STEAM in a Global K-12 Educational System

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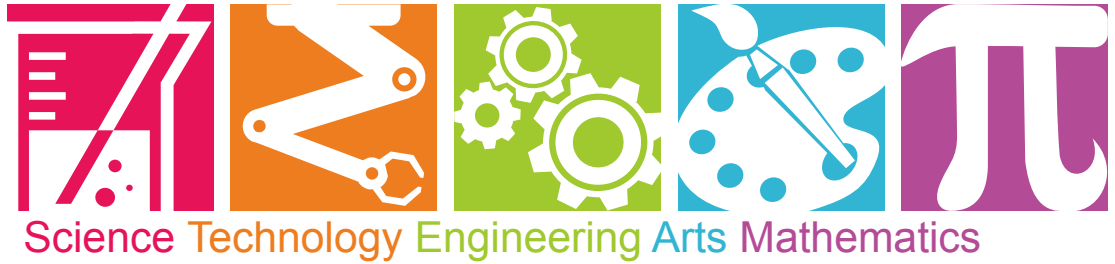
Overview

- STEAM and 21st Century Skills in K-12
- What is STEAM Education?
- Core Elements of STEAM - TPACK & Design Thinking
- Getting Started: Playbook & Resources

STEAM & 21st Century Skills



STEAM

K-12 contexts

Preparing for Future Work

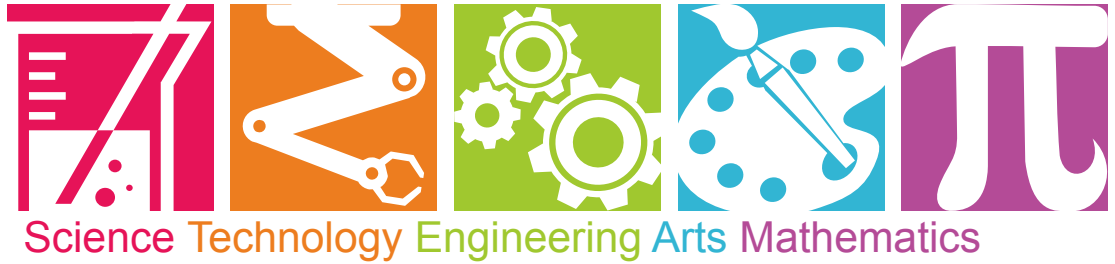
Type of Skill

- Problem-solving
- Working with people
- Technology use and development
- Self-management

- Analytical thinking and innovation
- Reasoning, problem-solving and ideation
- Complex problem solving
- Critical thinking and analysis
- Creativity, originality and initiative
- Leadership and social influence
- Technology use, monitoring and control
- Technology design and programming
- Resilience, stress tolerance and flexibility
- Active learning and learning strategies

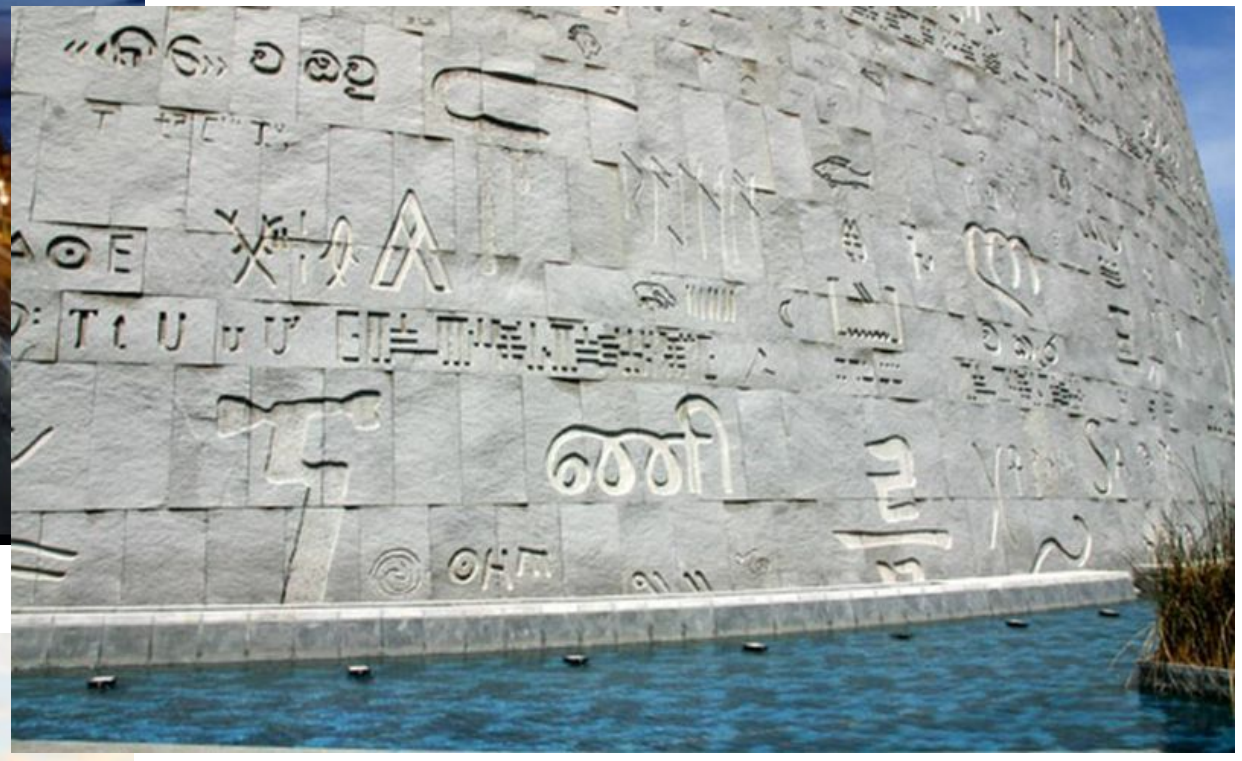
Adapted from image, source:
https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/

