Design Thinking: A Pathway to Innovation in Education

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Class Summary

Key to the successful implementation of science, technology, engineering, and math (STEM) learning is the development and implementation of innovative strategies that will support students in thinking across disciplines. This class highlights how the “design thinking” process, a methodology that has been successfully applied in business and multiple fields of design, can serve as a powerful tool for operationalizing STEAM learning in secondary education by promoting 21st-century skills related to creativity, critical analysis, collaboration, communication, and content mastery. The class will draw connections between design thinking and new research in the area of cognition and learning that challenge traditional educational policies and practices. Examples from the Digital STEAM workshop will be used to illustrate the potential of technology enhanced design thinking to support the successful integration of STEAM learning in secondary education.

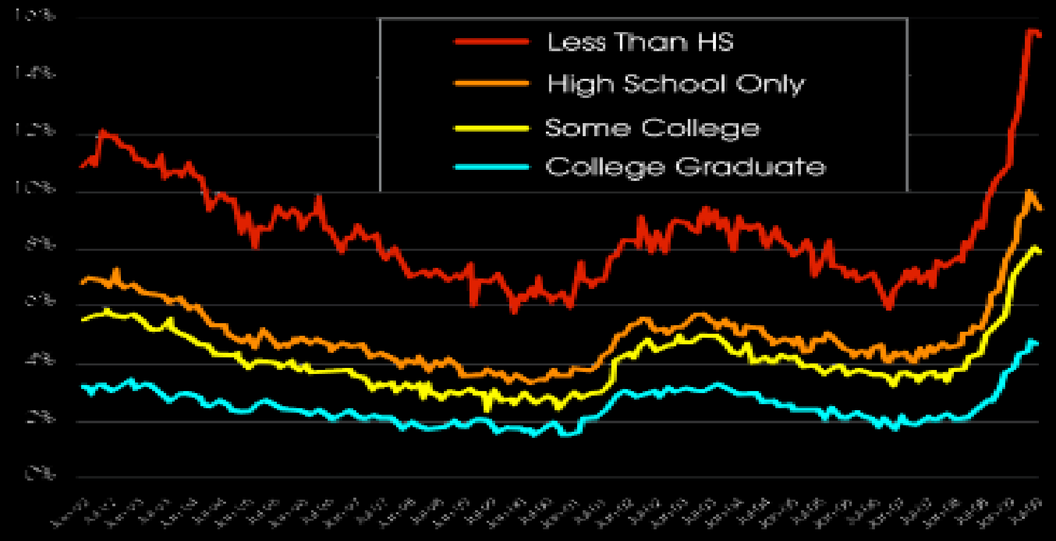
Learning Objectives

At the end of this class, you will be able to:

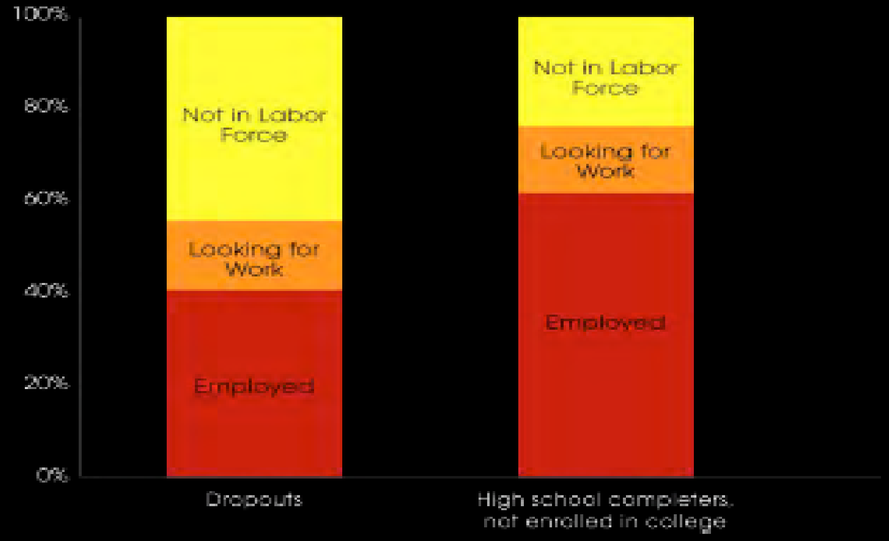
- List the principles of design thinking and explain the relationship of these “cognitive” practices to educational reform.
- Describe the research that validates the importance of design thinking as an educational methodology.
- Describe the role that design thinking plays in shaping the projects and curricular resources.
- Explain the significance of the arts (the "A" in STEAM) in relationship to STEM learning

