COURSE SYLLABUS

EDUC 8348: Approaches to Intervention in the Learning Sciences

Instructor: Bill Penuel

Course Overview

All research intervenes, and learning sciences research is no exception. But what forms do interventions in the learning sciences take? This seminar explores three different models of intervention research in the learning sciences: cultural-historical, systemic design-based research, and scaling up/experimental research. We will analyze cases that illustrate each model, cases selected because of their broad impact on thinking of different groups of learning scientists today. Readings will provide students in the seminar with opportunities to compare and contrast the theoretical and practical commitments of the different models, results from specific studies, and impacts on research and practice. A practicum experience at *El Pueblo Mágico,* an afterschool program at Sanchez Elementary School in Lafayette, will give students a direct encounter with one of the cases. A culminating project will provide students with an opportunity to synthesize what they have learned by developing a proposal for research and development of an intervention that could enhance the *El Pueblo Mágico* program and that follows the guidelines of a current program announcement of the National Science Foundation.

Learning Performances

By the end of this course, you will be able to:

- Use a variety of methods to identify stakeholder needs and goals for program development and improvement
- Formulate research questions at the intersection of stakeholder needs and what the field needs to know
- Devise a plan for research and development that addresses questions posed
- Locate your plan within a family of approaches to research and development in the learning sciences

Assessments

Your main assignment for this class will be to write several sections of an NSF proposal for research that could be conducted at *El Pueblo Mágico*. You may choose to write a proposal for one of the following two programs:

> ITEST: Information Technology Experiences for Students and Teachers
> http://www.nsf.gov/pubs/2011/nsf11525/nsf11525.htm
> DRK-12: Discovery Research (K-12)
> http://www.nsf.gov/pubs/2010/nsf10610/nsf10610.htm

You will work with 2 or 3 other participants in the class on the proposal and on all assignments leading up to the final product.

Each assignment will require you to develop a draft section of a proposal or help you conceptualize some aspect of the proposal. Your final assignment will be to revise and integrate these sections. The process of grant writing is an iterative one: you can expect to want or need to rethink your proposal completely at least once during the course.

You must follow the NSF's Grant Proposal Guidelines for formatting of each assignment and adhere to the page limits below:

Assignment	Date Due	Percent of Grade
Serve as discussion leader for seminar	-	10
Draft statement of Need and Purpose (1 p)	10/3/11	10
Draft research questions and argument for their importance (1.5 pp)	10/17/11	10
One-page abstract for advisory board + proposed advisors list and description of how their expertise is relevant (2 pp)	10/24/11	10
Description of the Proposed Intervention (3 pp)	11/7/11	10
Research and Development Plan (5 pp)	11/19/11	10
Present draft proposal to class	12/5/11	10
Revised Proposal (12 pp + References)	12/12/11	30
		100

Seminar Format

The weekly classes will include a discussion of the readings and provide for opportunities to gain practice with design techniques that can help you build a successful proposal. Each week, we'll begin with identifying your questions about the readings that you'd like to discuss over the course of the class and specific claims made by researchers you'd like the class to consider (for whatever reason), and then we'll take these up separately in class discussion.

Some weeks will include a guest speaker who will provide context for the readings. When there is no guest speaker, participants may present a summary of a reading they find relevant to their proposal.

The seminar will be unusual in that it has a service component. The service component includes a once-per-week commitment to volunteer at *El Pueblo Mágico* alongside undergraduates and staff at the program. You will have a different role from undergraduates: your service at the site is aimed at building knowledge of how the site might better build upon the strengths and address needs of its diverse participants. The service component will provide you with direct experience to a particular context for intervention design.

Texts

All journal articles and PDFs will be available through Dropbox. In addition, you will need to purchase one text at the CU Bookstore:

Cole, M., & the Distributed Literacy Consortium (2006). *The Fifth Dimension: An after-school program built on diversity*. Beverly Hills, CA: Sage.

Readings and Assignments by Week

Week 1: August 22, 2011

Driving Question

What does it mean to 'intervene' in the learning sciences?

