Fall 2014
Design Based Research
15:262:610
Monday 4:50-7:30

Professor Clark Chinn

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The learning goals for this class, along with how they will be assessed, are as follows:

Learning goals
Understand the nature of design-based research
Develop skills in designing a design-based research study
Design instruments and data collection plans for a DBR study
Understand how video analysis can be used in DBR and develop skills in this type of analysis
Complete the human subjects certification and learn how to navigate the process of applying for IRB approval
Learn how to write a research proposal using academic style appropriate for the discipline

Course Description

In this class, students will learn what about design-based research and how to design and conduct this kind of inquiry. Throughout the class, students will use data collected by the instructor to examine various design research principles and to consider how learning scientists approach the study of learning environments such as technology, curriculum units, and teaching strategies. We will take an action-oriented approach to the conduct of design-based research in the context of actual research projects.

Recommended book:

A. E. Kelly, R. A. Lesh & J. Y. Baek (2008). *Handbook of design research methods in education*. New York: Routledge.

References:

This will be provided as PDFs. There may be changes and/or additions to the reading list in Week 7 or later, as we address issues that are arising in class discussions or in projects.

Bannan-Ritland, B., & Baek, J. Y. (2008). Investigating the act of design in design research: The road not taken. In A. E. Kelly, R. A. Lesh & J. Y. Baek (Eds.), *Handbook of Design-based Research Methodology* (pp. 299-319). New York: Routledge.

Barab, S. A., Baek, E., Schatz, S., Scheckler, R., Moore, J. (2009). Illuminating the Braids of Change in a Web-Supported Community: A Design Experiment by Another Name. A. Kelly and D. Lesh (Eds.), Design-Based Research II (pp. 256-289. Mahwah, NJ: Erlbaum.

Bell, P. (2004). On the theoretical breadth of design-based research in education. *Educational Psychologist,* 39(4), 243-253.

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

Castanheira, M. L., Green, J. L., & Yeager, E. (2009). Investigating inclusive practices: An interactional ethnographic approach. In K. Kumpalainen, C. E. Hmelo-Silver & M. César (Eds.), *Investigating classroom interaction: Methodologies in action* (pp. 145-178). Rotterdam: Sense Publishers.

Chi, M. T. H. (1997). Quantifying qualitative analyses of verbal data: A practical guide. *Journal of the Learning Sciences*, 6, 271-315.

Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational researcher, 32*(1), 9-13.

Cobb, P., & Gravemeijer, K. (2008). Experimenting to support and understand learning processes. In A. E. Kelly, R. A. Lesh & J. Y. Baek (Eds.), *Handbook of design research methods in education* (pp. 68-95). New York: Routledge.

Cress, U., & Hesse, F. (in press). Quantitative methods for studying small groups. In C. E. Hmelo-Silver, A. M. O'Donnell, C. K. K. Chan & C. Chinn (Eds.), *International handbook of collaborative learning*. New York: Routledge.

Derry, S. J., Hmelo-Silver, C. E., Nagarajan, A., Chernobilsky, E., & Beitzel, B. (2006). Cognitive transfer revisited: Can we exploit new media to solve old problems on a large scale? *Journal of Educational Computing Research*, *35*, 145-162.

Derry, S. J., Pea, R. D., Barron, B., Engle, R. A., Erickson, F., Goldman, R., Hall, R., Koschmann, T., Lemke, J. L., Sherin, M. G., & Sherin, B. L. (2010). Conducting video research in the learning sciences: Guidance on selection, analysis, technology, and ethics. *Journal of the Learning Sciences, 19*, 3-53.

Greeno, J. G., Collins, A., & Resnick, L. (1996). Cognition and Learning. In D. Berliner & R. Calfee (Eds.), *Handbook of educational psychology* (pp. 15-46). New York NY: MacMillan.

Hmelo-Silver, C. E., Chernobilsky, E., & Nagarajan, A. (2009). Two sides of the coin: Multiple perspectives on collaborative knowledge construction in online problem-

based learning. In K. Kumpulainen, C. E., Hmelo-Silver & M. César (Eds.). *Investigating Classroom interaction: Methodologies in action* (pp. 73-98). Rotterdam: Sense Publishers.

