Syllabus

Course: ED 626/SI 548 Principles of Software and New Media Design for Learning

Room: School of Education, Room 2225

Time: Wednesdays, 4:00-7:00 pm

Web site: Course site on Canvas (http://umich.instructure.com)

Instructor: Chris Quintana (Email through Canvas message)

Phone: 734-615-0287

Office: School of Education, 4122 (Office hours by appointment)

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Learning Objectives

Students will:

- Gain practical experience in the design process for developing learning-oriented software.
- Differentiate between the design of learning and usability-centered design.
- Explore theories of learning and current work on educational scaffolding to see how they inform the learning technology design process.
- Engage in "hands-on" software design activity.

Course Overview

ED 626 is a required course for all students in the School of Education New Media and New Literacies program, and is cross-listed with the School of Information. This course examines the design of pedagogically sound learning technologies. This course will look at two major areas:

- *Learning Sciences and Design:* We will look at current work in educational scaffolding and how scaffolding techniques can be designed in technology to mediate learning.

- *Key Issues in Designing Effective Learning Technologies:* We will look at the design process in relation to designing learning technologies and the differences between learner-centered design and the more traditional usability-centered approach to software design.

The course is structured as a discussion-oriented seminar, involving design work and focused discussions of the assigned readings, group projects, and design-oriented presentations and critiques. Design is difficult and submitting one's designs to the scrutiny and criticism of others can be intimidating. However, design critiques provide invaluable opportunities to learn for the designer and the audience. Lessons can come both from the failures and successes of any particular design, as well as the contrast between different designs. In order to achieve the full benefits of these opportunities, it is important that we maintain a classroom culture of trust and sensitivity.

Target Audience

This course is open to students who have varying levels of experience in teaching with technology and designing learning technologies: Teachers who have used some technology in their classrooms and are interested in trying their hand at technology design projects; software designers interested in different approaches for designing learning technologies; and other students who might have little or no teaching experience, but who are comfortable with technology and are interested in applying their knowledge to educational projects.

Course Requirements and Schedule

There is a range of assignments in this course, but the core work for the semester is a group project (3-4 students/group) to design a learning technology. There will be several products that groups will create and present for discussion and review. With the exception of the class participation grade and final portfolio, all grades will be assigned to the group. All members of the group receive the same grade for assigned work. The overall course grades will be based upon the successful completion of each of the following components of course-related work.

Requirement	Details
Class Participation	Class attendance is mandatory, as is active participation in the course, including discussion on each week's readings and group work. **(10%)**
Learning Technology Exploration	Solo or in groups (2-3), take a focused look at something you believe is a "learning technology/new media" project. Begin identifying different aspects: What are the learning goals? What is the context of use? What is the supported activity structure? Are there specific features in the technology that you feel support learning (or are such features lacking)? **(5%)**
Design Project (Group)	***Design Proposal Summary: Briefly Describe Your Project Idea*** The design proposal summary is a short written document that describes the goals of your proposed software/new media project, a description of the target audience, the content area of the software, learning goals, and other assumptions that will define the software being designed. **(10%)**
	Updated Design Project Report: Refine and Expand Your Project Summary The updated design project report should expand on your design proposal summary. The updated report should provide more details about the content area, the learner audience, and the learner needs supported by the software. The learner needs should be discussed in sufficient detail to fully motivate and inform the learning-oriented software features that you will design in future stages. The report should also describe specific activities supported by the software and other aspects of the work that the target audience will engage in with your software. **(15%)**
	Design Outline: Sketch Out Your Software/Media Approach and Idea The design storyboard or outline is a document that sketches out the functionality and rough screens for your software. The document should start to describe details such as information structure, user interface screens and elements, scaffolding features and rationalization, etc. While some aspects of the design might change as the project evolves, a well-thought out outline will help the design team develop a unified vision. **(15%)**
	Final Design Prototype/Storyboard: Complete Your Project Idea The design outline should now be expanded into your final software prototype/storyboard. This could be a paper-based or computer-based artifact that is a "proof-of-concept" representation that could serve as a model for further development work. You should be able to "demo" a typical user path to illustrate the software design and user interface elements. Your final artifact should be carefully planned and rendered as professionally as possible. **(20%)**