In class Design Activity

Draw Your Experience: Draw the process for developing an ITEST proposal

Readings

Packer, M. J. (2010). Educational research as a reflexive science of constitution. In W. R. Penuel & K. O'Connor (Eds). *Learning research as a human science. National Society for the Study of Education Yearbook, 109*(1), 113-127.

Bryk, A. S. (2009). Support a science of performance improvement. *Phi Delta Kappan, 90*(8), 597-600.

NSF's ITEST Program Announcement (NSF 11-525)

Week 2: August 29, 2011

Driving Question

What are strategies for identifying and synthesizing diverse perspectives on the need for intervention?

In class Design Activity

The Five Whys: What interests you about the learning sciences?

Readings

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (1995). *Writing ethnographic fieldnotes*. Chicago, IL: University of Chicago Press. Chapters 1 & 2.

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences, 2*(2), 141-178.

Coburn, C. E., Bae, S., & Turner, E. O. (2008). Authority, status, and the dynamics of insider-outsider partnerships at the district level. *Peabody Journal of Education, 83*, 364-399.

Week 3: September 5, 2011

Labor Day, no class

Week 4: September 12, 2011

Guest: Anna-Ruth Allen, Site Coordinator, *El Pueblo Mágico,* Alex Repenning

Driving Question

What is the Fifth Dimension?

In class Design Activity

Unfocus Group: Remake the space of *El Pueblo Mágico*

Readings

Cole, M., & the Distributed Literacy Consortium (2006). *The Fifth Dimension: An after-school program built on diversity*. Beverly Hills, CA: Sage. Chapters 2-4

Roschelle, J., DiGiano, C., Koutlis, M., Repenning, A., Jackiw, N., & Suthers, D. (1999). Developing educational software components. *IEEE Computer, 32*(9), 50-59.

Week 5: September 19, 2011

Guest: <mark>Kris Gutiérrez – Find new date for her</mark>

Driving Question

What are sociocultural approaches to intervention in the learning sciences?

In class Design Activity

Character Profiles: Represent needs of different personas

Readings

Cole, M., & Engeström, Y. (2006). Cultural-historical approaches to designing for development. In J. Valsiner & A. Rosa (Eds.), *The Cambridge handbook on sociocultural psychology* (pp. 484-507). New York: Cambridge University Press.

Engeström, Y., & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review, 5*, 1-24.

Gutiérrez, K. (2008). Developing sociocritical literacy in the third space. *Reading Research Quarterly, 43*(2), 148-164.

Week 6: September 26

Driving Question

What is the evidence regarding what works, when, and for whom?

In-class Design Activity

Competitive Product Survey: What are alternative sustainable designs for afterschool programs?

Readings

Cole, M., & the Distributed Literacy Consortium (2006). *The Fifth Dimension: An after-school program built on diversity*. Beverly Hills, CA: Sage. Chapters 5 & 6.

Blanton, W., Moorman, G., Hayes, B., & Warner, M. (1997). Effects of participation in the Fifth Dimension on far transfer. *Journal of Educational Computing Research, 16*(4), 371-396.

Nicolopoulou, A., & Cole, M. (1993). The Fifth Dimension, its play-world, and its institutional context: Generation and transmission of shared knowledge in the culture of collaborative learning. In E. A. Forman, N. Minick & C. A. Stone (Eds.), *Contexts for learning:*

Sociocultural dynamics in children's development (pp. 283-314). New York: Oxford University Press.

Week 7: October 3

Guest by Skype: Phil Bell, University of Washington and the LIFE Center

Assignment Due

Draft statement of Need and Purpose (1 p)

Driving Question

Where are sociocultural approaches to intervention headed?

In-class Design Activity

Activity Analysis: Representing tasks, actions, tools, people, and interactions in an afternoon at *El Pueblo Mágico*

Readings

U.S. Department of Education (2010). *Transforming American education: Learning powered by technology*. Washington, DC: Office of Educational Technology, U.S. Department of Education.