Education is highly correlated with employment and workforce participation

High school dropouts today have 3x the unemployment rate of college graduates.

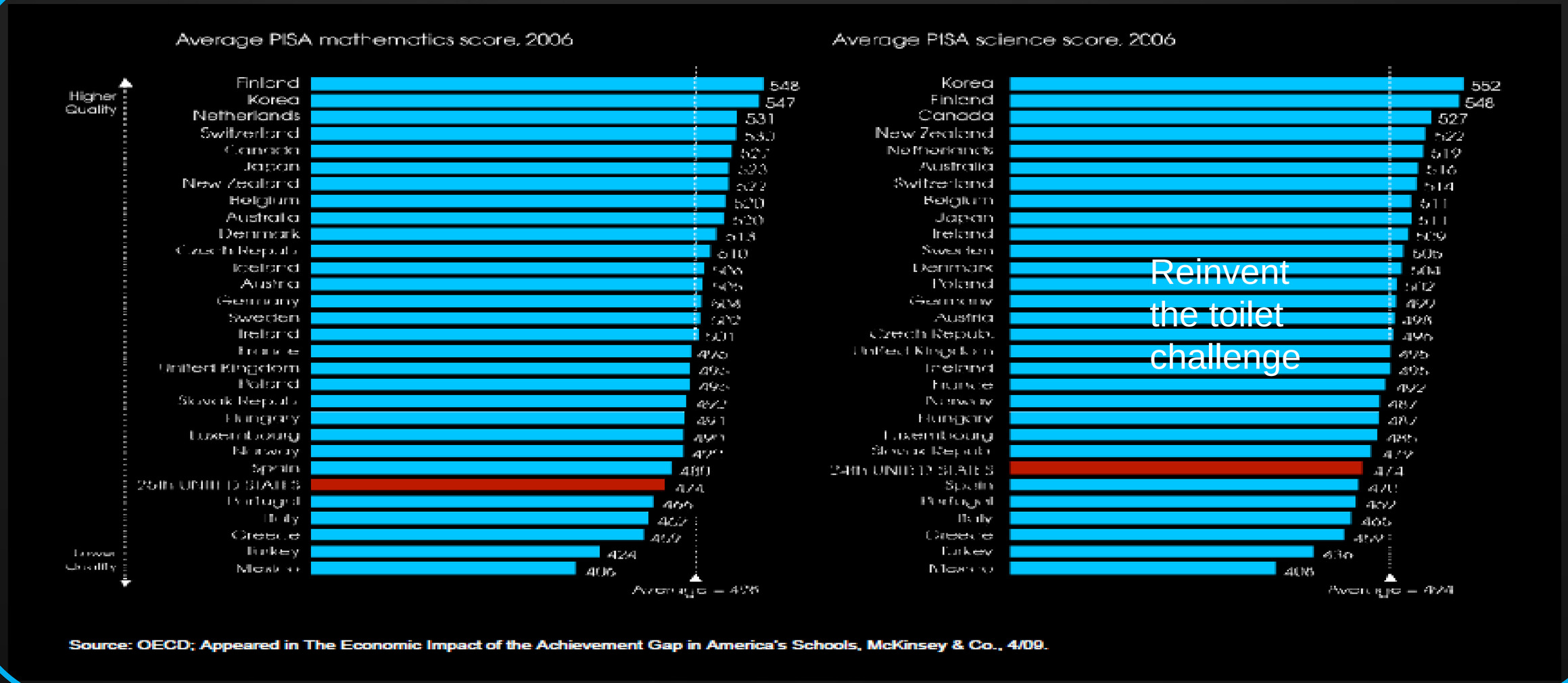


44% of high school dropouts are not in the labor force and an additional 15% are unemployed.