Requirement	Details
Final Reflective Piece/Portfolio (Each student)	Throughout the semester, each student should maintain a "design diary" to document the specific roles and contributions made to the group project. The design portfolio should demonstrate individual progress over the semester. Design documents and artifacts can be kept in a folder, journal, or online source (e.g., blog). Students are encouraged to take notes on their thinking and their group's processes as the projects develop. Part of the design portfolio is a final short overview describing the personal progress made as a designer, including an assessment of the major successes and failures of the software design project and what was learned about the design of learning technology. **(5%)**
Final Project (Group)	***Present Your Final Project and Expand It in Your Final Paper*** Together with your team partners, you should plan a presentation (e.g., slides, poster, etc.) and an accompanying project report that showcases your final design, a summary of the design process involved in the particular project, and an identification and rationalization for the scaffolding and other learning-oriented features in the software. **(20%)**

Schedule (subject to change depending on progress made on projects)

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January:	Overview and goals of learning technologies, overview of user-centered design and learner-centered design, project selection, begin design work
Session 1 January 9 Course Overview and Introductory Discussion	Course overview, introductory business, preliminary discussion on learning technologies, and ***learning technology/new media exploration project assignment*** (for January 23). Assignments for January 16: • Bring in possible design project ideas • Read Soloway, Guzdial, & Hay • Read Quintana et al.
Session 2 January 16 Introduction: Designing Software for Learning	Discuss: • Learner-centered design • Compare and contrast designing for usability versus for learning • Set up software project groups Assignment for next week: Prepare technology exploration presentations Assignments for January 30: • Read Metcalf et al. • Supplementary: Read Goodwin, Ch. 11 and 12
Session 3 January 23 Technology Exploration Discussions	Short group presentations to discuss the technology exploration projects. Project groups should start meeting. Assignment for next week: Prepare ***Design Proposal Summary*** for submission/discussion on January 30

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Session 4 January 30 Learning Theory Introduction	Discuss: • Continue technology exploration projects, if necessary • Design methods • Learner and domain analysis • Thinking about learner needs for support Submit *Design Proposal Summary* on Canvas (one per group) Assignment for next week: • Read Fosnot & Perry • Read Wilson • Read Honebein • Read Oliver
February	**Learner needs, learning theories and perspectives, implications of theory for design**
Session 5 February 6 Continue Design Discussion Learning Theory: Social constructivism and scaffolding	Discuss: • Constructivism, overview of Piaget and Vygotsky • Design Proposal Summaries In-class group work Assignment for next week: • Read Quintana, Reiser, Davis et al. • Prepare *Updated Design Project Report* for submission/discussion on February 13
Session 6 February 13 Learner needs and scaffolding	Discuss: • Scaffolding • Updated Design Project Reports In-class work: Project group meetings, discuss and continue refining project overviews (with focus on learner needs) Assignment next week: • Read Driscoll (Cognitive Information Processing) • Read Mayer • Read Koedinger et al.
Session 7 February 20 Learning Theory: Information processing.	Discuss: • Information processing, ACT theories, design implications • Cognitive tutors In-class work: Work on project descriptions (with focus on learner needs and project outcomes) Assignment for next week: Read Driscoll (Behaviorism)

Session 8 February 27 Learning Theory: Information processing (cont'd) and Behaviorism	Wrap up cognition and multimedia learning. Discuss work on behaviorism and its impact on learning technologies In-class work: Continue work on updated project description and begin working on *design outlines* (due on March 20) Assignment for next meeting: • Read Goodwin (Storyboard example) • Read Gruen (Storyboarding) • Give a quick look at Symphony project summary and conceptual design for our discussion
March:	**Theory recap, new directions for learning technologies, moving to project work on storyboarding and prototyping**
Spring Break March 6	No class meeting this week. Enjoy the break!
Session 9 March 13 Behaviorism recap. New Horizons in Learning Tech	Continue discussions on behaviorism. Short project descriptions by groups for peer feedback (pair-wise group presentations or class presentations). Continue working on projects and storyboarding ideas. In-class work: Continue project discussions and work on storyboarding. For March 20, prepare draft design outline document.
Session 10 March 20 Back to Design... Storyboarding Intro	Submit draft design outline document. Discuss scaffolding examples, questions, etc. Discuss new issues in learning technology landscape: gaming, mobile computing, social networks, information visualization, etc.) In-class work: Continue storyboarding and design to move towards *final prototype/storyboard* for April 17th presentations.
Session 11 March 27 Storyboarding and Design Work	Time for questions, discussions, etc. about your project presentations (due on April 17) and papers (due on April 25). Discuss: • Questions on final projects, project papers, and portfolios. • Further discussion on storyboarding, if necessary.

