THE UNIVERSITY OF BRITISH COLUMBIA

Faculty *of* Education

# Design and Technology II: Maker Education (EDCP 377 301)

**Date: September 2017**

**Course Description:**
This course inquires into critical issues surrounding making, tinkering, creating, and innovating in the classroom. In short, the course focuses on maker education as an effective way to understand and extend our praxis of technology education. It is designed as a *project based course* where students engage in the design of several maker projects through deliberate, sustained and systematic processes. Students will explore theories of maker education and collaborate in maker practices with a focus on creativity and exploration via critical making. Students are given opportunities to make, tinker, address challenges that arise through discussion and reflection, try out new or revised technological practices, and evaluate the results. Maker education, then, is a joyful collaborative process of teaching and learning found when we are all critically making together.

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**Valued Ends of the Course:**
My intention is to help you develop a background and a depth of expertise for understanding and interpreting maker education, as well as utilizing digital methodologies in your educational praxis.

**COURSE OBJECTIVES**
Upon completion of this course, the student should have developed:

1. an understanding of maker education requiring inquiry, creativity, and engagement with complex situations, materials, and relationships —with colleagues, students, and the scholarly community.
2. an appreciation of the importance of research, design, and iterative making for the educational engagement of teaching and learning.
3. A discerning pedagogical praxis that is technologically mediated and valuable for the maker classroom.

**Texts, Readings & Activities**
As an education student and pre-service teacher, you are expected to prepare for class each week, which entails a variety of things including academic conversation, articulation, and presentation. Preparation is interdependent with participation for each module, which involves ***reading*** (highlighting, post-it note-taking, commenting & questioning in margin-notes, etc.), ***writing*** (posting to discussions, blogging, journaling, defining, framing, outlining, summarizing,

sketching, etc.), ***organizing*** (archiving, documenting, labeling, mindmapping, ordering, sequencing events, etc.), ***reflecting*** (rethinking, reincorporating, remapping, analyzing, ideating, synthesizing, etc.), and ***speaking*** (corresponding with peers, critiquing, debating, negotiating, podcasting, etc.). Read for ***meaning*** along with ***purpose***.

**ASSESSMENT AND MARKS / ASSIGNMENTS (see details below):**

| **Assignment** | **Due Date:** | **Percentage** |
|---|---|---|
| 1. Class participation | Ongoing | 30% |
| 2. Coding MIT app inventor project | December 8, 2017 | 35% |
| 3. Making Media project | December 8, 2017 | 35% |

## Course Schedule

| **DATE** | **MODULE** | **ASSIGNMENT** | **READINGS & TOPICS** |
|---|---|---|---|
| Class 1<br>Sept 8 | Course Introduction | Participation, Preparation & Readings | **Course Syllabus, Mapping & Definitions:** Making, maker ed, STEM/STEAM, DIY |
| Class 2<br>Sept 15 | History, philosophy, practices | Readings, intro coding project | **Histories, Philosophies, and Practices of Maker Education:** constructionism, makers<br>(Lee, 2017) |
| Class 3<br>Sept 22 | Maker teaching and learning | Readings, intro coding project | **Making as site of pedagogy:** teaching and learning<br>(Sator & Bullock, 2017) |
| Class 4<br>Sept 29 | Space, tools, and materials | Readings, intro making media project | **Making in the schools**<br>(Wardrip & Brahms, 2015) |
| Class 5<br>Oct 6 | Play, creativity, gamification | Readings, coding work in class | **Making as play**<br>(Herro & Clark, 2016; Nicholson, 2012) |
| Class 6<br>Oct 13 | Project presentation | **Coding pitch due** | **Making and Coding Education**<br>(Kanbul, 2017) |
| Oct 20 | ***Professional Development Day – class cancelled*** | | |
| Class 7<br>Oct 27 | PBL, badges, portfolios, etc | Readings, explore modes of assessment | **Assessing and documenting maker ed**<br>(Flores, 2016) |
| Class 8<br>Nov 3 | Digital supports, social media | Readings, discuss online possibilities | **Making online**<br>(Rafalow, 2015) |
| Class 9 | Critical | Readings, | **What is critical making?** |

| | | | |
|---|---|---|---|
| Nov 10 | making | looking beyond the classroom | (Ratto, 2011, CBC article) |
| Nov 17, 24 | ***2 week School-based Orientation Practicum*** | | |
| Class 10<br>Dec 1 | Case studies, review | Readings, project work in class | **Making meaning**<br>(NYHS, 2013) |
| Class 11<br>Dec 8 | Course Synthesis | **media project Presentations** | **Celebration of Learning** |