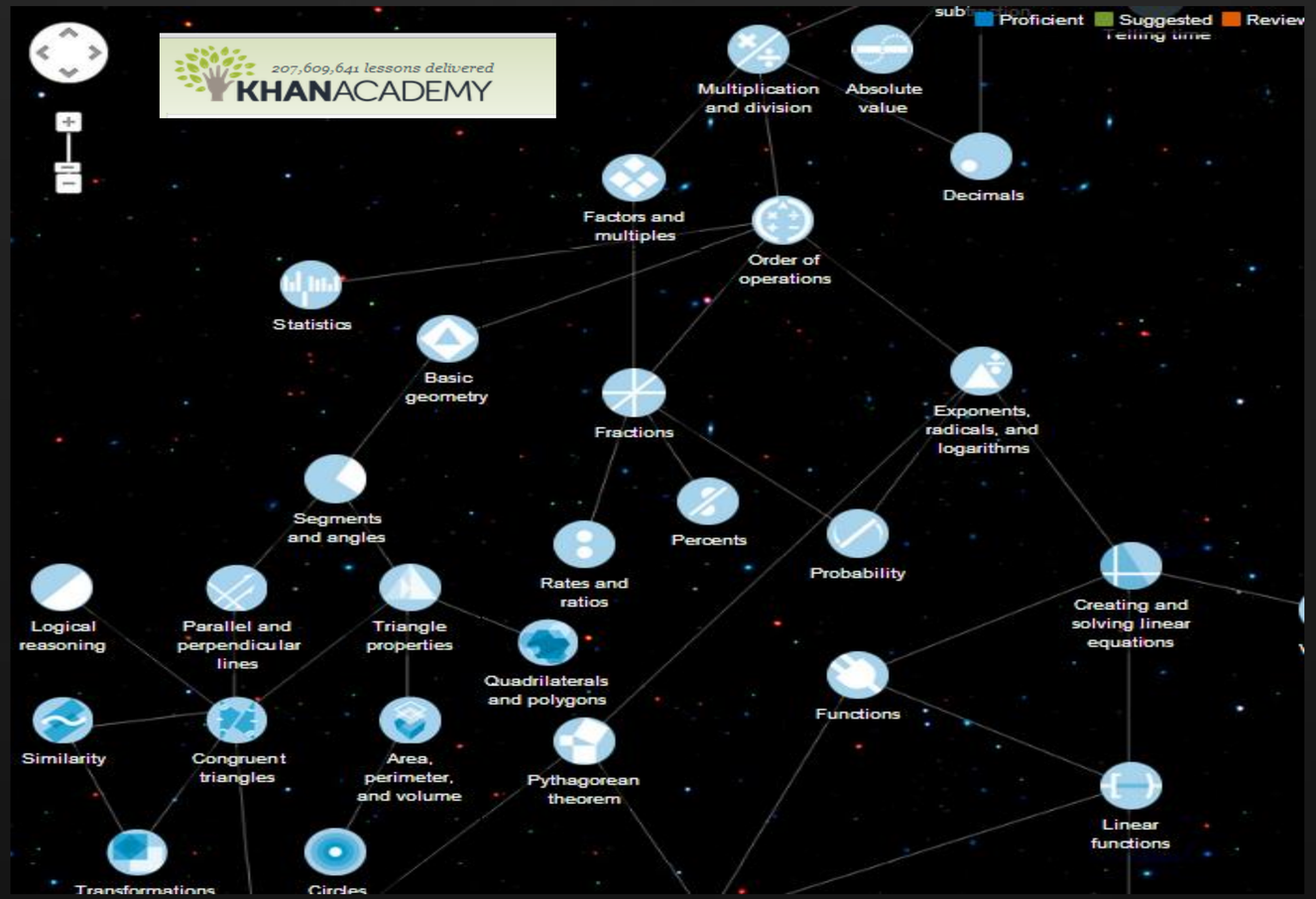
Source: Bureau of Labor Statistics, December 2009 unemployment data; Current Population Survey (left); U.S. Department of Commerce, Census Bureau, Current Population Survey (CPS), October 2007.

