

Makerspaces Reducing the Digital Divide in Low Socioeconomic Communities: How Self-Efficacy Plays an Important Role



**This study will test the lasting effects of
instilling self-efficacy through
classroom opportunities that allow
students to build agency from learning**

Introduction

- ❖ Students in technology-enriched classrooms score significantly higher academic achievements and have higher self-esteem levels than peers in nontechnology-enriched classrooms
- ❖ Schools without basic connectivity and reliable technology are falling even further behind in the digital divide
- ❖ Technology literacy is as essential as reading and writing skills
- ❖ Students later in life as adults are unable to get higher paying jobs in careers where technology proficiency is a requirement



Research Questions

- ❖ Is making critical to building self-efficacy, agency, and student empowerment?
- ❖ Can student centered learning be as successful without hands-on project making?
- ❖ What correlations, if any, exist in utilizing maker technology in the classroom of community schools with low socioeconomic status?



Literature Review

Technology

- ❖ Increasing technology in classrooms is an important step for low socioeconomic citizens to rise from poverty
- ❖ Frequent obstacle is low digital proficiencies
- ❖ Democratizing technology is a huge part of closing the digital divide
- ❖ Accessibility for educator training in new technologies and better teaching practices essential

Literature Review

Dismantling & Clarifying

- ❖ Initial studies show positive outcomes in leveraging maker technologies, unfortunately have limited participants and do not clarify which components, student centered learning or experiential learning, is the greater contributor to gains in self-efficacy and higher academic achievements
- ❖ Schools in low socioeconomic communities have an even wider divide to giving students a comparable education
- ❖ Studies indicate the effects of a student's participation in these programs as potentially being life-changing, especially with individuals in low socioeconomic communities.

Literature Review

Study Purpose

- ❖ Digital competencies play a critical role in job searching and other life functions
- ❖ Governments and communities have placed libraries and schools as figureheads for providing open access
- ❖ Additional research is needed to bring to light the realities of this lack of funding

Data

- ❖ Same geographic area – Ideally in multi-city
- ❖ Identify willing schools to participant
- ❖ Recommended Socioeconomic Measurements
- ❖ Entire 3rd-5th grade classes from each school
- ❖ Four-year study, testing each grade level

Research Methods & Procedures

Timeline

- ❖ Pre-testing prior to starting study, post-test at the end of 6th grade
- ❖ Final year: no independent variable influencing
- ❖ Additional surveying beginning and end of every school year



5 th grade	1 year - Post test at end of 6th grade	2 years total
4 th grade	2 years - Post test at end of 6th grade	3 years total
3 rd grade	3 years - Post test at end of 6th grade	4 years total

Research Methods & Procedures

Recruitment & Incentives:

