Navigating Change: SAMR and the EdTech Quintet
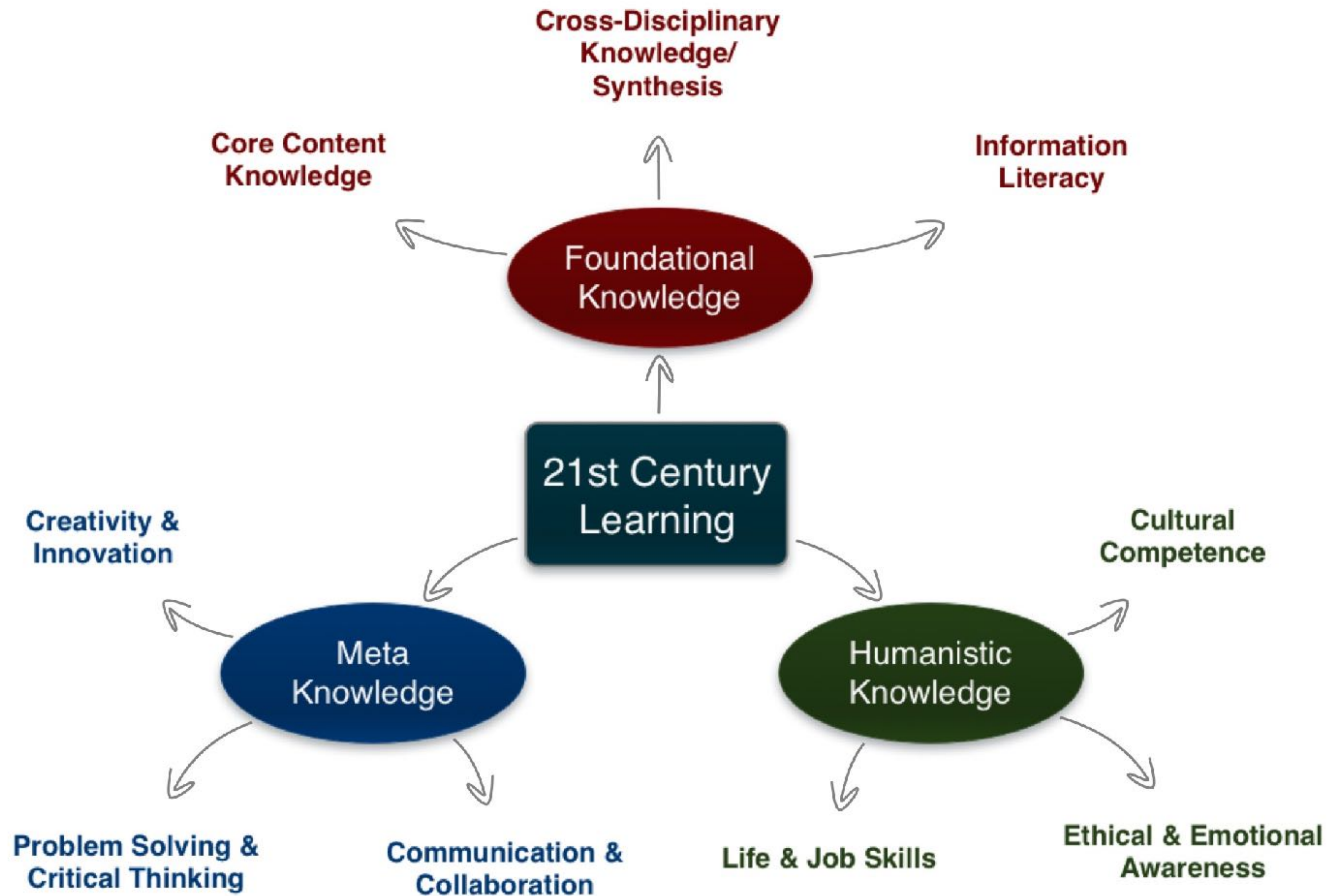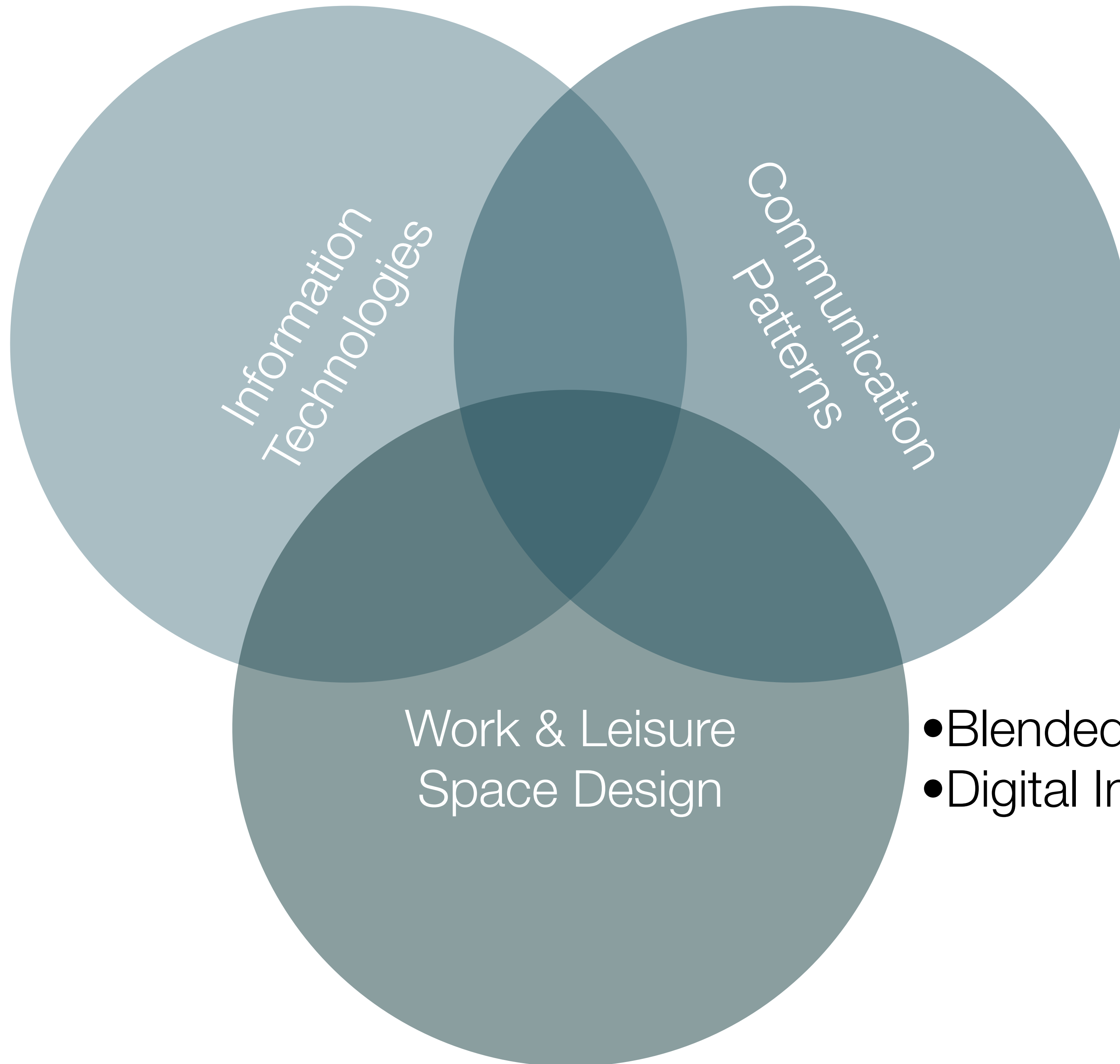
Ruben R. Puentedura, Ph.D.
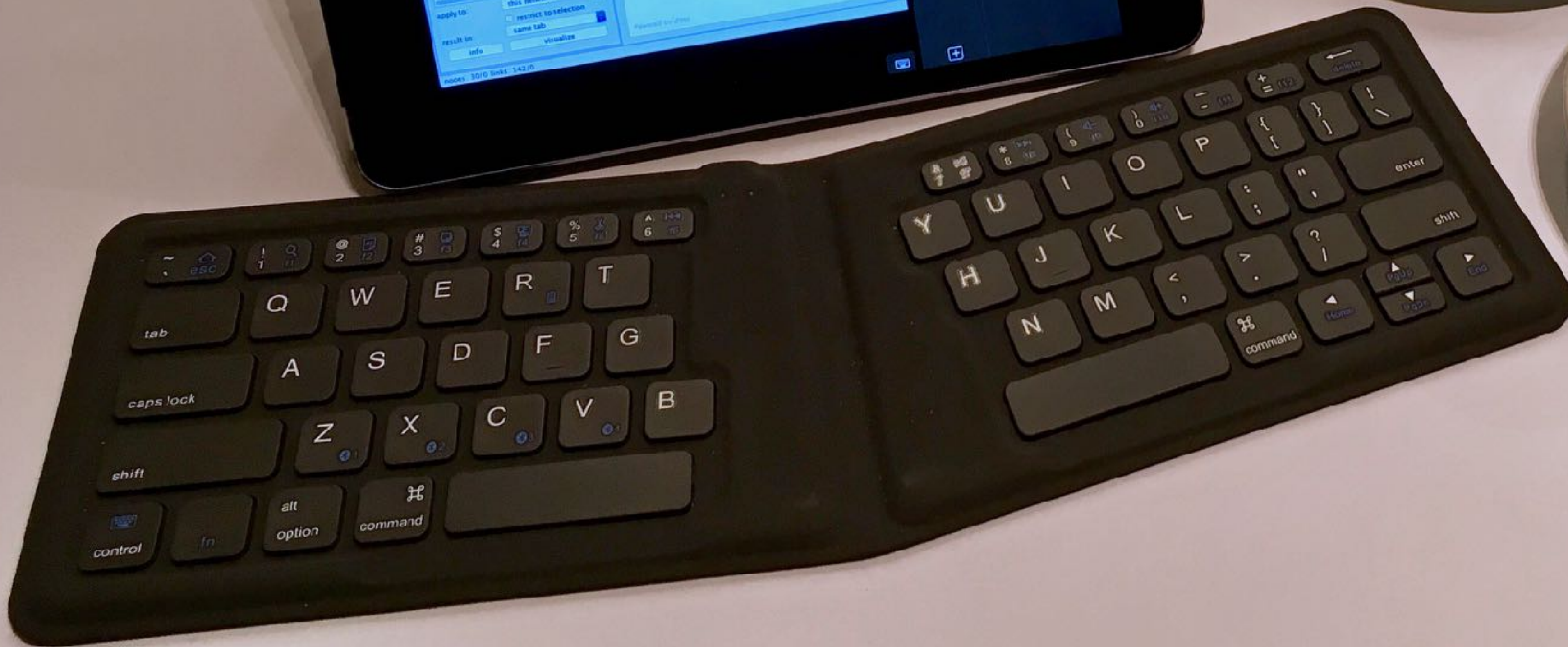
- Computing Power
- Machine Learning