What is STEAM Education?



What is STEAM in Education?

- Science
- Technology
- Engineering
- Arts
- Mathematics



STEAM: Pedagogies & Learning Outcomes

- Integration of curriculum for a more balanced approach
- authentic problem solving
- design thinking
- use of available tools and digital technologies
- inquiry and project-based learning
- challenge-based learning (solve a design challenge)

Building 21st century skills: STEAM

- critical thinking
- creativity and innovation
- communication
- collaboration, working in teams
- engaging higher order thinking skills
- building skills and dispositions for learning: metacognition, self-regulation, self-motivation and assessment

STEAM - Education Reform

Education 2.0 promotes a vision of 'learning, thinking, innovating', where education is the means to create passionate and curious learners, open-minded communicators, and creative innovators to compete in national and international markets, and to contribute to creating a 'learning society' as well as the economic and social development in Egypt.

Life Skills and Citizenship Education Initiative
Middle East and North Africa

LSCE

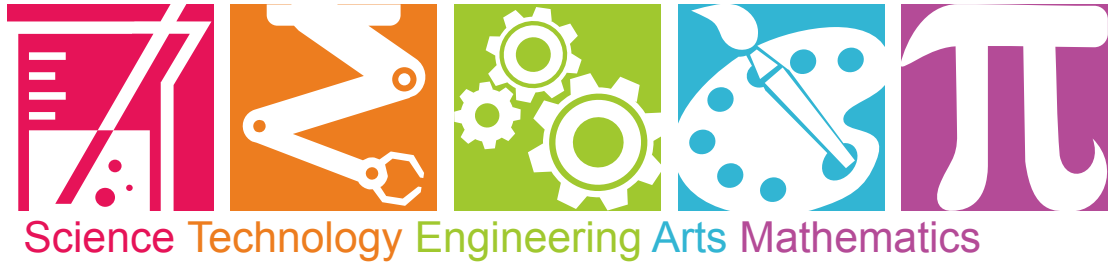
مبادرة تعليم المهارات الحياتية والمواطنة
الشرق الأوسط وشمال أفريقيا

Pause to Reflect

How do you incorporate "thinking skills" into your teaching and learning context?

