

**EDC&I 581: Design-based Research Methods in Education – Part I**  
A Two-Quarter Sequence (3 – 5 credits per quarter)

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Fall 2006

Tuesdays, 4:30 – 6:50

Miller 320

Prof. Philip Bell  
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221-3642

OH: Thurs, 3:00 to 5:00 (drop-in in 312F)

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OH: Wed, 1:00 to 3:00 (in Gilman office)

### COURSE OVERVIEW

“As a design scientist in my field, I attempt to engineer innovative educational environments and simultaneously conduct experimental studies of those innovations. This involves orchestrating all aspects of a period of daily life in classrooms, a research activity for which I was not trained.”

— Ann Brown (1992)

“Rather, the master question from which the mission of education research is derived: *What should be taught to whom, and with what pedagogical object in mind?* That master question is threefold: what, to whom, and how? Education research, under such a dispensation, becomes an adjunct of educational planning and design. It becomes design research in the sense that it explores possible ways in which educational objectives can be formulated and carried out in the light of cultural objectives and values in the broad.”

— Jerome Bruner from *Issues in Educational Research* (1999)

Design-based research methods are an emerging form of educational inquiry. In short, design-based research involves the orchestration and study of complex educational interventions in naturalistic settings. In contrast to methods that are strictly observational, design-based research seek to shape and even engineer learning environments and experiences “in the wild.” Design experimentation might focus on such endeavors as: the creation of a new instructional sequence, the development of a new professional development approach, or the design of a new learning technology. This form of inquiry necessarily involves foundational features of design practice as well as quantitative and qualitative research as appropriate.

This course has two main purposes. First, it introduces students to different design-based research methods in educational research. Second, it provides students with an intensive experience in carrying out their own design-based research studies. Through a combination of readings, lectures, demonstrations, discussions, and class exercises, students will be introduced to the issues and practices associated with design-based research and how different researchers engage in this kind of work. By learning about the work of different researchers, students will also be introduced to distinct forms of design-based research in education. In their practicum experience, students will apply what they have learned to the design and conduct of their own design-based research studies.

This course is not a substitute for coursework on quantitative or qualitative methods. This course is actually intended to complement such courses. I will provide an overview of the modes of inquiry that can be used in the study of education in which design-based methods play a prominent role. This will often involve employing qualitative or quantitative methods as central components to the research. Therefore, it is strongly recommended that students taking

the course have some grounding in qualitative or quantitative research traditions. Most important, I will stress how the purposes a scholar intends to achieve (e.g., theory development, theory refinement, authoring of complex interventions, microgenetic analysis of development) strongly determine the appropriate form of inquiry.

By the end of the class you will be able to:

1. Understand the various forms of design-based research that are being conducted in the field of education.
2. Design a design-based study within one of the emerging forms.
3. Engage in design activities and discussion.
4. Conduct all phases of a design-based study, including original design work, entry into a setting, data collection, data reduction, data analysis, refinement of designs, and the reporting of research results.
5. Assemble and present conclusions from research in a rigorous and cogent form, both orally and in writing.
6. Offer constructive feedback on colleagues' work and incorporate feedback into one's own work.

## PRACTICUM

At the heart of this course is the two-quarter practicum experience: each student (or team) will design and carry-out a small-scale design research project. The goal is for students to experience the full cycle of research, from the identification and narrowing of a problem to the final rendering and reporting of results.

## STUDY GROUPS

It is important to receive external feedback on research and design efforts during the formative stages. The instructors will provide feedback throughout the course in this vein. In addition, we will also form small study groups (of 3 or 4 persons) that will convene periodically to review the direction and progress of each of the design studies underway. Groups will usually meet outside of class to discuss the projects (see schedule below). Please consider these study groups as an additional resource for providing input about your project.

## HUMAN SUBJECTS APPROVAL

Students should strongly consider securing approval from the UW human subjects division for the research conducted in this class. This allows the course project to be treated fully as a reportable research study (i.e., to publish it). Details of application will be discussed early in the quarter. If you plan to *not* seek human subjects approval, please notify the instructors.

## COURSE POLICIES

1. Prerequisite (strongly recommended): at least one graduate course in statistics, quantitative research design, or qualitative methods.
2. Eligibility: second year doctoral standing, or by permission.
3. Course credits: 3 units each quarter; if your project involves intensive design work, an additional 2 independent study units can be taken with the class.
4. Students must enroll in *both quarters*; credit will not be given for one quarter only. The second half of the course sequence will be offered Spring quarter.
5. Regular attendance and active participation is required. If for any reason you must miss the class, it is your responsibility to notify one of the instructors beforehand (in writing or by email) and to arrange with a fellow student to make up work and/or to obtain class notes and assignments. Students who have 3 or more unexcused absences during the 10 week quarter will receive “no credit” for the course.
6. Policy on R & I: Students may not use their work in this class as the basis for their R & I presentation if it planned for Winter or Spring quarters this year. Before using the work from this course for the R & I requirement, students should confer with their advisors and be prepared to engage in additional analyses and/or data collection at their advisor’s discretion.