Information Technologies

Communication Patterns

- Mobile Devices
- Social Media

Work & Leisure Space Design

- Blended Spaces
- Digital Integration

- Computational Thinking
- Digital Citizenship
- Maker Culture
- Blended Learning
- Active Learning Design

Information Technologies

Communication Patterns

Work & Leisure Space Design

Distribution of Automatibility in the US
(Task-Based vs. Occupation-Based Approach)

Occupation-Based Approach: Frey/Osborne-Values are applied to ISCO occupations in PIAAC data, using identical weights for each 6-digit SOC occupation within the corresponding 2-digit ISCO occupation.

Arntz, M., T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, Paris.

Advanced G20 Countries: Jobs at High Risk of Automation

■ Jobs at high risk of automation
(>70% of tasks)

■ Jobs at risk of significant change
(50–70% of tasks)

Korea, Japan, France, Turkey, Australia, Canada, United States, United Kingdom, Germany, Italy
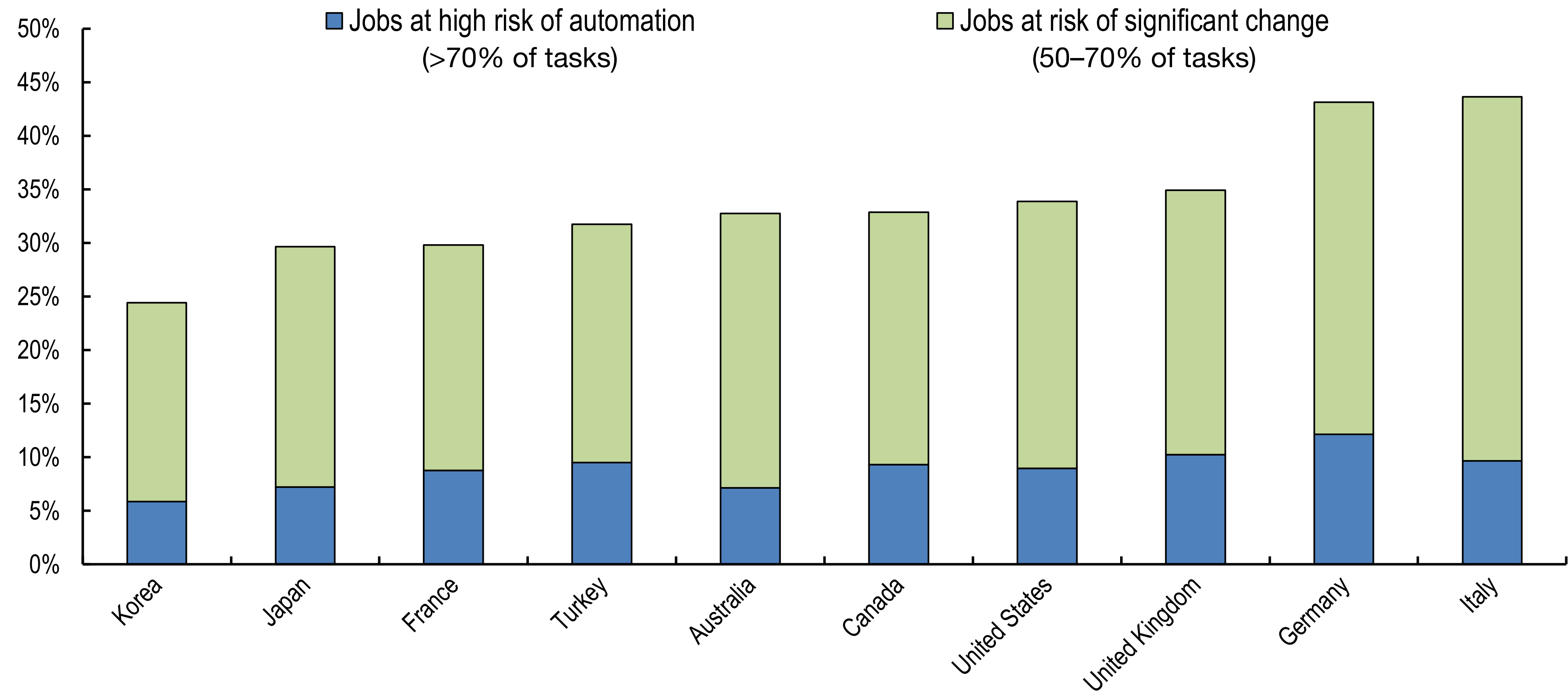
Figure 1: Job transition matrix between 958 jobs in the United States

Architecture and Engineering

Arts, Design, Entertainment, Sports, and Media

Building and Grounds Cleaning and Maintenance

Business and Financial Operations

Community and Social Service

Computer and Mathematical

Construction and Extraction

Education, Training, and Library

Farming, Fishing, and Forestry

Food Preparation and Serving

Healthcare Practitioners and Technical

Installation, Maintenance, and Repair

Life, Physical, and Social Science

Office and Administrative

Personal Care and Service

Production

Protective Service

Sales and Related

Transportation

■ high similarity score
■ medium similarity score
■ low simiarity score

Source data: Burning Glass Technologies and US Bureau of Labor Statistics.

World Economic Forum, *Towards a Reskilling Revolution: A Future of Jobs for All*, 2018.

