DESIGN OF LEARNING ENVIRONMENTS

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3 Credits

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Office Hours: by arrangement	Prerequisites or other limitations: NA
Mode of Instruction:[1] ___ Lecture ___ Seminar ___ Hybrid ___ Online __x_ Other	Permission required: _x_ No __ Yes Directions about where to get permission numbers:

LEARNING GOALS

— Students will be able to describe the design process (needs analysis, design, user testing)
— Students will be able to apply this process to the design of a learning environment of their choice
  o Students will conduct and report on their needs analyses for the design
  o Students will develop the designed product in multiple stages
  o Students will conduct and report on their user testing for the design
— Students will be able to describe several useful design frameworks in the field

COURSE CATALOG DESCRIPTION:

Learning environments are the diverse settings in which people (children and adults) develop new ways of thinking, acting, and being in the world. A learning environment can be as simple as a mother teacher her infant to build a tower of blocks, or as complex as a flight simulator. Learning environments can include formal settings such as a science classroom, or a professional development workshop for teachers; or informal settings such as an after-school science club or a museum display. Many learning environments include technology to support and facilitate learning. In all these environments people can develop new knowledge about a topic, develop new ways of doing a task (selling, cooking), or learn new ways of engaging with others (learn cultural norms). These environments interact with the learners' cultural background, prior knowledge, interests, and identity. The design of any learning environment must begin with a consideration of the learner's needs. In this regard there must be some consideration of the social context in which the learning is to occur and the physical setting.

This course is an introduction to the process of planning, designing, and user testing of learning environments in formal and informal settings. In this course we will focus on both the theoretical and practical aspects of design. Towards this end students will work in small groups to design a *simple* learning environment of their choice. The process of design will be guided by various design frameworks, and informed by current research on the design and study of learning environments. The goal is <u>not</u> to build a functional LE but rather to build some simple LE that will allow you to engage with and <u>experience the design process</u>, which is the focus of this course. The course is divided into three stages that reflect the design process:

- **Needs analysis: what is the target audience for the design and what needs does it address, what are the design goals and constraints**
- **Design: within the design space choosing among alternative designs, identifying the tradeoff space, and making informed design decisions**
- **User testing and revision: small scale testing of elements of the designed product**

The course is a hybrid of mostly in-class session with a few on-line sessions. The course includes multiple assignments, most of which will be carried out in groups.

Course Structure and Assignments

<u>Readings and discussion:</u> There will be assigned readings for most class sessions; you are expected to read them and be prepared to discuss them in class. On occasion an additional reading may be assigned or a new reading may be substituted.

Student pairs will be expected to take turns facilitating the online and in-class discussions of the readings in class. These activities count towards your participation grade.

<u>Participation:</u> Your participation in class and online counts towards your grade. It is therefore important that you actively participate in class activities and discussions. Learning is an active process: the more you participate the more you learn.

<u>Discussion board:</u> Each student is expected to contribute weekly to the online discussion board. Entries should be substantive and may be in response to a post or a generation of a new post (responses are preferred). This discussion board will serve several purposes: (1) a to think about and discuss your design project, (2) a place to respond to various questions posted by others and by the instructor or weekly discussants, (3) a place to reflect about what you are learning about design (both things you understand and things you are confused about). Participation in discussions counts towards your participation grade.

<u>Course project:</u> As noted above this course is organized around the development of a learning environment. The design work will be conducted in small groups and will take place both during class and on-line between classes. The design process will progress in stages and there will be graded and non-graded assignments associated with these stages, including presentation of artifacts from various stages of the design. The following is a brief description of each stage and the relevant assignment/s:

Needs/Task analysis: Each group will conduct a needs analysis that includes the identification of the target audience and their needs. This will be done through observations, surveys, and interviews with members of the target audience. The needs analysis will also include a description of the design goals and constraints.

Developing the storyboard: Using the design frameworks each group will develop a storyboard for how the learning environment will function. What are the tasks that learners will perform and with what support? How will the learning process unfold? What are the various options and functionality involved? Groups need to provide documentation of the rational for key design decisions and describe the tradeoffs involved in these decisions.

Designing a prototype of the environment: Each group will develop a prototype for the environment with most of its functionality. Documentation of design decisions is also part this assignment. Prototypes will be presented to the class.

User testing of prototype: Each group will conduct user testing of the prototype with either individual users or focus groups. Groups will prepare a report based on the testing and will suggest revisions to the design.

<u>Informal learning environment report:</u> Individually or in pairs you will visit, on your own time,(counts as a class session) an informal learning environment of your choice such as a museum, after school academic club, science center, etc. (pending approval of instructor). You will spend at least 2 hours at the location viewing the interaction of visitors with the environment. You will then focus on 1-2 aspects of the environment to analyze in depth and critique. You will develop a screencast presentation report for the class about your visit and analysis.

<u>Individual reflection paper:</u> The last assignment of this course is an individual reflection paper about 5 pages long in which you reflect on what you have learned in this course. This reflection should be based on the contribution of the readings, class activities, and final project to your developing understanding of the design of effective learning environments.

