



**CREATEiT Learning By Making  
A Professional Development Course  
For Educators – Fall 2017  
Hosted by the Annville-Cleona School District**

**Overview**

A popular trend in education is the implementation of Maker spaces in schools. For students to benefit optimally from exposure to Maker experiences, teachers need to support cognitive development as well. This course will provide participants with an opportunity to learn how to use Maker tools to stimulate design thinking in students and how to develop a design culture in which exploration, questioning, problem solving, and making mistakes are seen as valued aspects of the classroom community. One of the main tools teachers will learn in this workshop is how to think about design as creative learning opportunities for their classroom. To accomplish this aim, we will first introduce participants to fundamental design concepts, building on ideas of science inquiry, and other previous teaching experiences. We will then introduce a variety of tools teachers can use as objects to set the stage for design. In this way, teachers can decide what tools they enjoy working with and begin the process of thinking about how to incorporate design exploration into classroom activity.

The course will include in-class sessions supplemented by online activities.

The first session will provide the structure for the course and will introduce the concept of design thinking and ways that teachers can help students develop this type of thinking. After the introductory session, participants will deepen their understanding of design thinking and how to instill it by participating in hands on technology workshops. The specific technologies that will be utilized will be TinkerCAD, littleBits, and Lego robots. The sessions will focus not only on understanding the technologies but also on using them to teach design thinking. Online modules will help participants to reflect on learning outcomes and strategies for effectively implementing the technologies in their classrooms. The hands on sessions will provide participants with the opportunity to use Maker technologies. The sessions will be structured so that participants with varying levels of experience with the tools will benefit.

Also, at the end of each session participants will be able to discuss and share ideas and strategies for successfully implementing Maker technologies in their classrooms.

## **Schedule**

September 18	Learning by Making: Introduction
September 25	Using littleBits to Teach Design Thinking
October 2	Using littleBits continued
October 9	Using TinkerCAD to Teach Design Thinking
October 16	Using TinkerCAD continued
October 23	Using Lego Robotics to Teach Design Thinking
October 30	Using Lego Robotics continued
November 6	Design Thinking Review
Nov 13-Dec 8	Students will complete readings and assignments online as well as develop final projects. Required only for students enrolled for student credit.
December 11	Student presentations. Optional for ACT 48 students.

## **Description of Topics**

### **Learning By Making: An introduction**

In this session participants will be introduced to the concept of Maker Spaces as Thinker Spaces. In addition, participants will learn about Design Thinking and begin to develop strategies for Implementing Design Thinking in the classroom.

### **Using littleBits: Tinkering is Learning\***

Learning and prototyping with electronics is easy and versatile and used by educators as a cross-curricular, multisensory tool to reach students. littleBits are used to supplement and enhance existing curriculum in a creative and interactive manner. Participants will learn and understand the basic modules while completing sample circuits and predetermined projects and will then employ the design process to produce products of their choice.

\* This section of the course will introduce participants to coding.

### **Using TinkerCAD: Revolutionizing the Classroom**

3D Modeling and Printing in the classroom is another creative and interactive way to engage a student's head, heart and hands and is an important 21st Century skill. This workshop will teach 3D design with TinkerCAD, a simple-to-learn solid modeling program, with numerous activities. TinkerCAD requires no prior experience with design but is robust enough to create 3D models for printing and is easily accessible. No one disputes how personal computers have revolutionized education, but projects and artifacts have lived on paper or on screen. Bringing these projects to life will aid in a student's problem solving ability and comprehension.

### **Using Lego Robotics: The Future is Here**

Robotics is another tool used to teach often difficult or abstract concepts in science, math, technology and engineering where students use a hands-on, minds-on approach to create fun learning opportunities. Participants in this workshop will actively build Robots and manipulate how they work and move by producing a simple program using LEGO Mindstorms, gaining an understanding of how problem solving and critical thinking skills are developed through creativity and applying math & science to real world situations.

### **Learning By Making: A Conclusion**

This session will allow participants to develop strategies from using Maker technologies to teach design thinking in the classroom. Participants will learn from the instructors and each other. The final session will end with a description of the opportunities to earn additional digital badges, by continuing implementation activities after the course has ended.

### **Enrollment Options**

There are two enrollment options. Students can enroll as graduate non-degree students in SCIED 460: Trends and Issues in STEM, or students can be enrolled in the course as non-credit students.

**Non-Credit Fee:**        The fee of \$250 includes instruction and materials

**Act 48 credit:** This course has been approved for ACT 48 credit. Professional educators are encouraged to confirm that this program fits their school district's professional development plan for Act 48. Non-credit students will receive 24 hours of ACT 48 credit and graduate credit students will receive 90 hours.

### **Instructors:**

Gabriela Richards, Ph.D.  
Assistant Professor  
Learning, Design, and Technology  
Department of Learning and Performance Systems  
College of Education  
Penn State

Peggy Condon-Vance, MS  
Instructor, Engineering  
Division of Engineering, Computing and Business  
Penn State Berks

**Registration:**

**Non-Credit:** Click on or copy and paste the following link in your web browser  
<https://register.outreach.psu.edu/search/publicCourseSectionDetails.do?method=load&sectionId=14000501>

**Credit:** Students may enroll as graduate non-degree students in SCIED 460: Trends and Issues in STEM. Click on or copy and paste the following link in your web browser to apply for non-degree enrollment <http://gradschool.psu.edu/prospective-students/how-to-apply/new-applicants/enrollment-types/>

**Please forward to others who may have an interest in this program.**