CD 173: Curriculum for Young Children: Math, Science and Technology

Tuesdays 4:30-7pm, Fall 2011

Eliot-Pearson Department of Child Development

Curriculum Lab

http://ase.tufts.edu/devtech/courses.html

Prof. Marina Bers

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Office hours: Mondays 9-10 am and by appointment

Course Description

This course explores how to create and implement curriculum for young children, with a focus in the use of technology to teach math and science, and the development of technological fluency. The underlying philosophy of this course is that people learn better when engaged in making and designing their own meaningful projects; therefore, we will become designers of curriculum and technological tools and we will test it out in a pilot project in an early childhood classroom. We will observe how children play and learn with technology and we will learn how to use on-line tools to document their learning experience. This course has three pillars: design of innovative curriculum and technological environments, observation and evaluation of technology-rich curriculum in the classroom, and documentation of the experience using new technologies.
Course Requirements

- **Readings.** All students are expected to do the readings, and to participate in discussions of the readings in class. Prof. Bers book, *“Blocks to Robots: learning with technology in the Early Childhood Classroom”* will be used. Most of the other readings are linked from the syllabus.

- **Class presentations.** Class time will be organized as discussions, not lectures. To help get discussions started, each session a student will be asked to summarize the readings and describe one question or issue that he or she found particularly provocative in that week's reading.

- **Design studio.** Students will work individually and in teams to experience different educational software, design interactive projects and test them out in the classroom. These experiences are aimed at connecting the readings and the theory with hands-on practice.

- **Empowering ideas paper (Due September 20):** Students will choose a "powerful idea" in the areas of math, science or technology, that empowered them to think in new ways when they were young. They will write a three page report describing what is the powerful idea, a personal recount of how they first encountered it, the struggles to grasp it and the tools, people and related ideas that helped them understand it. They will also specify if and how it relates to the MA curriculum frameworks and the core curriculum.

- **Curriculum proposal presentation (Due November 1):** Students will choose a "powerful idea" in the areas of math, science or technology and design Scratch-based curricular module or set of activities that helps students to explore and understand it. They will present it in class and will engage in peer-review of the proposal.

- **Final project:** For the final project students will implement the curricular proposal in a classroom or with a small group of children. Students will report
results from their final project during a final presentation on **December 6**. The final paper should be approx. 15 pages and is due on **Dec 12**.

**Tentative Schedule**

**Day 1 (Sept 6): Introduction and course overview**


Videos

**Design studio (5:30-7) with Amanda Sullivan: WeDo robotics projects building a classroom garden**

**Day 2 (Sept 13): Powerful ideas; empowering ideas**


**Design studio lead by students**: Working with the frameworks and standards

- [NCTM standards](website) (National Council of Teachers of Mathematics website)
- National Science Education [Standards](website)
- [Benchmarks for Science Literacy](website) (American Association for the Advancement of Science’s website)
- [Pre-school and Kindergarten core curriculum frameworks](website)
• **ITEA standards for Technological Literacy**

**Day 3 (Sept 20): Learning by doing, learning by designing**


**Design studio:** Students will make a Logo project. Microworlds Logo tutorial (see LCSI website)

**Assignment due:** “Empowering ideas” paper.

**Day 4 (September 27): Young children and computer programming**


Resnick et al *Scratch: Programming for All* Communications of the ACM (CACM)


**Day 5 (October 4): Scratch day**

Developing Scratch modules

**5:30-7 Design studio:** Working with Scratch with Louise Flannery
**Day 6 (October 11) Robotics in early childhood**


**Design studio 5:30-7:** Tangible K robotics with Louise and Safoura

**Day 7 (Oct 18): Robotics day**

Working with the WeDo robotics curriculum (led by Amanda Sullivan)

**Day 8 (October 25): Math in early childhood**


**Guest speaker 4:30-6pm: Prof. Barbara Brizuela**

**Day 9 (November 1): Learning about math with technology**


**Assignment due:** presentations of curriculum proposal and peer-review

**Day 10 (November 8): No class. Substitute schedule**

**Day 11 (November 15): Scratch classroom modules**

Students will play and test each other’s Scratch classroom modules and provide feedback on assessments.

**Day 12 (November 22) Science in the classroom**


"Chapter 5: How can I make it move?" (pp75-104) In The Young Child as Scientist: A Constructivist Approach to Early Childhood Science Education.


**Guest speaker:** Museum of Science Boston. “Engineering is Elementary” curriculum

**Day 13 (November 29) Little scientists**

Papers to be sent by guest speaker

**Guest speaker:**

Merredith Portsmore, PhD Research Assistant Professor, CEEO

**Day 14 (December 6): Presentation of final projects**