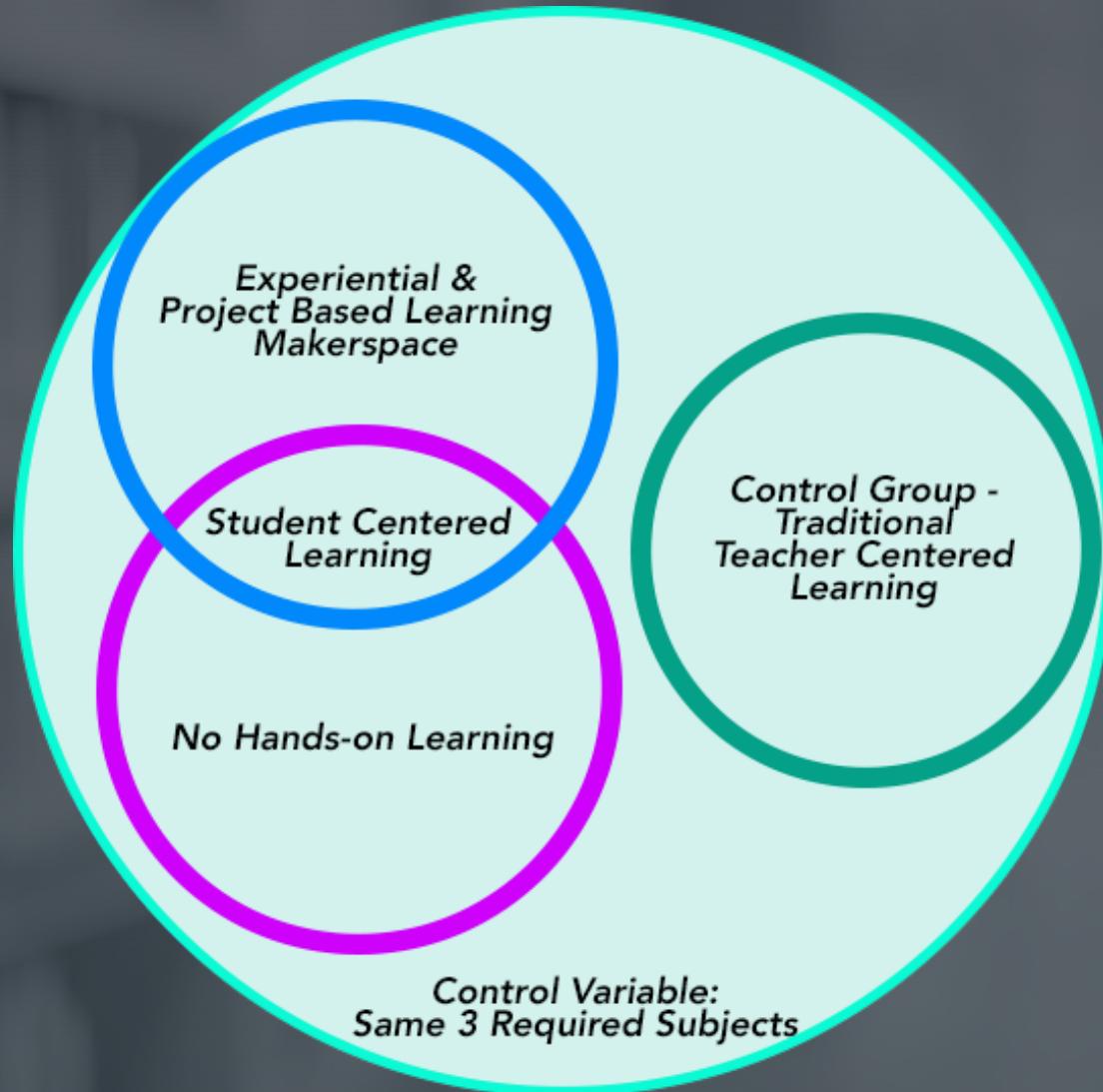
- ❖ Inclusion – In order to reduce threats to internal validity all 3rd-5th graders in the school will be participating in the program
- ❖ Schools - Free curriculum, makerspace equipment and tools, additional training, and 2-3 years of support for teachers following the study
- ❖ Exclusion - Students without parental/guardian permission will not be tested and/or surveyed
- ❖ Students - Financial incentive after completion of post-test at the end of 6th grade

Research Methods & Procedures

Experimental Design

- Every set of three participating schools in each city will be randomly assigned a program design on the school cluster level
- Students will not be specifically chosen by researchers, the only determining factors will include participation in regular academics and permission from parents/guardians
- There will be a control and two treatment groups

Research Methods & Procedures



Experimental Design

- ❖ Independent Variable – Student Centered Learning Structure with/out hands-on project-based learning
- ❖ Control Variable – Same Required Subjects
- ❖ Dependent Variable – Student's scores on Self-Efficacy Formative Questionnaire and Coopersmith Self Esteem Inventories self-report questionnaire

Research Methods & Procedures

Experimental Design

Potential Confounds:

- ❖ Community acceptance – prior to study information sessions
- ❖ Cannot determine the teaching practices of 6th grade schools that students will attend - only accepting data from students that attend specific feeder schools



Implications of Research

- ❖ Obtaining specific metrics on the effects of maker technologies and maker pedagogies
- ❖ If significant variations, then maker technologies are not just a luxury but essential tools that should be in all schools
- ❖ Which will lead to more grants and additional sources of funding for educators
- ❖ Overall improving the economies in cities where higher skilled workers are needed

Limitations

External

- ❖ High costs due to long term study
- ❖ Current social and political climate, other nation-wide emergencies

Internal

- ❖ Maturation and Attrition
- ❖ Student behavior