## ASSIGNMENTS

1. Class Participation  
*Class Discussions.* All class members are expected to actively participate in the discussions each week.  
*Study Groups.* Members of class are expected to actively participate in the activities of their assigned study group (3 meetings / quarter at a minimum).
2. Project Variations Document (1 to 2 pages, double-spaced) **DUE: 10/10**  
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.
3. Field Observation (2 to 3 pages, double-spaced) **DUE: 10/17**  
Write a brief summary or interpretation of your research setting based on your fieldnotes and outline the implications for design.
4. Elaborated Project Plan (2 to 3 pages, double-spaced) **DUE: 10/17**  
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. Annotated Bibliography (2 to 4 pages, double-spaced) **DUE: 10/24**  
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.
6. Target Scenarios-of-Use (2 to 3 pages, double-spaced) **DUE: 10/31**  
Describe at least three specific contextualized uses of your design. Also note that if your design has many facets, you could well need many more scenarios than

this to depict the range of expected uses. These scenarios should be used to flesh-out, test, and refine your design work.

7. Design Prototype I & II **DUE: 11/7 and TBD**  
 Over the course of this quarter, you need to be making progress on your designs. The designs need to be complete by the time of enactment and data collection during Winter quarter. There will be two public design reviews during this quarter 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.
  
8. Data Collection Plan (detailed spreadsheet) **DUE: 11/14**  
 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.
  
9. Research Proposal (5 to 7 pages, double-spaced) **DUE: 11/28**  
 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. (If you plan to submit an application to human subjects, you should try to make progress on your research proposal earlier in the quarter.)

#### GRADING POLICY

We expect all assignments to be completed in a timely fashion. All written work will be held to high standards and should conform to rules of proper grammar, usage, punctuation, and spelling. Because of time pressures, *late papers will not be accepted unless prior written confirmation has been given by one of the instructors.* Assignments will be weighed according to this scheme:

Participation	15% (credit / no-credit)
Project Variations Document	5% (credit / no-credit)
Elaborated Project Plan	5% (credit / no-credit)
Field Observation	5% (credit / no-credit)
Target Scenarios-of-Use	5% (credit / no-credit)
Annotated Bibliography	5% (credit / no-credit)
Data Collection Plan	5% (credit / no-credit)
Research Proposal	20% (graded)
Final Design	35% (graded)

Please double-space all written work and use a 12-pt. font. Unfortunately I cannot accept email attachments or faxes unless prior arrangements have been made.

#### SCHEDULE OF ACTIVITIES, MILESTONES & READINGS

<b>Week 1, 10/3</b>	<b><u>Introduction to Design-Based Research and Its Place within Social Science Inquiry</u></b>
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Design-based research is an emerging form of inquiry in education. Researchers have been pursuing different research traditions augmented with a central design component. In this

course, we will explore many of these different forms of design-based research with the goal of understanding how they each can uniquely answer different types of research questions.

This session will provide an introduction to the goals and purposes of this course. In this class we will:

- Preview the main themes and activities of this course.
- Discuss the emergence of design-based research as a form of educational inquiry.
- Discuss how design is a central feature of this kind of work.
- Review how the educational research community has reacted to design-based research.

#### ASSIGNMENTS & MILESTONES

**Study groups meet to discuss project variations.**

<b>Week 2, 10/10</b>	<b><u>Design-based research in education: Introduction &amp; Overview</u></b>
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#### REQUIRED READINGS

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

Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design Research: Theoretical and Methodological Issues. *The Journal of the Learning Sciences*, 13(1), 15-42.

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

#### OPTIONAL:

Collins, A. (1992). Toward a design science of education. In E. Scanlon & Tim O'Shea (Eds.), *New directions in educational technology* (pp. 15-22). New York: Springer-Verlag. (Available online: <http://www.edc.org/CCT/ccthome/reports/tr1.html>)

#### ASSIGNMENTS & MILESTONES

**Project Variations Document due**

**Week 3, 10/17**

**Design-based research in education: Issues & Prospects**

REQUIRED READINGS

Design-Based Research Collective. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher*, 32(1), 5-8.

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

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.

ASSIGNMENTS & MILESTONES

**Field Observation due**

**Elaborated Project Plan due**

**Week 4, 10/24**

**Designing for innovation, designing for theory development**

REQUIRED READINGS

Simon, A. H. (1981). The science of design: Creating the artificial. *The science of the artificial*, (3rd ed.). Cambridge, MA: The MIT Press.

diSessa, A., & Cobb, P. (in press). Ontological innovation and the role of theory in design experiments. *The Journal of the Learning Sciences*.

ASSIGNMENTS & MILESTONES

**Annotated Bibliography due**

**Week 5, 10/31**

**Developmental psychology design research**

REQUIRED READINGS

Brown, A. L., & Campione, J. C. (1998). Designing a community of young learners: Theoretical and practical lessons. In N. M. Lambert & B. L. McCombs (Eds.), *How students learn: Reforming schools through learner-centered education* (pp. 153-186). Washington, DC: American Psychological Association.

