**MS_ED 438/LS 338: Learning and Teaching with Technology**
Winter 2021
Wednesday 6 - 9 p.m.
on Zoom

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*Office hours: by appointment*

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**Course Description**
Technological innovation has become an integral part of everyday life. All digital tools (i.e. programming/coding, robotics, social media, VR/AR, games, and digital design fabrication) have the potential to be used to help learners develop their own understandings of subject-matter. But technology is not always used in ways that improve experiences of learning and teaching. The lack of realizing this potential is often due to limited views of learning that are embedded in the design and use of new technologies. In this course, we will explore views of learning that can be used to realize the promises and avoid the pitfalls that technological innovations can hold for learning in both informal and formal settings.

This course is based on the premise that exploring *learning with* technology will allow us to deepen our understanding of how to effectively *teach with* technology. As educators, researchers and designers, we need our understandings of technology and its uses to be connected to the theories of learning that are enacted in our practice whether we make them explicit or not. To this end, we will examine how combinations of cognitive, sociocultural and ecological theories enable us to articulate understandings of learning that will improve our pedagogical practice. We will explore the design of activities using technologies that encourage teachers to recognize and value the multiple pathways that learners can make sense of new ideas. These designs also provide opportunities for multiple avenues of research related to learning and teaching.

The course is designed to immerse students in the use of technological tools for learning and the design of projects with for learning with various technologies. Projects, reading and writing are intended to help students to reflect on their own learning and the learning of others. Course work is also designed to provide opportunities to try out, analyze and interpret various approaches to teaching with technologies. The goal is to develop perspectives on learning and teaching with technology that enable both pre-service teachers and emerging learning scientists to create learning environments that support all learners in coming to understand academic ideas, themselves, and their social/cultural contexts.

For example, we will look beyond the popular assumption that coding is a good skill for all children as preparation for future economic expansion and workforce development. We will give greater attention to deeper meanings and purposes of coding. We will consider what computational thinking *can be* when educators attend to the new ways learners can make sense of ideas and phenomena using computational tools. The kinds of questions that emerge from the work in this class include: How can geometry be explored and understood differently with computational tools as opposed to traditional pedagogical approaches? How can engaging in inquiry using sensing devices help learners to expand their sense of possibility for what they can make, learn and do? How does the cultural context

of learning inform how technology can be taken up to support learning? What new purposes and meanings for technology use might young people generate for themselves?

Core strands of activity in the course include:

1) **Class Participation & Pedagogical Leaders**: Activities during class will often be informed by the readings. So students must come prepared to class with thorough reading of the material that is assigned. This preparation may include how specific passages have provoked new ideas and questions. Each student will participate in a Pedagogical Leaders group who will read and prepare an activity for the class based on an optional reading.

2) **Technology Inquiries & Field Work** - Students will create projects that involve making artifacts with technologies in order to explore the understanding of a phenomena. Several of these inquiries will be done in class and class discussions will include reflection on learning and encountering phenomena in ways that are made possible by features of the technologies. One of these projects will be done as a field work experience on site at a middle school maker space program.

3) **Learning & Teaching with Technology Journal** - Each week, students will capture observations and questions about learning and teaching with technology. At the beginning of the course, these questions may be based on situations you have seen in the world. For example, why is it that young children are so easily engaged in using iPhones? Is there something about the quality of easily taking and reviewing pictures with mobile devices that can enhance children's exploration of science? What kinds of questions can teachers ask that encourage or constrain students' explorations of ideas about force and motion using robotics? Towards the middle of the course, students will develop a focused investigation and begin to use their journal to design an activity focused on using technology in ways that are informed by course readings and reflections. These reflections should include reference to relevant course readings and will inform the final project.

4) **Final Project: Learning, Teaching, Inquiry, and Play** - The last several weeks of the course will be spent designing an activity/project that integrates uses of technology with learning some area of content. There will be several options for how to structure this project. One structure will be to try this activity with a small group of learners for at least three sessions. Another approach could be working with a group of classmates to learn how to use a technology that is new to you. Regardless of the approach for the projects, you will be required to collect data from learning sessions and analyze it in connection with the readings and reflections throughout the course. Your analysis and reflections on the project will be submitted as a **final paper** to share your new ideas about learning and teaching with technology. During our final class during Exam Week, you (or your group) will give a **class presentation** that is focused on an aspect of your project that surprised you or you still wonder about.