Figure B15: Examples of Pathways for Mine Cutting and Channeling Machine Operators

Mine Cutting and Channeling Machine Operators

Construction and Extraction Occupations

wage: $51,000

18 opportunities with pay rise

Structural Iron and Steel Workers
Construction and Extraction Occupations
wage: $56,000
similarity score: 0.86

20 opportunities with pay cut

Tile and Marble Setters
Construction and Extraction Occupations
wage: $45,000
similarity score: 0.86

Rail-Track Laying and Maintenance Equipment Operators
Construction and Extraction Occupations
wage: $53,000
similarity score: 0.86

Subway and Streetcar Operators
Transportation Occupations
wage: $62,000
similarity score: 0.86

Excavating and Loading Machine and Dragline Operators
Transportation Occupations
wage: $45,000
similarity score: 0.91

Nuclear Equipment Operation Technicians
Life, Physical and Social Science Occupations
wage: $78,000
similarity score: 0.85

Key

Job
Job family
Remuneration
Similarity score with previous job

Source data: Burning Glass Technologies and US Bureau of Labor Statistics.

"*Gakushiryoku* - ability required for university graduates for an unpredictable era including the education, knowledge and experience to make correct decisions in the face of unexpected difficulties."

MEXT - *Summary of Report: Towards a Qualitative Transformation of University Education for Building a New Future - Universities Fostering Lifelong Learning and the Ability to Think Independently* **(2012)**

Four Defining Characteristics of Action Research

- Practical Nature

- Change-Oriented

- Part of a Cyclical Process

- Teachers are Active Researchers and Participants

Martyn Denscombe. *The Good Research Guide: For small-scale social research projects (6th Edition).* McGraw-Hill Education (UK). (2017).

Substitution	Augmentation	Modification	Redefinition

EdTech Quintet

Shared Practices

TPCK

2\C Learning Framework

Refraction

Conversational Framework

Communities of Practice

Personal Learning Networks

Dynamic Learning Structures

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Transformation

- -

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Enhancement

Ruben R. Puentedura, *As We May Teach: Educational Technology, From Theory Into Practice*. (2009)

Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years

The EdTech Quintet – Associated Practices	
Social	Communication, Collaboration, Sharing
Mobility	Anytime, Anyplace Learning and Creation
Visualization	Making Abstract Concepts Tangible
Storytelling	Knowledge Integration and Transmission
Gaming	Feedback Loops and Formative Assessment

The Research: 1,097 Studies, 25 Metastudies, 19 Years

Tamim, Rana M., Robert M. Bernard, Eugene Borokhovski, Philip C. Abrami, and Richard F. Schmid. "What forty years of research says about the impact of technology on learning a second-order meta-analysis and validation study." *Review of Educational Research 81*, no. 1 (2011): 4-28.
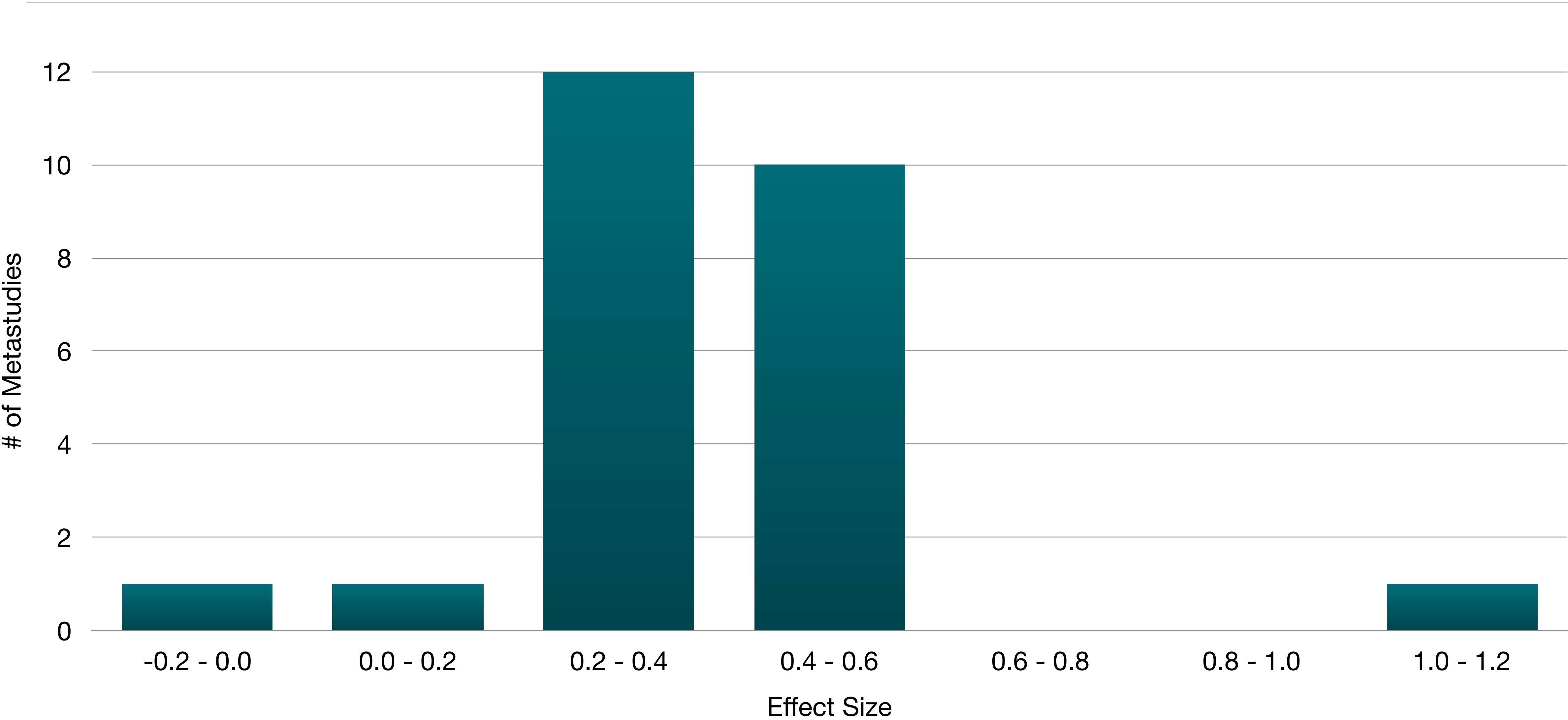
SAMR and the Use of Technology to Enhance Reading Performance in Middle School