## Class 1
## Maker Education Introduction

**Readings / Media**

1. Maker Education website - http://makered.org/
2. How the maker movement is making into classrooms - https://www.edutopia.org/blog/maker-movement-moving-into-classrooms-vicki-davis

**Resources**

a. Fallows, J. (2014). Why the Maker Movement Matters - https://www.theatlantic.com/business/archive/2016/06/why-the-maker-movement-matters-part-1-the-tools-revolution/485720/.
b. Hatch, M. (2014). *The maker movement manifesto: Rules for innovation in the new world of crafters, hackers, and tinkerers*. New York, NY: McGraw Hill.
c. The tinkering studio - https://tinkering.exploratorium.edu/

## Class 2
## Histories, Philosophies, and Practices of Maker Education

**Readings / Media**

3. Lee, Y. (2017). Designing technotheologies: Ethics, pedagogies, and spiritualities in maker actor-networks (pp. 14-20, 121-133). Retrieved from https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0348246

**Resources**

a. Anderson, C. (2012). *Makers: The new industrial revolution*. New York, NY: Crown Publishing Group
b. Youth Makerspace Playbook. Retrieved from http://makered.org/wp-content/uploads/2015/09/Youth-Makerspace-Playbook_FINAL.pdf
c. Maker Education Resource library - http://makered.org/resources/
d. Young Makers Profesional Development - http://makered.org/youngmakers/training-resources-support/prof-dvlp/

**Class 3**
**Making as site of pedagogy**

**Readings / Media**

4. Sator, A. J., & Bullock, S. M. (2017). 'Making' as a catalyst for reflective practice. *Reflective Practice, 18*(2), 244-255.

**Gaming Resources**

a. Virtonomics, a business game - https://virtonomics.com/
b. Kahoot - https://kahoot.it/#/
c. Phylo game - http://phylogame.org/

**Class 4**
**Making in the schools**

**Readings**

5. Wardrip, P. S., & Brahms, L. (2015). Taking making to school: A model for integrating making into classrooms. In K. Peppler, E. R. Halverson, & Y. B. Kafai (Eds.), *Makeology: Makerspaces as learning* environments (97-106). New York, NY: Routledge.

**Making Media Resources:**

a. Väljataga, T. & Fiedler, S. (2009). Supporting students to self-direct intentional learning projects with social media. *Journal of Educational Technology & Society*, *12*(3), 58–69. Retrieved from http://www.jstor.org.ezproxy.library.ubc.ca/stable/jeductechsoci.12.3.58
b. Nielsen, L. (2013). Using social media to engage students and families. *Educational Horizons*, *92*(2), 16–20. Retrieved from http://www.jstor.org.ezproxy.library.ubc.ca/stable/42927216
c. Clayton, K. E. and Murphy, A. (2016). Smartphone apps in education: Students create videos to teach smartphone use as tool for learning. *Journal of Media Literacy Education*, *8*(2), 99-109. Retrieved from http://digitalcommons.uri.edu/jmle/vol8/iss2/6
d. Kinash, S. & Brand, J. (2014). Does social media breed learner laziness? *Education Technology Solutions, 58*, 56-59. http://epublications.bond.edu.au/cgi/viewcontent.cgi?article=1071&context=tls
e. Dede, C. (2016). Social media and challenges to traditional models of education. In C. Greenhow, J. Sonnevend, & C. Agur (Eds.), *Education and social media: Toward a digital future* (pp. 95-113). Cambridge, MA: MIT Press.
f.

