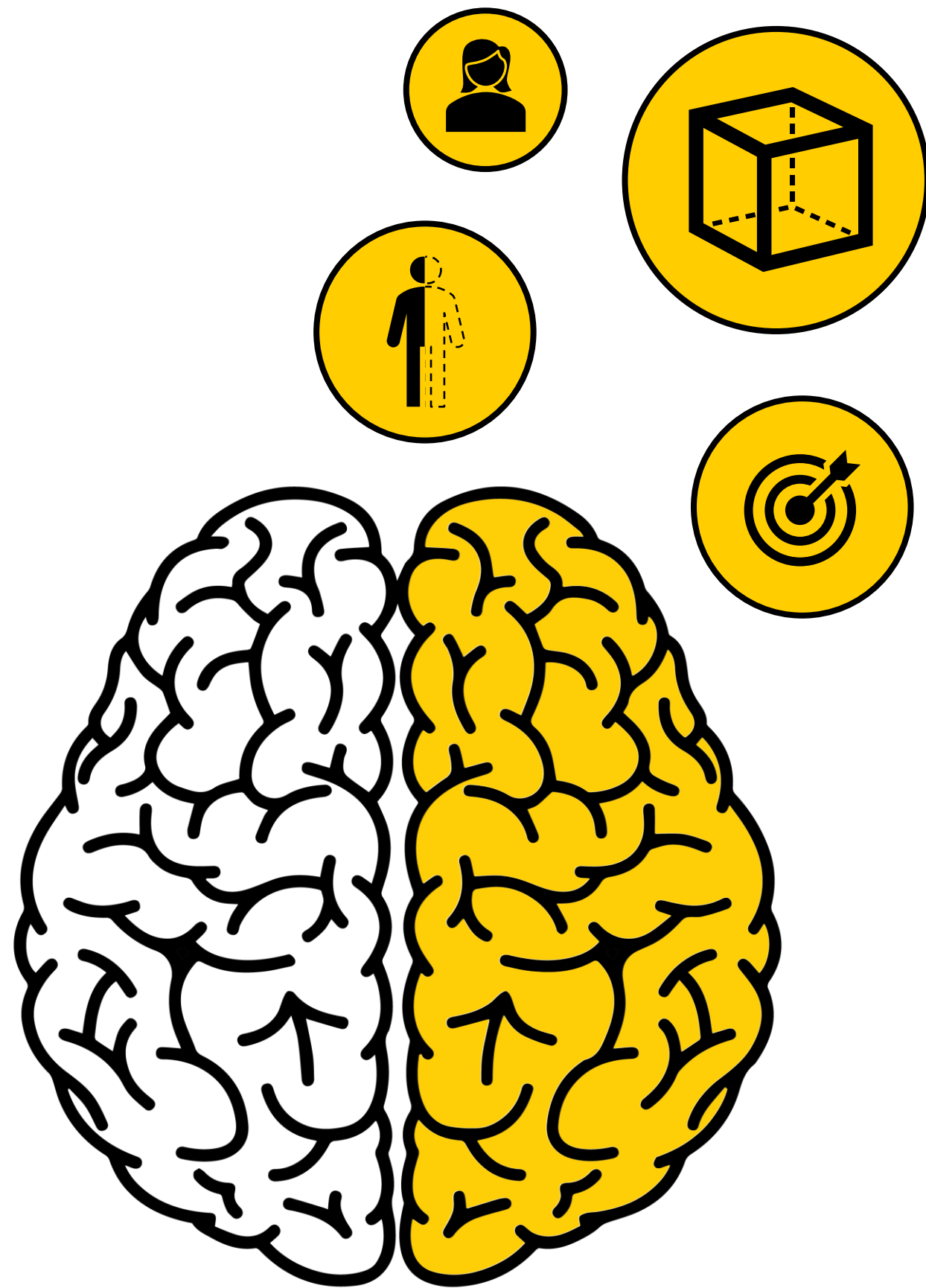
### Functional Differences

- **Language**
- Right side of the body and visual field
- **Core regions of the Default Mode Network**
  - Reflection, mind wandering, daydreaming, sense of self
  - Overlap with the “**social brain network**” (social cognition)
  - Activated during rest, deactivated during focused tasks

**The “Interpreter”**: making sense of the world, generating explanations, resolving uncertainty







## Right Hemisphere

### *Lateralized Functions*

#### Physiological Differences

- More white matter
- **More extensive connections**

#### Functional Differences

- **Visual-spatial judgements – more “visually intelligent”**
- Facial recognition
- Left side of the body and visual field
- **Core regions of the Attention Control Network**
  - “Frontoparietal attention network”
  - Focus on a single task (particularly rote tasks)
  - Activated during **routine tasks**, deactivated during rest

**The “Statistician”:** conflict detection between internal hypotheses and the real world, updating beliefs



CORPUS CALLOSUM

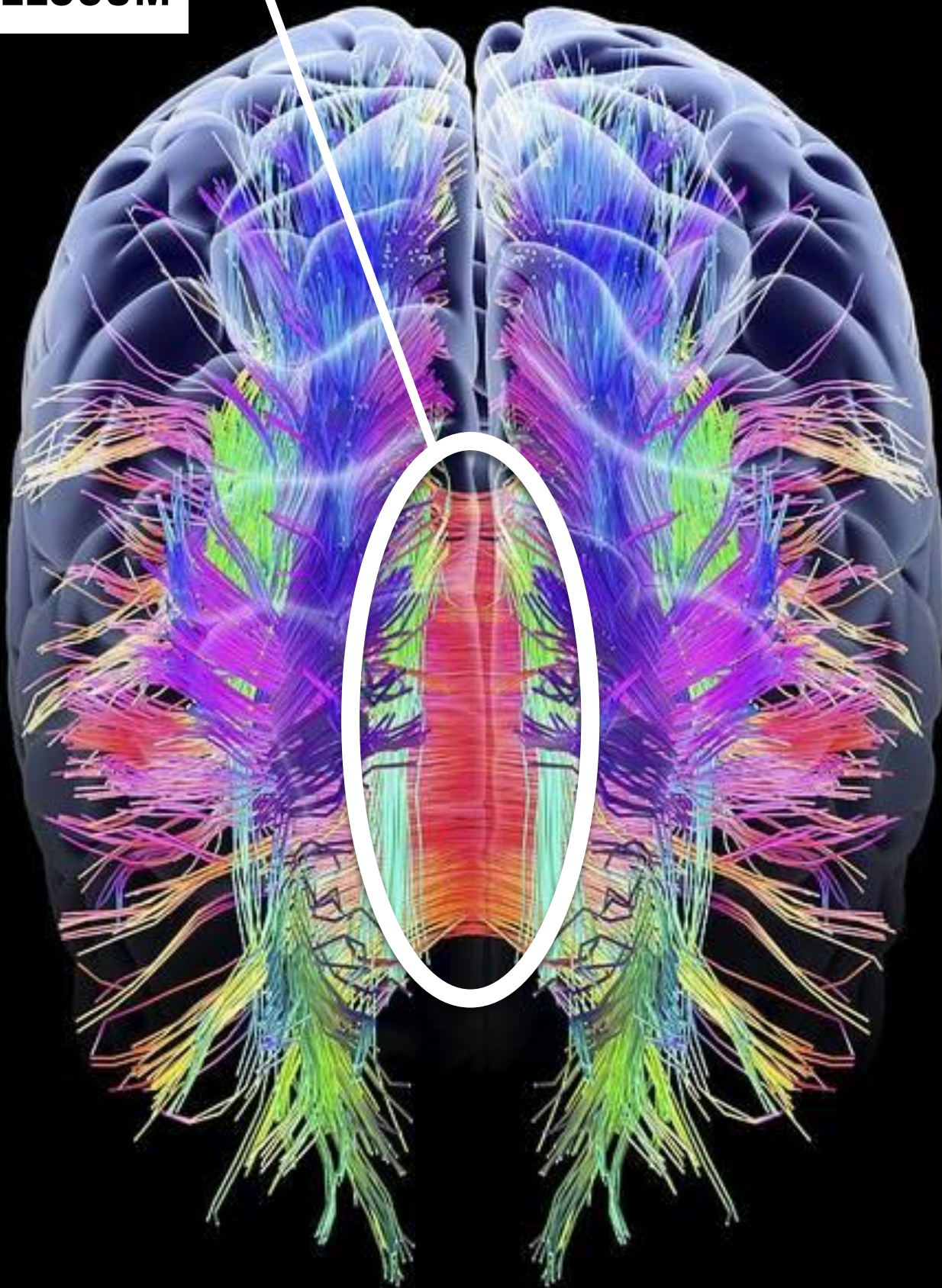


Image Credit: Science Photo Library, NIH Human Connectome Project

“

...in general, **both hemispheres are important for the vast majority of cognitive functions. Thinking and reasoning** are two examples of functions that are typically associated with the left brain, but these **require communication between many regions of the brain on both sides.**

[Schultz, 2023]





Why do we oversimplify complexity?



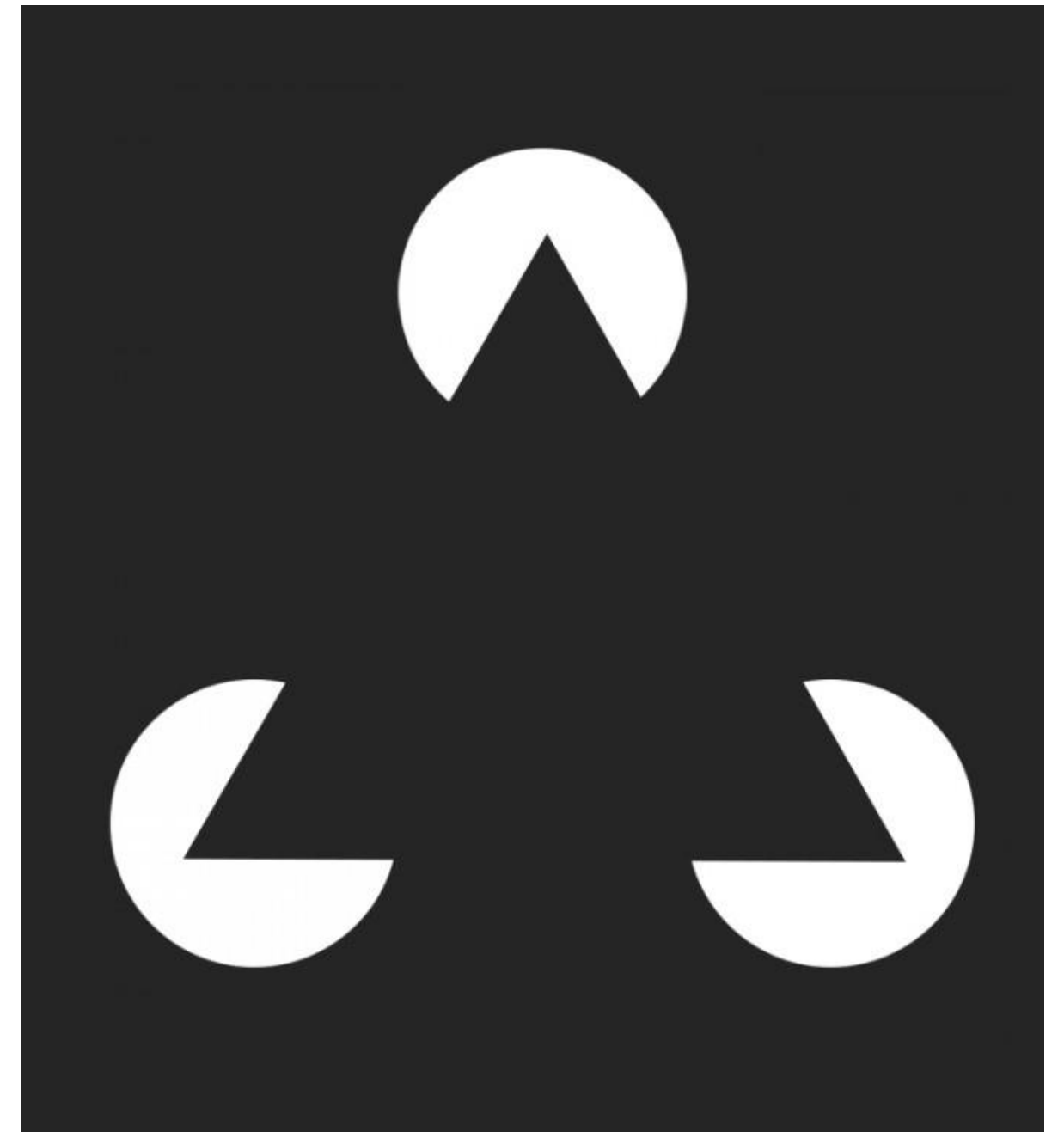
# Our Brains are Wired to *Categorize* and *Find* *Meaning*

- Efficient processing
- Maximizing limited information
- Understand ourselves and our complex world
- Very useful for making sense of our environment
- Can be problematic- creates biases, assumptions, artificial divides, etc.