Hmelo-Silver, C. E., Nagarajan, A., & Derry, S. J. (2006). From face-to-face to online participation: Tensions in facilitating problem-based learning. In M. Savin-Baden & K. Wilkie (Eds.). *Problem-based learning online* (pp. 61-78). Berkshire England: Open University Press.

Lobato, J. (2008). Research methods for alternative approaches to transfer. In A. E. Kelly, R. A. Lesh & J. Y. Baek (Eds.), *Handbook of design research methods in education* (pp. 167-194). New York: Routledge.

Jordan, B., & Henderson, A. (1995). Interaction analysis: Foundations and practice. *Journal of the Learning Sciences, 4*, 39-103.

York: Routledge.

Powell, A. B., Francisco, J., & Maher, C. A. (2003). An analytical model for studying the development of learners' mathematical ideas and reasoning using videotape data. *Journal of Mathematical Behavior, 22*, 405-435.

Penuel, W. R., Fishman, B. J., Haugan Cheng, B., & Sabelli, N. (2011). Organizing research and development at the intersection of learning, implementation. and design. *Educational Researcher, 40*, 331-337.

Puntambekar, S., Stylianou, A., & Goldstein, J. (2007). Comparing classroom enactments of an inquiry curriculum: Lessons learned from two teachers. *Journal of the Learning Sciences, 16*, 81-130.

Sandoval, W. A. (2004). Developing learning theory by refining conjectures embodied in educational designs. *Educational Psychologist, 39*, 213-233.

Shavelson, R. J., Phillips, D. C., Towne, L., & Feuer, M. J. (2003). On the science of education design studies. Educational researcher, 32(1), 25-28.

Zhang, J., Scardamalia, M., Reeve, R., & Messina, R. (2009). Designs for collective cognitive responsiiblity in knowledge building communities. *Journal of the Learning Sciences, 18*, 7-44.

Course Assignments

1. Class Participation

Class Discussions. All class members are expected to actively participate in the discussions each week. (15%)

For the assignments that follow, you may work collaboratively

3. Annotated Bibliography (2 to 4 pages, double-spaced) DUE: Week 6

Each of you will be expected to create and share an annotated bibliography associated with your final course project. Identify and briefly describe relevant prior research and how it relates to your project. We will share the bibliographies during class. (5%)

4. Theoretical framework (2-3 pages, double spaced). DUE Week 7.
Describe the theoretical framework that you will use for your project and why that is an appropriate framework for the research questions that you are posing. An additional page should include a figure with your embodied conjecture. We will discuss these in class. (5%)

5. Project Variations Document (1 to 2 pages, double-spaced) DUE: Week 7
Briefly outline at least three alternative approaches that you could take with your complex intervention. This assignment should be an act of brainstorming where you push on the framing of your research focus, educational objectives, and design approach. It is worth thinking broadly before the design gets fixed. This may be based on work you have done in other classes. (5%)

6. Elaborated Project Plan (2 to 3 pages, double-spaced) DUE: Week 8
Describe the educational focus associated with your project, the package of "objects" to be designed, and what you know about the research setting that is relevant to your project. (5%)

7. Design Prototype DUE: Week 10
Over the course of this semester, you need to be making progress on your designs. The designs need to be complete by the time of enactment and data collection. There will be a public design reviews during so you can present your design work and receive feedback from the group. In class we will discuss low-fidelity prototyping methods (e.g., paper prototyping) you may elect to use. (5%)

8. Video analysis (TBA). DUE: Weeks 9, 11, 12
Based on the video analysis sessions in class, describe the video and summarize the analysis. The three assignments will include a description, interpretation, and content analysis. You are encouraged to do this by creating an analytic using the VideoMosaic Collaborative repository but other options are possible if you have other video that is available. (15%)

Further instructions will be provided on 9/29.