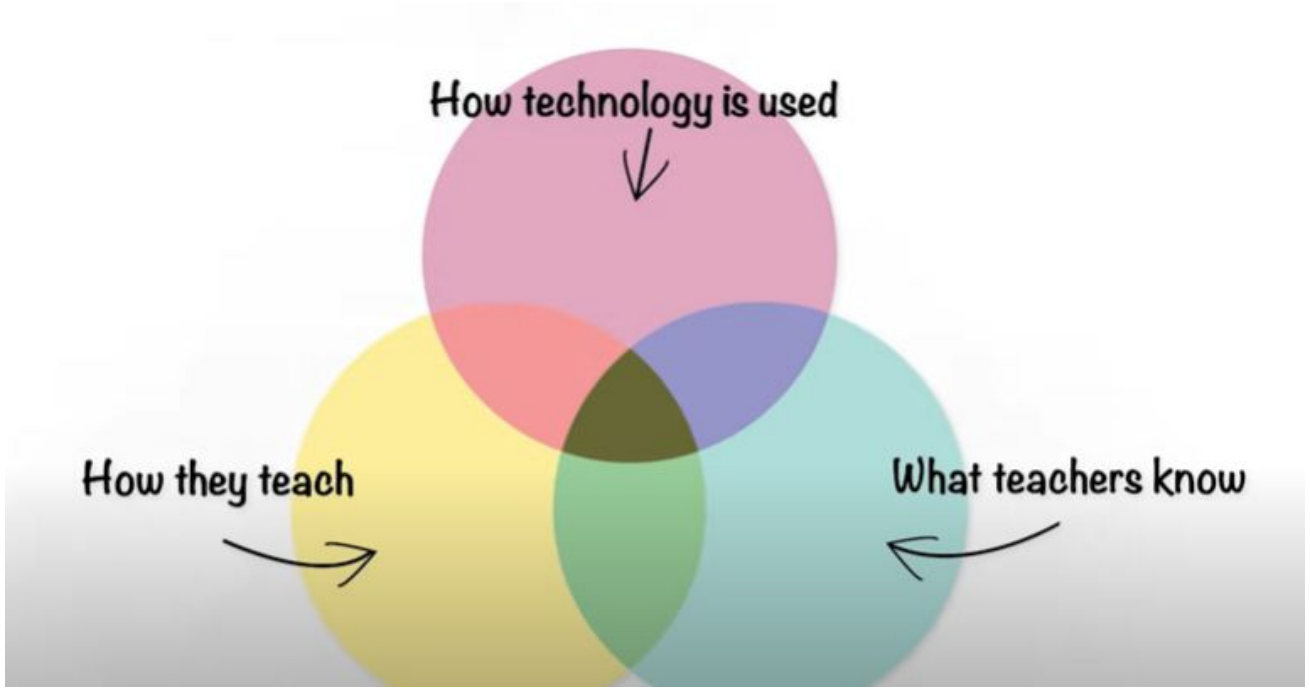
Turn and Talk

Core Elements of STEAM

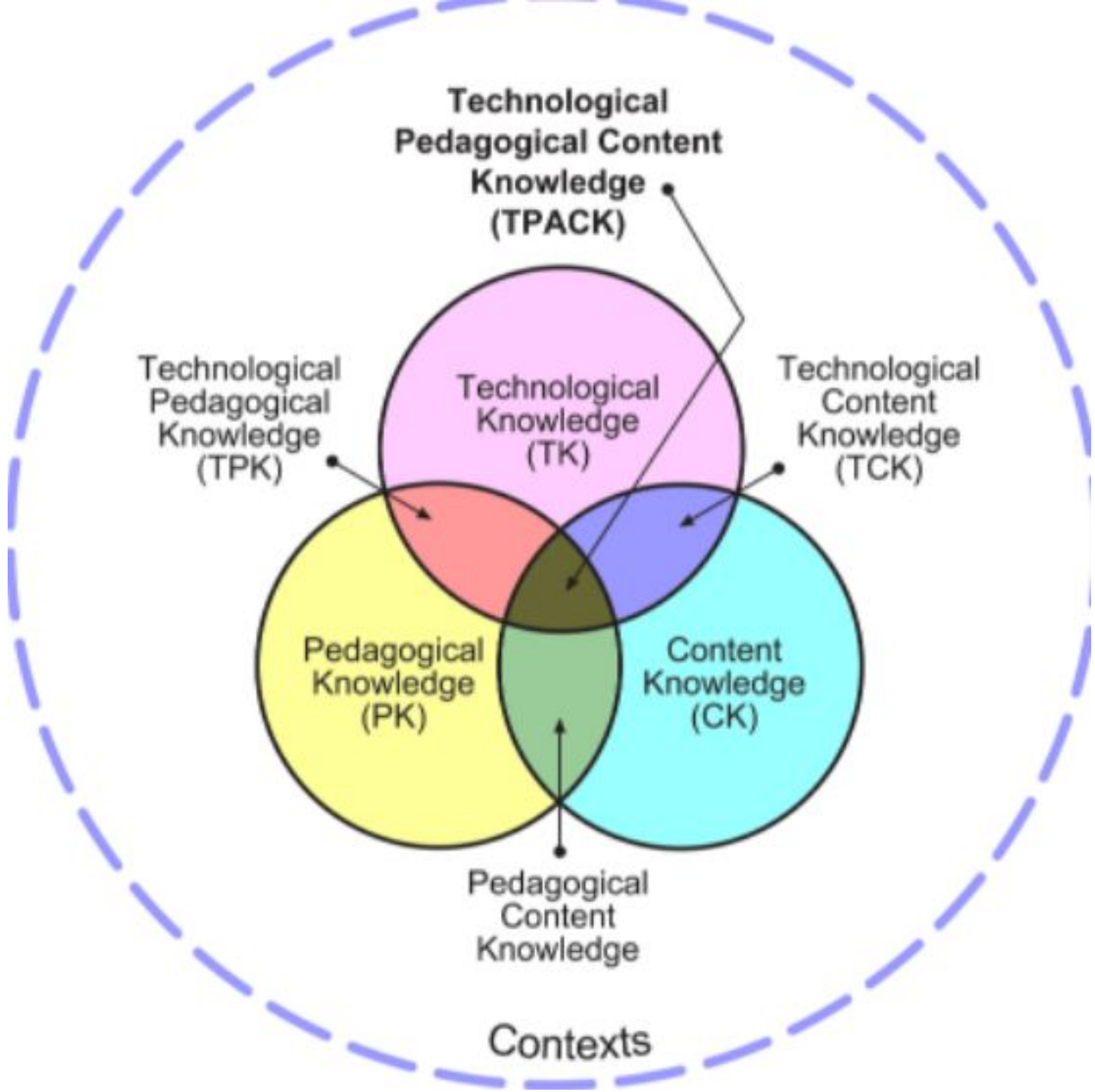


TPACK & Design Thinking

STEAM: Pedagogical Knowledge



TPACK