[Purves et al, 2018; Farmer & Matlin, 2019]

## PAREIDOLIA:

Seeing faces or other patterns in ambiguous images



## GESTALT:

Simplifying and organizing complex images to create a whole



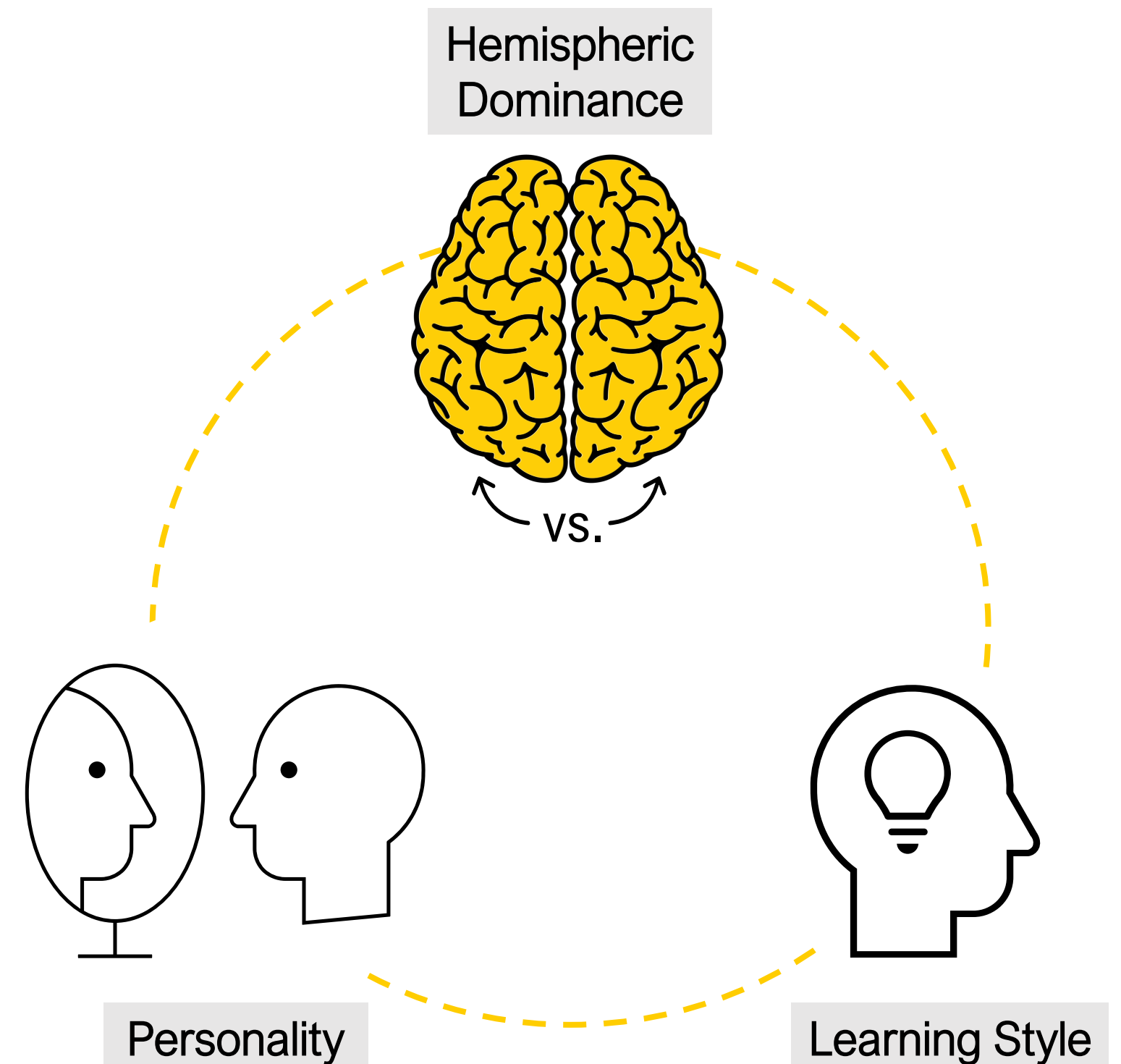
# Hemispheric Dominance, Learning Styles, and Personality Types

## *Tools for Understanding Ourselves and Others*

“Although people commonly prefer some learning styles over others, there isn’t great evidence to support the idea that processing information in the modality of your preferred learning style will actually improve educational outcomes.”


- Schultz, 2023; Pashler et al., 2008

- Hemispheric Dominance and Learning Styles are interrelated **metacognitive tools** we can use to understand ourselves and others
- **Overlap with personality traits** to describe how we prefer to learn and process information
- Empirical study of these constructs **does not show strong, causal support for improved educational outcomes**



[Schultz, 2023; Pashler et al., 2008]



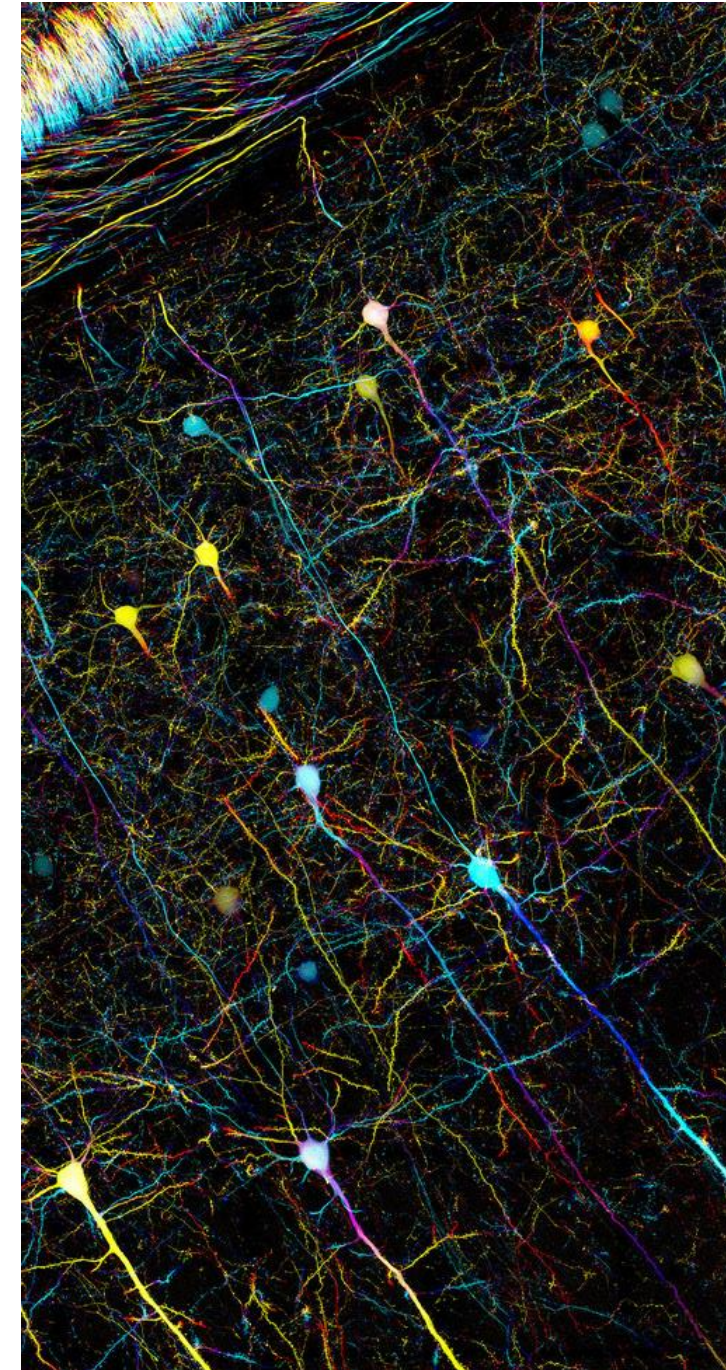
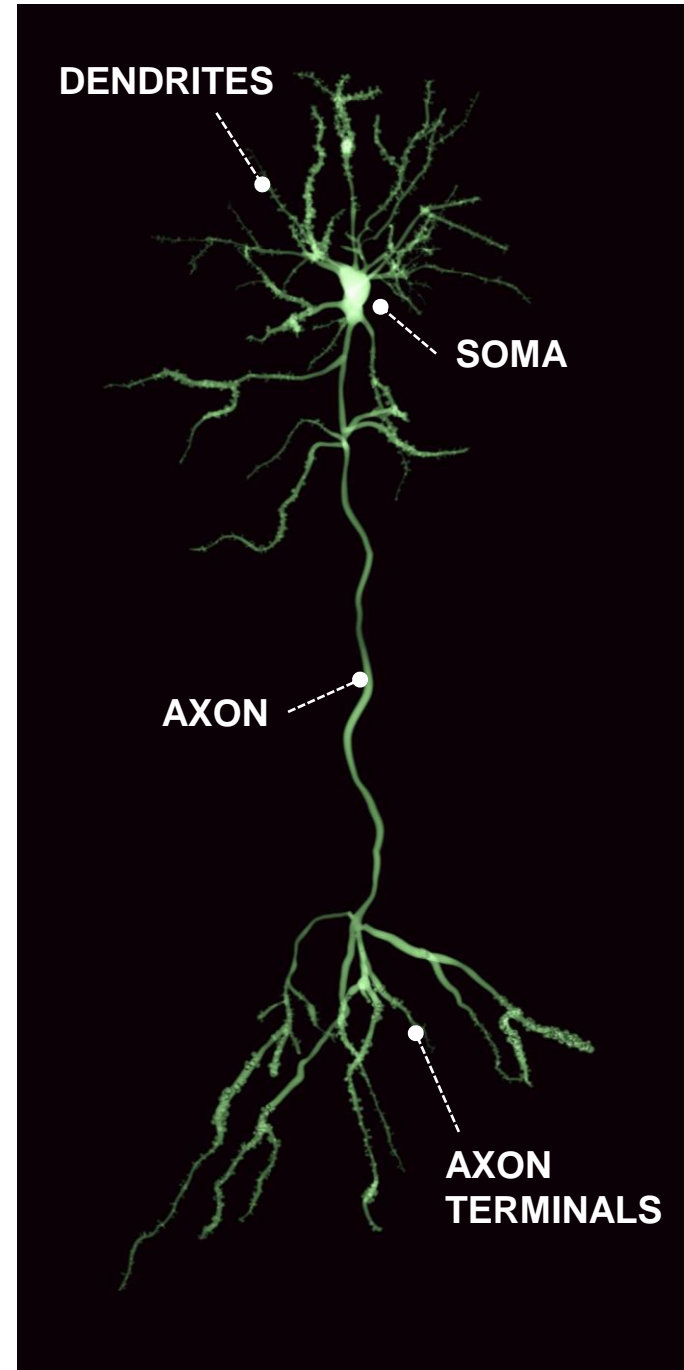
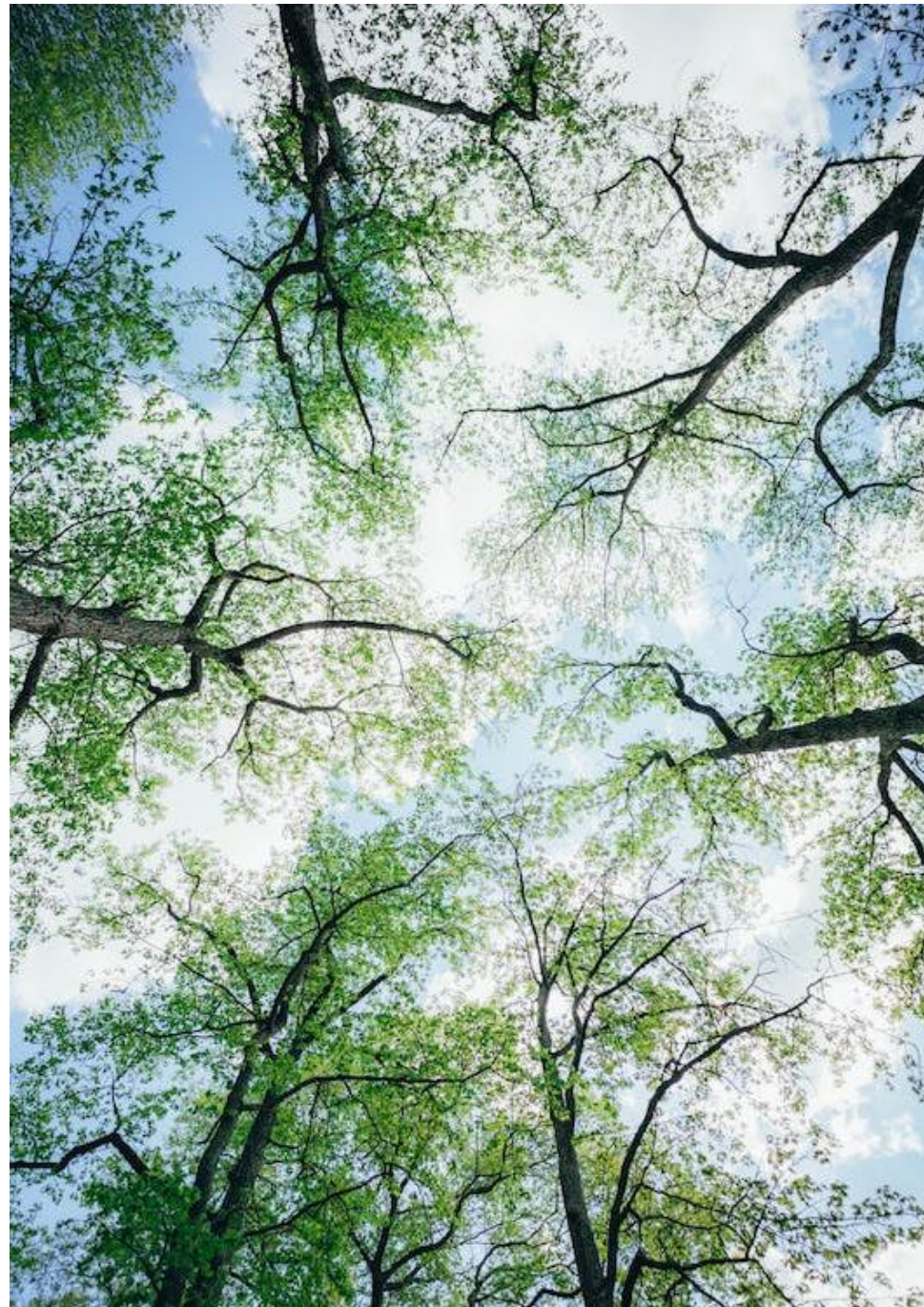


**The *power of our brain* comes from its *connectivity***



# Dendritic Arborization

*Learning is Like Building a Forest of Neurons*



- **Dendritic Arborization:** neurons “branch out” to form a dense network of connections with other neurons
- **Synaptic connections** facilitate the flow of information in the brain
- Extensive arborization can be considered a sign of **complexity**
- **Learning** is the process of *building, strengthening, and pruning synaptic connections*

[Purves et al, 2018]





## BODY

- Movement is encouraged through hands-on activities
- Increased sensory engagement takes advantage of the body's natural perceptual capabilities

## MIND

- Learning is student-led and inquiry-based
- Creativity and problem-solving are encouraged through divergent and critical thinking
- The formation of generalized knowledge is the goal
- Social and Emotional Learning is also emphasized



## ENVIRONMENT

- Engage the social, cultural, technological, natural, and material environment
- Holistic learning environments connect students to the real world
- Integrate real-life experiences into the classroom





## Emergent Phenomena

*Properties or behaviors that are not found in any component of a complex system, but are features of the system as a whole*

High-level functions and valued competencies emerge through **connected activity** throughout the brain:

- Consciousness
- Cognition
- Creativity



# Creativity

*Activating the both hemispheres to produce novel ideas*



“...greater creativity is associated with more communication between the two hemispheres rather than more activity in the right hemisphere.”

