

Design-Based Research: Design of Learning Environments

15:262:610

Instructors: Dr. Catherine Eberbach, Dr. Cindy Hmelo-Silver

This is primarily an Asynchronous Online Class. The 1st day to log-in is Wednesday, September 4.

Topics switch every Wednesday morning. Weekly Participation is according to your schedule but deadlines for all assignments and discussions must be met. Please check details below.

Note that we will meet for **two in-person classes** at the GSE from 4:50-7:30pm. The 1st in-person class is Wednesday, September 11 in room 347. The 2nd in-person class is likely to be the 2nd or 3rd week of October. We can adjust meeting times for each in-person session.

Virtual Office Hours: The primary instructor, Dr. Eberbach, logs in 4 times a day and will respond to your queries promptly. If you have an immediate or personal concern, email Dr. Eberbach directly at c.eberbach@gse.rutgers.edu. Alternatively, students may meet individually or in groups with Dr. Eberbach via Skype or Google Hangout. The secondary instructor, Dr. Hmelo-Silver will participate in discussion boards, etc as needed. Her email is cindy.hmelo-silver@gse.rutgers.edu.

Course Objectives

The objective of this course is to familiarize you with design-based research (**DBR**) in education settings and how to design and conduct this kind of inquiry. Throughout the class, students will use data collected by the instructors 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. This is a working class in which students develop all parts of a learning research proposal.

Learning Goals

This course is designed to help you acquire specific knowledge and skills related to DBR:

1. You will learn and be able to demonstrate an understanding of theories that influence the nature of DBR.
2. You will develop skills in designing a design-based research study.
3. You will learn to design instruments and data collection plans for a DBR study.
4. You will understand how video analysis—a critical method—can be used in DBR and develop skills in this critical form of analysis.
5. You will learn to how to complete the human subjects certification and learn how to navigate the process of applying for IRB approval.
6. You will learn how to write a research proposal using academic style appropriate for your discipline.

Course Readings

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

VideoMosaics Website: This site contains videos of students learning mathematics and online video. You may access the website at www.videomosaic.org.

In addition, research articles are posted within the appropriate unit folder (e.g., Week 1) on e-college as each unit becomes available to students. Please refer to the reading list at the end of this document. This list is subject to modification.

Participation Schedule

Because learning in this course is predominantly via discussion, it is **essential** that you complete all readings for each week **prior to the start** of discussions. For example, we are scheduled to discuss Topic 2 starting on 9/11. Complete all readings on Topic 2 **BEFORE** 9/11. As we discuss Topic 2, you are expected to concurrently read readings assigned for the following week (9/18). A schematic of the weekly schedule looks like this:

Su	M	T	W	TH	F	SA
			Discussions for current week start Wednesday evening. Begin reading next week's readings.	Continue contributing to current week's discussion. Continue next week's readings.	Continue contributing to current week's discussion. Continue next week's readings.	Continue next week's readings.
Continue contributing to current week's discussion. Continue next week's readings.	Continue next week's readings	Continue next week's readings	Topic change: Start contributing to next topic discussion Begin reading next week's readings Weekly assignments for current week is due by midnight.	The cycle repeats each week		

Course Structure & Expectations

This course is structured as a hybrid course. We will meet for **2 in-person meetings** at the **GSE from 4:50-7:30pm**. These dates include 9/11 and the 2nd or 3rd Wednesday in October. All other "meetings" will be virtual via online asynchronous discussions, with the possibility of scheduling 1-2 synchronous meetings on Google Hangout or Go-to-Meeting

when a whole class discussion seems important. Synchronous meetings may be at the suggestion of the students as well as the instructor. For example, some assignments may be highly visual and sites like Go-to-Meeting allow us to share screens, have discussions, and get real-time reactions to your work.