**Approach to Feedback:**
You will receive feedback on your writing and other work for this course in several ways including: written feedback on Canvas, oral discussions and work conferences, and peer feedback. Feedback is a key part of a conversation about your ideas and a space to push your thinking on core concepts and passages from the readings and other class activities. Think about the feedback as formative. Framing much of your writing as a journal emphasizes that comments *are aimed at your learning* and are meant to help us to engage in written dialogue that will deepen your thinking and improve your writing over time. Use feedback to inform your next written piece**.** Sometimes you will get specific suggestions for things to work on in your subsequent L&T Tech Journal entries. Questions may be raised pertaining to the big ideas of the course or to identify areas where you might reflect on your assumptions. There will also be opportunities to share passages that typify high quality in forms of creative, scholarly writing and encourage you to continue stretching into this craft.

Prof. Hooper is happy to talk about your writing, participation in class, work on projects, questions and concerns at any point during the quarter. Please send an email to arrange an appointment anytime. Also, there will be three scheduled meetings across the quarter for feedback and discussion about your ideas and how they are developing. These **Independent Focus Conferences** can be scheduled individually or in small groups. The first meeting will be during weeks 2 or 3, the second will be mid-term and the third will be during your work on your final project.

**Summary of Assignments and Grading:**
The details of each assignment will be available on the Canvas site. See below for how they are weighted. All assignments are expected to be done within the time frames that are given on Canvas. Due dates/times are selected so as to give the maximum possible time to complete a task, while also leaving sufficient time to provide feedback that contributes to the progress of your thinking. Previous notice must be given to Prof. Hooper regarding concerns about timing for assignments or attendance.

| Grading | |
|---|---|
| **Final Project** | 30% |
| **Learning & Teaching w/ Technology Journal** | 20% |
| **Technology Inquiries & Field Work project** | 15% |
| **Pedagogical Leaders** | 10% |
| **Class Participation & IFC Conferences** | 25% |
| **total** | 100% |

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**Course policies:**

**School of Education and Social Policy Academic Integrity Statement**: Students in this course are required to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic guide".  All papers submitted for credit in this course must be submitted electronically unless otherwise instructed by the professor.  Your written work may be tested for plagiarized content.  For details regarding academic integrity at Northwestern or to download the guide, visit: http://www.northwestern.edu/provost/policies/academic-integrity/index.html

**Accommodations for Students with Disabilities**: Any student requesting accommodations related to a disability or other condition is required to register with AccessibleNU (accessiblenu@northwestern.edu; 847-467-5530) and provide professors with an accommodation notification from AccessibleNU, preferably within the first two weeks of class. All information will remain confidential.**

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**Course Readings & Materials**

Please purchase the following books (available at bookstore):
*Mindstorms: Children, Computers, and Powerful Ideas* by Seymour Papert
https://www.amazon.com/Mindstorms-Children-Computers-Powerful-Ideas/dp/0465046746

*The Having of Wonderful Ideas* by Eleanor Duckworth
https://www.amazon.com/Having-Wonderful-Essays-Teaching-Learning/dp/0807747300

Files for all of the other readings and written materials will be available through Canvas.

There will be opportunities for you to bring in and use some of your own materials and tools for some projects.

You will need to have access to a laptop (not tablet) for almost every class. Please let me know if you need help with this access.**

***\*\* Please let Prof. Hooper know if you have any other concerns or needs about your participation in this course and/or access to materials.***

## Course Calendar and Assignments

Changes to the timetable and/or assignments may occur in response to how learning progresses and the flow of the class. Any changes to assigned readings or the course schedule will be announced in class and posted on Canvas. All readings and assignments are due on the dates on which they are written unless otherwise noted.

