CREATEiT Learning By Making
A Professional Development Course
For Educators – Summer Course

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. Participants will have an opportunity to earn "digital badges" documenting the skills and knowledge they gain through participation.

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.

The course will utilize a unique instructional approach. The first session will be held on May 17 with Dr. Gabriella Richards presenting design thinking concepts via interactive video conferencing technology. Participants will be provided with readings and exercises to prepare them for the condensed hands-on sessions scheduled for June 19-22. Following the hands-on sessions participants will have the opportunity during the month of July to work with Penn State engineering students in our Maker space to develop lesson plans using a Maker technology. Our students can help participants trouble shoot problems and become more comfortable with the technology. More information will be provided upon registration.

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.

Participants will be encouraged to participate in a wrap-up session to be scheduled for late July.

May 17	Learning by Making: Introduction – 5:00pm to 8:00pm
June 19	TinkerCAD and 3D Printing – 9:00am to 3:30pm
June 20	littleBits and Introduction to Coding – 9:00am to 3:30pm
June 21	Robotics using Lego Mindstorms – 9:00am to 3:30pm
June 22	Robotics continued – 9:00am to 12:00pm
June 22	Integrative Activity – 12:30pm to 3:30pm
TBD	Learning By Making: Conclusion

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 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 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.

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.

Case Study: The Discovery Program at the Wilson School District
The Discovery Program was implemented in the Wilson School District during the 2015-2016 school year to better develop critical thinking skills in elementary students via project based learning. A team of educators from Wilson will provide an overview of the program, highlighting its successes, and lessons learned.

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.

Fee: The fee of $225 includes instruction and materials

Act 48 credit: Penn State has made application to become a noncredit Act 48 approved provider. Upon approval you can earn 24 hours toward fulfilling Act 48 requirements by attending this entire program. Professional educators are encouraged to confirm that this program fits their school district's professional development plan for Act 48.

Instructors:

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