U.S. Ranking in Math and Science in Relation to all other OECD countries



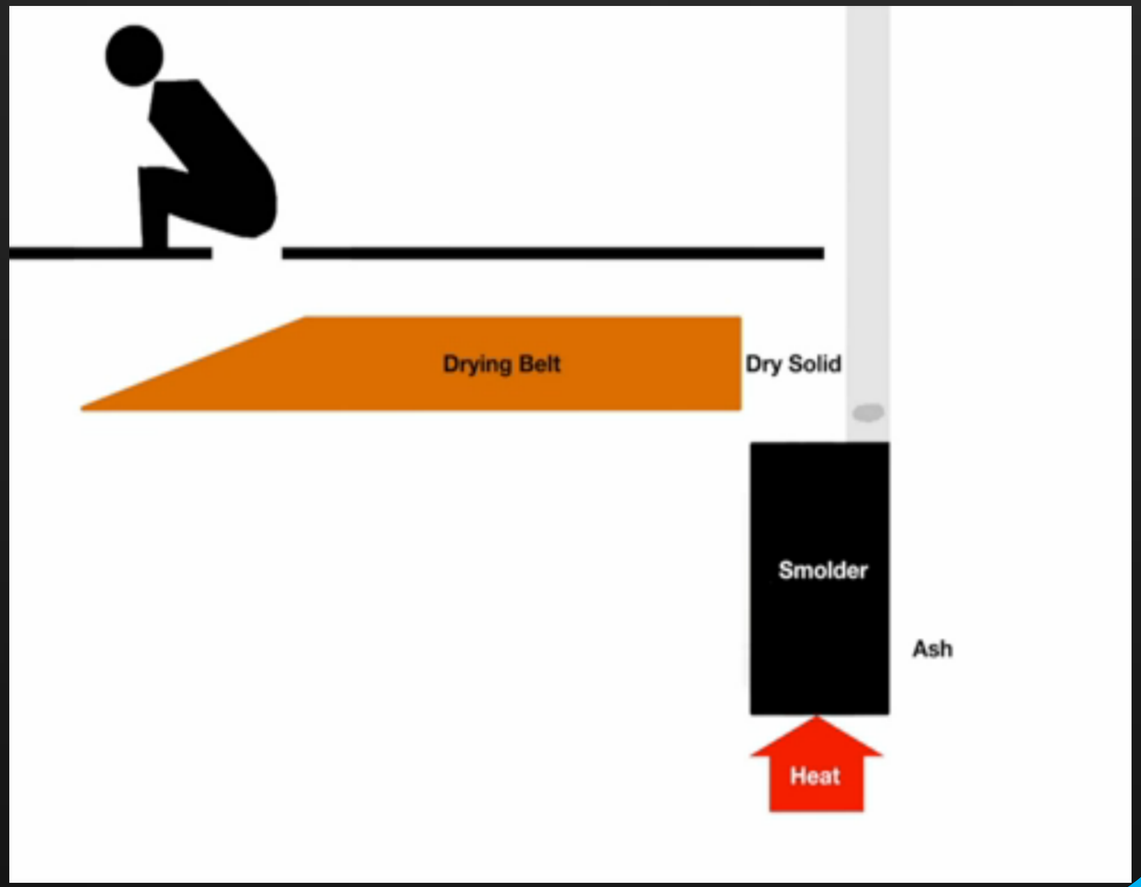
Source: OECD; Appeared in The Economic Impact of the Achievement Gap in America's Schools, McKinsey & Co., 4/09.