Technological
Pedagogical Content
Knowledge
(TPACK)
Technological
Pedagogical
Knowledge
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Technological
Content
Knowledge
(TCK)
Pedagogical
Knowledge
(PK)
Content
Knowledge
(CK)
Pedagogical
Content
Knowledge
Contexts

Designing & Measuring Impact

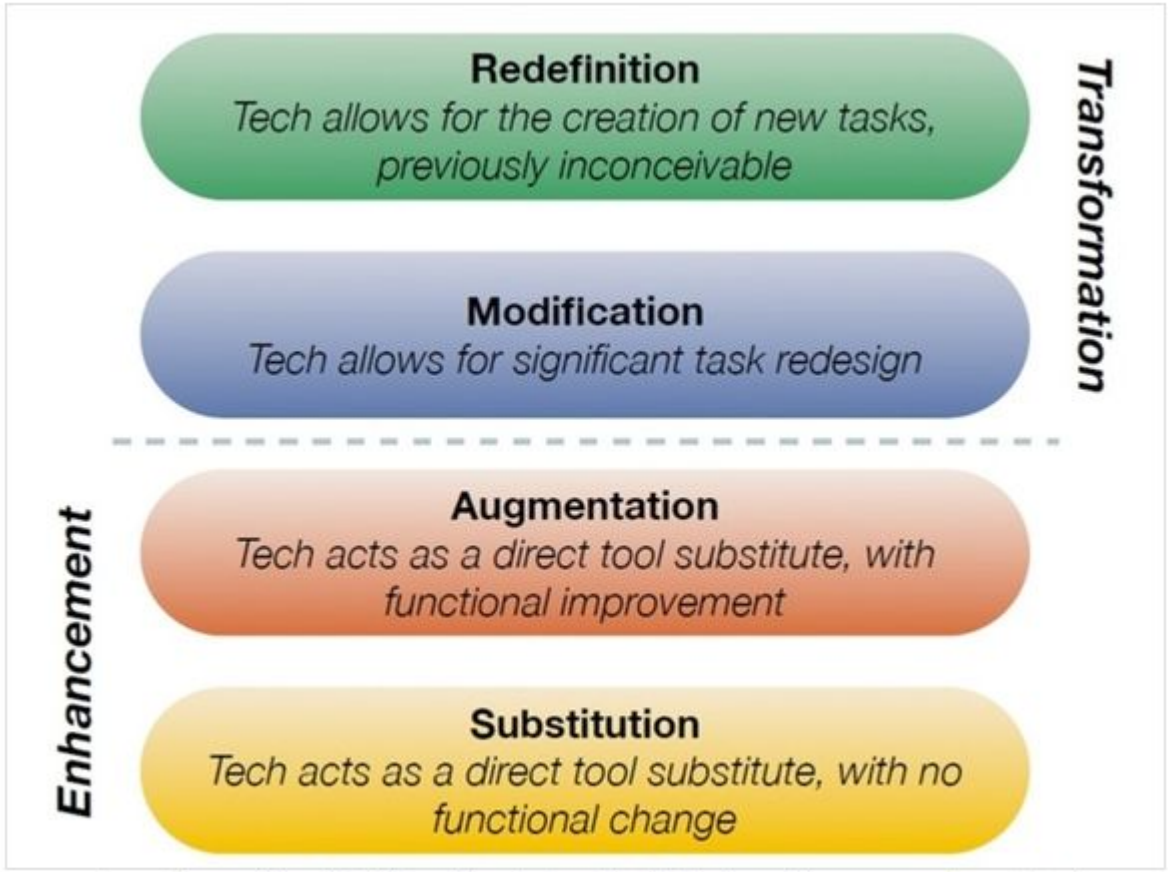
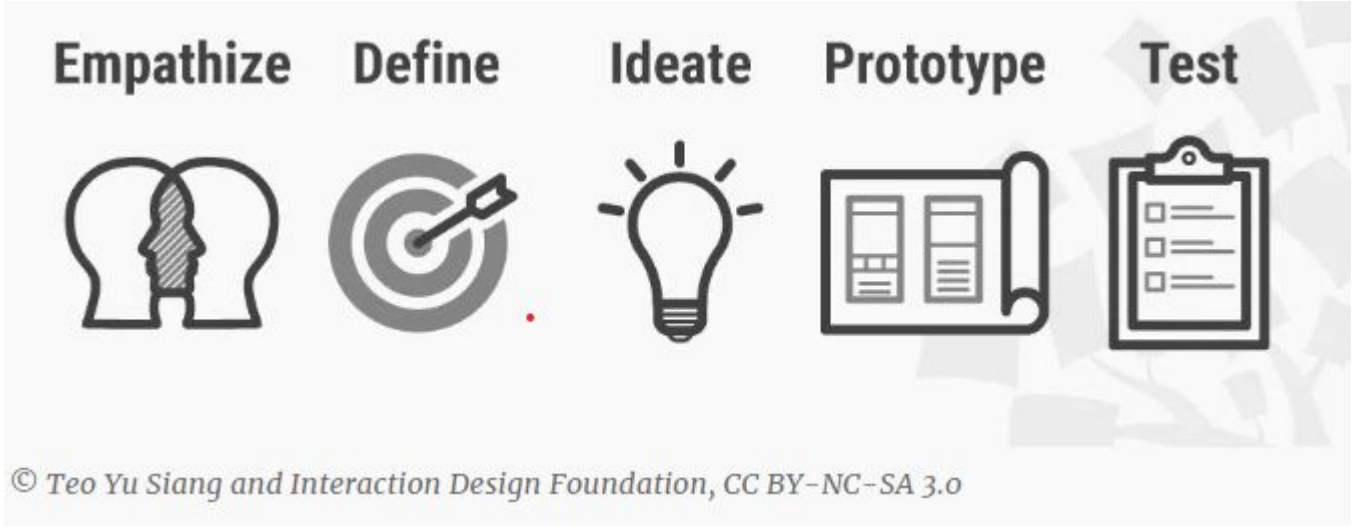