| Week & Theme | In-Class Activities | Readings | Written Assignments & Projects |
|---|---|---|---|
| **1**<br>**1/13**<br>"Reading the World" of Learning and Teaching with Technology | - Introduction to course<br><br>- How do you think about learning and teaching with technology?<br><br>- I notice … I Wonder<br><br>- Building classroom culture & community | Read during class:<br>- Syllabus<br>- Gears of My Childhood (Papert 1980) | |
| **2**<br>**1/20**<br>Theories and Frameworks for Learning Influence Teaching & Design: Constructionism | - Review course on Canvas & Syllabus<br><br>- I Notice, I Wonder …<br><br>- Sharing ideas L & T Tech Journal #1: Readings & Discussion of Childhood Object stories<br><br>- Logo Turtle Graphics Demo & Discussion<br><br>- Participatory Lecture: Constructionism | - Mindstorms: Chapter 1 (Papert 1980)<br><br>- 3 of the Childhood Object stories (Turkle 2007, 2008)<br><br>Recommended Reading: A Word for Learning (Papert 1991) | - L & T Technology Journal #1 DUE Tues 1/14 @ 8 p.m.<br>• Write about an object from your childhood that you enjoyed and influenced your thinking in ways that resonate with the Childhood Object Stories<br><br>• Notice ways that you see children using computational objects (iPhone, iPad, toy, etc.) What are they doing? What do you wonder about how they are thinking with the object? |

| Week & Theme | In-Class Activities | Readings | Written Assignments & Projects |
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| **3**<br>**1/27**<br>Theories and Frameworks for Learning Influence Teaching & Design: Constructionism 2 | - I Notice, I Wonder …<br><br>- Readings Reflection and Discussion<br><br>- Technology Inquiry: Programming/Coding in Microworlds for learning<br><br>- Intro Nasir et. al., & Gutierrez & Rogoff<br><br>- Intro to coding in Scratch | Mindstorms: Ch 3 Turtle Geometry<br><br>Constructionism (Kafai 2006) | Technology Inquiry: Create a project in Microworlds EX that you find interesting<br><br>L & T Tech Journal #2:<br>DUE Tues 1/21 @ 8 p.m.<br>- Describe the project(s) that you made and reflect on what the process of creating it was like for you. What was fun, challenging, motivating, and/or frustrating? What did you learn? How did you learn it? What questions did your experience raise for you about learning and teaching?<br>- Choose 2 excerpts from each paper that were particularly useful to your thinking about learning |
| **4**<br>**2/3**<br>Theories and Frameworks for Learning Influence Teaching & Design: Coordinating Constructionism & Constructivism | - Share and discuss Scratch projects & readings<br><br>- Participatory Lecture: Big Ideas from Papert and Duckworth | The Having of Wonderful Ideas essay (Duckworth 2006)<br><br>Mindstorms: Ch 5 Microworlds | Technology Inquiry: Create a project in Scratch that you find interesting<br><br>L & T Technology Journal #3<br>DUE Tues 1/28 @ 8 p.m.<br>- Write about what you notice in the learning of and with Scratch<br>- Choose 2 excerpts from each paper that were particularly useful to your thinking about learning |

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| **5**<br>**2/10**<br>Theories and Frameworks for Learning Influence Teaching & Design: Beyond Constructionism to Culture in Learning | - Technology Inquiry: The Spiro Inquiry (Hooper & Freed 2013)<br><br>- Presentation "They have their Own Thoughts …": Children's Learning of Computational Ideas from a Sociocultural Perspective (Hooper)<br><br>- Discussion of Learning as a cultural process | Learning as a Cultural Process (Nasir, Rosebery, Warren, Lee 2006)<br><br>Cultural Repertoires of Practice (Gutierrez & Rogoff 2003) | Technology Inquiry: Engage a learner (or two) in creating a Scratch or Microworlds project<br><br>L & T Technology Journal #4 DUE Tues 2/4 @ 8 p.m.<br>- Describe the project that was created<br>- What did you notice about the learners work and thought?<br>- What was challenging or easy in your interactions as a teacher? |

