**EDC&I 581: Design-based Research Methods in Education – Part I**

**WINTER 2015 TUESDAYS 4:30-6:50 THOMSON 334**

INSTRUCTORS


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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 a form of educational inquiry that has emerged over the past couple of decades. 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 seeks to shape and even engineer learning environments and experiences "in the wild." Design research might focus on such endeavors as: the creation of a new instructional sequence, the development of a new professional development approach, the development of a new museum exhibit, 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 working from a learning theory perspective.

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, site visits 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 theoretical approaches to 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 first part of the course is focused on the conceptualization of a design-based research study and the associated design of learning environment features and a research study approach. The second part of this course sequence provides 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. We will stress how the specific research goals a scholar brings to design-based research (e.g., theory refinement vs. exploration, the refinement of an existing learning environment or the creation of a novel one) 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 emergent 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 are strongly encouraged to enroll in *both quarters* of the sequence. The second half of the course sequence will be offered Fall 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 is planned for Winter or Spring quarters this year, unless specifically approved by your advisor. 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: Week 3 (Jan 20)**. 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: Week 4 (Jan 27)**. 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: Week 4 (Jan 27)**. 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: Week 5 (Feb 3)**. 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: Week 6 (Feb 10)**. 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: Week 7 (Feb 17) and Week 11 (Mar 17)**. 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 Spring/Summer. 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: Week 8 (Feb 24)**. 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: Week 10 (Mar 10)**. 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:

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|---|---|
| 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. Please use the canvas site to submit all work unless prior arrangements have been made.

SCHEDULE OF ACTIVITIES, MILESTONES & READINGS

## Week 1 (Jan 6): Introduction to Design-Based Research

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.

REQUIRED READINGS

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

IN CLASS ACTIVITIES

**Form study groups & meet to discuss project variations.**

## Week 2 (Jan 13): Design-based research in education: Introduction & Overview

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.

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

diSessa, A., & Cobb, P. (2004). Ontological innovation and the role of theory in design experiments. *The Journal of the Learning Sciences*.

Gravemeijer, K., & Cobb, P. (2006). Design research from a learning design perspective. In J. Van den Akker, K. Gravemeijer, S. McKenney & N. Nieveen (Eds.), *Educational design research* (pp. 17-51). London: Routledge.

OPTIONAL

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

## Week 3 (Jan 20): Doing Design Research: Beginning Nuts and Bolts

REQUIRED READINGS

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.

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

Sandoval, W. (2014). Conjecture mapping: An approach to systematic educational design research. *The Journal of the Learning Sciences*, *23*(1), 18-36.

McKenney, S., & Reeves, T. C. (2013). Analysis and exploration (Chapter 4), Design and construction (Chapter 5). In *Conducting educational design research* (pp. 85-132). New York, NY: Routledge.

OPTIONAL

Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences*, *13*(1), 1-14.

Sharon J. Derry , Roy D. Pea , Brigid Barron , Randi A. Engle , Frederick Erickson , Ricki Goldman , Rogers Hall , Timothy Koschmann , Jay L. Lemke , Miriam Gamoran Sherin & Bruce L. Sherin (2010): Conducting Video Research in the Learning Sciences: Guidance on Selection, Analysis, Technology, and Ethics. *Journal of the Learning Sciences*, *19*(1), 3-53.

ASSIGNMENTS & MILESTONES

**Project Variations Document due**

IN CLASS ACTIVITIES

**Sketch design conjecture maps in study groups**
**POSSIBLE GUEST LECTURE**

## Week 4 (Jan 27): Developmental psychology & Cognitive science 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.

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.

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

**Field Observation due**
**Elaborated Project Plan and Conjecture Map due**

## Week 5 (Feb 3): Cultural psychology design research

REQUIRED READINGS

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

Engeström, Y. (2011). From design experiments to formative interventions. *Theory & Psychology*, *21*(5), 598-628.

Danish, J. A. (2014). Applying an activity theory lens to designing instruction for learning about the structure, behavior, and function of a honeybee system. *Journal of the Learning Sciences*, (ahead-of-print), 1-49.

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).

ASSIGNMENTS & MILESTONES

**Annotated Bibliography due**

POSSIBLE GUEST SPEAKER

## Week 6 (Feb 10): Designing for equity, change and theory development

REQUIRED READINGS

Gutiérrez, K. D., & Vossoughi, S. (2010). Lifting off the ground to return anew: Mediated praxis, transformative learning, and social design experiments. *Journal of Teacher Education*, *61*(1-2), 100.