- Schultz, 2023; Lindell, 2011

- Producing novel and useful solutions
- Involved both **divergent and convergent thinking**
- **Widespread activity in the brain** during creative thinking
- **Both hemispheres** are activated in the creative process

# Innovation

*Making new connections to break barriers and solve problems*



“Innovation is the intersection of previously unrelated neural patterns”

- Janet Crawford, 2013

- Making **connections** and solving problems
- Working through obstacles and barriers
- **Overcoming functional fixedness** to think in new ways and develop of novel solutions



## What Can We Learn from the Renaissance?



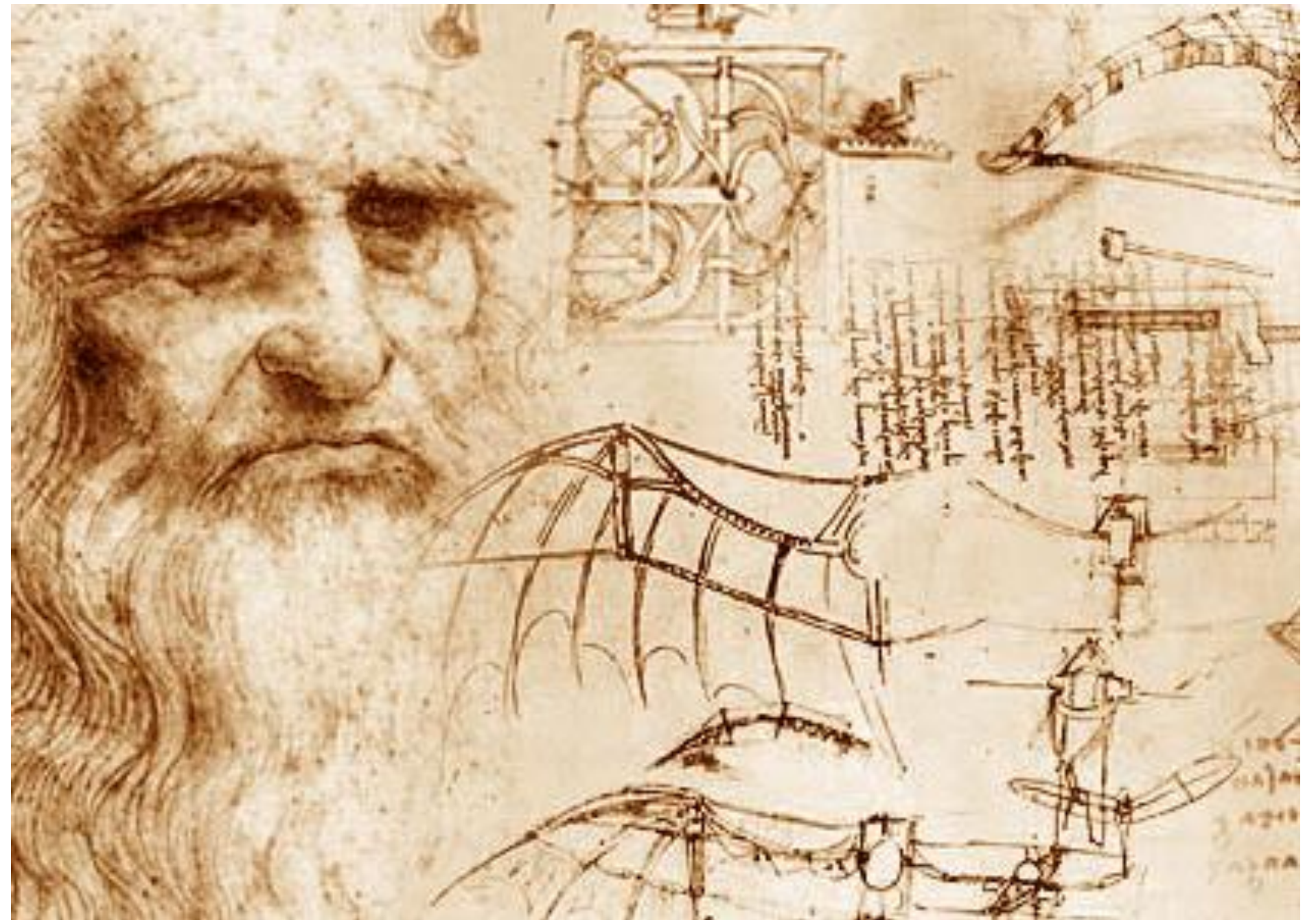
A period of *ingenuity and creativity yielding new knowledge, insight, innovation, and progress* in the sciences, mathematics, philosophy, literature, and art.



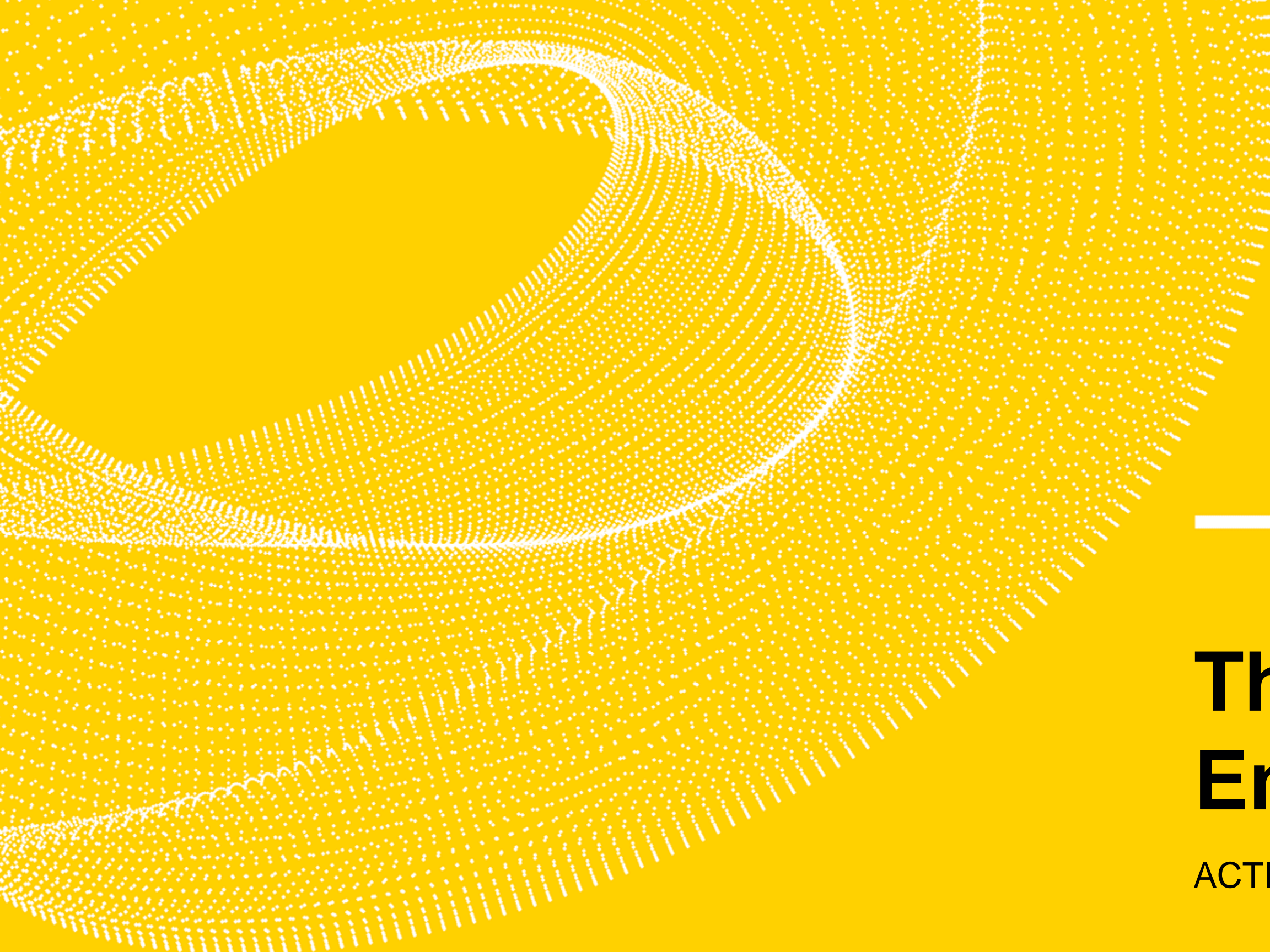
## Forwarding an Interdisciplinary Approach

### *Learning from the Renaissance*

- Renewed **passion for learning** and human achievement
- Investment in education and the arts
- Spirit of **curiosity, imagination, and exploration**
- Focus on **apprenticeship and mentorship**
- Innovation involves a **synthesis of ideas across disciplines**
- **“Renaissance Person”** approach







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# The Art of Engineering

ACTIVITY #1

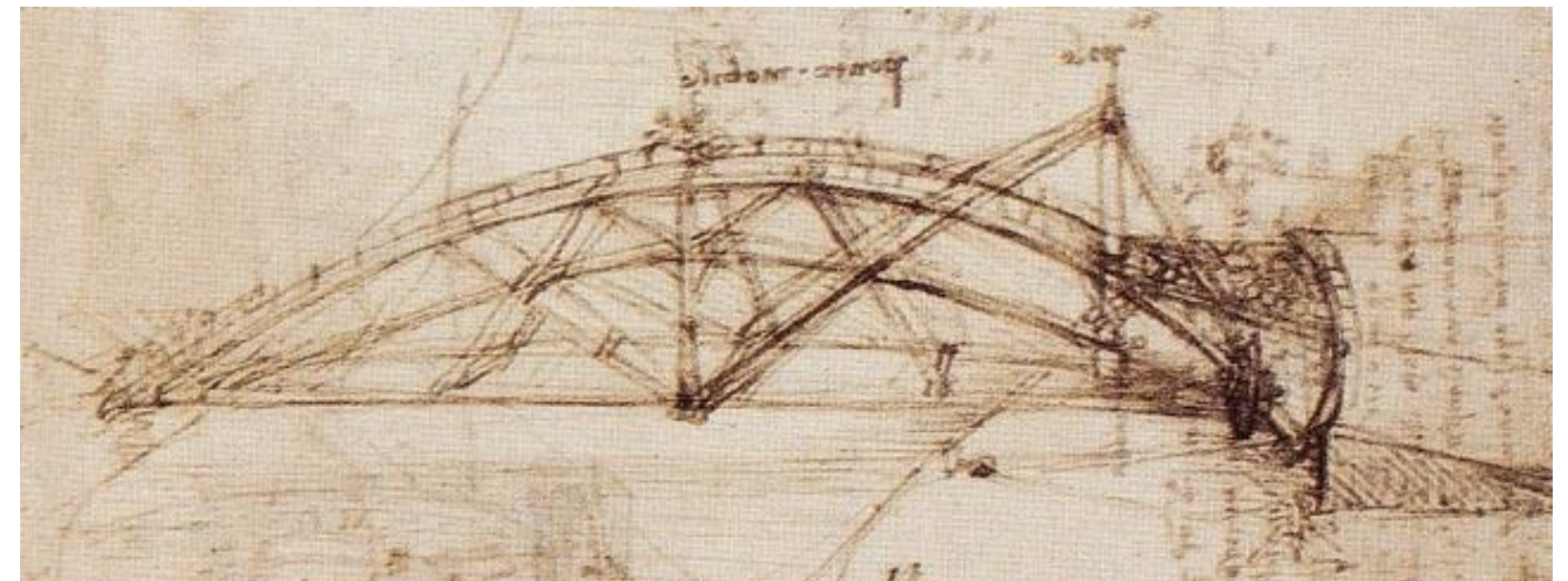


ACTIVITY #1

## The Art of Engineering: Build a da Vinci Bridge!

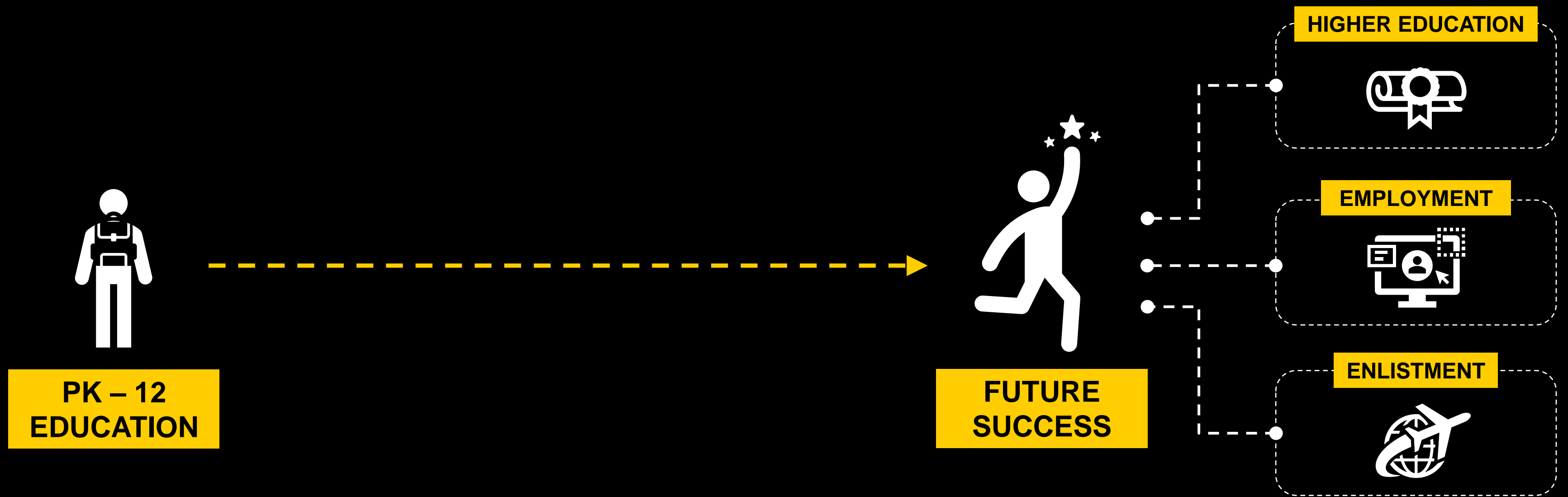
We're challenging you to **solve a problem from one discipline using the tools of another**: *build a Chicago-inspired, self-supporting da Vinci Bridge using art supplies!*

Who will rise to the challenge-  
the right-brainers or the left-brainers?