Image the creation of Dr. Ruben Puentedura, Ph.D. http://www.hippasus.com/rrpweblog/

SAMR

STEAM: Pedagogical Knowledge



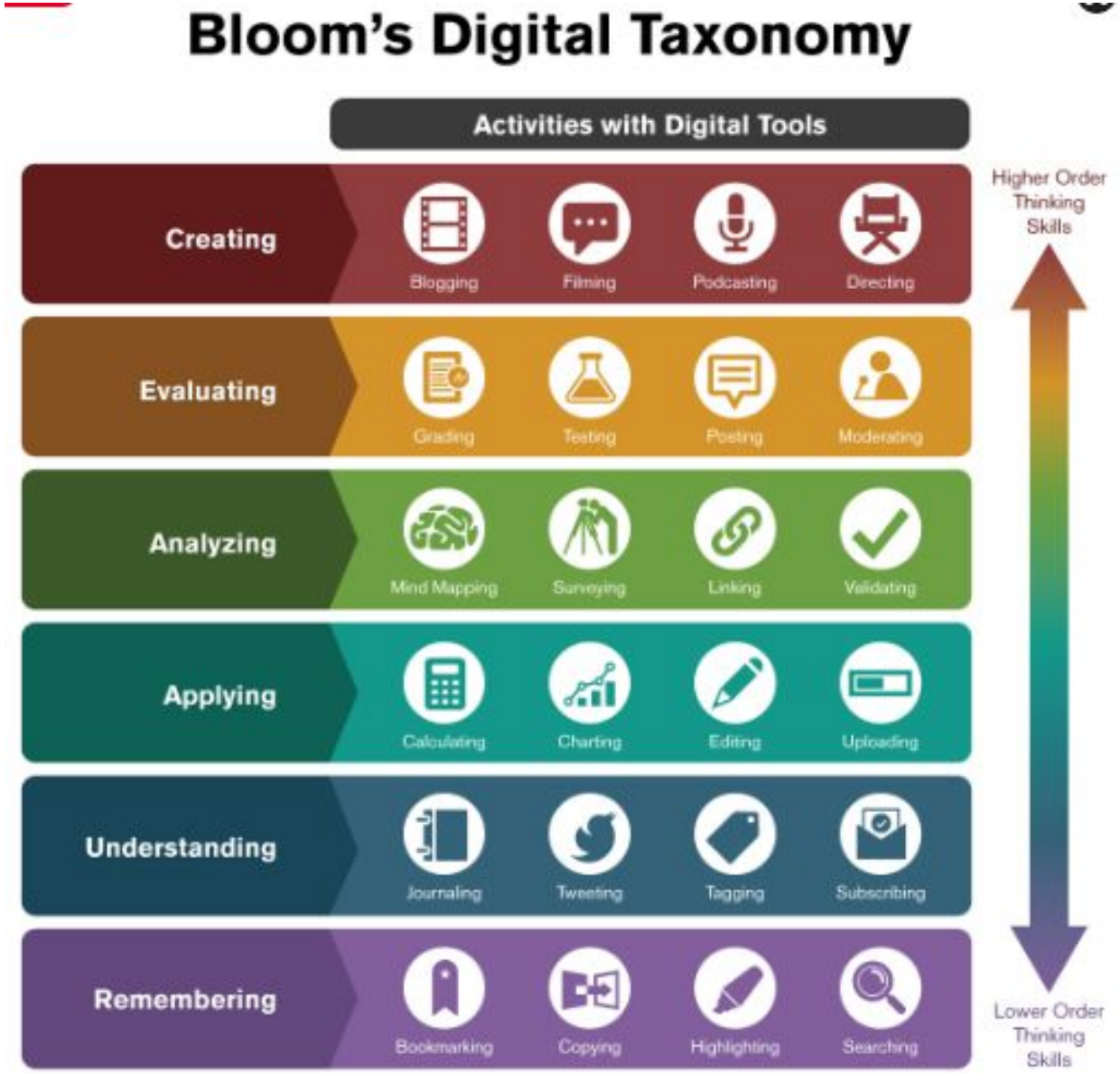
Design Thinking

https://www.interaction-design.org/literature/topics/design-thinking

International Society for Technology in Education (ISTE) Standards

ISTE Standards for Education Leaders

Design your [technology use] level

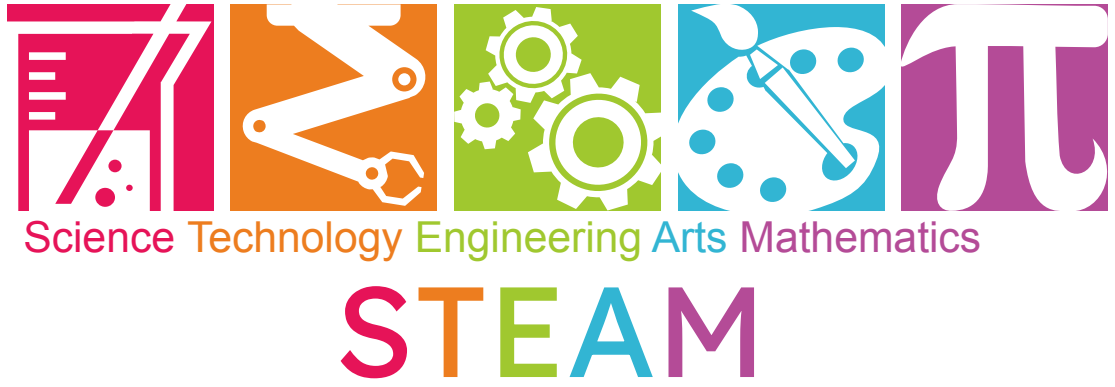


Pause to Reflect

How do you use digital tools and technologies to empower your learners?

