# An Investigation of Digital and Hands-on Learning Styles and their Potential Impact on STEM and Online Education

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## Introduction and Objectives

Virtual Learning

Hands-on Learning

<u>Educational Objective 1:</u> Investigate the effects of *virtual* and *hands-on* learning on student performance

<u>Educational Objective 2:</u> Develop technology solutions to help integrate *virtual* and *hands-on* learning in STEM and online courses (e.g., MOOCs)

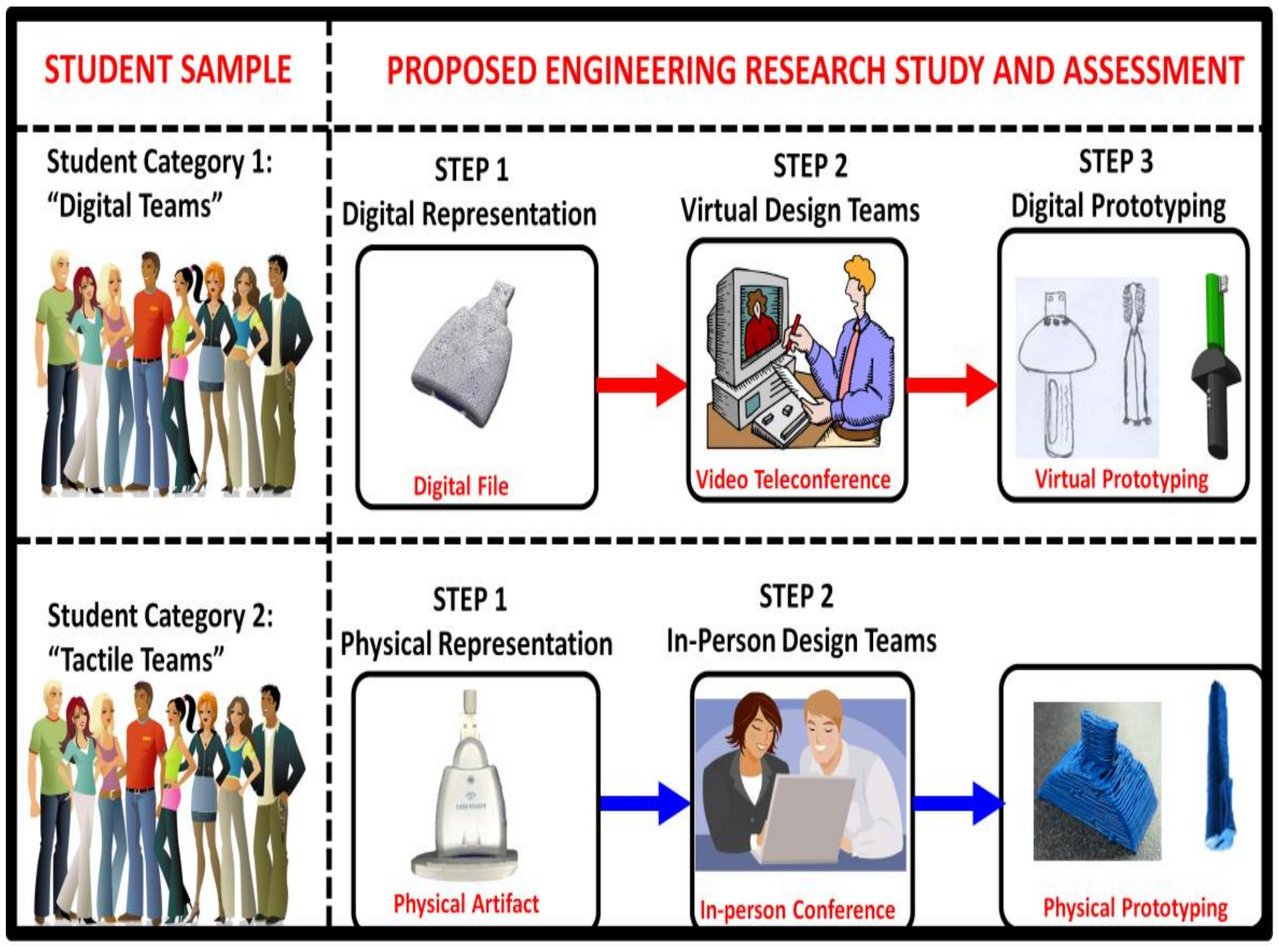
<u>Educational Objective 3:</u> Pioneer novel data acquisition techniques to help capture student activities

**Disciplines of interest:** STEM

**Course focus:** MOOCS, Engineering

## Learning Activities and Materials

- Students engage in product dissection and other related hands-on activities
- Digital representation of physical artifacts using desktop 3D scanners
- Physical representation of digital artifacts using RepRap 3D printers




## Discussion and Path Forward

- Ubiquitous computing / sensor devices have the potential to advance scientific knowledge in both traditional and online education (e.g., MOOCS)

Physical Interaction in Digital World

## Acknowledgments

- Leonhard Center at Penn State
- Penn State Center for Online Innovation in Learning (COIL)

## Development History

- **Spring-Fall 2012-:** Grant to procure equipment needed to quantify student team interactions
- **Spring-Fall 2013: C**ollaboration (Penn State, University of Maryland)

## Execution

- Design equipment setup: 3D scanner and printer hardware
- Student surveys will address how the hands-on and virtual experiences influence their design process

## Major Issues to Resolve

- Reduce the learning curve for both students and instructors aiming to implement these educational objectives as part of their in-class/online curricula

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