Effect Size

3
2.25
1.5
0.75
0
-0.75

✕ S - 5 Studies   ✕ A - 4 Studies   ✕ M - 8 Studies   ✕ R - 3 Studies

Pearson, P.D., Ferdig, R.E., Blomeyer Jr, R.L., & Moran, J. "The Effects of Technology on Reading Performance in the Middle-School Grades: A Meta-Analysis With Recommendations for Policy." *Learning Point Associates/North Central Regional Educational Laboratory (NCREL)* (2005).
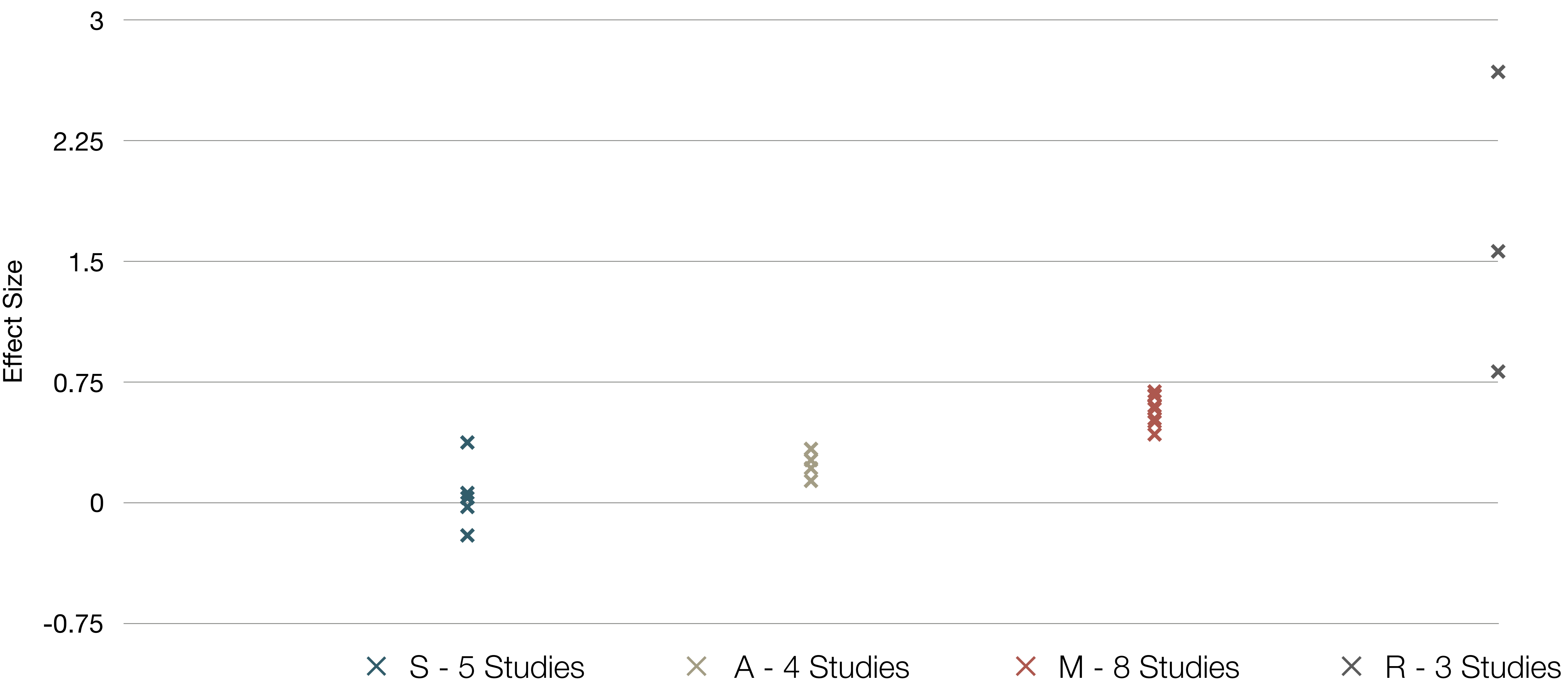
SAMR and the Use of Tablets in Education
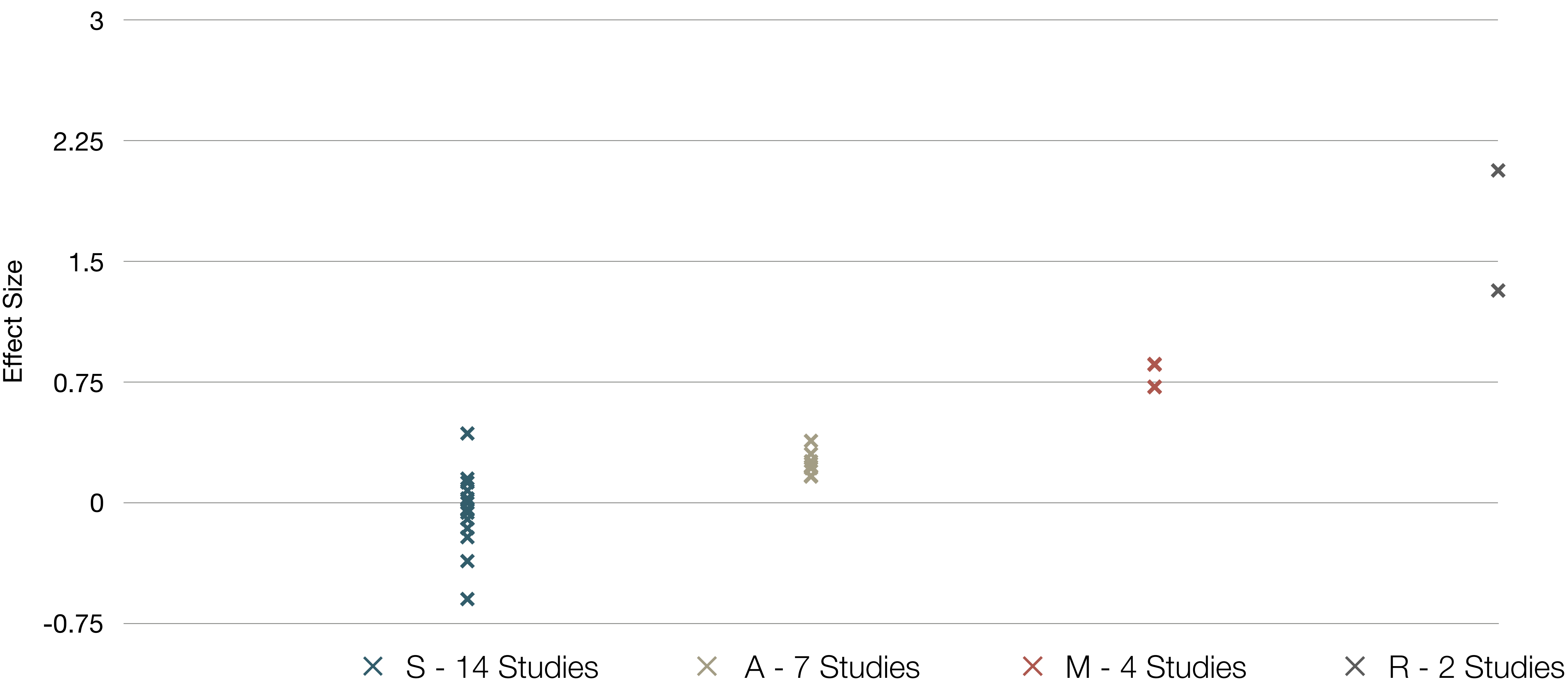
Effect Size

× S - 14 Studies   × A - 7 Studies   × M - 4 Studies   × R - 2 Studies

Tamim, R.M., Borokhovski, E., Pickup, D., Bernard, R.M. & El Saadi, L. "Tablets for Teaching and Learning: A Systematic Review and Meta-Analysis." *Commonwealth of Learning (COL)* (2015).

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Extended Thinking

Modification
Tech allows for significant task redesign

Strategic Thinking

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Skills and Concepts

Substitution
Tech acts as a direct tool substitute, with no functional change

Recall and Reproduction

Webb, Norman L. *Depth-of-knowledge levels for four content areas*. (2002)