Today, Information is Ubiquitous and Knowledge is a Commodity …



“It is no longer about what you know but rather what you can do with what you know”…

Tony Wagoner – “ Creating Innovators”



Reinvent the toilet challenge

Skills for Success in the Global Knowledge Economy

Tony Wagoner Creating Innovators”

Next Generation Science Standards – " Reasoning" Practices"

Source *U.S. National Research Council Framework for K-12 Science Education 2012*

1. **Asking questions (for science) and defining problems (for engineering)**
2. **Developing and using models**
3. **Planning and carrying out investigations**
4. **Analyzing and interpreting data**
5. **Using mathematics and computational thinking**
6. **Constructing explanations (for science) and designing solutions (for engineering)**
7. **Engaging in argument from evidence**
8. **Obtaining, evaluating and communicating information**

Common Core State Standards- Mathematics " Reasoning" Practices"

Source *National Governor's Association and Council of Chief State School Officers 2012*

1. **Make sense of problems and persevere in solving them**
2. **Reason abstractly and quantitatively**
3. **Construct viable arguments and critique the reasoning of others**
4. **Model with mathematics**
5. **Use appropriate tools strategically**
6. **Attend to Precision**
7. **Look for and make use of structure**
8. **Look for and express regularity in repeated reasoning**

Common Core State Standards- English Language Arts And Literacy in History/ Social Studies, Science and Technical Subjects " Reasoning" Practices"

Source *National Governor's Association and Council of Chief State School Officers 2012*