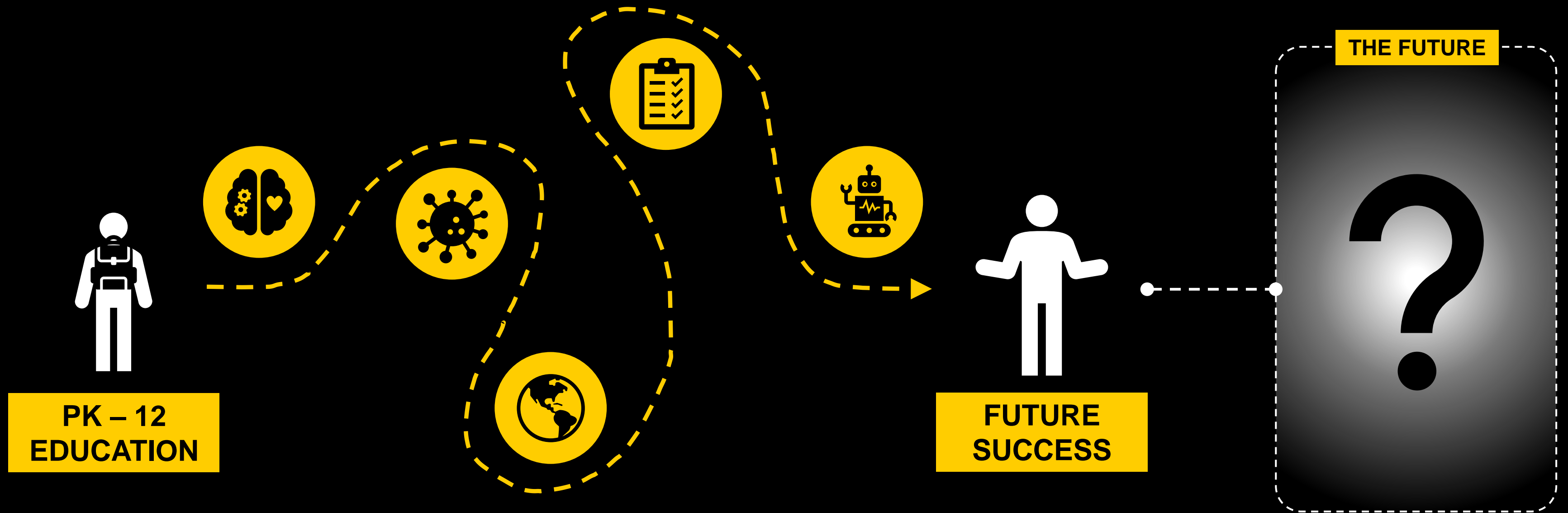


# Navigating an Unpredictable World





# Navigating an Unpredictable World





# Jobs of Tomorrow?

## *Projections for 2030*

1

### **VIRTUAL STORE SHERPA**

Focus on customer satisfaction through virtually advising customers using the knowledge of the product line

2

### **PERSONAL DATA BROKER**

Confirm consumers receive revenue from their data. The broker will establish prices and execute trades.

3

### **PERSONAL MEMORY CURATOR**

Consult with patients and stakeholders to generate specifications for virtual reality experiences.

4

### **AR JOURNEY BUILDER**

Collaborate with talented engineers and technical artists to develop vital elements for clients.

5

### **BODY PART MAKER**

Will create living body parts for athletes and soldiers

6

### **NANO-MEDIC**

Will transform healthcare



## In-Demand Skills

### America Succeeds Durable Skills

- Character
- Collaboration
- Communication
- Creativity
- Critical Thinking
- Fortitude
- Growth Mindset
- Leadership
- Metacognition
- Mindfulness

### World Economic Forum Education 4.0 Framework

- Global citizenship skills
- Innovation and creativity skills
- Technology skills
- Interpersonal skills
- Personalized and self-paced learning
- Accessible and inclusive learning
- Problem-based and collaborative learning
- Lifelong and student-driven learning

### Brookings Institute Skills for a Changing World

- Collaboration
- Communication
- Content
- Critical Thinking
- Creative Innovation
- Confidence

### McKinsey Global Workforce Skills Model

- Higher Cognitive Skills
- Social and Emotional Skills
- Technological Skills



“ [Generation Alpha] will be **lifelong learners, holding multiple jobs across multiple careers.** They will also need to be **adaptive, constantly upskilling and retraining to remain relevant** to the changes anticipated as they move through their working life.

— *Mark McCrindle and Ashley Fell*



# The Science of *How* and *What* Children Learn

Insights from the Brookings Institute



"WHAT"

## SKILLS FOR A CHANGING WORLD: 6Cs

- *Collaboration*
- *Communication*
- *Content*
- *Critical Thinking*
- *Creative Innovation*
- *Confidence*

## PLAYFUL LEARNING PRINCIPLES

- *Active*
- *Engaging*
- *Meaningful*
- *Socially Interactive*
- *Iterative*
- *Joyful*
- Must have a well-articulated *learning goal*

"HOW"

”

As the world of work changes, it is the **character qualities** as well as **competencies** that will **futureproof Generation Alpha.**

- *McCrindle*



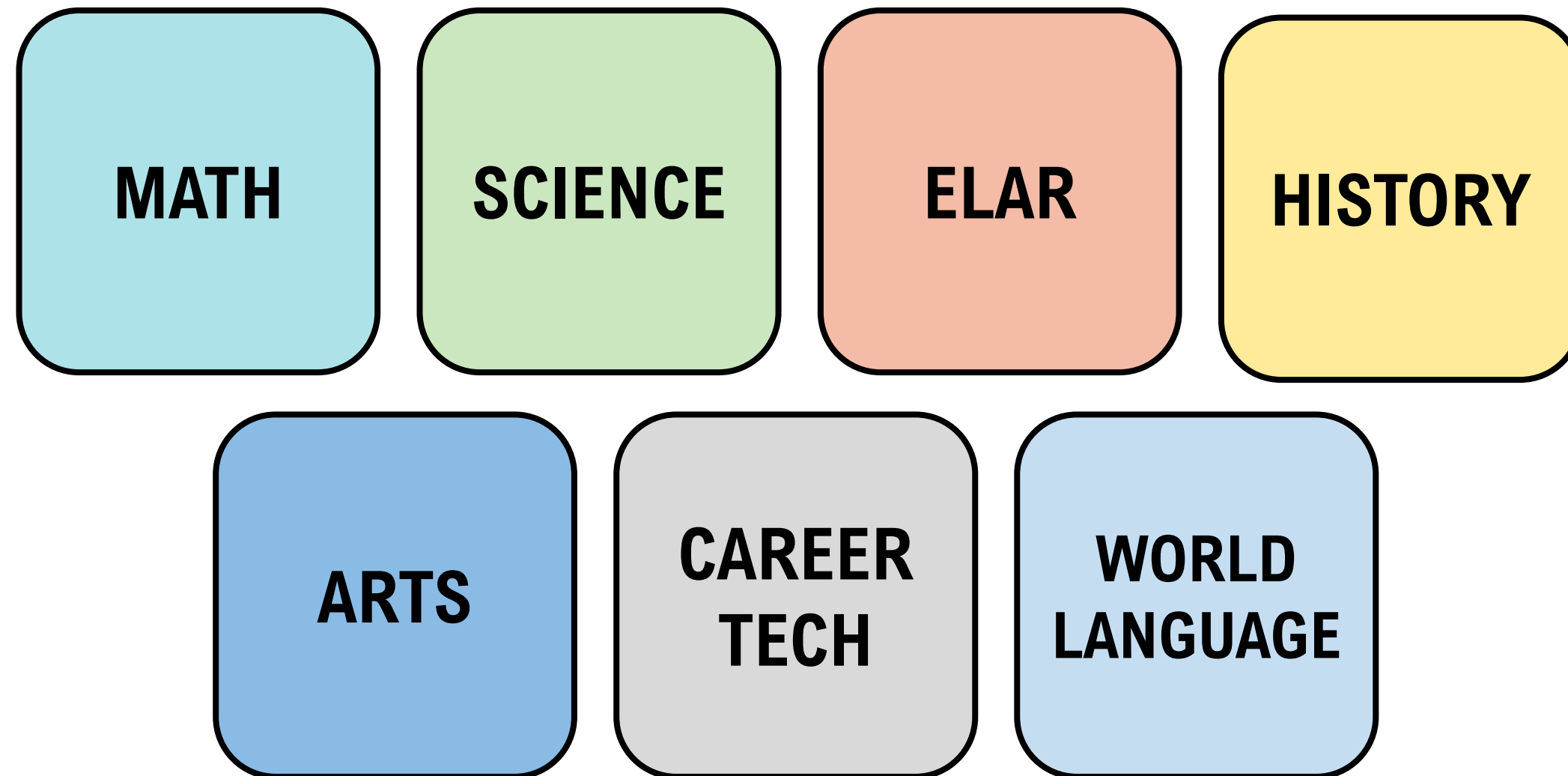
# Next-Gen Approach to Learning

- **For emerging generations, learning is about innovating, building skills, and engaging with the real world**
- Shift from content mastery to **meaningful and relevant skill-building experiences with real-world connections**
- Balance integration of digital tools with grounded experiences
- Nurture a natural drive for **innovation, entrepreneurship, and knowledge-sharing**
  - Opportunities to **create products and services of value**
  - High-Fidelity Learning Environments
  - Industry Partnerships
- Support **social and emotional skills** and competencies
- **Foundation for lifelong learning** and career mobility