National Research Council (2009). *Learning science in informal environments: People, places, and pursuits*. Washington, DC: National Academies Press. Chapter 2: Theoretical Perspectives.

Banks, J. A., Au, K. H., Ball, A. F., Bell, P., Gordon, E. W., Gutierrez, K. D., et al. (2007). *Learning in and out of school in diverse environments: Life-long, life-wide, life-deep*. Seattle, Washington: The LIFE Center (The Learning in Informal and Formal Environments Center), University of Washington, Stanford University, and SRI International and Center for Multicultural Education, University of Washington.

Week 8: October 10

Guest by Skype: Barry Fishman, University of Michigan

Driving Question

What is LeTUS?

In class Design Activity

Empathy Tools: Trying out *My World*

Readings

Gomez, L., Fishman, B. J., & Pea, R. D. (1998). The CoVis Project: Building a large scale science education testbed. *Interactive Learning Environments, 6*(1/2), 59-92.

D'Amico, L. (2010). The Center for Learning Technologies in Urban Schools: Evolving relationships in design-based research. In C. E. Coburn & M. K. Stein (Eds.), *Research and practice in education: Building alliances, bridging the divide* (pp. 37-53). Lanham, MD: Rowan & Littlefield.

Reiser, B. J., Spillane, J. P., Steinmuler, F., Sorsa, D., Carney, K., & Kyza, E. (2000). Investigating the mutual adaptation process in teachers' design of technology-infused curricula. In B. Fishman & S. O'Connor-Divelbiss (Eds.), *Fourth International Conference of the Learning Sciences.* (pp. 342-349). Mahwah, NJ: Erlbaum.

Week 9: October 17

Assignment Due

Draft research questions and argument for their importance (1.5 pp)

Driving Question

What are systemic approaches to design-based research?

In class Design Activity

Predict Next Year's Headlines: What Newspapers Will Say about Your Project

Readings

Fishman, B. J., Marx, R. W., Blumenfeld, P., Krajcik, J., & Soloway, E. (2004). Creating a framework for research on systemic technology innovations. *The Journal of the Learning Sciences, 13*(1), 43-76.

Krajcik, J. S., McNeill, K. L., & Reiser, B. J. (2008). Learning-goals-driven design model: Developing curriculum materials that align with national standards and incorporate project-based pedagogy. *Science Education, 92*(1), 1-32.

Week 10, October 24

Assignment Due

One-page abstract for advisory board + proposed advisors list and description of how their expertise is relevant (2 pp)

Driving Question

What is the evidence regarding what works, when, and for whom?

In class Design Activity

Scenario: Describe Your Participants' Experiences

Readings

LETUS Water Unit.

Fishman, B. J., Marx, R. W., Best, S., & Tal, R. (2003). Linking teacher and student learning to improve professional development in systemic reform. *Teaching and Teacher Education, 19*(6), 643-658.

Geier, R., Blumenfeld, P., Marx, R. W., Krajcik, J., Fishman, B. J., & Soloway, E. (2008). Standardized test outcomes for students engaged in inquiry-based science curricula in the context of urban reform. *Journal of Research in Science Teaching, 45*(8), 922-939.

Week 11, October 31

Possible Guests: Ben Kirshner (or John Falk)

Driving Question

Where are systemic approaches to design-based research headed?

In class Design Activity

Group Brainstorming and Iteration (CILT): Refining your question and identifying entailments for the research and development process

Readings

National Research Council. (2011). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* Washington, DC: National Research Council.

PCAST (2010). *Prepare and inspire: K-12 education in science, technology, engineering and math (STEM) for America's future*. Washington, DC: Executive Office of the President.

Donovan, S., Wigdor, A. K., & Snow, C. E. (2003). *Strategic education research partnership*. Washington, DC: National Research Council. Executive Summary.

Week 12, November 7

Assignment Due

Description of the Proposed Intervention (3 pp)

Driving Question

What is scaling up research?

In class Design Activity

Structuring Your Argument: Re-Write Your Abstract

Readings

McDonald, S.-K., Keesler, V. A., Kauffmann, N. J., & Schneider, B. (2006). Scaling up exemplary interventions. *Educational Researcher, 35*(3), 15-24.