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Recall and Reproduction

Redefinition
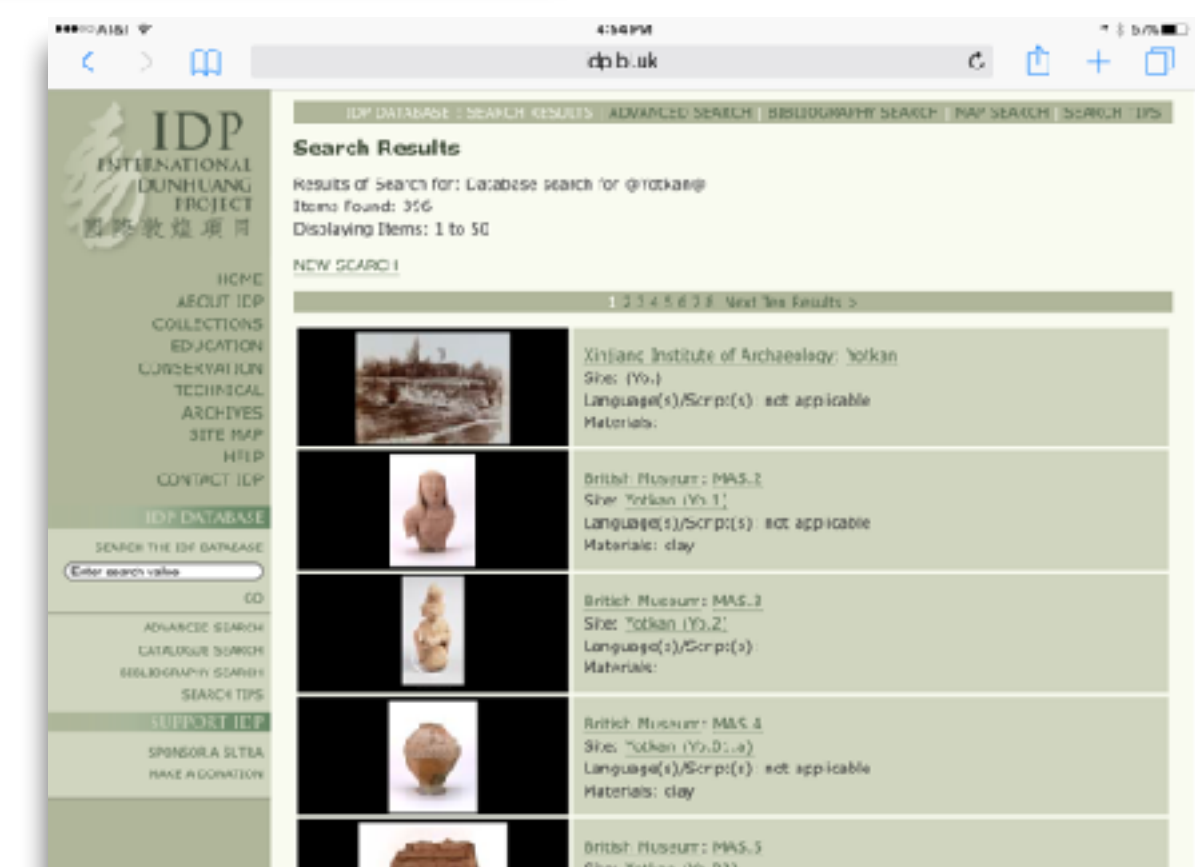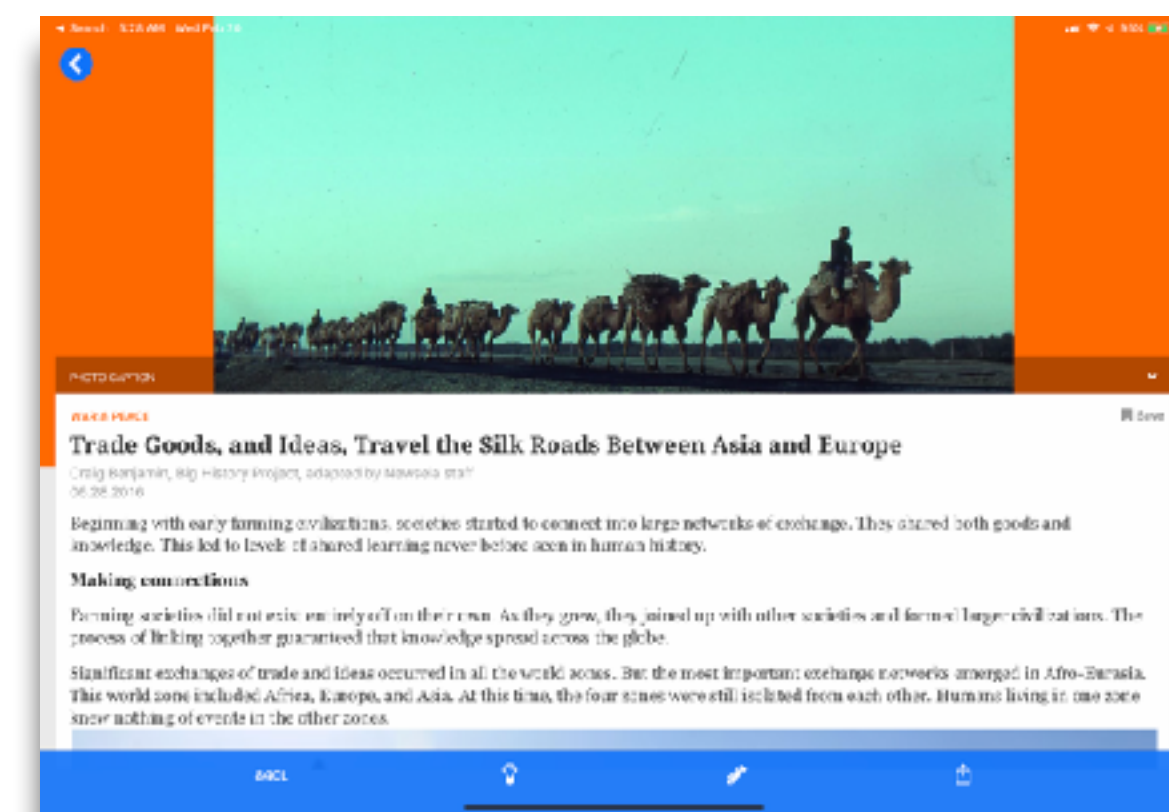*Tech allows for the creation of new tasks, previously inconceivable*