9. Draft versions of instruments and data collection plan DUE: Week 13.
Prepare draft version of written instruments that you are planning to use. At a minimum, these must address targeted learning outcomes. You may do this through a written measure, performance assessment, or structured interview. Be clear about how each instrument will address your research question and how you will handle the data (e.g., will it require additional coding, will surveys need to be scaled in some way, etc). The data collection plan should be a detailed spreadsheet. In preparation for the enactment phase of your research, create a worksheet detailing the kinds of data you plan to collect and any related contingencies (e.g., needing to author assessment items for use on a pre/post test). During your data collection phase, you can use the worksheet to keep track of your activities in the field. During the data analysis phase, you can update the spreadsheet in order to track progress in your analysis. It can be a working document for your actual study. (15%)

11. IRB proposal DUE: Week 14. Include your actual proposal per IRB guidelines including appropriate forms, research protocols, and instruments. You may need to get letters of support from research sites (5%)

12. Research Proposal (10 to 15 pages, double-spaced) DUE: Week 15
Your research proposal should build upon previous assignments. The research questions, argument, design, and methods associated with your research project should be detailed, and your project's relevance to the literature should be examined. This should incorporate feedback from the earlier assignment (25%)

Please double-space all written work and use a 12-pt. font. All work should be submitted through the class Sakai assignments tool.

Academic Integrity Policy

- All students must follow the RU Code of Student Conduct which can be accessed at: http://rci.rutgers.edu/%7Epolcomp/judaff/ucsc.shtml
- For information on the academic integrity policy, please go to: http://www.rci.rutgers.edu.~polcomp/integrity/policy.shtml
- A multimedia presentation on plagiarism can be found at: http://www.rci.rutgers.edu/~polcomp/integrity/realifeexamples.html

Related regulations may also be found in the Rutgers Graduate School of Education Catalog
Important Note: This syllabus, along with course assignments and due dates, are subject to change. It is the student's responsibility to check Sakai for corrections or updates to the syllabus. Any changes will be clearly noted in course announcement or through Sakai email.

Topic Outline/Schedule & Assignments

Class	Date	Topic	Readings	Assignments
Conceptualizing Design Based Research				
1	9/8	General intro to design based research Comparison with other genres of research (e.g., action research)		
2	9/15	Conceptions of Design-based Research: Issues and Potential	Brown (1992) Cobb et al. (2003) Shavelson, Philips & Towne (2003)	Blog about initial ideas of DBR
3	9/22	Understanding Learning in DBR	Lobato, 2008 Cobb & Gravemeijer, 2008 Derry et al, 2006	Reflect in blog on controversies in DBR; read other blogs
4	9/29	Introduction to Video Analysis in DBR	Powell, Francisco, & Maher (2003);	Continue to blog each week along with other deliverables
5	10/6	The place of theory in design based research	Bell, 2004 Sandoval, 2004 Barab (2008)	
6	10/13	Multiple enactments over time and space	Puntambekar, Stylianou, Goldstein (2007) Zhang et al., (2009) Bannan-Ritland & baek (2008) Hmelo-Silver, Nagarajan, & Chernobilsky (2009)	Annotated bibliography
Doing Design Based Research				
7	10/20	Design-based Implementation research	Penuel et al (2011) DBR book chapter	Theoretical framework document—includes embodied conjecture Project variations document

Class	Date	Topic	Readings	Assignments
8	10/27	Methodology in DBR, Creating a design prototype What are you going to do examine in your research design? Testing out of: Scaffolds for existing problem Use of a piece of technology Implementation of a curriculum unit Conversion of a curriculum unit to an inquiry oriented unit, an inter-disciplinary unit and test this out.	Sloane & Kelly (2008) Student-identified readings TBA	Elaborated project plan
9	11/10	Use of Video in DBR (GENI lab)	Chi (2007)	Descriptive analysis of video, using VMC or other video
10	11/17	How will you study the design, what data will you collect on whom and where (hopefully in own worksite)	Students identified readings	Design prototype for Design Review
11	11/24	Use of Video in DBR Preparation of IRB paperwork	Jordan & Henderson (1995)	Content Analysis
12	12/1	Use of video in design based research – Data Analysis (GENI lab)		Interaction analysis
13	12/8	How will you analyze your Data Identifying needed data sources Designing measures	Castanheira, Green, & Yeager (2007) Additional reading TBA	Draft versions of instruments and data collection plan
14	12/15	How will you analyze your data, part 2 Looking for unintended consequences Analyzing enactments Qualitative and quantitative approaches	Hmelo-Silver, Nagarajan, & Derry (2006) Cresse & Hess (in press)	IRB

Class	Date	Topic	Readings	Assignments
15	12/22	Summations and project presentations		Research proposal