Means, B., & Penuel, W. R. (2005). Research to support scaling up technology-based educational innovations. In C. Dede, J. P. Honan & L. C. Peters (Eds.), *Scaling Up Success: Lessons from technology-based educational improvement* (pp. 176-197). San Francisco, CA: Jossey-Bass.

Week 13, November 14

Assignment Due (November 19)

Research and Development Plan (5 pp)

Guest: Jeremy Roschelle or Nikki Shechtman, SRI International

Driving Question

How have learning scientists approached scaling up research?

In class Design Activity

Draw the Experience: Create a Visual Theory of Change

Readings

Roschelle, J., Knudsen, J., & Hegedus, S. J. (2010). From new technological infrastructures to curricular activity systems: Advanced designs for teaching and learning. In M. J. Jacobson & P. Reimann (Eds.), *Designs for learning environments of the future: International perspectives from the learning sciences* (pp. 233-262). New York: Springer.

Roschelle, J., Shechtman, N., Tatar, D., Hegedus, S., Hopkins, B., Empson, S., et al. (2010). Integration of technology, curriculum, and professional development for advancing middle school mathematics: Three large-scale studies. *American Educational Research Journal 47* (4), 833-878.

Week 14, November 21

Thanksgiving break, no class

Week 15, November 28

Draft presentations of proposals by student groups

Reading

NSF's Merit Review Criteria

Week 16, December 5

Draft presentations of proposals by student groups

Reasonable Accommodation

Disability: If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services early in the semester so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. To contact Disability Services, call (303) 492-8671 or view www.colorado.edu/sacs/disabilityservices.

Religious Obligations: University policy is for teaching faculty to make every effort to accommodate all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or other required attendance, provided they notify instructors well in advance of the scheduled conflict. Whenever possible, students should notify faculty at least two weeks in advance of the conflict to request special accommodation. The campus policy can be viewed at www.colorado.edu/policies/fac_relig.html.

Classroom and Course-Related Behavior: As a result of extensive discussions with and recommendations from faculty and students, a new classroom behavior policy and associated procedures have been adopted. See www.colorado.edu/policies/classbehavior.html.

Student Honor Code: A Student Honor Code system has been implemented in all schools and colleges and students should be familiar with these new policies and procedures. You can view the honor code information at www.colorado.edu/academics/honorcode/.

Sexual Harassment Policy: The University of Colorado Policy on Sexual Harassment applies to all students, staff and faculty. Sexual harassment is unwelcome sexual attention. It can involve intimidation, threats, coercion, or promises or create an environment that is hostile or offensive. Harassment may occur between members of the same or opposite gender and between any combination of members in the campus community: students, faculty, staff, and administrators. Harassment can occur anywhere on campus, including the classroom, the workplace, or a residence hall. Any student, staff or faculty member who believes s/he has been sexually harassed should contact the Office of Sexual Harassment (OSH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the OSH and the campus resources available to assist individuals who believe they have been sexually harassed can be obtained at: **http://www.colorado.edu/sexualharassment/**

Relevant Performance-based Standards for Colorado Teachers

Though this is a doctoral seminar primarily focused on preparing you to engage in research and development in the learning sciences, the course content directly addresses the following standards focused on teachers and teaching:

- Understand the cognitive processes associated with various kinds of learning (e.g. critical and creative thinking, problem structuring and problem solving, invention, memorization and recall) and ensure attention to these learning processes so that students can master content standards. (5-5)

- Communicate a variety of assessment results, and their implications to students, parents, guardians, professionals, administrators, and the community. (5-9)

- Understand and respond to influences on educational practice including:
    - Federal and state constitutional provisions.
    - Federal executive, legislative and legal influences.
    - State roles of the governor, legislature and State Board of Education.
    - Local school districts, boards of education and boards of cooperative educational services.
    - Non-traditional and non-public schools, including: charter schools, religious schools and home schooling.
    - Public sector input from business, advocacy groups, and the public. (8-3)