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change
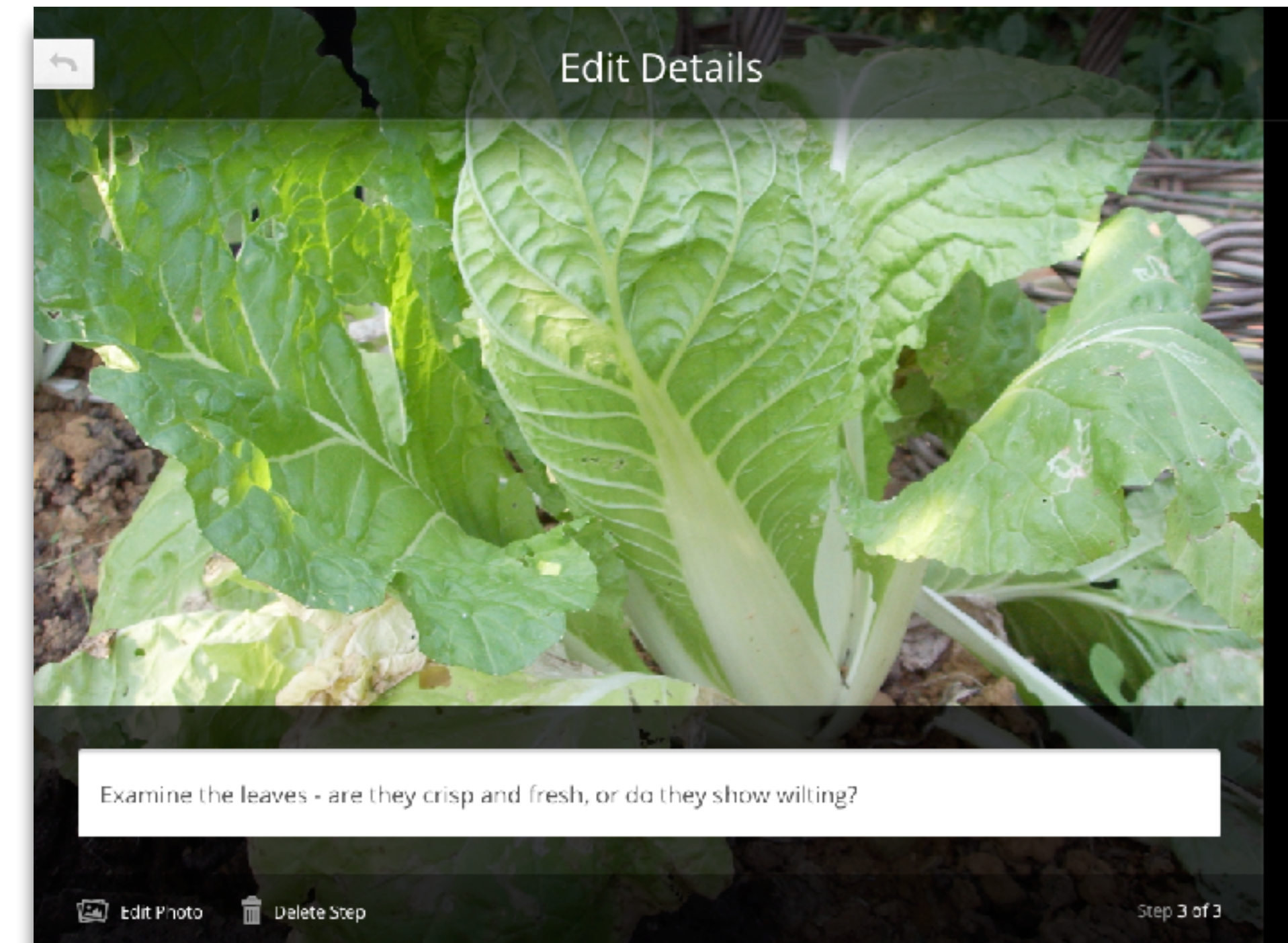
Strategic Thinking
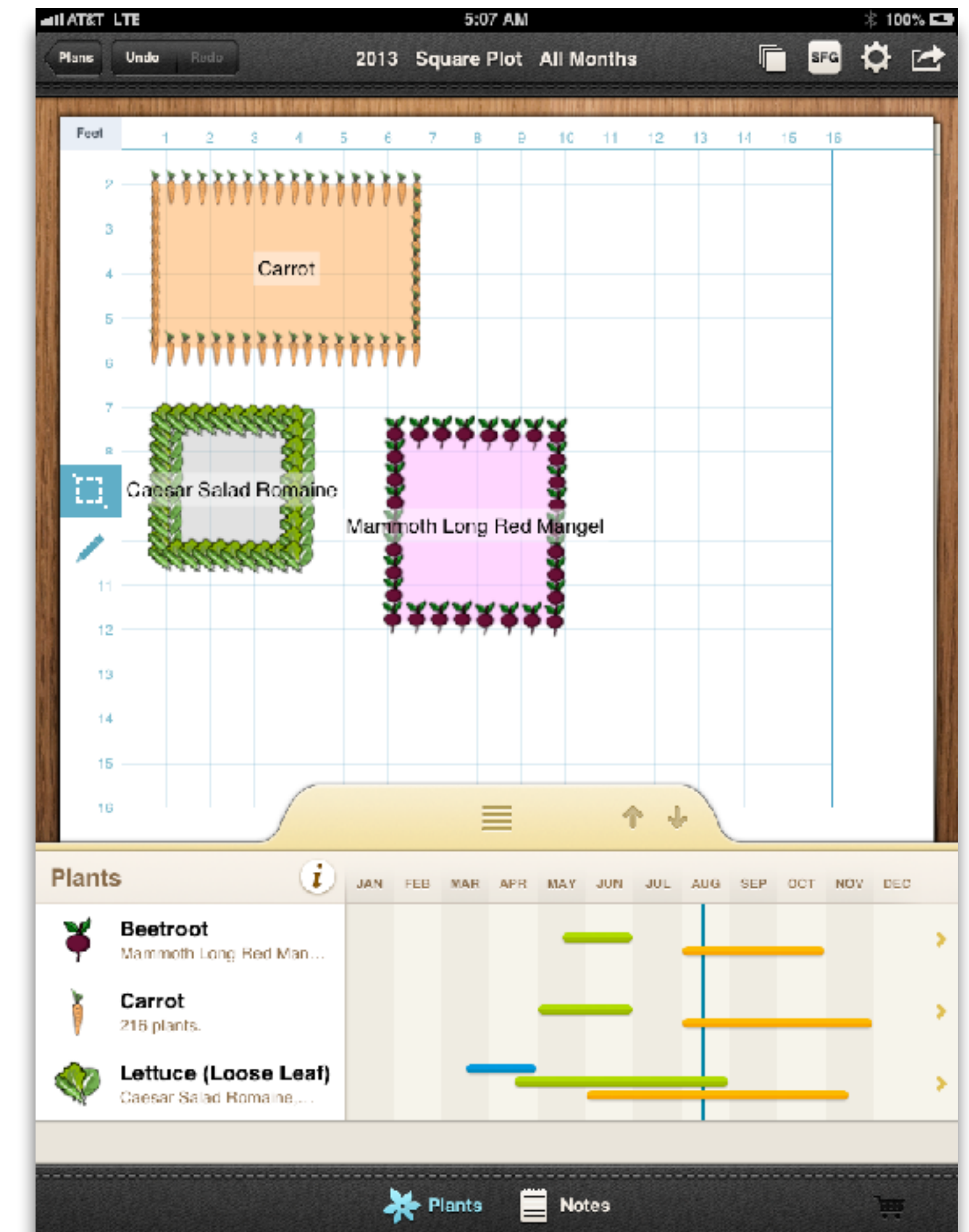
Redefinition
Tech allows for the creation of new tasks, previously inconceivable
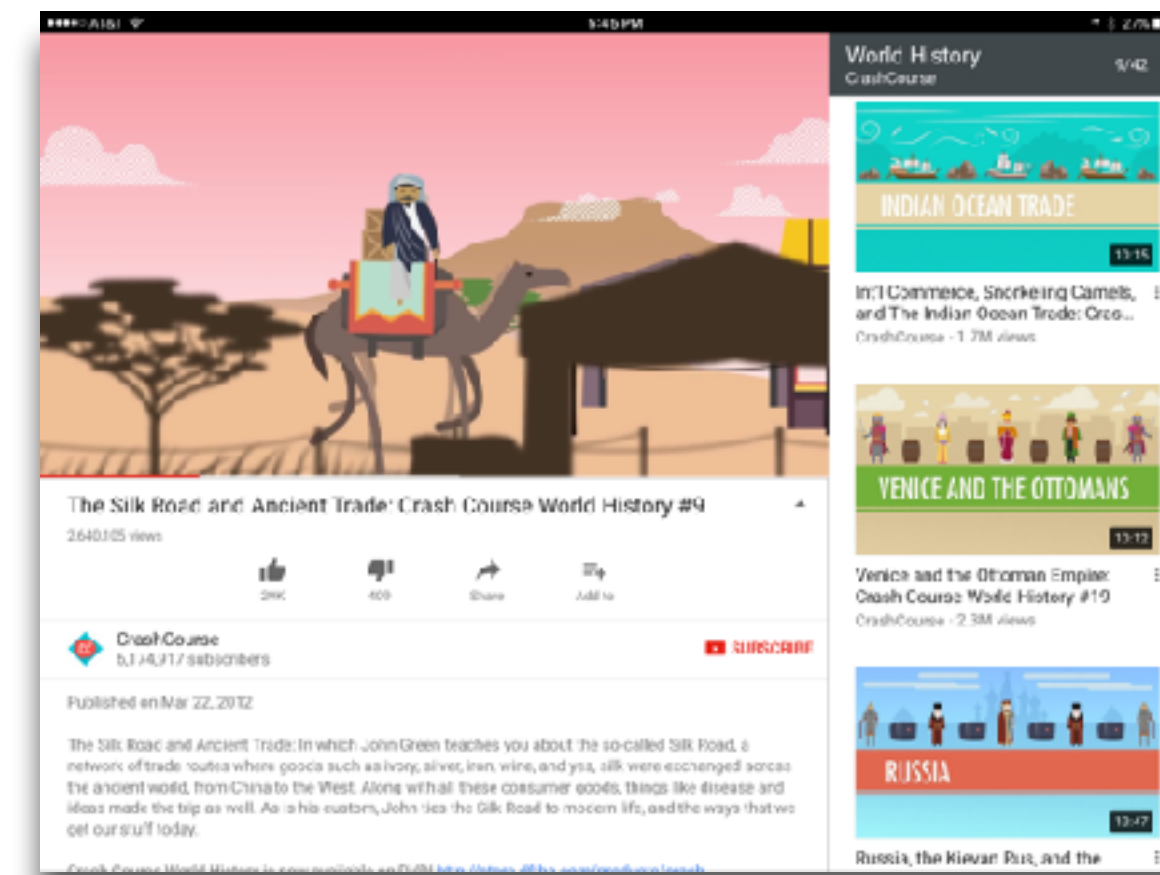
Extended Thinking

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Competency / Concept	Evaluate Historical Accounts	Interpret Primary Sources	Apply Chronological Reasoning	Contextualize	Construct Acceptable Historical Accounts
History as an Interpretive Account					
The Relationship of Past and Present					
Historical Evidence					
Complex Causality					
Significance					

