

THINGS YOU SHOULD KNOW ABOUT...™ EDUCATIONAL DESIGN RESEARCH

Scenario

As the sponsor of the Learning Technologies Innovations Grant program at a large university, Dr. Flores was excited when four faculty members from two very different departments (American Literature and Public Health) submitted a proposal to develop cross-disciplinary courses. The goals were a focus on critical thinking and a commitment to better health choices, along with the integration of tablet computers as mobile learning tools. One course would analyze the portrayal of public health issues in works by American writers, using tablet computers to collect data about student attitudes toward the obesity epidemic and other health concerns.

Dr. Flores knew that a professor in the Research and Evaluation program at the university had several PhD students interested in applying educational design research (EDR) to significant problems in higher education. Dr. Flores brought the professor and his students together with the faculty from American Literature and Public Health. The meeting began with an overview of EDR by the R&E professor, stressing the twin outcomes of EDR: a robust intervention, in tandem with the development of theoretical knowledge related to issues such as higher-order learning outcomes and technology integration. Subsequently, the collaborating faculty members introduced their project proposal. Two of the PhD students were keen to join the project, one with an interest in critical thinking regarding healthy choices, and the other with a research focus on mobile learning. The two students worked with the faculty members to write an educational research plan for the project, and Dr. Flores decided to fund the revised proposal.

As is essential in any EDR process, the entire team will work together—for two years or more—to clarify project goals, identify outcome measures, develop a prototype innovative course, and offer the course for several iterations. During these iterations, data will be collected regarding the critical thinking outcomes, the mobile learning model, and other factors. Those data will be used to refine the course until the outcomes have been reached and an enhanced mobile learning model has emerged. The results of the EDR will be extended to other courses at the university as well as other campuses interested in similar innovations. The two students will complete their dissertations during the project, reporting their theses in a journal article format with co-authorship of several of the refereed journal articles by the collaborating faculty members.

1 What is it?

Educational design research (EDR, also referred to as “design-based research” or simply “design research”) addresses educational problems in real-world—not laboratory—settings. In contrast to many kinds of educational research, **EDR has two primary goals: to develop knowledge, and to develop solutions.** Like other research, EDR extends theoretical knowledge through data collection and analysis. But unlike many other kinds of research, the EDR process is embedded in the (often cyclic) development of a solution to the problem being tackled. Here is an example situated in an undergraduate biology class:

- Problem: Students are no longer required to dissect real fetal pigs, but existing simulations for teaching pig anatomy lack sufficient fidelity (practical side of problem); current simulation literature provides insufficient guidance on how to develop high-quality simulations for mammal anatomy (scientific side of problem).
- Practical aim: Develop a high-quality pig dissection simulation that allows students to meet course goals without actual dissection.
- Scientific aim: Understand and describe the characteristics of high-quality simulations for mammals in general and pigs in particular.

In the past, EDR has been popular among learning scientists involved in such fields as computer-supported learning or collaborative learning. More recently, it has been adopted in other fields as well, including teacher professional development and curriculum design.

2 How does it work?

The context for educational design research can be any setting where teaching and learning take place, whether physical/virtual, university/preschool, adult learners/child learners, or formal/informal. An EDR project could be initiated because a practitioner and/or a researcher sees an issue that warrants attention, such as misconceptions that hamper student learning or a teaching repertoire that is ill-suited to certain course goals.

Once a problem is identified, **EDR tends to evolve through three main phases, each of which may be repeated multiple times: analysis, design, and evaluation.** In analysis, researchers and educators talk to one another and possibly to others (such as students) and learn about the root causes of the problem. During design, a creative, multidisciplinary team reviews the theoretical knowledge relevant to the problem; brainstorms innovative solutions; considers various options; and creates designs to try in real

[more >>](#)

educational settings. Once a prototype solution is developed, evaluation takes place to test and revise both the design and the ideas/assumptions on which it is built.

Reports of design research sometimes tell the whole story (sometimes in book form), from beginning to end. However, many design studies are long-term endeavors, taking years of work to design and refine both solutions and the understandings on which they are constructed. Therefore, it is also common to see components of design studies (such as results from a single iteration) reported in the literature (journal articles). Design researchers use the same quantitative and qualitative tools as other researchers, although there might be a stronger tendency for design researchers to use mixed methods in their efforts.

3 Who's doing it?

Many different kinds of researchers in the field of education conduct EDR. Perhaps due to its natural ties with a research and development cycle, **it has been particularly well received by researchers developing educational technologies.** For example, the Crystal Island project allows students at North Carolina State University to delve into the intricacies of an infectious outbreak, investigating cause and effect within the structure of a game. Similarly, The River City Project created at Harvard University offers a multiuser learning environment that transports middle-school students to the nineteenth century with all of their twenty-first century education and skills intact. Both projects have yielded practical and effective technologies addressing real problems in education, as well as theoretical understanding related to the main problems, to the solutions created, or to both.

4 Why is it significant?

EDR is particularly powerful because it addresses real needs in the here-and-now through the development of a solution to a problem, while also generating knowledge that can be used in the future. Both the solution and the knowledge that come out of EDR are highly usable. This is due, in part, to the choice to conduct research not in highly controlled settings like laboratories but in the dynamic settings of educational practice. If tools and insights hold up under normal conditions, they tend to be more useful.

EDR might also offer faculty new opportunities to empirically study and reflect teaching practice. The goal of studying and improving one's own practice can be taken to another level when done with the rigor and reflection that are required to produce credible findings (that is, described in journal articles) and useful solutions (addressing widely held problems), both of which can serve the practice of others.

5 What are the downsides?

One challenge that educational design researchers face is that **funding agencies are relatively unfamiliar with it, and therefore they may be reluctant to support it.** A second challenge has to do with the way funding is allocated. Only a few grant schemes cover research and development together; most cover either research or development. This presents a substantial challenge to the design researcher, who must secure resources for both aspects of a project. A third challenge is that design studies tend to be lengthy and told best in fine-grained detail. This is difficult to do well within the space limitations of most academic journals, and, given the "publish or perish" world, this is not an insignificant issue.

6 Where is it going?

Since it really began to take off in the early 1990s, EDR has spread slowly but steadily. **Many of the well-known studies published in the past decade have taken place in higher education settings.** The results are promising, and researchers engaging in EDR might be able to lead the way on several fronts, for example by demonstrating productive forms of researcher-practitioner collaboration and/or illustrating that highly relevant research can also be rigorous.

7 What are the implications for teaching and learning?

Rather than comparing the relative effectiveness of one method over another, such as classroom versus online instruction, with the predictable finding that it really does not matter ("no significant difference"), EDR seeks answers to different questions. EDR asks questions such as "Why is this problem present?"; "What must be done to make this innovation effective?"; and "What design principles can we learn from the process of making it work that can inform the work of others?" Design-based projects, because of their intense focus on real-world problems and dedication to discovering and refining solutions, can provide a socially responsible form of research. **It can offer researchers and practitioners the opportunity to produce interventions of real value—tools, approaches, theories, and products—tested in the field and shown to be effective,** which can alter how instructors and students interact and can enhance the acquisition of learning.

EDUCAUSE®

EDUCAUSE 7 Things You Should Know About...™

EDUCAUSE is a nonprofit membership association created to support those who lead, manage, and use information technology to benefit higher education. A comprehensive range of resources and activities are available to all EDUCAUSE members. For more information about EDUCAUSE, including membership, please contact us at info@educause.edu or visit educause.edu.