This is a reading and writing intensive course. You are responsible for keeping up with the weekly readings and being prepared to participate in online discussions during the week, and to submit all assignments as per the deadlines. Online discussions will be whole-class, small-group, and in dyad settings. **You can expect to put in 6 – 9 hours each week in preparation, participation, and homework assignments.** Given the online nature of the course, you can determine your own timing and plan your schedule **in order to meet** the weekly deadlines.

Our goal is to make your experience productive, practical, and personally meaningful. For this to happen, it is vital that you understand how the course is structured and what our expectations are:

- We will have asynchronous discussions online on a weekly basis on the topic under consideration. Throughout the semester, you will discuss the readings and other documents that we will upload, which might include research articles, school and out-of-school scenarios, videos of learning and teaching, and actual learner artifacts/products. These readings and activities will help in understanding design based research and its use in educational settings. You are encouraged to share articles, current news-stories, videos, simulations, and/or other related materials that can help to explain, clarify, or elaborate on ongoing class topics.
- All components of this course require your active and consistent involvement and participation in class. If you have any questions or concerns regarding online participation or writing, please address this with Dr. Eberbach as soon as possible. Considering the strength of the class and that a main function of the assignments is to enable you to develop a competitive learning research proposal, **no late submissions can be accepted.** You can expect feedback on weekly assignments before the next assignment is due.

Communication

Most of our communication in this online course is via asynchronous discussion and exchange of ideas via shared work (e.g., assignments). Assigned readings and any introductory slides are typically reviewed individually and then we will discuss our ideas on the discussion board.

This experience may feel isolating for those who prefer in person communication. In an effort to enhance our communication and to make things more personable, we will upload mini-video segments discussing certain aspects of the week's discussion as appropriate. "Seeing" the instructors may help in setting certain things in context. In addition, Dr. Eberbach will also host small group virtual meetings via Skype, Google Hangout, or Go To Meeting, whereby we could "meet" one on one and/or in small group or dyad settings as

needed to review any queries you may have. Dr. Eberbach is always available on email and can also talk to you via phone or Skype if we schedule a predetermined time.

Course Assignments and Grading

• Online Discussion and Facilitation	22%
• Annotated Bibliography	5%
• Theoretical Framework	10%
• Projects Variations Document	5%
• Elaborated Project Plan	5%
• Design Prototype	5%
• Video Analysis	18%
• Draft versions of instruments and data collection plan	10%
• IRB proposal	5%
• Research Proposal	25%

Grading Scale

90 and above = A; 87-89 = B+; 80-86 = B; 77-79 = C+; 70- 76 = C; 60-69 = D; Below 60 = F

Details of Course Assignments are discussed in detail below

Online Discussion and Facilitation (20%)

Because this course is primarily online, all of our review, understanding and discussion of weekly readings will be conducted via the e-college discussion board. All students **must** complete the weekly readings and review any additional information that may be posted including slides and handouts for the week's topic. You are also required to engage in the online discussion by responding to the questions of the week or summarizing your understanding of the given readings. You have 2 roles to play, either that of a facilitator and/or that of a participant.

Beginning Week 4, two-three students will be assigned as facilitators of the discussions. (This is a good opportunity for peer-to-peer collaboration!) I will be the facilitator for Weeks 1-3 and will facilitate discussions 9/4 through 9/14. (See Deadline section for explanation of end date.) Students will be assigned to facilitate the online discussion starting on 9/18 and ending on 9/21 and so on for the remaining weeks. Every student will get an opportunity to facilitate 2 discussions. *All student facilitators MUST email their discussion questions to me by 7pm on the SUNDAY prior to their topic discussion for approval before posting on the discussion board.* For example, if you are facilitating Week 4 and the discussion is to start on 9/18 you must email your questions to me by 9/15 and wait for my response before posting on ecollege.

The role of the facilitator is to get the discussion started by briefly summarizing the paper and asking a BIG IDEA question from the readings. The facilitator should also help keep the discussion going for the week by asking students to justify their thinking and explain their ideas and how they fit with others in the class or group. If some students are not participating or haven't posted a single idea or comment, the facilitators can and should

politely encourage these students to express their opinions. If a comment seems ambiguous, you can ask for elaborated explanations or clarifications.