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April:	Completion of design projects, final presentations and papers
Session 12 April 3 Project meetings (if necessary)	Extended group project meetings, if needed. Or any other discussion that you want.
Session 13 April 10	No class meeting today due to possible travel to AERA conference.
Session 14 April 17 Final project presentations	Final meeting for the semester. Final group project presentations. And probably some chocolate.
Final Deadline April 25 Final group papers and individual portfolios due	• Final project reports and individual reflections/portfolios due (both in PDF format) by 5:00 pm eastern via Canvas • Good luck on the rest of your finals!

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Course Readings

Soloway, E., Guzdial, M., & Hay, K. E. (1994). Learner-centered design: The challenge for HCI in the 21st century. *Interactions, 1,* 36-48.

Quintana, C., Krajcik, J., & Soloway, E. (2003). Issues and approaches for developing learner-centered technology. In M. Zelkowitz (Ed.), *Advances in Computers* (Vol. 57, pp. 272-321). San Diego, CA: Academic Press.

Metcalf, S. J., Krajcik, J., & Soloway, E. (2000). Model-It: A Design Retrospective. In M. J. Jacobson & R. B. Kozma (Eds.), Innovations in Science and Mathematics Education (pp. 77-115). Mahwah, NJ: Lawrence Erlbaum Associates.

Goodwin, K. (2009). Designing for the Digital Age: How to Create Human-Centered Products and Services. Wiley Publishing Inc. (Chapters 11-12).

Fosnot, C. T. & Perry, R. S. (2005). Constructivism: A psychological theory of learning. In C. T. Fosnot (Ed.) *Constructivism: Theory, Perspectives, and Practice*, Teachers College Press.

Wilson, B. G. (1996). Introduction: What is a constructivist learning environment? In B. G. Wilson (Ed.) *Constructivist Learning Environments: Case Studies in Instructional Design*, Educational Technology Publications.

Honebein, P. C. (1996). Seven goals for the design of constructivist learning environments. In B. G. Wilson (Ed.) *Constructivist Learning Environments: Case Studies in Instructional Design*, Educational Technology Publications.

Oliver, K.M. (2000). Methods for developing constructivist learning on the web. *Educational Technology*, 40(6), 5-18.

Quintana, C., Reiser, B. J., Davis, E. A., Krajcik, J., Fretz, E., Golan, R., et al. (2004). A scaffolding design framework for software to support science inquiry. *Journal of the Learning Sciences, 13*(3), 337-386.

Koedinger, K. R., and Corbett, A. (2006). Cognitive tutors: Technology bringing learning sciences to the classroom. In R. K. Sawyer (Ed.) *The Cambridge Handbook of the Learning Sciences*, Cambridge University Press.

Driscoll, M.P. (2005). *Psychology of Learning for Instruction* (Third Edition). Pearson. (Chapters 2 and 3).

Mayer, R. E. (2005). Cognitive theory of multimedia learning. In R. E. Mayer (Ed.) *The Cambridge Handbook of Multimedia Learning,* Cambridge University Press.

Supplemental Books and Readings

Anderson, J. R. (1996). ACT: A simple theory of complex cognition. *American Psychologist*, *51*(4), 355-365.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How People Learn: Brain, mind, experience and schoo*l (Expanded Edition). Washington, D. C.: National Academy Press. (Online version is available at http://www.nap.edu/openbook/0309065577/html/index.html)

Gee, J. P. (2004). Learning by design: Games as learning machines. *Interactive Educational Multimedia*, 8(April 2004), 15-23.

IDEO.org. (2015). *The Field Guide to Human-Centered Design*. IDEO.

Kumar, V. (2013). *101 Design Methods: A Structured Approach for Driving Innovation in Your Organizations*. Wiley & Sons.

Reiser, B. J. (2004). Scaffolding complex learning: The mechanisms of structuring and problematizing student work. *Journal of the Learning Sciences, 13*(3), 273-304.

The Fine Print: Given the dynamic nature of design and a design-oriented class, the professor reserves the right to make changes in the syllabus as needed. Students will be notified of changes in advance.

Date: January 9, 2019