Grading:

Assignment	Date due	Grade
Participation (individual)	Throughout course	30%
Needs Analysis (group)	Week 4	5%
Storyboard (group)	Week 7	5%
Prototype (group)	Week 10	5%
Critique of Informal LE (individual/pair)	Week 13	20%
User Test Report (group)	Week 14	15%
Individual reflection paper (individual)	Week 14	20%

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Syllabus:

<u>Week 1 [Thurs Sep 9]- Introduction</u>

No reading

Introduction to the design of LEs, discussion of course plan and requirements

<u>Week 2 [Mon Sep 16]- The process of design</u>

Travis, D. (2009). The fable of the user-centered-designer. Userfocus.

Group contract due Sep 20 at 8pm

Proposal for 3 development ideas due (~1 page per idea) Sep 20 @ 8pm, be prepared to describe and discuss each idea.

<u>Week 3 [Sep 23]- Needs Analysis I: Plan the needs analysis</u>

Norman- Design of Everyday things chapters 1-3

Present alternative proposals

<u>Week 4 [Sep 30]- Needs Analysis II: Conduct needs analysis **(on-line)**</u>

Handbook of the LS: Chapter 8- Learner Centered Design

Norman Design of Everyday Things Chapter 7 (skim 4)

Needs analysis report due Oct 4 @ 8pm

<u>Week 5 [Oct 7]- Storyboard I: Storyboarding (in class)</u>

Quintana, C., Reiser, B. J., Davis, E. A., Krajcik, J., Golan, R., Kyza, E. A., et al. (2004). Evolving a scaffolding design framework for designing educational software. *Journal of the Learning Sciences, 13*(3), 337–386.

Week 6 [Oct 14]- Storyboard II: Create storyboard **(online)**

Edelson, D. C. (2001). Learning-for-Use: A Framework for the Design of Technology-Supported Inquiry Activities. *Journal of Research in Science Teaching*, 38 (3), p355-85

Develop a storyboard for the prototype due in class Oct 21

Week 7 [Oct 21] – Storyboard III: Present storyboard (in class) -

Handbook of the LS Chapter 20: Making Authentic Practices Accessible to Learners

Handbook of the LS Chapter 4: Cognitive apprenticeship

Present storyboard (10 min per group)

Week 8 [Oct 28]- Prototype I: Prototyping (in class)

Handbook of the LS- Chapter 28: Motivation and Cognitive Engagement in LE

Another reading TBD

Guest speaker: Motivation (tentative)

Week 9 [Mon Nov 4]- Prototype II: Create prototype **(on line)**

Edelson, D. C. (2002). Design research: What we learn when we engage in design. *Journal of the Learning Sciences*, 11(1),105-121

Develop mocked up prototype due in class Nov 11

Week 10 [Mon Nov 11]- Prototype III: Present prototype (in class)

Gee. J. P. (2005). "Learning by Design: good video games as learning machines". *E-Learning, Volume 2* (Number 1), p. 5-16

Gee, J. P. (2005). Good video games and good learning. Phi Kappa Phi Forum, 85(2), 33-37.

Barab, S. A., Gresalfi, M., & Arici, A. (2009). Why educators should care about games. Educational Leadership, 67 (1), 76-80.

Present prototype (10 min).

Week 11 [Nov 18]- User test I: Planning the test (in class)

Allen, S. (2004). Designs for learning: Studying science museum exhibits that do more than entertain. *Science Education*, 88, 17–33.

Barab, S., Thomas, M., Dodge, T., Squire, K., & Newell, M. (2004). Critical design ethnography: Designing for change. Anthropology & Education Quarterly, 35 (2), 254-268

User Testing methodologies: https://www.msu.edu/~thorpjus/w3cwai/ucdres.html

User test plan due Fri Nov 22nd @ 8pm

Week 12 [Nov 25]- User test II: Revise test (in class)

Cornelius, L. Herrenkohl, L. R. & Wolfstone-Hay, J. (in press) Organizing Collaborative Learning Experiences Around Subject Matter Domains: The Importance of Aligning Social and Intellectual Structures in Instruction, to appear in Hmelo-Silver, C. E., O'Donnell, A.M., Chan, C. and Chinn, C. A. (Eds.), *The International Handbook of Collaborative Learning*. Taylor and Francis.

Bielaczyc, K. & Collins, A. M. (1999). Learning communities in classrooms: A reconceptualization of educational practice. In Reigeluth, C. M. (Ed), Instructional-design Theories and Models: A New Paradigm of Instructional Theory : 269-292. (instead of Cornelius)

Matthews, T., Whittaker, S., Moran, T., & Yuen, S. (2011). Collaboration personas: a new approach to designing workplace collaboration tools. *Proceedings of the Annual Conference on Human Factors in Computing Systems*, Vancouver, BC.

Guest Speaker- Tentative

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<u>Week 13 [Dec 2]- User Testing- **(online)**</u>

Kanter, D.E. (2010). Doing the project and learning the content: Designing project-based science curricula for meaningful understanding. *Science Education*, 94(3), 525-51.

Informal LE critiques due Fri Dec 6th @ 8pm

User test report due Fri Dec 6 @ 8 pm

<u>Week 14 [Dec 9]- Design Fair (in class)</u>

User testing presentation Due in class Dec 9th

Groups will present their designs, results of user testing and revisions

Individual reflection paper due Dec 10th @ 8pm

No Readings