GUIDING PRE-SERVICE TEACHERS TO MAKING

This research explored a guided approach to learning and practicing maker pedagogical approaches with technologies and analyzed the impact to pre-service teachers' confidence, competencies, and teaching practices. A four-tiered conceptual framework guided this qualitative, interpretive case study that used an iterative abduction analysis process to interpret the findings. Research results and educational implications are described below and may be considerations for teacher maker- or technology-focused professional development courses.

Margie Lam, BSc, BEd, MA
Faculty of Education
OntarioTech UNIVERSITY

Introduction

- Our knowledge society demands adaptive skills and global competencies, but the skill gaps are growing (World Economic Forum, 2020).
- Schools are investing in tech hoping to transform student learning (Rudd, 2013), but focus is on consumption vs. creation (Resnick, 2002).
- Maker pedagogies could disrupt educational practices and reform education organically by focusing on the underlying pedagogy vs. tech alone (Datnow, 2020).

These three elements of MAKING mix in a makerspace creating a trifecta of innovation, support, & fun.

The Literature

- Limited in-class making as teachers face many challenges with this student-centered practice that is different from many traditional methods and school expectations (Nichols, 2020).
- After many years of top-driven ed reforms that lack stakeholder buy-in and focus on curriculum changes, barriers have been fortified in many schools and classrooms to change (Setiawan, 2020).
- Organic, bottom-up reform from maker teachers has the potential to transform practices with effective PD and ongoing teacher support (Berman et al., 2016).

Research Question

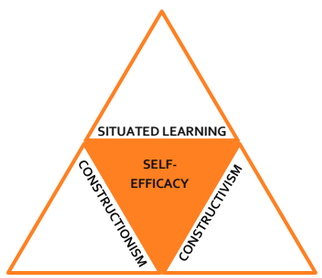
To what extent does guided inquiry, coupled with hands-on facilitation, promote pre-service teachers' confidence and competence with maker pedagogical approaches and influence their mindset and teacher practices?

- *What challenges do pre-service teachers face, and what risks do they take to implement maker activities in their own practicum placements?*

Conceptual Framework

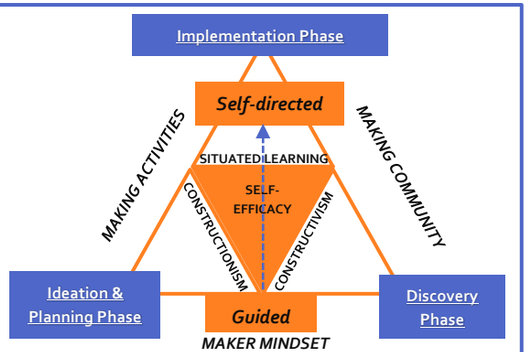
Four theories guided this research approach and analysis:

- *Constructivism*, theory based on work from Piaget (1936, 1957) & Vygotsky (1978).
- *Constructionism*, theory based on work from Papert (1980, 1988, 1993).
- *Situated Learning Theory*, based on work from Lave & Wenger (1991).
- *Social Cognitive Theory* with *self-efficacy theory*, based on work from Bandura (1991, 1999).



Methodology

- Qualitative, interpretive single-case study design.
- Seven pre-service teacher participants representing Primary/Junior & Intermediate/Senior streams.
- Research design included three phases with 18 workshops over four months.
- All three phases started with guided support & progressed to self-directed.

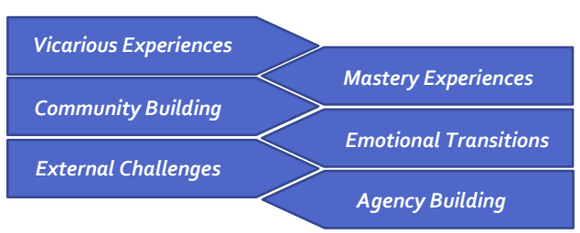


Data Analysis

- Multiple sources of data collected from varied perspectives. Over 450 distinct data sources including: surveys, interviews, observations & artifacts.
- This study used an Iterative abduction data analysis which involved several cycles of inductive coding, followed by deductive coding, and finally searching for patterns, resulting in six categories and three data themes.

Findings

The six data categories align to the sources of self-efficacy and agency:



Conclusions

- In this study building confidence and competencies in maker pedagogies & developing maker mindsets was best accomplished through a *progressive guided to self-directed journey* with a *supportive community* and the opportunities to *build capacity for agency*.
- When time-constrained, this guided community approach can help teachers adapt to these practices as making involves productive struggle, failure, and frustration.
- Developing agency is key as teachers will face many school challenges with making.

Detailed Report & References

Email: margie.lam@ontariotechu.net
Twitter: @margiesam9

SCAN ME

Special Thanks: OTU STEAM-3D Maker Lab
Website: janettehughes.ca/lab/