All remaining students (non-facilitators) are expected to either respond to these questions, identify questions that they have about the readings, and/or share critical ideas that stem from the readings. Posting 2-3 lines of general ideas is **NOT** considered as effective participation and **WILL** reflect on your participation grade. On the other hand, posting a 2-page long summary on the discussion board is also ineffective. Make sure that you are addressing the posted question and not summarizing the entire reading.

In order to demonstrate your opinion, understanding, and critical analysis of the reading, you must contribute a significant number of ideas and also respond to other students' questions. We expect that you will each contribute at least 3 initiating comments and/or elaborated questions on different topics within the readings AND respond to at least 3 posts by other students each week. Remember, these postings need not be perfect or represent your final understanding of the topic. These are your thoughts, ideas, and reactions to the reading. Your understanding and final stances on the topics will evolve after sharing, discussing, and reflecting on these ideas. **You will learn more if you focus on the content and depth of discussion rather than the number of posts required.**

***Deadline:** So that you have sufficient time to discuss topics as well as to prepare for the following week's discussions, online discussions are scheduled Wednesday through Saturday. You must post your own initial comment—as well as respond to other students' comment—on the weekly readings by Thursday at 8PM. These discussions are asynchronous and we expect a lot of back and forth exchange of ideas taking place. Discussions will close for each topic at the end of Saturday. Clearly, waiting until the last minute to post your comments or respond to other's responses makes it difficult to contribute productively to discussions and to building community understanding. The new discussion topic will start on Wednesday mornings.*

Annotated Bibliography (5%)

Each student will 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. Bibliographies will be posted online. (2 to 4 pages, double-spaced)

Theoretical Framework (10%)

Describe the theoretical framework that you will use for your project and why it is an appropriate framework for the research questions that you are posing. An additional page should include a figure with your embodied conjecture. These will be discussed in class (or on small group online discussions).

Projects Variations Document (5%)

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. (1 to 2 pages, double-spaced)

Elaborated Project Plan (5%)

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. (2 to 3 pages, double-spaced)

Design Prototype (5%)

Over the course of the semester, you should make progress on your designs, which should be complete by the time of describing the enactment and data collection. There will be a public design review so you can present your design work and receive feedback. We will discuss low-fidelity prototyping methods (e.g., paper prototyping) you may elect to use. (5%)

Video Analysis (18%)

Based on the video analysis sessions in class (this is the 2nd in-person meeting at Rutgers), 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 using the video data VideoMosaic Collaborative repository, but other options are possible if you have other available video and have prior agreement with Dr. Eberbach. Further instructions will be provided on or around October 1.

Draft version of instruments and data collection plan (10%)

Prepare draft version of written instruments that you are planning to use. At a minimum, this 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, 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 own data collection, you can use the worksheet to keep track of your activities in the field. During the your data analysis phase, you can update the spreadsheet in order to track progress in your analysis. This work can be a working document for your actual study.

IRB proposal (5%)

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.

Research Proposal (25%)

Your research proposal should build upon previous assignments. The research question(s), 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 earlier assignments.

Please double-space all written work and use a 12-pt. font. All work should be submitted

through the course **e-college dropbox**.

With written approval from Dr. Eberbach, students may work collaboratively on all assignments, with the exception of online discussions, which are done individually.