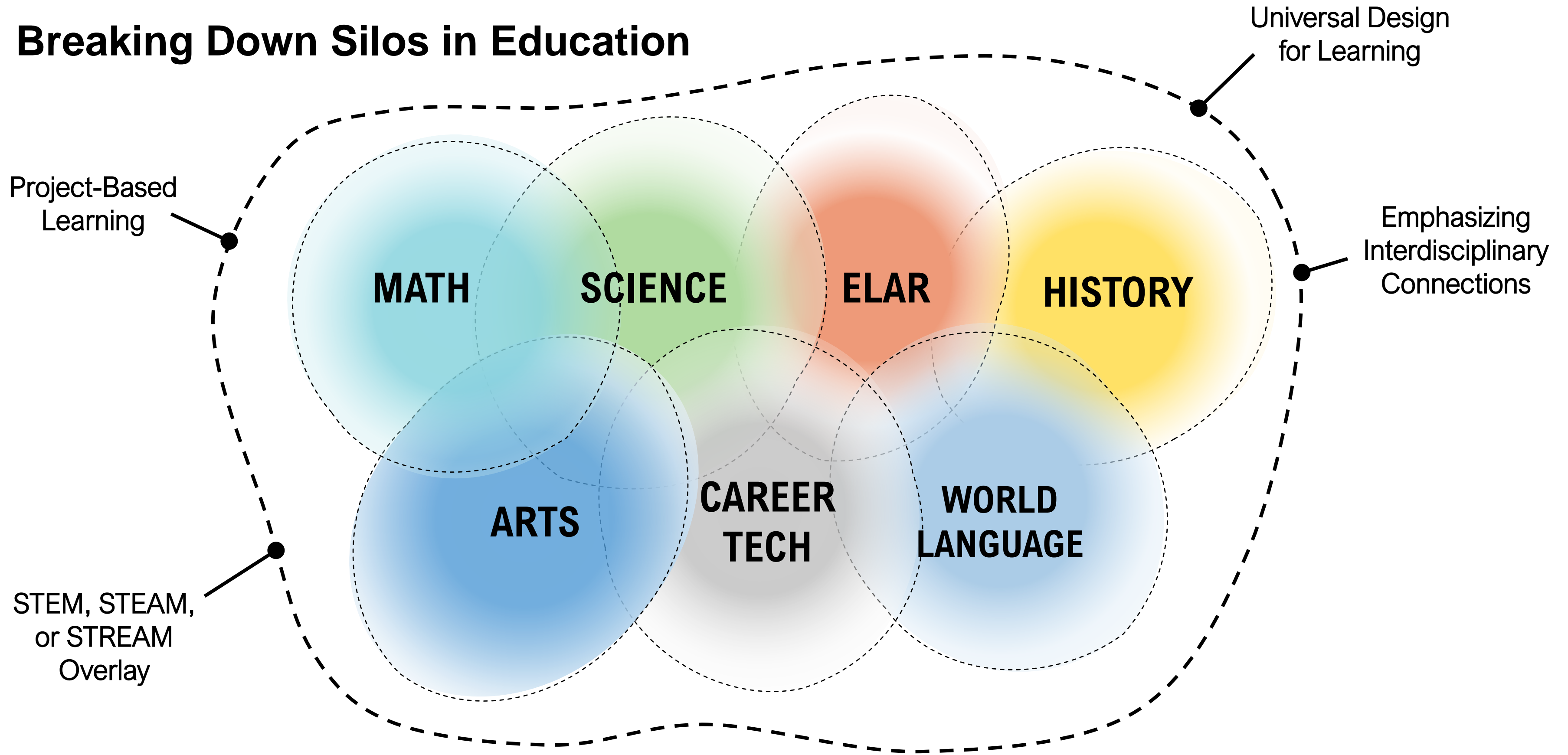


## Breaking Down Silos in Education





# Breaking Down Silos in Education





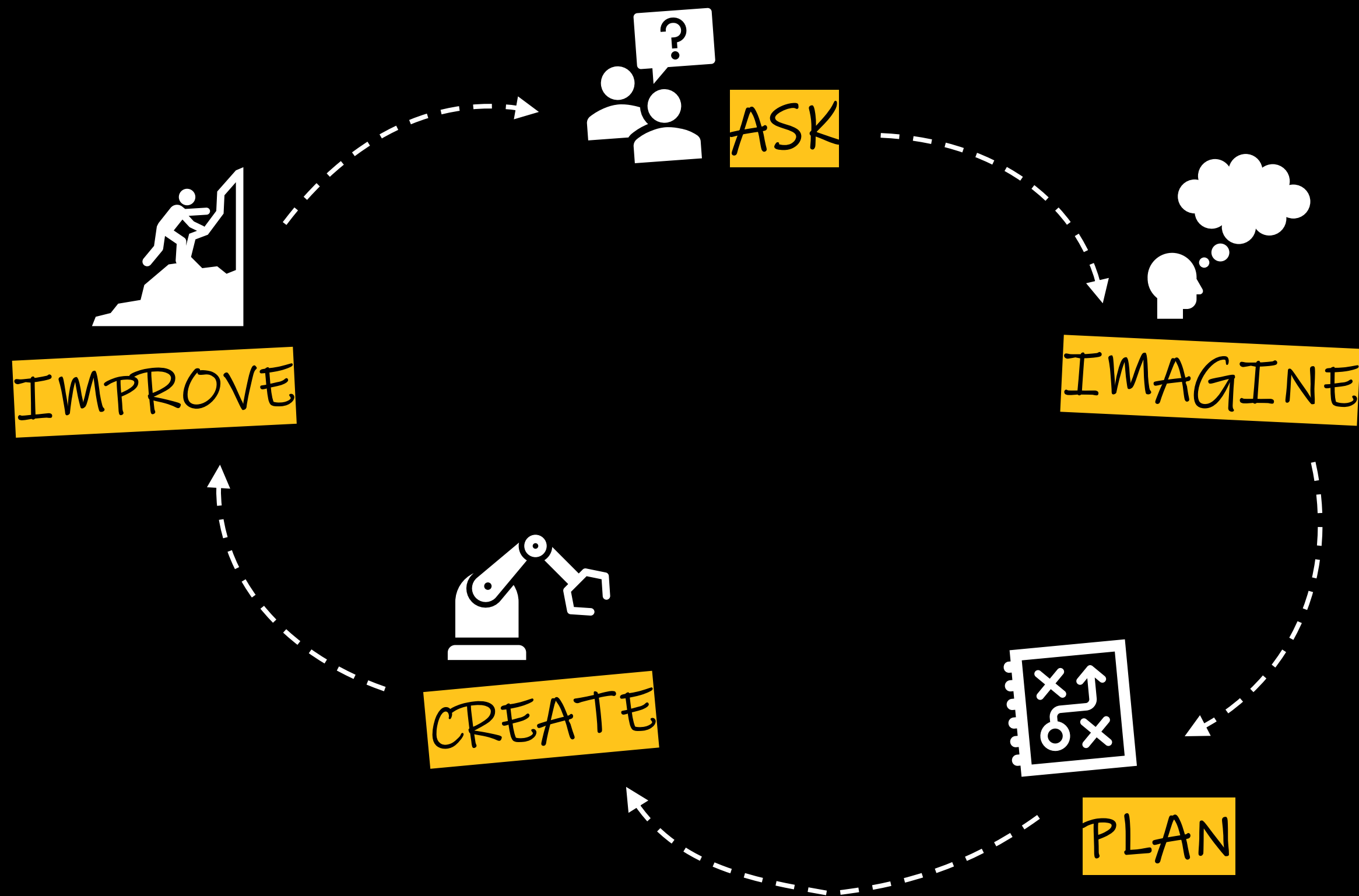
## STREAM as an Integrated Lens for Learning



*The overall aim is to spur curiosity, inquiry, and creativity, ultimately building a love of learning*

[Peters-Burton et al, 2019]





## Learning Through a STREAM Mindset

*5-Step Engineering Design Cycle*

- **STREAM as an approach to learning** and a way of thinking **rather than a content domain**
- Explore interests
- Develop skills and core competencies
- Supports active, student-led, inquiry-based learning

[Peters-Burton et al, 2019; Allal, 2001]



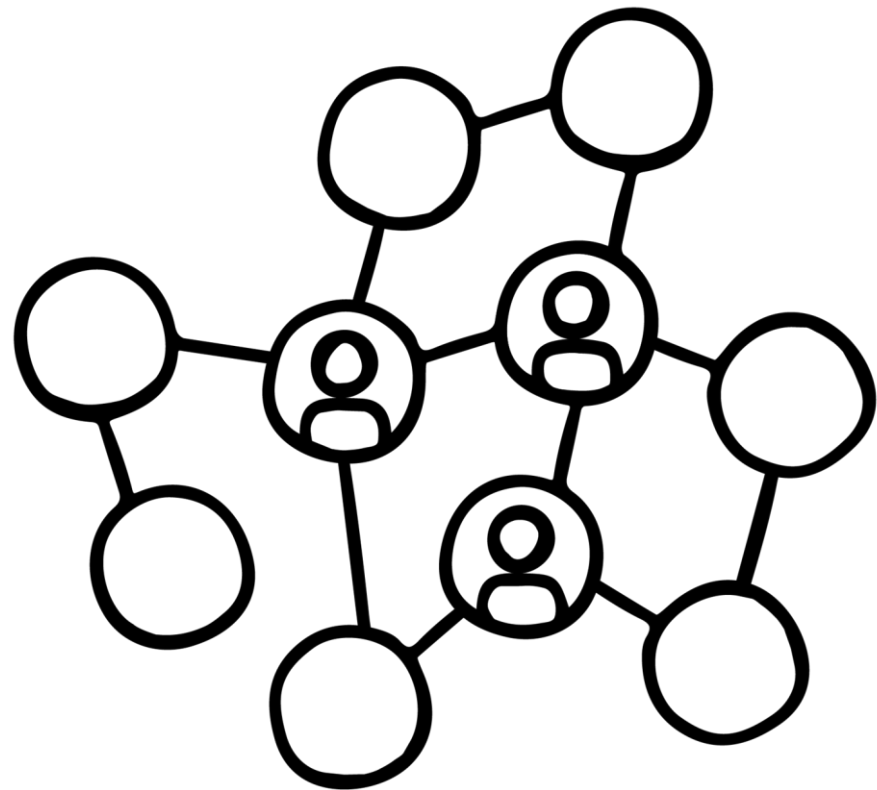
# Horizontal and Vertical Curriculum Integration

- **STREAM** can be a part of learning throughout the day, not just taught as a discrete course
- Facilitate a **comprehensive** educational experience that **builds connections rather than silos of learning**
- Connect knowledge and learning experiences:
  - **Horizontally** across content areas
  - **Vertically** between grade levels

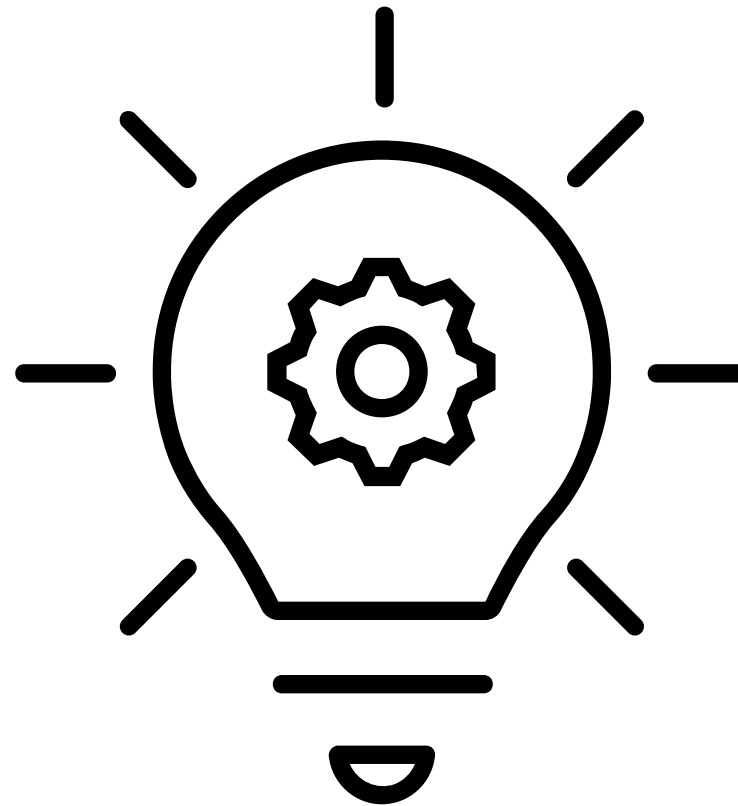




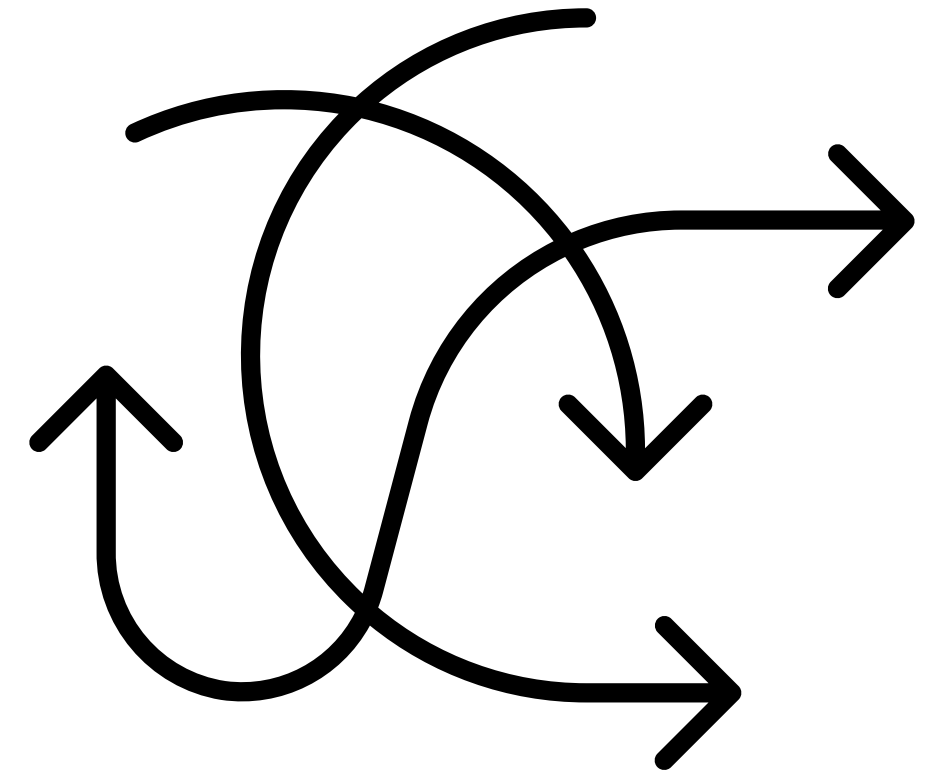
## Core Competencies for Learning and Design