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Redefinition
Tech allows for the creation of new tasks, previously inconceivable
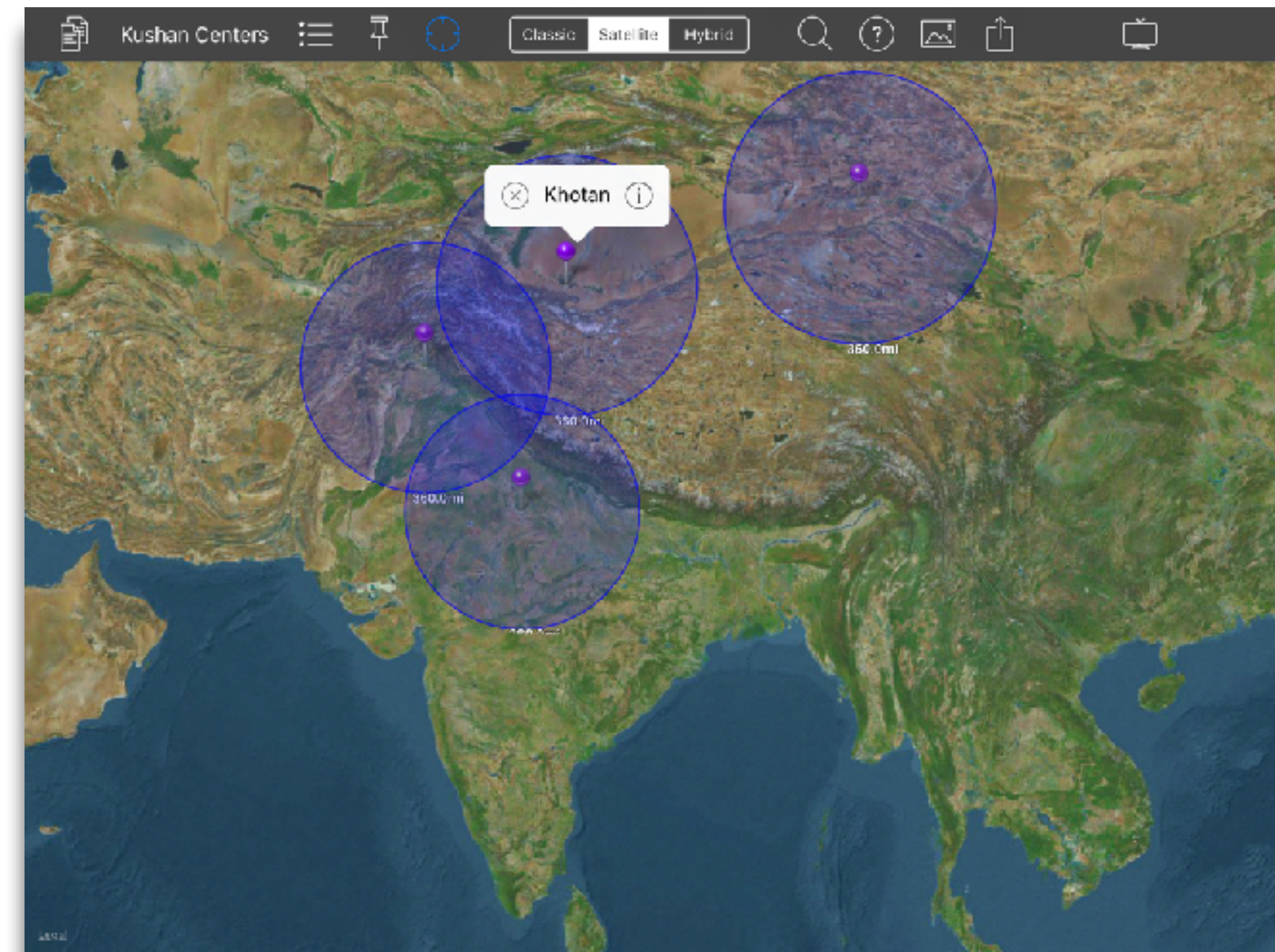
Modification
Tech allows for significant task redesign

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Substitution
Tech acts as a direct tool substitute, with no functional change

Redefinition
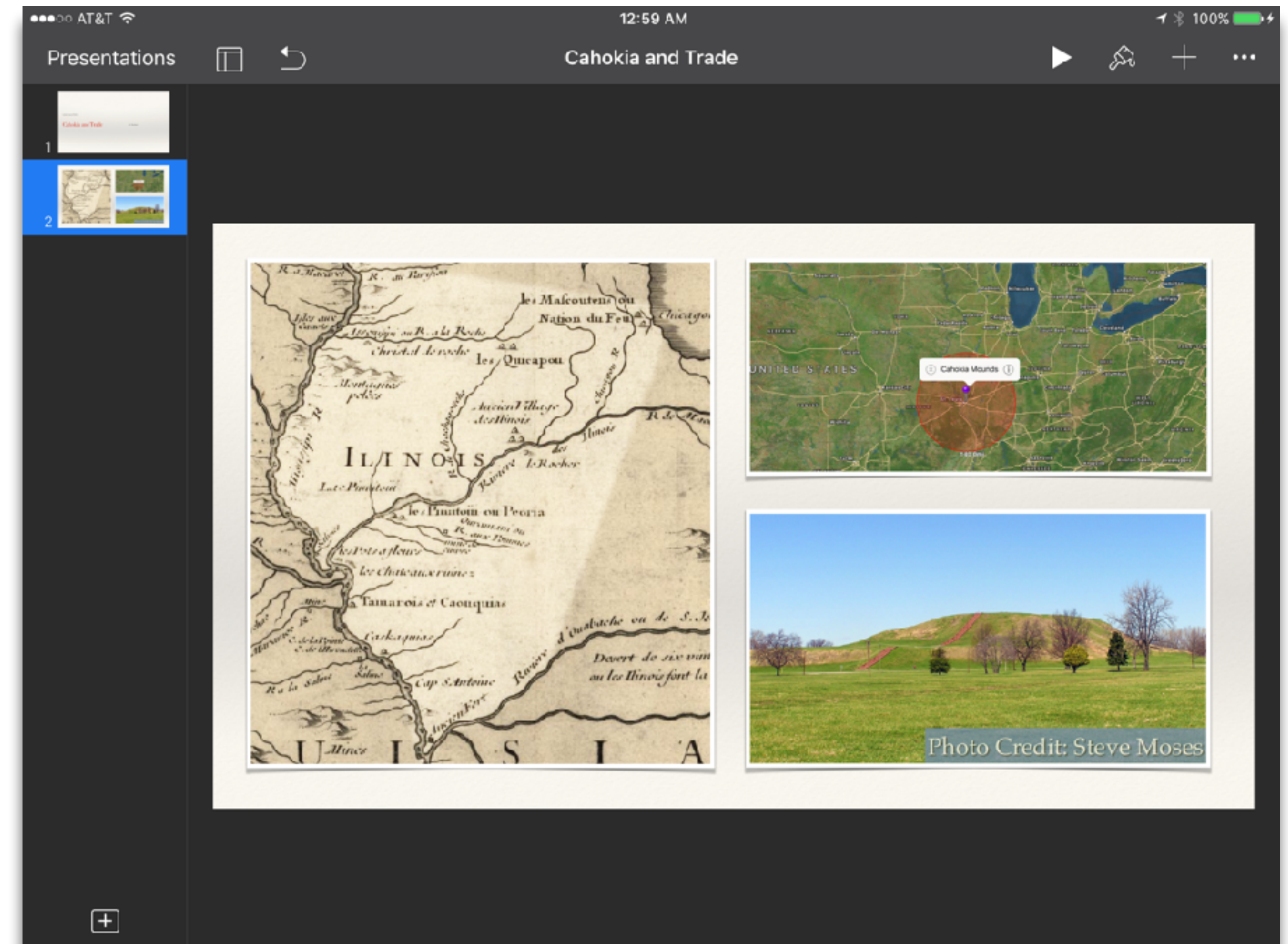*Tech allows for the creation of new tasks, previously inconceivable*