Tentative Class Schedule

	Date	Topic	Readings & Resources	Assignments & Activities
Part 1: CONCEPTUALIZING DESIGN BASED RESEARCH				
1	Sept. 4-10 ONLINE	-Overview of class & establishment of class norms -Course goals -Survey -Introductions	<i>Questions about syllabus, readings, assignments</i>	-Survey & Online introductions due 9/7. -Asynchronistic discussions
2	Sept. 11-17 Meet @ GSE on 9/11	Conceptions of DBR: Issues and Possibilities	<i>Brown (1992); Cobb et al (2003); Shavelson, Philips, & Towne (2003)</i>	-Asynchronistic discussions
3	Sept 18-24 ONLINE	Understanding Learning in DBR	<i>Lobato (2008); Cobb & Gravemeijer (2008); Derry et al (2006)</i>	-Asynchronistic discussions
4	Sept. 25-Oct 1 ONLINE	The Place of Theory in DBR	<i>Bell (2004); Sandoval (2004; 2013); Barab (2008)</i>	-Asynchronistic discussions
5	Oct. 2-8 ONLINE	Multiple Enactments over Time & Space	<i>Bannan-Ritland & Baek (2008); Hmelo-Silver, Nagarajan, & Chernobilsky (2009); Puntambekar, Stylianou, Goldstein (2007); Zhang et al., (2009)</i>	-Asynchronistic discussions -Annotated Bibliography due 10/8 @ 8pm
6	Oct. 9-15 Meet @ GSE. Date TBD	Introduction to Video Analysis in DBR	<i>Chi (2007); Selections from Video Research in the Learning Sciences (2009)</i>	-Asynchronistic discussions -Theoretical Framework (inc. conjecture map) due during class meeting
Part 2: DESIGNING DESIGN BASED RESEARCH				
7	Oct. 16-22 Online	Design-based Implementation research	<i>Penuel et al (2011); Roschelle, Tatar, & Kaput (2008)</i>	-Asynchronistic discussions -Project Variations due 10/22 @ 8pm
8	Oct. 23-30 Online	Methodology in DBR -Creating a design prototype -What will you examine in your research design? Ex: Test scaffolds for existing problem; Use specific	<i>Sloane & Kelly (2008); Student-identified readings TBA</i>	-Asynchronistic discussions -Descriptive Video Analysis due 10/30 @ 8pm

		technology; Implement a curriculum unit; Convert curriculum unit to inquiry design or inter-disciplinary based & test it out		
9	Oct. 30- Nov. 5 Online	Using Video in DBR (Data Analysis)	<i>Jordan & Henderson (1995)</i>	-Asynchronistic discussions -Elaborated Project Plan due 11/5 @ 8pm
10	Nov. 6-12 Online	Use of Video in DBR	<i>Selections from Video Research in the Learning Sciences (2009)</i>	-Asynchronistic discussions -Interpretive Video Analysis due 11/12 @8pm
11	Nov. 13-19 Online	How will you study the design? What data will you collect (on whom and where)? How will you analyze your data: -Identifying needed data sources -Designing measures	<i>Castanheira, Green, & Yeager (2007)</i> Additional reading TBA: Student-identified readings (may focus on instrument design, coding etc.)	-Synchronistic discussion on 11/19 -Design Prototype for design review due 11/19 @ 8pm
12	Nov. 20-26 Online	How will you analyze your data? Looking for unintended consequences - Analyzing enactments -Qualitative and quantitative approaches	<i>Cresse & Hess (2013); Hmelo-Silver, Nagarajan, & Derry (2006); Derry et al, (2006)</i>	-Asynchronistic discussions -Content Video Analysis due 11/26 @ 8pm
	Nov. 27- Dec. 3	NO CLASS FOR THANKSGIVING RECESS		
13	Dec. 4-10 Online	Representing results (e.g., writing up statistical results in text and graphics, visual representations, etc...)	<i>Eberbach, Hmelo-Silver, & Jordan, (submitted); Huck (2000)</i>	-Asynchronistic discussions -Draft of instruments & data collection and IRB due 12/10 @ 8pm
14	Dec. 11-17 Online	Diffusing Innovation	<i>Larson, R. S. & Dearing, J. W. (2008).</i>	
15	Dec. 18 Online	Final Project due	No readings	-Final Project due 11:59pm

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 **ecollege** for corrections or updates to the syllabus. Changes will be clearly noted in course announcements or via **ecollege** email.

Accessibility

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>."

Course Readings

(Subject to modification; References marked with * are part of the course textbook)

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