Cobb, P. (2001). Supporting the improvement of learning and teaching in social and institutional contexts. *Cognition and instruction: Twenty-five years of progress*. S. M. Carver and D. Klahr. Mahwah, NJ, Erlbaum: 455-478.

## ASSIGNMENTS & MILESTONES

**Target Scenarios-of-Use due**

**Study groups meet to discuss upcoming design prototypes**

<b>Week 6, 11/7</b>	<b><u>Cognitive science design research</u></b>
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### REQUIRED READINGS

Norman, D. A. (1986). Cognitive Engineering. In D. A. Norman & S. W. Draper (Eds.), *User Centered System Design* (pp. 31-61). Hillsdale, NJ: Lawrence Erlbaum Associates.

Linn, M. C. (2006). The knowledge integration perspective on learning and instruction. In R. K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (pp. 243-264). Cambridge: Cambridge University Press.

Reiser, B. J., Tabak, I., Sandoval, W. A., Smith, B. K., Steinmuller, F., & Leone, A. J. (2001). BGuILE: Strategic and conceptual scaffolds for scientific inquiry in biology classrooms. In S. M. Carver & D. Klahr (Eds.), *Cognition and instruction: 25 years of progress*. Mahwah, NJ: Lawrence Erlbaum.

### ASSIGNMENTS & MILESTONES

**Design Prototype I due:** We will critically review and discuss your design in class.

<b>Week 7, 11/14</b>	<b><u>Cultural anthropology design research</u></b>
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### REQUIRED READINGS

Blomberg, Jeannette, et. al. (1993). Ethnographic Field Methods And Their Relation To Design, In *Participatory Design: Principles And Practices*, Schuler, Douglas, Ed. Lawrence Erlbaum Associates, New Jersey, 123-155.

Bødker, S., Grønbaek, K., & Kyng, M. (1993). Cooperative design: Techniques and experiences from the Scandinavian scene. In D. Schuler & A. Namioka (Eds.), *Participatory design: Principles and practices*. Hillsdale, NJ: Erlbaum.

Suchman, L. (2005). Agencies in technology design: Feminist reconfigurations. Workshop on Gendered Innovations in Science and Engineering, Stanford University, April 15-16, 2005. (forthcoming book: *Plans and Situated Actions II: Human-Machine Reconfigurations*, Cambridge University Press).

### ASSIGNMENTS & MILESTONES

**Data collection plan due**

Week 8, 11/21

Cultural psychology design research

REQUIRED READINGS

Nasir, N. S., Rosebery, A. S., Warren, B., & Lee, C. D. (2006). Learning as a cultural process. In K. Sawyer (Ed.), *The Cambridge Handbook of the Learning Sciences* (1st ed.) (pp. 489-504). Cambridge: Cambridge University Press.

Cole, M. (1996). Creating model activity systems, *Cultural psychology: A once and future discipline* (pp. 257-285). Cambridge, MA: Belknap Press.

OPTIONAL:

Cole, M. (2001, January 19-20). Sustaining Model Systems of Educational Activity: Designing for the Long haul. Paper Presented at Symposium Honoring the Work of Ann Brown, Berkeley, California. (Accessed online on 15 November 2001 at <http://lchc.ucsd.edu/People/MCole/ann.html>).

Brown, K. and M. Cole (1999). Cultural Historical Activity Theory and the Expansion of Opportunities for Learning After School. (Accessed online on 31 August 2001 at <http://lchc.ucsd.edu/People/Localz/MCole/browncole.html>).

ASSIGNMENTS & MILESTONES

**Study groups meet to discuss upcoming research proposals**

Week 9, 11/28

Learning about Methods

REQUIRED READINGS

In the prior week, customized readings focused on specific methodological practices or issues will be assigned to individuals (or teams) based on the details of their proposed research. Students will also be asked to nominate appropriate methodological readings.

ASSIGNMENTS & MILESTONES

**Research proposal due**

Week 10, TBD (12/11? 12/15?)

Fieldwork & Collecting Data

REQUIRED READINGS

Erickson, F. (1986). Qualitative methods in research on teaching, pp. 119-145 (up to "Data analysis and reporting.") Monograph reproduced from M. Wittrock (Ed.), *Handbook of Research on Teaching*. New York: MacMillan.

ASSIGNMENTS & MILESTONES

**Design Prototype II due:** We will critically review and discuss your design in class.

***Administrative Notes about Teaching at the University of Washington***

If you have any concerns about the course or your instructor, please see the instructor about these concerns as soon as possible. If you are not comfortable talking with the instructor or not satisfied with the response that you receive, you may contact Prof. Mark Windschitl (Chair of C&I), 543-6636, mwind@u.washington.edu.

If you are still not satisfied with the response that you receive, you may contact Prof. Tom Stritikus, 221-4791, tstrit@u.washington.edu. For your reference these procedures are posted on the bulletin board just outside Student Services, 206 Miller.

If you would like to request academic accommodations due to a disability, please contact Disabled Student Services, 448 Schmitz, (206) 543-8924 (V / TTY). If you have a letter from Disabled Student Services indicating you have a disability that requires academic accommodations, please present the letter to the Area Secretary to discuss the accommodation you might need for class.