**Media Production Resources**

a. Musburger, R. B. & Kindem, G. (2009). *Introduction to media production: The path to digital media production* (Chapter 2). Boston, MA: Elsevier.
b. Academy of Motion Picture Arts and Sciences. (2008). *Teachers guide series*. http://www.oscars.org/education-outreach/teachersguide/index.html
c. *Video Maker Magazine* http://www.videomaker.com/
d. *Creative Cow Magazine* http://forums.creativecow.net/
e. CyberCollege http://www.cybercollege.com/
f. Student Filmmakers http://www.studentfilmmakers.com/filmfestivals/
g. SchoolTube http://www.schooltube.com/
h. Student Television Network http://www.studenttelevision.com/
i. FilmSkills http://www.filmskills.com

j. Beginning Reporting http://www.courses.vcu.edu/ENG-jeh/BeginningReporting/Introduction/home.htm
k. Resources at NFB Education https://www.nfb.ca/education/guides/
l. American Film Institute
m. Royalty Free Music for Schools http://www.soundzabound.com/

**Class 5**
**Making as play**

**Readings / Media**

6. Herro, D., & Clark, R. (2016). An academic home for play: Games as unifying influences in higher education. *On the Horizon, 24*(1), 17-28.
7. Nicholson, S. (2012, October). Strategies for meaningful gamification: Concepts behind transformative play and participatory museums. Presented at *Meaningful Play 2012*. Lansing, Michigan. Available online at http://scottnicholson.com/pubs/meaningfulstrategies.pdf

**Media Education & Literacy Resources**

a. TED Ed – Gamification of Education - https://ed.ted.com/on/uk36wtoI#review.
b. Kurshan, B. (2016). The intersection of learning and fun: Gamification and education. https://www.forbes.com/sites/barbarakurshan/2016/02/11/the-intersection-of-learning-and-fun-gamification-in-education/#74d6e1e59c19
c. Legends of learning - https://www.legendsoflearning.com/research/
d. UBC Emerging Media Lab - http://eml.ubc.ca/

**Class 6**
**Making and Coding Education**

**Readings / Media**

8. Kanbul, S. (2017). Importance of coding education and robotic applications for achieving 21st-century skills in north Cyprus. *International journal of emerging technologies in learning, 12*(1), 130-140.

**Media Education & Literacy Resources**

a. Minecraft education - https://education.minecraft.net/
b. MIT app inventor - http://appinventor.mit.edu/explore/
c. Hour of Code - https://hourofcode.com/us
d. Coding Games and Programming - https://www.codingame.com/

**Class 7**
**Assessing and documenting maker education**

**Readings / Media**

9. Flores, C. (2016). Alternative assessments and feedback in a "maker" classroom. In P. Blikstein, S. L. Martinez, & H. A. Pang (Eds.), *Meaningful making: Projects and inspirations for fab labs and makerspaces* (28-33). Torrance, CA: Constructing Modern Knowledge Press. Retrieved from http://fablearn.stanford.edu/fellows/sites/default/files/Blikstein_Martinez_Pang-Meaningful_Making_book.pdf

**Resources**

a. Open badges - https://openbadges.org/
b. Creating infographics - https://www.canva.com/create/infographics/
c. Vlogging for education - http://socialmediaandtheclassroom415.weebly.com/vlogging.html

## Class 8
## Making online

**Readings / Media**

10. Rafalow, M. (2015). Tinkering online: Digital supports for making and sharing. In K. Peppler, E. R. Halverson, & Y. B. Kafai (Eds.), *Makeology: Makerspaces as learning* environments (158-174). New York, NY: Routledge.

**Resources**

a. WIRED documentary – 'Holy Land – Starup Nations' - https://www.youtube.com/watch?v=I5h8GfxIWVY
b. WIRED documentary – Shenzhen: The Silicon Valley of Hardware' - https://www.youtube.com/watch?v=SGJ5cZnoodY

## Class 9
## What is critical making?

**Readings / Media**

11. Ratto, M. (2011). Critical making: conceptual and material studies in technology and social life. *The Information Society, 27*, 252-260.
12. Burpee, J. (2015). Canadian team uses 3D printer to mke artificial legs for Ugandans. http://www.cbc.ca/news/technology/canadian-team-uses-3d-printer-to-make-artificial-legs-for-ugandans-1.2953620

**Resources**

a. Matt Ratto @ TEDxUofT, 'Without a leg to stand on – 3D printing prosthetics' - https://www.youtube.com/watch?v=LNohxpJntZo
b. Chris Anderson, From Maker Movement to Industrial Revolution – http://www.youtube.com/watch?v=i03GLcn_ceE

## Class 10
## Making meaning

**Readings / Media**

*13.* New York Hall of Science. (2013). Making Meaning [M2]. Retrieved from http://www.lpi.usra.edu/education/stemlibraryconference/events/Making-Meaning-Report.pdf