**INTERCONNECTED**



**INNOVATIVE**



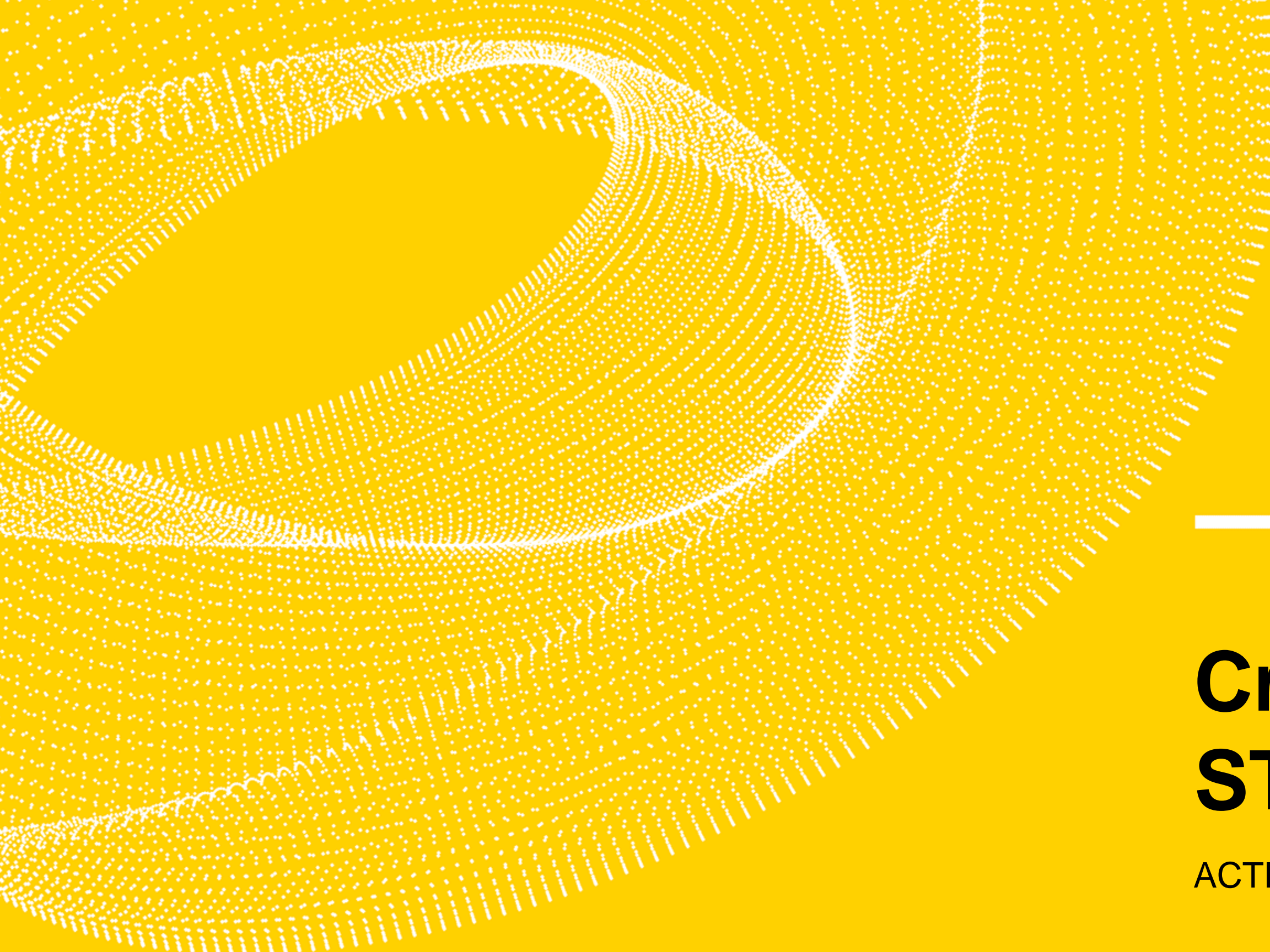
**AGILE**





The challenges we face in the modern world are **complex and interdisciplinary**, but our traditional education system is **siloed**. How can we change that?





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# Create Your Own STREAM Program

ACTIVITY #2



## ACTIVITY #2

# Create Your Own STREAM Program

Work with your team to imagine an interdisciplinary **STREAM** (science, technology, research, engineering, art, and mathematics) **program**.

Start by sorting through your “**content**” and “**career**” cards to identify the **focus of your program** and the **types of future careers** you hope to prepare students for.

Next, **write a description of your program** and/or describe a **STREAM learning experience** students might have.

**STREAM**  
*Create Your Own Interdisciplinary Program*

**1** Which content areas would you like to integrate into your STREAM program?

**2** What career(s) of the future could your STREAM program support?

**3** Write a brief description of the STREAM program you've imagined. What do you hope students will learn in your program?

Chemistry

Coding / Computer Science

Biotechnology

Genetics Coach

Biomimicry Innovator

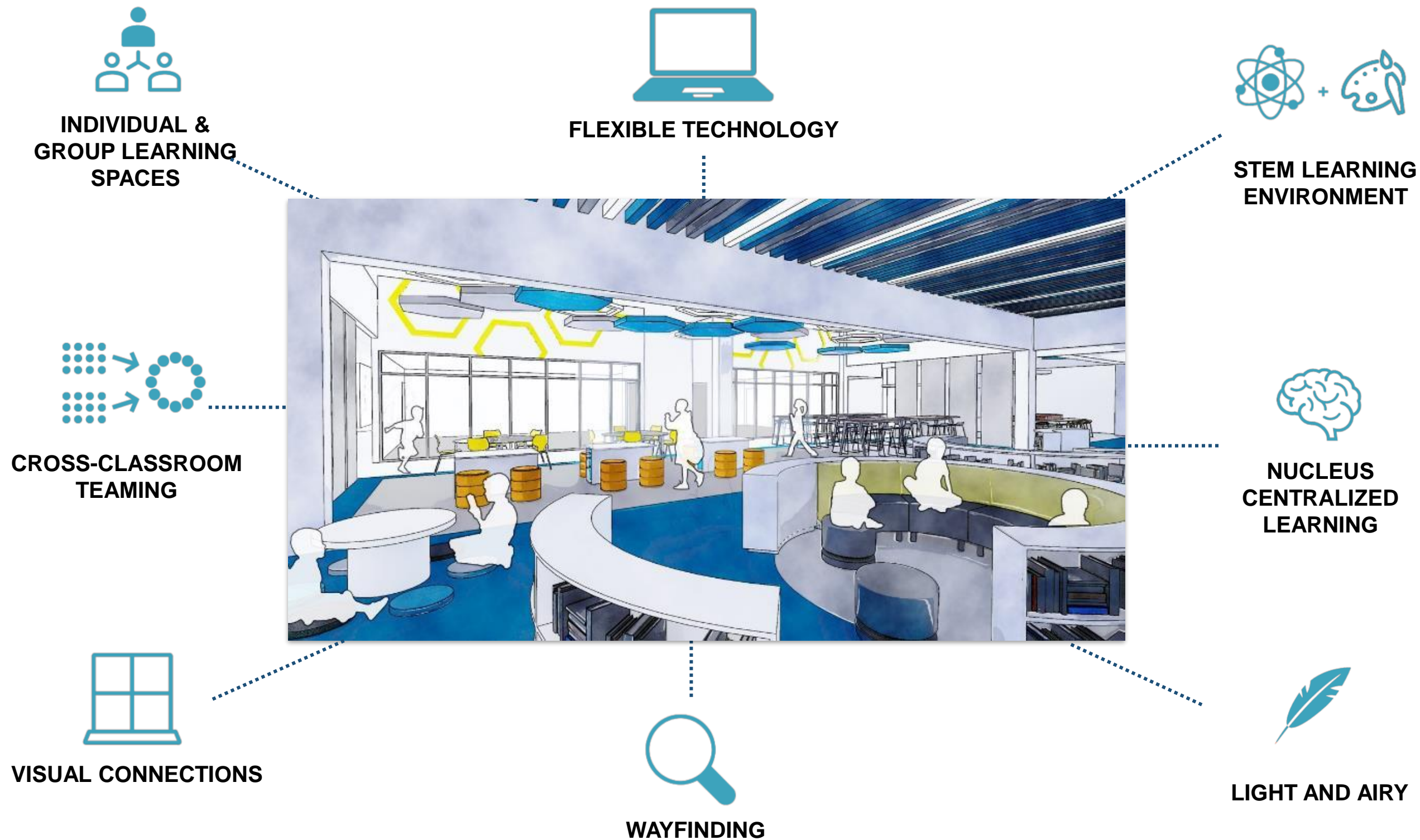


# Decatur ISD STEM Academy at Enis Elementary





# Research-Based Design

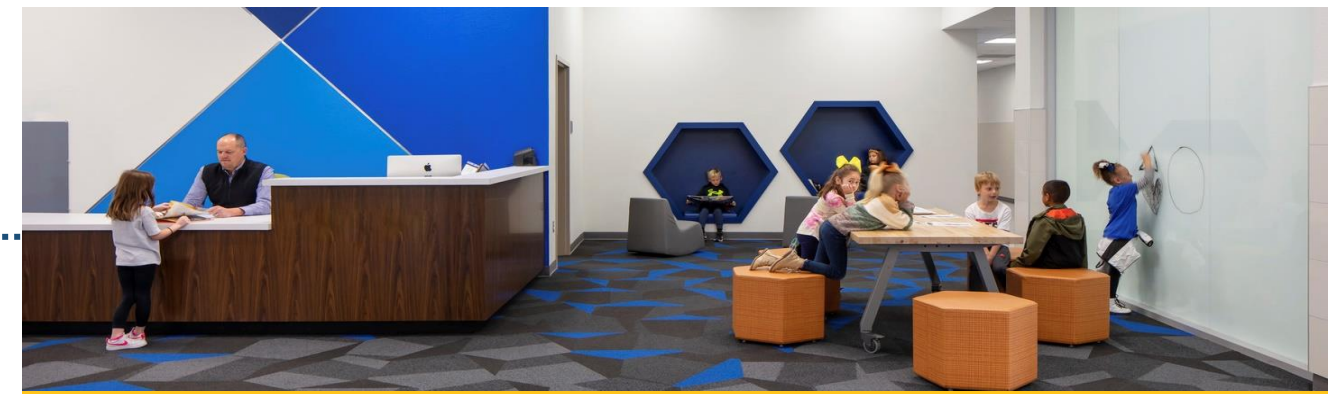
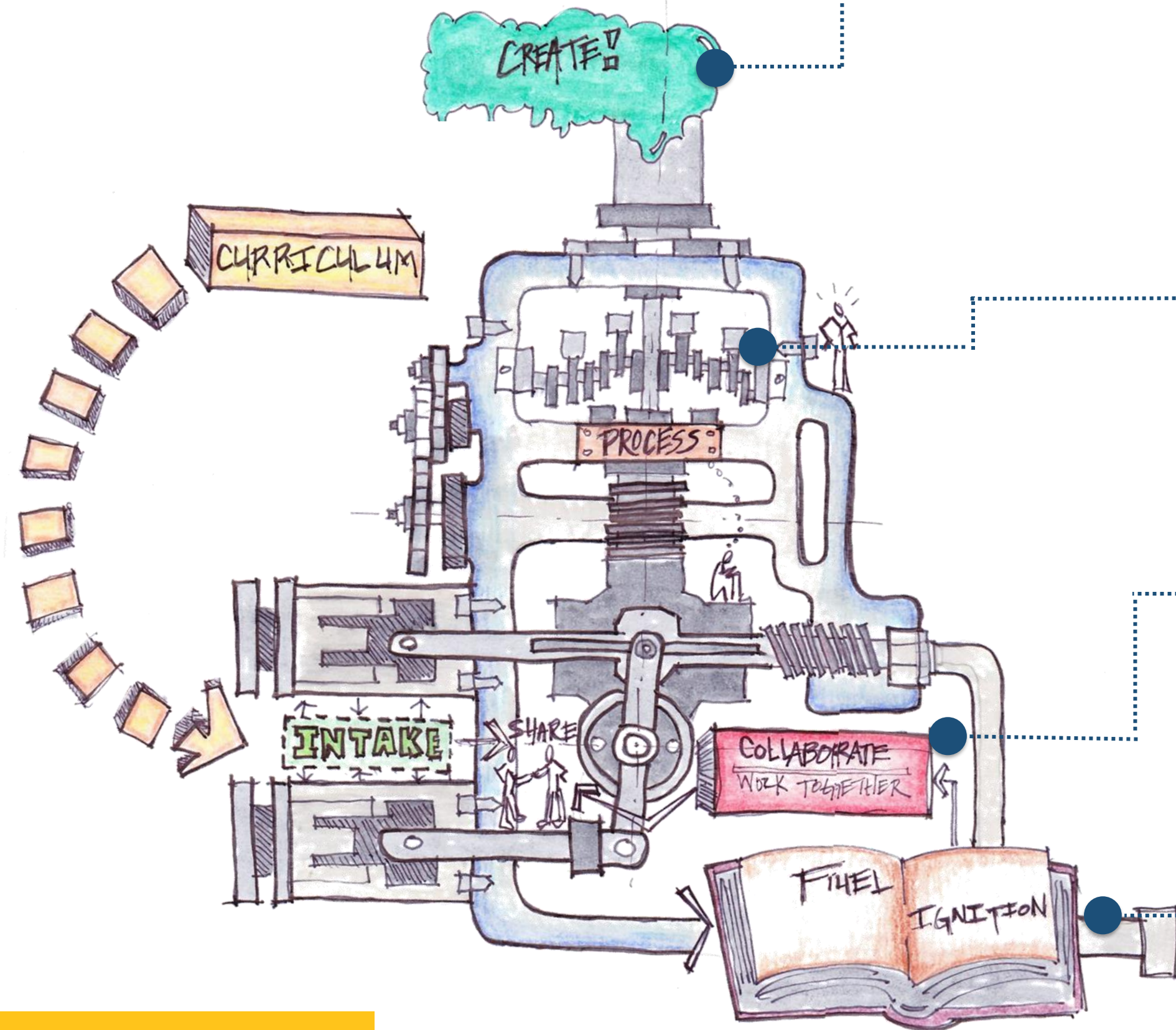


*Initial planning efforts revealed key research-based space typologies*

- Active learning
- Whole person learning
- Learning through observation and learning by doing
- Empowerment and belonging
- Unlimited opportunities



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**4. CREATE** Produce tangible outcome