Turn and Talk

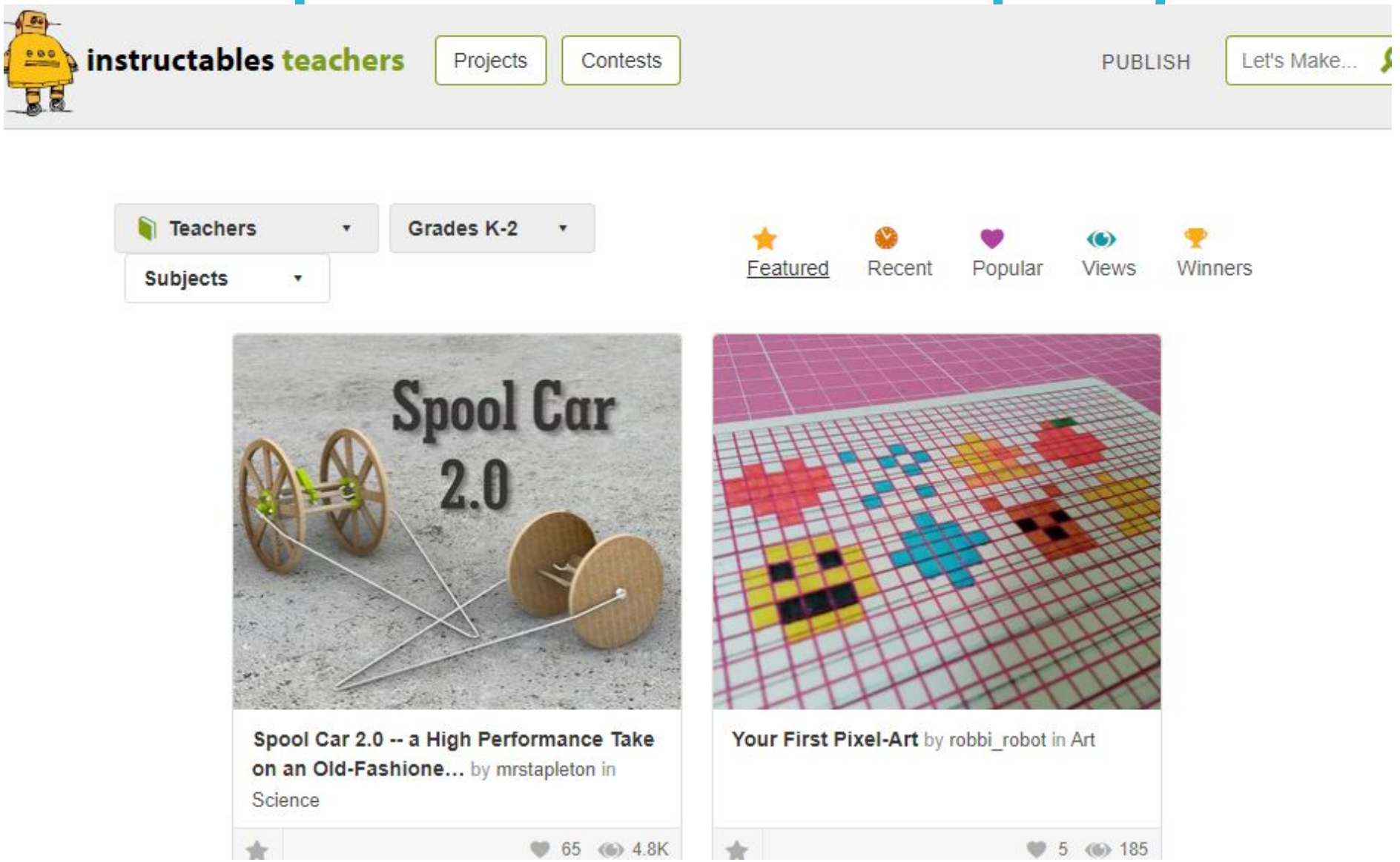
Getting started: Playbook & Resources



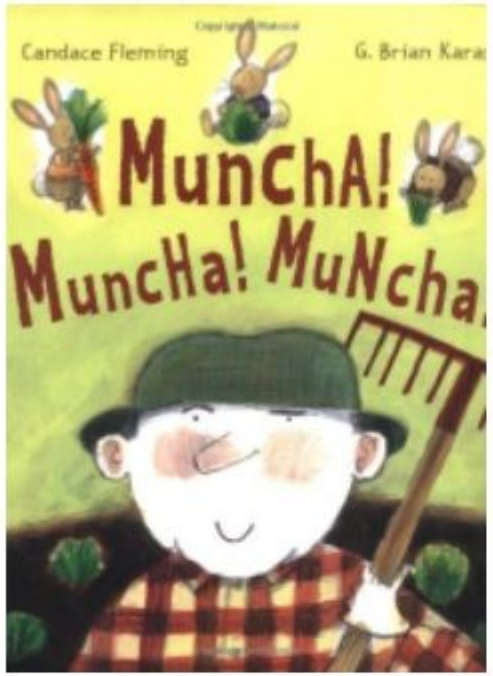
Educational Leaders: Implementation

- Models / Ways to Integrate STEAM Learning
  - Challenge learning - problem identification and solution generating
  - Genius time / 20% time / Passion projects
  - Maker model
  - After school / Clubs
  - Collaborations between teachers
  - Specialized curricula - eg. Project Lead the Way
  - Participate in Global Challenges, e.g Day of AI, Cardboard Challenge

Examples of STEAM projects



Literature inspired projects



Select a story from http://www.novelengineering.org/books (or, select your own favorite story!) Create a solution to a problem students have identify in the story -- see the website for ideas -- click on a story for additional details. Show us your solution in one of these ways:

1) build it! share pictures and details

2) draw a detailed solution with labelled parts (uploading a picture of your drawing is ok)

3) describe how you would integrate the story, problem and solution into a mini-lesson (s). What criteria would you use to assess?

happy engineering!