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| **6**<br>**2/17**<br><br>Exploring Technological Tools for Learning & Teaching: Digital Design Fabrication & Maker spaces as places for learning & teaching | - Discuss Readings<br><br>- Share and Discuss experiences with Spiro Inquiry<br><br>- Intro to Making: community digital tools and environments<br><br>- Plan to visit a maker space (on campus or off) where you can practice and observe digital design fabrication | Computational Thinking (Wing 2006)<br><br>Computational Thinking with Scratch (Brennan & Resnick (website))<br><br>Mindstuff (Eisenberg 2003) | Technology Inquiry: Continue investigation with Spiro & engage learners in the inquiry<br><br>Prep for MetaMakes Field Work project<br><br>L & T Technology Journal #5 DUE Tues 2/11 @ 8 p.m.<br>- Describe what it was like for you to learn with Spiro. What did you figure out about Spiro designs? What question(s) did you try to answer?<br>- Describe the teaching experience that you provided. What did you notice about learning and teaching with Spiro? What question(s) did learners try to answer? How did the process of asking their own questions affect their learning experience?<br>- Write about what you notice about their learning that seems to be tied to the interactions with the physical, digital or fabrication parts of the activity. Also, what do you notice about the social and cultural parts of the learning experience for them. What was it like for you to teach/engage them in learning through the Spiro Inquiry? |
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| Week & Theme | In-Class Activities | Readings | Written Assignments & Projects |
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| **7**<br>**2/24**<br>Exploring Technological Tools for Learning & Teaching:<br>What is a microworld and how do you live in it? | - Share and Discuss experiences with digital design fabrication<br><br>- Microworlds Circus<br><br>- Details for Final Projects & Review of repertoire of technological tools<br><br>- Guest Speaker: Mike Horn "TunePad" | Twenty-Four, Forty-Two: Keeping it Complex (Duckworth, 1991)<br><br>Messing about in time (Franz and Papert 1988)<br><br><br>(recommended reading) Chapter 1, Vignette and interview in Blocks to Robots (Umaschi Bers 2008)<br><br>Watch videos of children building and playing with robots | Technology Inquiry:<br>Design a microworld to help a learner explore a set of idea within any subject matter<br><br>L & T Technology Journal #6 DUE Tues 2/18 @ 8 p.m.<br>- Write about the rationale for the design of your microworld. Describe your microworld including pictures and any other media. Refer to ratings to support your rationale and description. What ideas is it designed for learners to explore? What kinds of interactions with the technology will support their learning? How can it be used collaboratively?<br>- Prepare to have classmates work in your microword during class |
| **8**<br>**3/3**<br>Exploring Technological Tools for Learning & Teaching:<br>Making, Culture, Power and Equity +<br>Electronic Art and Robotics as engineering, design, and programming | - Participatory Lecture: Culture and Equity in Learning through Making<br><br>- Intro to Robotics: (incl Constructopedia & Robot Competitions)<br><br>- Technology Inquiry: Lego Mindstorms with Starter ideas and robots to build & Little Bits<br><br>- Technology Inquiry: Electronic Art - i.e. Jie Qi's work, Little Bits, Makey Makey, Circuit Boards) | transcripts from Tinkering Afterschool Research<br><br>The Maker Movement in Education (Halverson and Sheridan 2014)<br><br>Making through the Lens of Culture and Power: Toward Transformative Visions for Educational Equity (Vossoughi, Hooper, Escude 2016) | Technology Inquiry:<br>Continue to explore with creating your robot or interactive design<br><br>L & T Technology Journal #7 DUE Tues 2/25 @ 8 p.m.<br>- What did you learn from building your robot or design? What did you learn from programming your robot or design?<br>- Write your reflections on questions about culture, power, equity and working with digital tools based on the readings<br>- Sketch out ideas for final project |

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| **9**<br>**3/10**<br>Education in Future Computer Cultures begins today:<br>Resonance between NGSS/ CCSS and ideas about learning and teaching with technology<br>&<br>Investigating computational art/ science and categories of apps | - Intro to the future: Star Trek and other imaginations for future education<br>- Presentation: NGSS and CCSS new possibilities within the digital age<br><br>- Technology Inquiry: Contrasting different kinds of educational apps<br><br>- Share and Discuss ideas for Final Projects | NGSS frameworks excerpts<br><br>Examples of classroom practice that exemplify CCSS and NGSS<br><br>Watch Crochet Coral Reefs (website & Ted Talk) | Proposal for Final Project – discuss and revise<br><br>-  L & T Technology Journal #8 DUE Tues 3/3 @8 p.m.<br>Write your reflections on what you have noticed and what you continue to wonder about the collection of technological tools for learning that we have explored. |
| **10**<br>**3/17**<br>Workshop on Final Projects & papers | - Work together on: How to bring views of learning, teaching and design together in your projects? - hybrid of cognitive, sociocultural, and ecological is necessary for the benefits of technological tools to support the learning of all children | Review previous readings and your own writing | Final Project work: learning sessions and analysis |
| Sharing Final Projects:<br>What have we learned about learning and teaching with technology? | - Project Presentations<br>- Final Discussion & Creating model of learning and teaching with technology<br>- Class Celebration Potluck and Closing thoughts | [no new readings this week] | Final paper DUE Mon 3/16<br><br>Final Projects presented during class 3/18 |