**3. PROCESS** Evaluate information from all sources



**2. COLLABORATE** Share information



**1. FUEL/IGNITE** Absorb guided instruction

**Igniting Innovation**





AFTER

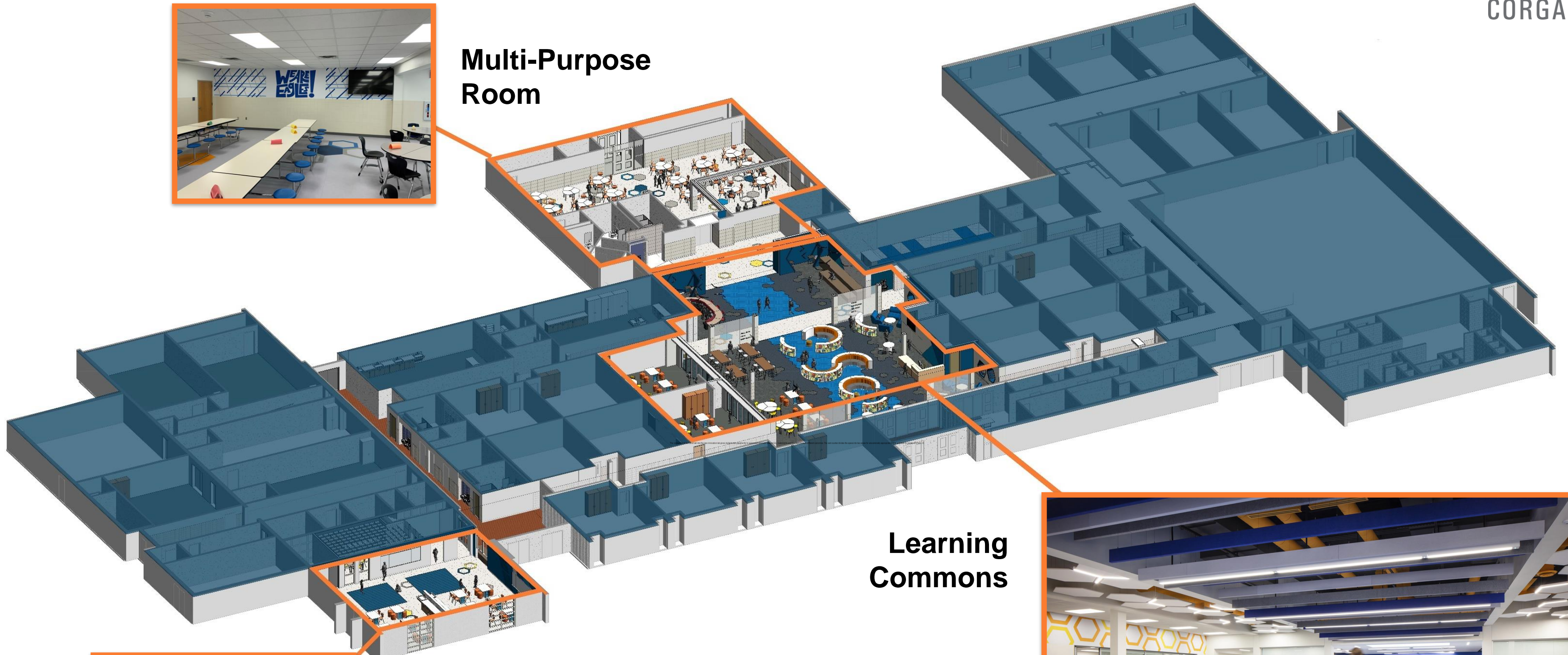


BEFORE

# Embracing a Spirit of Transformation in Learning and Design:

*Elevating learning environments of the past to serve the students of the future*





**Multi-Purpose Room**



**Learning Commons**



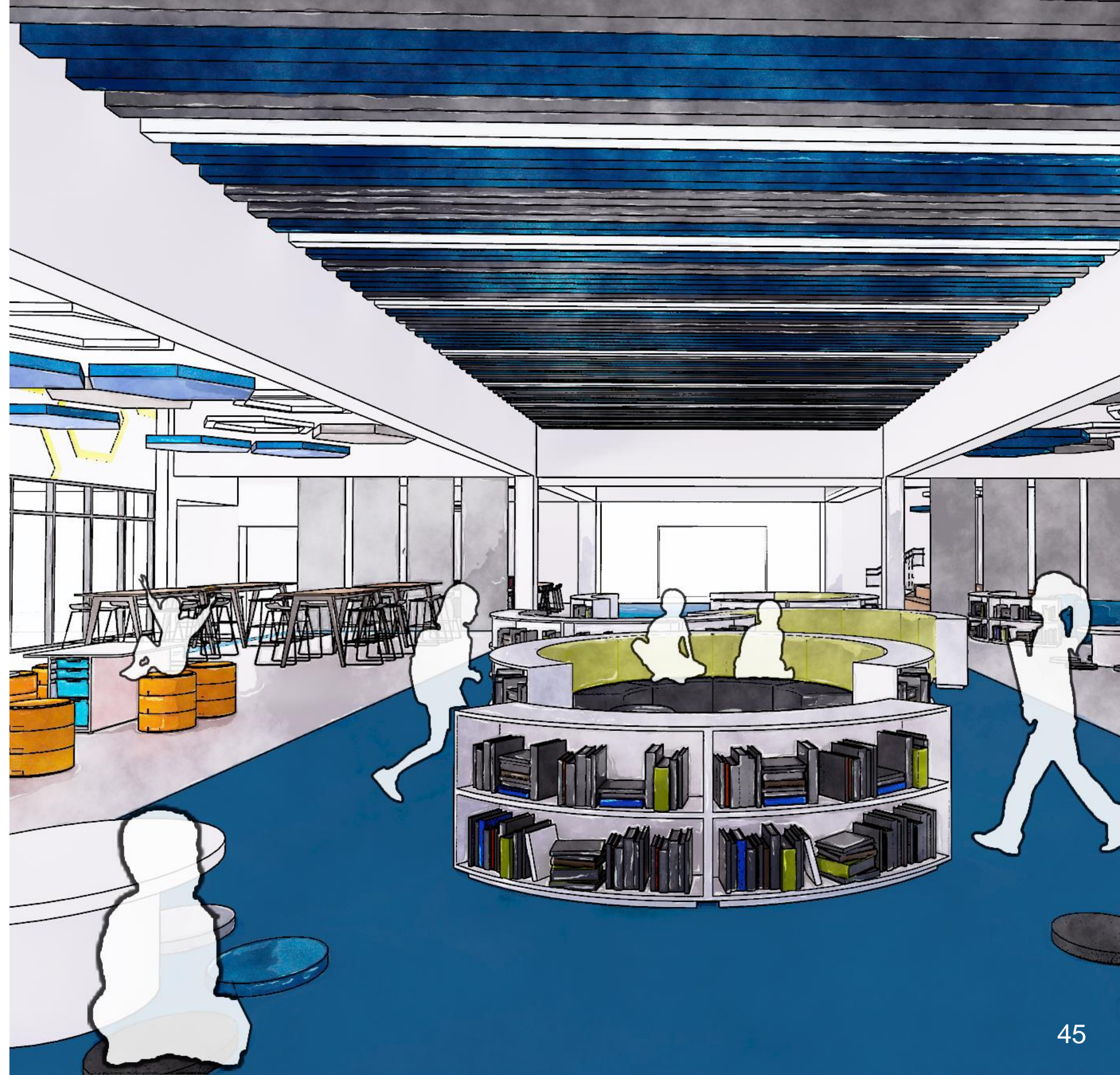
**Innovation Lab**



# STEM at the Center

## *The Learning Commons*

The renovation transformed a traditional 38-year-old building into a **facility for modern learning** that includes flex spaces, project labs, and collaboration areas. Planning revealed the importance of **spatial flexibility** to accommodate current and evolving programs. **At the center of the school, the learning commons serves as a place for students to absorb, gather, and connect knowledge across learning experiences.**





The **Learning Commons** serves as the **central heartbeat** of the building

Students can **“cross pollinate”** by circulating through an open environment with visual connections to a variety of opportunities for learning.

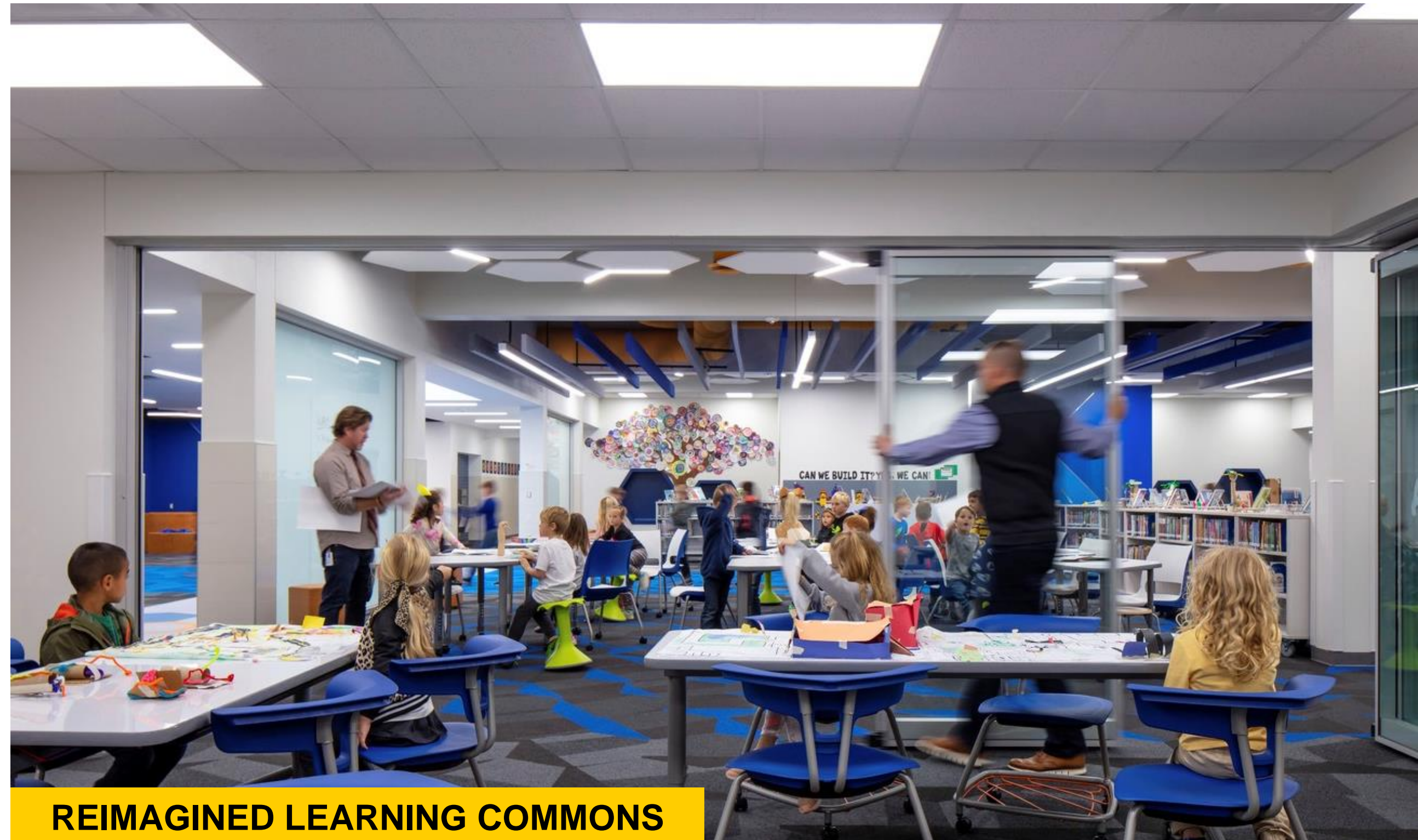




## Adaptability in Learning and Design

*Teaching methods and practices will **evolve** and change more frequently than in a traditional school environment.*

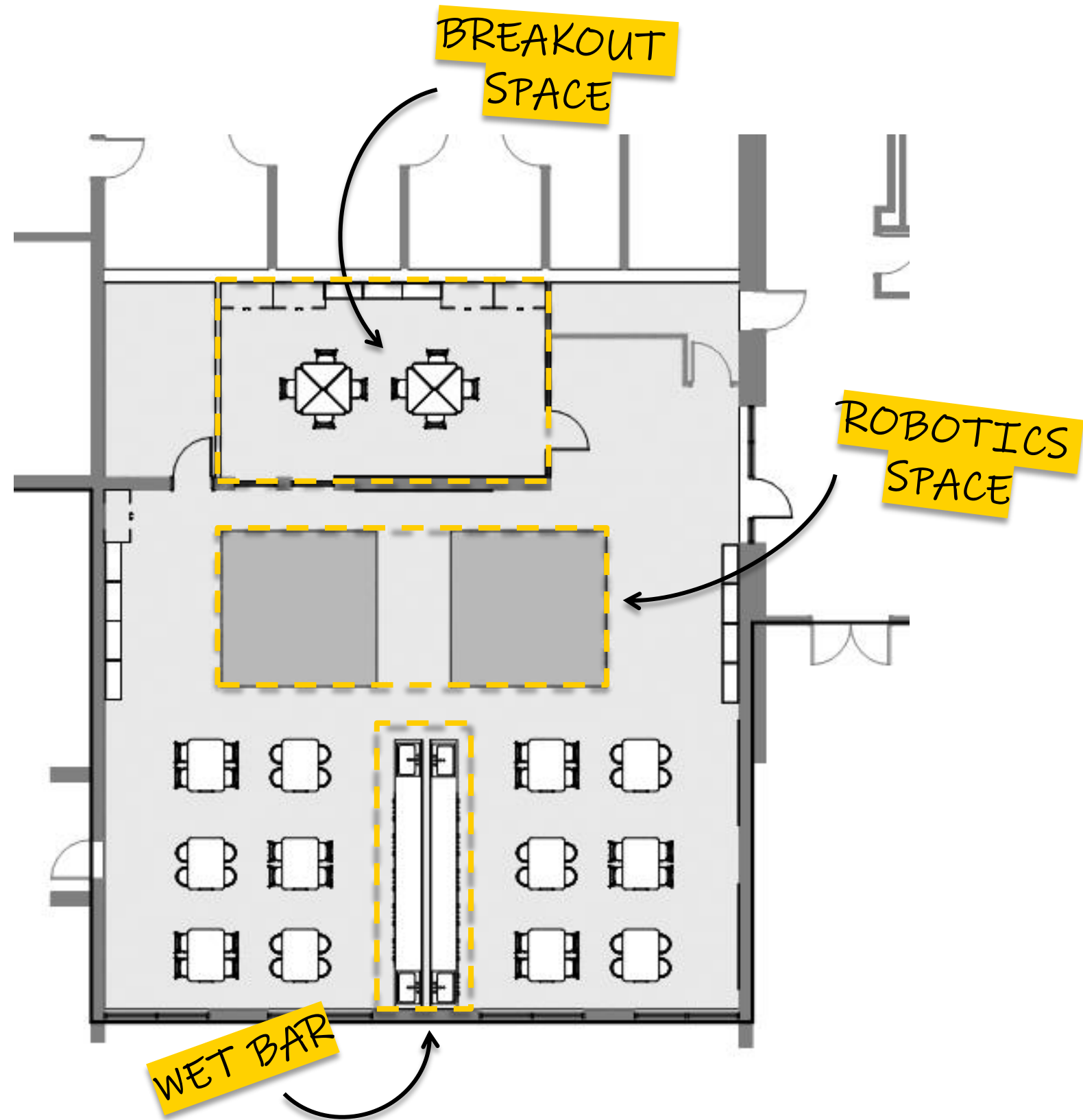
- Flexible, modifiable, adaptable spaces to support a variety of learning activities
- Facilitate easy transition and transformation
- **Accommodate changing needs as programs evolve**
- Encourage interdisciplinary learning