Modification
Tech allows for significant task redesign

Augmentation
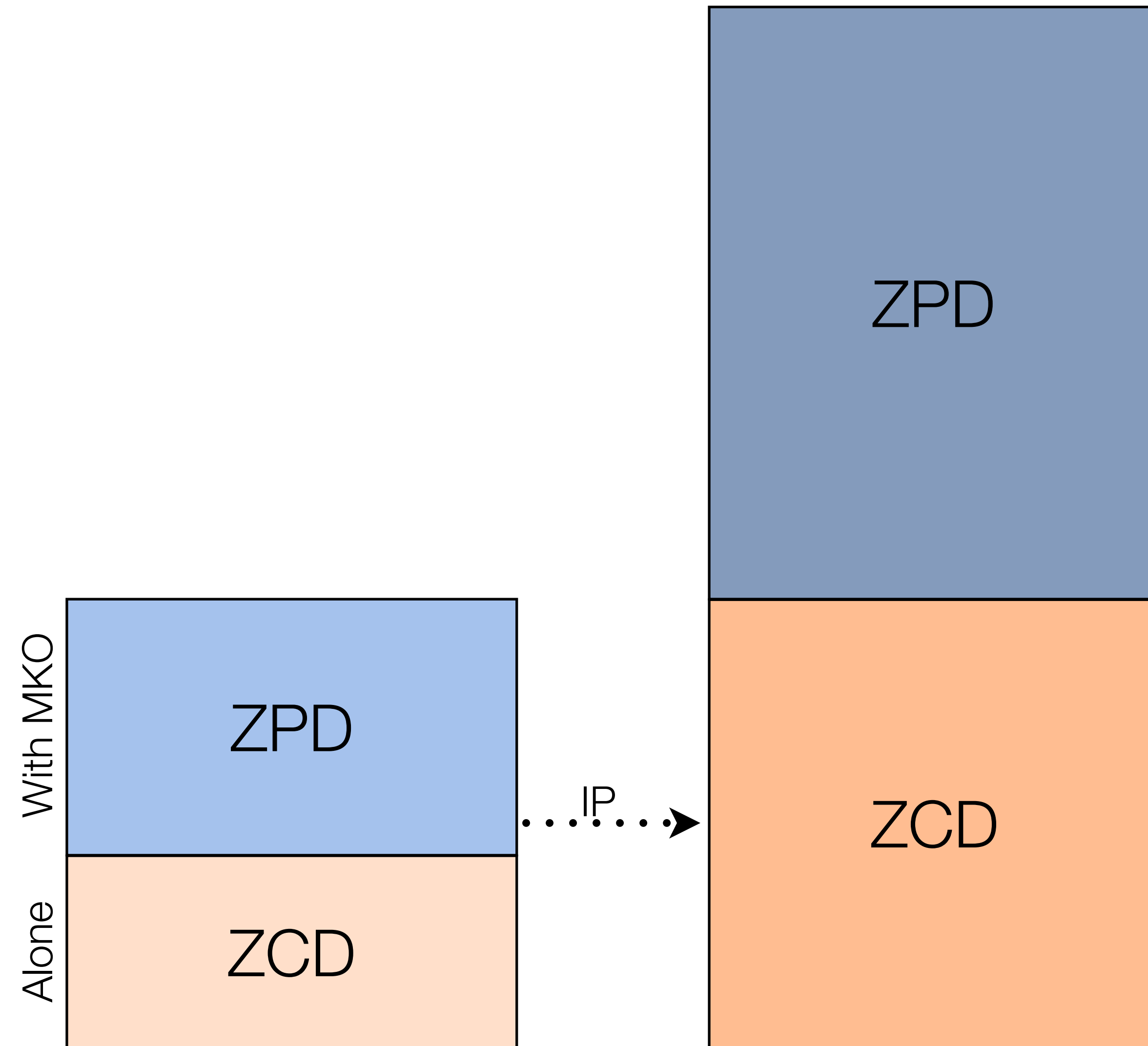*Tech acts as a direct tool substitute, with functional improvement*
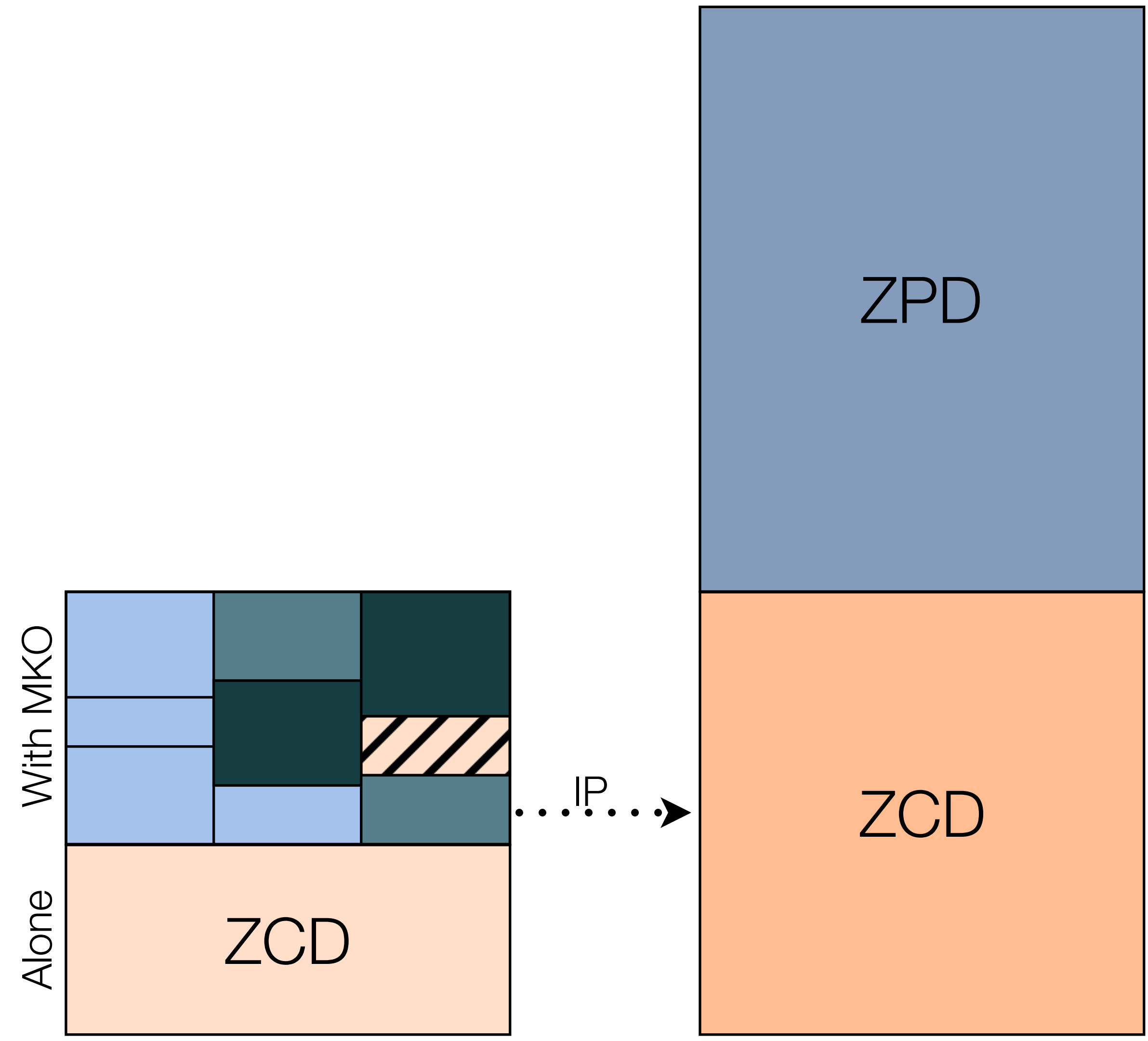
Substitution
Tech acts as a direct tool substitute, with no functional change

Communities of Practice and Personal Learning Networks

- Internally: *School as Community of Practice*

  - A **domain** of shared interest, commitment, and competence;

  - A **community** where joint activities, discussions, information sharing, and help processes are focused around and by the domain;

  - A **practice** with a shared repertoire of resources, such as experiences, stories, tools, and problem-solving approaches.

- Externally: *Individual Personal Learning Networks*

  - Loosely structured around a range of tools, individually chosen - no two PLNs are the same;

  - Usually online, but may involve face-to-face components (e.g. meetups);

  - Resources may range from professional society websites, to educator blogs, to Facebook groups, to Twitter feeds;

  - Involvement may range from primarily reading sources, to participating in discussions, to authoring new materials.

Etienne and Beverly Wenger-Trayner. *Introduction to communities of practice: A brief overview of the concept and its uses*. (2015) Online at: http://wenger-trayner.com/introduction-to-communities-of-practice/

Will Richardson and Rob Mancabelli. *Personal Learning Networks: Using the Power of Connections to Transform Education*. Solution Tree. (2012)

Lev Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press. (1978)

Galperin, P.Ia. "Stage by Stage formation as a method of psychological investigation". *Journal of Russian and East European Psychology, 30*(4), 61-80 (1992)

Van Geert, Paul. "Vygotsky's dynamic systems." *Lev Vygotsky: Critical assessments* 4 (1997): 3-21.

The EdTech Quintet – Associated Practices	
Social	Communication, Collaboration, Sharing
Mobility	Anytime, Anyplace Learning and Creation
Visualization	Making Abstract Concepts Tangible
Storytelling	Knowledge Integration and Transmission
Gaming	Feedback Loops and Formative Assessment

The EdTech Quintet – Associated Practices

Social	Provides diversity to the ZPD
Mobility	Creates the context for the process
Visualization	Aids in segmenting ZPD, bridging gaps
Storytelling	Aids in the integration of the ZPD
Gaming	Provides frameworks for independent practice

Hippasus

Blog: http://hippasus.com/blog/
Email: rubenrp@hippasus.com
Twitter: @rubenrp