1. Developing grade level appropriate competencies in reading, writing, speaking, listening and language

1. Building strong content knowledge

2. Comprehend as well as critique

3. Respond to varying demands of audience, task, purpose and discipline

4. Value evidence

5. Use technology and digital media strategically and capably

6. Come to understand other perspectives and cultures

Design Thinking

is a Process and a Mindset

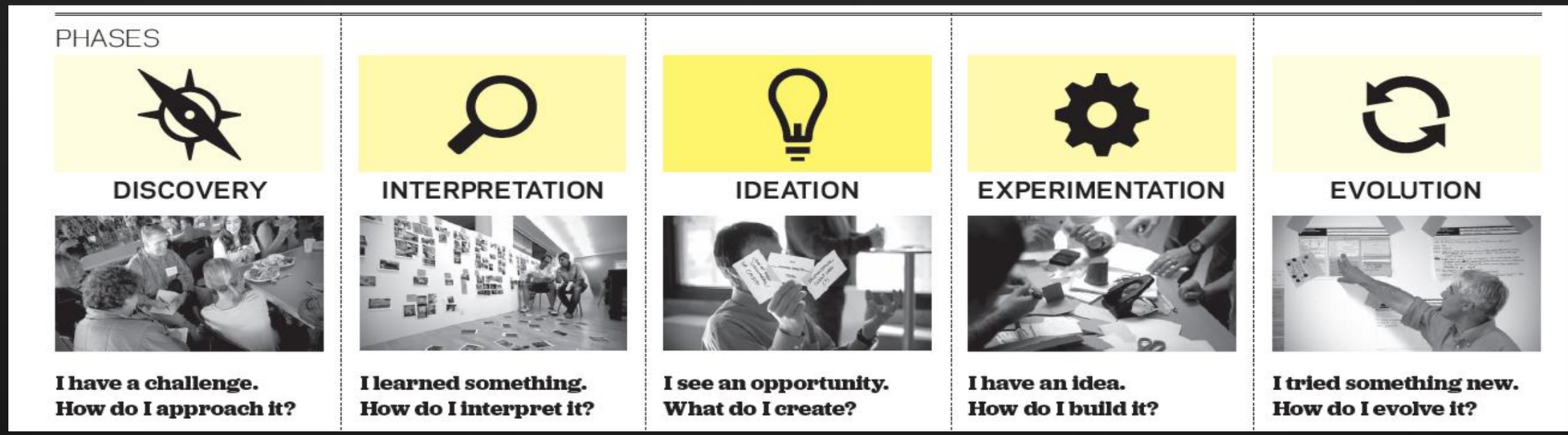
It's Human Centered

It's Collaborative

It's Experimental

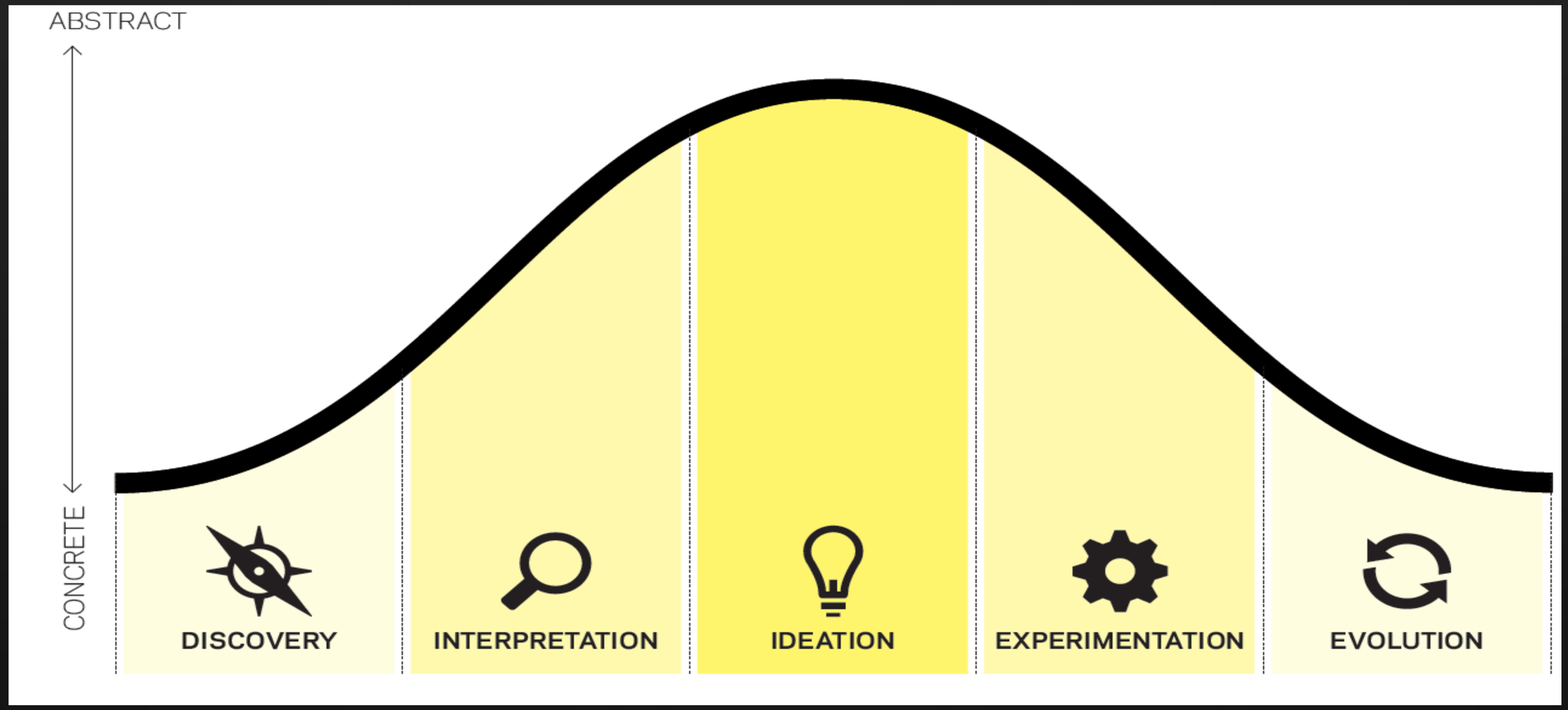
It's Optimistic

Design Thinking



Source: Edutopia - Design Thinking Toolkit for Educators

Design Thinking



Source: Edutopia - Design Thinking Toolkit for Educators

Design Thinking

Autodesk

UNDERSTAND

Paused

Secondary Education Curriculum

House of Curves
Animation - Creating a Public Service Announcement
Andy Daffy

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EXPLORE

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DEFINE

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IDEATE

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PROTOTYPE

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REFINE

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SOLUTION

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