**Resources**

a. Edutopia resources for maker education - https://www.edutopia.org/article/maker-education-resources
b. Maker labs - http://www.makerlabs.com/

c. UBC School of Architecture - https://sala.ubc.ca/resources/workshop-fabrication/laser-cutters
d. UBC engineering prototyping tools - http://projectlab.engphys.ubc.ca/prototyping/

## Participation (Ongoing) (30%)

Participation is valued at 30% of your final grade. Participation is interdependent with **preparation** for each class, which involves ***reading*** (highlighting, pagination post-its, margin notes, comments & questions, etc.), ***writing*** and ***speaking*** (discussing, corresponding with peers, chat, etc.), and **commenting** on classmates' in-class and digital work. ***Challenges*** also are expected to be completed and participated in on their due dates; presentations and assignments should be polished, **creative**, **unique**, and informative.

**Participation (30%)**

| |
|---|
| Low----------Avg----------High<br><br>Appropriately and accurately prepares and participates in readings discussions, reflection, etc.<br><br>F----------P<br><br>Level of participation in activities and group work is high quality and professional, etc.<br><br>F----------P<br><br>Demonstrate curiosity, enthusiasm, and in-depth inquiry into weekly explorations of maker curriculum and pedagogy.<br><br>F----------P<br>Total: F / P |

## Coding MIT app inventor project [DUE: Dec 8, 2017] (35%)

In *groups of 2*, use app inventor (http://appinventor.mit.edu/explore/) to pitch an idea for an app and design it to be useful in your classroom. The *pitch* should be a proper **5 minute presentation** (using visuals, audio, presentation technologies, etc.) to the class on **October 13**. Your classmates and the instructor will give you feedback for your initial pitch. Afterwards, you will have class time to work on the assignment with a final **5 minute presentation** reveal of your app due **December 8**.

The project should be a comprehensive, working app. Additionally, the user experience (UX) and user interface (UI) should be designed well, and will be graded according to the rubric listed below.

**Coding project (35%)**

Low----------Avg----------High

The pitch is interesting, detailed, and reflects your interests

F----------P

The pitch has good use of images, texts, and story which conveys your idea

F----------P

The app creatively addresses the issues raised during the pitch

F----------P

The app demonstrates a technical proficiency (ie. It works)

F----------P

The app has rich use of design: graphics, functions, interface

F----------P

Total: F / P

## Making Media Project [Due: December 8, 2017] (35%)

Create a *5 minute video tutorial* (or small series of lessons), in combination with Augmented Reality (AR) technologies, to instruct students on specific design and technology class challenges (e.g., assembly, design, programming, etc.). The topic must follow the following qualities:

a) Addresses a challenging procedure. Use screen capture software, CamStudio (CamStudio or Camtasia can be downloaded free through UBC Connect http://elearning.ubc.ca/connect/). Students are also advised to download VideoScribe from Connect. Use screen capture in conjunction with presentation or publishing software such as Publisher or InDesign OR web technologies (Wix, Wordpress, Wikia, Weebly, etc.) to create a professional quality tutorial/unit plan.
b) The lesson incorporates AR software, use Aurasma (https://www.aurasma.com/ ), Layar (https://www.layar.com/ ), or other AR software to uniquely connect your video tutorial lesson to a physical object, material, or location in your classroom
c) Appropriate, appealing, and relevant to students at either the grades 8-10 or 11-12 levels
d) Relates to and connects the unit/tutorials' learning objectives with either the BC IRPs and PLOs.

The tutorial should include the following elements:

a. **Title/Introduction**: Introduce your tutorial and its learning outcomes.
b. **Procedural Challenge**: What challenge does procedure describe and resolve?
c. **Image. Text & Sound**: Write effective text and insert appropriate images or reference sound files to provide a fully descriptive procedure.

d. **Focus Points:** Provide steps that allow for pause and challenge the students to think through decision trees.
e. **Next steps:** Include next logical steps for the students to pursue after completing the procedure described in the tutorial.
f. **Professional Format**: Uses a variety of digital technologies (interactivity, audio, visual) for tutorial design which are presented through a polished and professional format.

**Making Media Project (35%)**

Low----------Avg----------High

Clarity of communication, and professional formatting
F----------P

Creative use of audio, video, animation, etc.
F----------P

Development and logical flow of procedures
F----------P

Effective and creative use of Augmented Reality software
F----------P

AR use and video tutorial work seamlessly together
F----------P

**Total:** F / P