Educational leaders: Planning

- **Vision**: Create and share a vision - allow teacher (and student!) voice
- **Plan**: Draft a plan with goals (how will you measure progress?)
- **Develop teacher capacity:** Training/ Professional Development
- **Resources:** expensive equipment isn't necessary
- **Consider:** the change process
- **Support**: Teachers need ongoing support and a positive culture
- **Pilot** - start small then scale

- **Potential challenges:**
  - teachers may not have content knowledge or skills in all areas
  - covering existing curriculum

Resources & Evaluation

Wakelet:
https://wke.lt/w/s/sF0cnB

http://www.designedlearning.space/cairo-steam-resources/ and available on the ICPEL website

EVALUATION https://tinyurl.com/CAIROSTEAM

Thank You!

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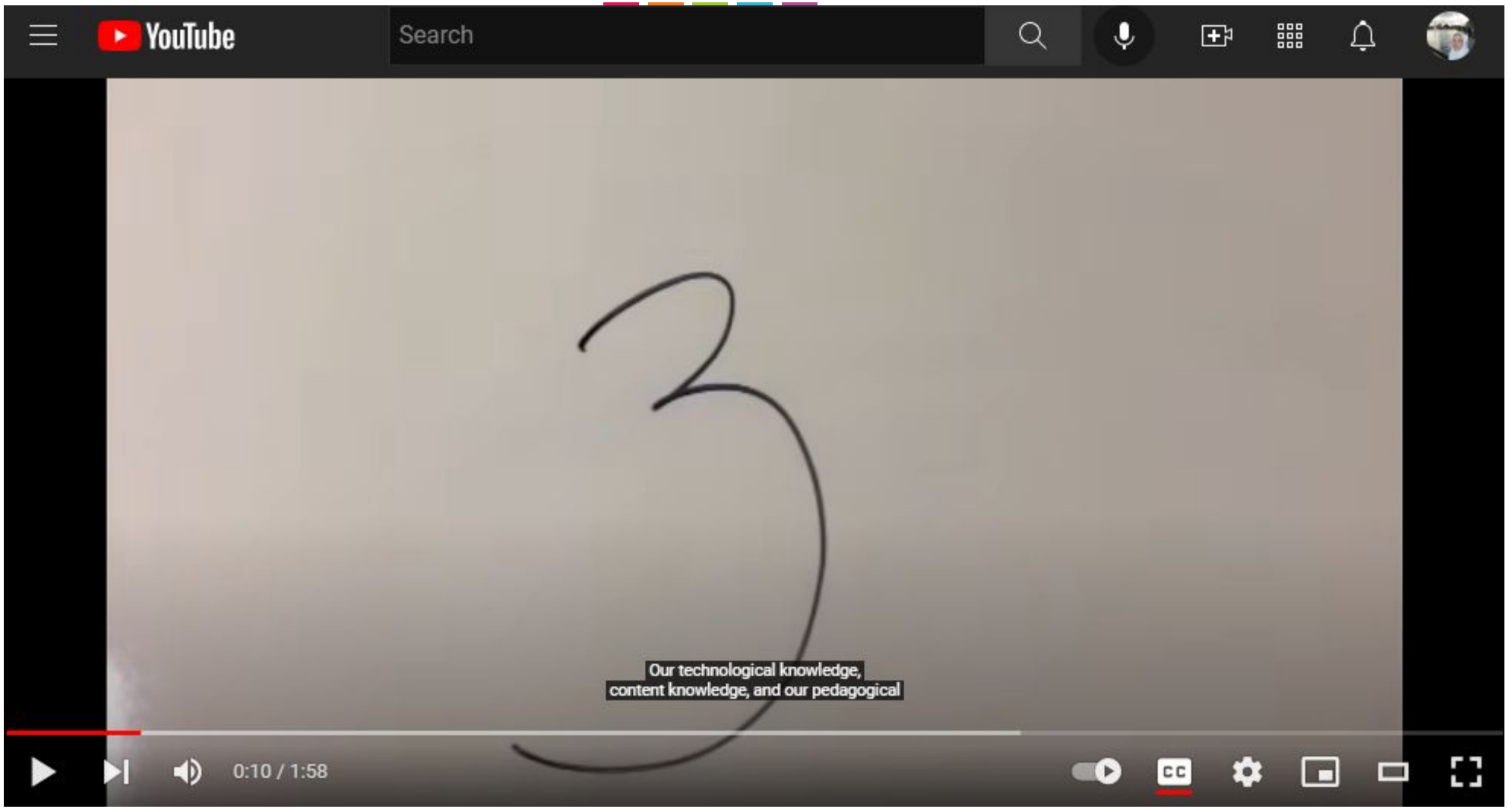
Contact: aelkordy@nl.edu

TPACK in 2 minutes



https://www.youtube.com/watch?v=FagVSQIZELY