**REIMAGINED LEARNING COMMONS**



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## ***Innovation Lab***

- Hands-on, minds-on learning experiences
- The **innovation lab** allows students to use project space and experiment on multiple levels
- Supports a variety of activities and learning opportunities



Modern Renaissance: Challenging Siloed Learning with a Whole-Brain Approach to Educational Environments



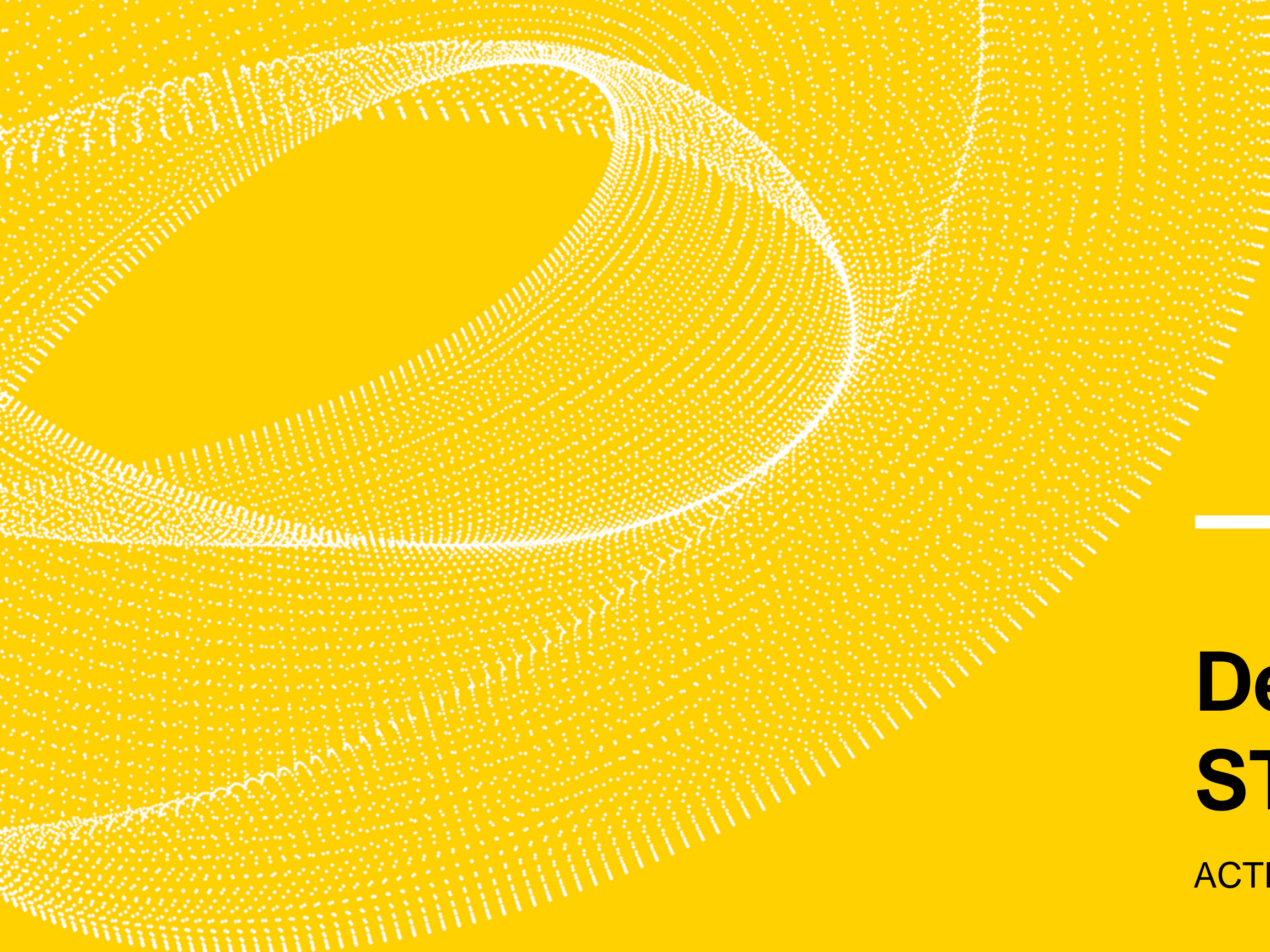


## Designing for a *Future- Ready Mindset*

Integrating core competencies, future-focused mindsets, and innovative design strategies to support future-ready learning







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# Designing for **STREAM**

ACTIVITY #3



## ACTIVITY #3

# Designing for STREAM

What **design elements and features** do you need to support your **STREAM program** from Activity #2?

Work with your team to identify key design features and sketch out your vision.

### DESIGNING FOR STREAM:

What do you imagine a **learning environment** for your **STREAM program** would look like?

#### KEY FEATURES:

Blank area for identifying key design features.

#### LEGEND:

- Solid Wall
- - - Window
- ~ Operable Partition
- - - - Overhead Door

Balance nature and technology

Connect to the outside

**DESIGN IDEAS:** You can create a diagram, a sketch, or a plan!



# References & Sources

- Allal, L. (2001). Situated cognition and learning: From conceptual frameworks to classroom investigations. *Schweizerische Zeitschrift für Bildungswissenschaften*, 23(3), 407-422.
- The Annie E. Casey Foundation. (2020, November 4). What is generation alpha? The Annie E. Casey Foundation. Retrieved October 7, 2021, from <https://www.aecf.org/blog/what-is-generation-alpha>.
- Cole, L., Short, S., Cowart, C., & Muller, S. (2021, October). The High Demand for Durable Skills. *America Succeeds*.
- Corgan. (2022). (rep.). Design Lessons from Teachers 2.0. Retrieved March 15, 2023, from <https://www.corgan.com/sites/default/files/inline-files/design-lessons-from-teachers-whitepaper-corgan-2022.pdf>.
- Dawson, E. (2020, July 7). Forget the right vs. left myth: You're whole-brained. Ohio State Medical Center. <https://wexnermedical.osu.edu/blog/right-vs-left-myth>
- Duggal, N. (2023, March 9). Future of work: What job roles will look like in 10 years [updated]. *Simplilearn.com*. Retrieved March 15, 2023, from <https://www.simplilearn.com/future-of-work-article>
- Farmer, T. A., & Matlin, M. W. (2019). *Cognition*. John Wiley & Sons.
- Golinkoff, R. M.; Hirsh-Pasek, K. (2016). *Becoming brilliant: What science tells us about raising successful children*. American Psychological Association.
- Guthrie Yarwood, M. (2022). *Psychology of human emotion: An open access textbook*. Pressbooks. <https://psu.pb.unizin.org/psych425/>
- The high demand for durable skills - America succeeds. *America Succeeds - Business Voice for Education*. (2022, August 4). Retrieved March 15, 2023, from <https://americasucceeds.org/portfolio/the-high-demand-for-durable-skills-october-2021>
- Hirsh-Pasek, K., Zosh, J. M., Hadani, H. S., Golinkoff, R. M., Clark, K., Donohue, C., & Wartella, E. (2022, March 9). A whole new world: Education meets the metaverse. *Brookings*. Retrieved May 1, 2022, from <https://www.brookings.edu/research/a-whole-new-world-education-meets-the-metaverse/>
- Hoogendoorn, Claire. "The Neuroscience of Active Learning." *Writing Across the Curriculum*, October 15, 2015. <https://openlab.citytech.cuny.edu/writingacrossthecurriculum/2015/10/15/the-neuroscience-of-active-learning/>.
- Hwang, V. W. (2013, March 29). Can neuroscience explain innovation? *Forbes*. Retrieved September 24, 2021, from <https://www.forbes.com/sites/victorhwang/2013/03/28/can-neuroscience-explain-innovation/?sh=1beae366be3c>.
- Jezard, A. (2018, June 1). The 3 key skill sets for the workers of 2030. *World Economic Forum*. Retrieved March 15, 2023, from <https://www.weforum.org/agenda/2018/06/the-3-skill-sets-workers-need-to-develop-between-now-and-2030/>
- Lindell, A. K. (2011). Lateral thinkers are not so laterally minded: Hemispheric asymmetry, interaction, and creativity. *Laterality: Asymmetries of Body, Brain and Cognition*, 16(4), 479-498.
- Marinsek, N., Turner, B. O., Gazzaniga, M., & Miller, M. B. (2014). Divergent hemispheric reasoning strategies: reducing uncertainty versus resolving inconsistency. *Frontiers in human neuroscience*, 8, 839.
- Mars, R. B., Neubert, F. X., Noonan, M. P., Sallet, J., Toni, I., & Rushworth, M. F. (2012). On the relationship between the "default mode network" and the "social brain". *Frontiers in human neuroscience*, 6, 189.
- McCrinkle, M., & Fell, A. (2020). *Understanding Generation Alpha*. McCrinkle. Retrieved October 7, 2021, from <https://generationalalpha.com/wp-content/uploads/2020/02/Understanding-Generation-Alpha-McCrinkle.pdf>.
- Nielsen JA, Zielinski BA, Ferguson MA, Lainhart JE, Anderson JS (2013) An Evaluation of the Left-Brain vs. Right-Brain Hypothesis with Resting State Functional Connectivity Magnetic Resonance Imaging. *PLoS ONE* 8(8): e71275. <https://doi.org/10.1371/journal.pone.0071275>
- Overmann, K. A., & Malafouris, L. (2017). *Situated Cognition*. *International Encyclopedia of Anthropology*. H. Callan (Ed.), Wiley.
- Peters-Burton, E. E., House, A., Peters, V., & Remold, J. (2019). Understanding STEM-focused elementary schools: Case study of Walter Bracken STEAM Academy. *School Science and Mathematics*, 119(8), 446-456.
- Prabhu, V., Sutton, C., & Sauser, W. (2008). Creativity and certain personality traits: Understanding the mediating effect of intrinsic motivation. *Creativity Research Journal*, 20(1), 53-66.
- The Right/Left Brain Myth and More Neuroscience Insight. *Wharton Executive Education*. (2023, August 18). <https://executiveeducation.wharton.upenn.edu/thought-leadership/wharton-at-work/2023/05/insights-from-neuroscience/>
- Roth, A., Kim, H., Care, E. (2017, August 31). New data on the breadth of skills movement: Over 150 countries included. *Brookings*. Retrieved May 1, 2022, from <https://www.brookings.edu/blog/education-plus-development/2017/08/31/new-data-on-the-breadth-of-skills-movement-over-150-countries-included/>
- Schultz, K., & Davis, T. (2023). *Left Brain vs Right Brain: Definition, theory, & differences*. The Berkeley Well-Being Institute. <https://www.berkeleywellbeing.com/left-brain-vs-right-brain.html>
- Shmerling, R. H. (2022, March 24). Right brain/left brain, right?. *Harvard Health*. <https://www.health.harvard.edu/blog/right-brainleft-brain-right-2017082512222>
- Silva, A., Elhussein, G., Leopold, T., & Zahidi, S. (2022). (rep.). *Catalysing Education 4.0: Investing in the Future of Learning for a Human-Centric Recovery*. *World Economic Forum*. Retrieved March 15, 2023, from [https://www3.weforum.org/docs/WEF\\_Catalysing\\_Education\\_4.0\\_2022.pdf](https://www3.weforum.org/docs/WEF_Catalysing_Education_4.0_2022.pdf).
- Tompa, R. (2023, March 31). Why is the Human Brain so Difficult to Understand? We Asked 4 Neuroscientists. *Allen Institute*. <https://alleninstitute.org/news/why-is-the-human-brain-so-difficult-to-understand-we-asked-4-neuroscientists/#:~:text=Nearly%20100%20years%20ago%2C%20physicist,neuroscience%20is%20a%20futile%20endeavor>
- Weiner, E. (2017, May 8). Renaissance Florence was a better model for innovation than Silicon Valley is. *Harvard Business Review*. <https://hbr.org/2016/01/renaissance-florence-was-a-better-model-for-innovation-than-silicon-valley-is#:~:text=Those%20hoping%20to%20launch%20the%20world%E2%80%99s%20next%20great,the%20world%20has%20not%20seen%20before%20or%20since>.
- World Economic Forum. (2016). *The Future of Jobs*. *World Economic Forum*. Retrieved October 7, 2021, from <https://reports.weforum.org/future-of-jobs-2016/>.
- Zmuda, A., Alcock, M., & Fisher, M. (2017). *Meet Generation Alpha: Teaching the Newest Generation of Students*. *Solutiontree.com*:[sayt].-URL: <https://solutiontree.com/blog/teaching-generation-alpha>.





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# Questions?

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