Rosebery, A. S., Ogonowski, M., DiSchino, M., & Warren, B. (2010). "The coat traps all your body heat": Heterogeneity as Fundamental to Learning. *The Journal of the Learning Sciences*, *19*(3), 322–357.

Lee, C. D. (2008). The Centrality of Culture to the Scientific Study of Learning and Development: How an Ecological Framework in Education Research Facilitates Civic Responsibility. 2008 Wallace Foundation Distinguished Lecture. *Educational Researcher*, *37*(5), 267-279.

ASSIGNMENTS & MILESTONES

**Target Scenarios-of-Use due**

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

POSSIBLE GUEST SPEAKER

## Week 7 (Jan 17): Designing (with) objects, tools, and technologies

REQUIRED READINGS

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.

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, *53*(4), 5-23.

Akkerman, S. F., & Bakker, A. (2011). Boundary Crossing and Boundary Objects. *Review of Educational Research*, *81*(2), 132–169.

ASSIGNMENTS & MILESTONES

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

## Week 8 (Feb 24): Anthropology, Ethnography & Design research

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.

Suchman, L. (2011). Anthropological relocations and the limits of design. *Annual Review of Anthropology*, *40*, 1–18.

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

Razzouk, R., & Shute, V. (2012). What Is Design Thinking and Why Is It Important? *Review of Educational Research*, *82*(3), 330–348.

OPTIONAL

Bødker, S., Grønbæk, 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.

ASSIGNMENTS & MILESTONES

**Data collection plan due**

## Week 9 (Mar 3): Designing for Broader Impacts: Design Based Implementation Research

REQUIRED READINGS

Coburn, C. E. (2003). Rethinking scale: Moving beyond numbers to deep and lasting change. *Educational Researcher*, *32*(6), 3–12.

Fishman, B. J., Penuel, W. R., Allen, A.-R., Cheng, B. H., & Sabelli, N. (2013). Design-Based Implementation Research: An Emerging Model for Transforming the Relationship of Research and Practice. In B. J. Fishman & W. R. Penuel (Eds.), *National Society for the Study of Education*: Vol 112. Design Based Implementation Research (pp. 136-156).

Russel, J., Jackson, K., Krumm, A., and Frank, K. (2014) Theories and Research Methodologies for Design-Based Implementation Research. In B. J. Fishman & W. R. Penuel (Eds.), *National Society for the Study of Education*: Vol 112. Design Based Implementation Research (pp. 157-191).

Svihla, V. (2014). Advances in design-based research. *Frontline Learning Research*, *2*(4), 35-45.

ASSIGNMENTS & MILESTONES

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

POSSIBLE GUEST SPEAKER

**Week 10 (Mar 10): Partnerships, Fieldwork & Collecting Data (NOTE: This will be a virtual class on Canvas. We will not meet face-to-face, but please do the readings.)**

REQUIRED READINGS

Engle, R. A. (2008). Establishing collaborations in design-based research projects: insights from the origins of the MMAP project. *Proceedings of the 8th international conference on International conference for the learning sciences-Volume 1* (pp. 216–223).

Fishman, B. J. (2014). Designing usable interventions: bringing student perspectives to the table. *Instructional Science*, *42*(1), 115-121.

Penuel, P., Coburn, C., and Gallagher, D. (2014). Negotiating Problems of Practice in Research-Practice Partnerships. In B. J. Fishman & W. R. Penuel (Eds.), *National Society for the Study of Education*: Vol 112. Design Based Implementation Research (pp. 237-255).

Bouillion, L. M., & Gomez, L. M. (2001). Connecting school and community with science learning: real world problems and school–community partnerships as contextual scaffolds*. *Journal of Research in Science Teaching*, *38*(8), 878-898.

OPTIONAL

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

**Research proposal due**

**Week 11 (Mar 17): Design Prototypes and Implementation**

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. Elham Kazemi (ekazemi@uw.edu) or Deborah McCutchens (mccutch@u.washington.edu). For your reference these procedures are posted on the bulletin board just outside Student Services, 206 Miller.

**Academic Accommodations**

Your experience in this class is important to us, and it is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. If you experience barriers based on disability, please seek a meeting with DRS to discuss and address them. If you have already established accommodations with DRS, please communicate your approved accommodations to your instructor at your earliest convenience so we can discuss your needs in this course.

Disability Resources for Students (DRS) offers resources and coordinates reasonable accommodations for students with disabilities. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. If you have not yet established services through DRS, but have a temporary or permanent disability that requires accommodations (this can include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at206-543-8924 or uwdrs@uw.edu or disability.uw.edu.