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## Building to Learn: A New Paradigm for Design Research and Assessment

By Peter Sommer, Director of Education

The Columbia Center for New Media Teaching and Learning (CCNMTL) is a unique service enterprise that not only creates new tools for teaching and learning, but also researches their implementation, and assesses their success. Design Research is the unifying feature of our efforts, supporting the exploration, development, and application of digital technologies to enhance education at the University. Through an iterative cycle of research, development, and assessment, CCNMTL and its faculty partners experiment with innovative uses of technology among university courses, and generate advanced knowledge in the field of new media teaching and learning. In our presentation we described this process with examples selected from some of our 60 plus projects and work with over 1,500 University faculty members.

At the heart of our efforts is an important question: when new media are added to a course, do our students learn better, more, or differently? Researchers in our field (including CCNMTL staff members) are inching toward answers to this vexing question. Our answers are rooted in our own epistemologies and instructional design strategies, rather than being the sole property of psychometricians and schools of education. Our research at CCNMTL is occurring in the process of working collaboratively with our faculty partners in building and enhancing teaching and learning at the University.

Designing learning technology models that are innovative and effective, that exploit the technology, and that expand, enhance and create opportunities for teaching and learning in higher education, is an additional burden for academics. How is this to be possible?

The problem is that teaching does not invent its tools; it uses those invented by others. The academy had language, but it didn't invent writing – traders did that. It had writing but it didn't invent books – administrators did that. It didn't invent computers – engineers did that. It didn't invent the Internet – the military did that. It did invent the Web, but not for teaching purposes. All these technologies have been adopted by the teaching professions but in the service of the transmission model of learning. We have to conclude that it is not a natural part of the process of teaching that its practitioners invent tools for the improvement of that practice.

There is an alternative approach to the individual struggling to discover how best to use a complex technology. All technologies create communities that invent a range of formats within which practitioners can craft a variety of contents – e.g. types of book, types of TV program, types of PC application, etc. We need the same for learning technologies. But these devices grow organically. They are not designed in the abstract, as say, authoring systems were. They begin life in the excitement of creativity and the intention to do something different. That is how new teaching designs should begin, and is true for all the examples referred to above. But they should not stay rooted in the particularity of the original design. The beauty of computer programs is that

they can endure as a form, a tool for others to design by. So the program that began as a way of enlivening the study of Milton could be generalized to become a tool for enabling students to 'undertake guided investigations of a range of resource material in order to develop their own analysis of each investigation'. And as a design tool, it then becomes usable by academics in the same way as a book format, or a small group format can be. Similarly, the program that began, as a way of challenging students to uncover the source of contamination in a brownfield could become a tool that other academics customize for a quite different content, while preserving the form of identifying appropriate transition processes in a dynamic system. The form of the learning activity, already tested and proven, remains the same. The content may cover a wide range of different topics.

The experience of CCNMTL staff with the creation and refinement of instructional technologies has led to the adoption of a well-articulated iterative process for tailoring our work to serve educational needs. We believe that a conscious integration of problem analysis and design practice, with a constant process of formative evaluation leading to the cyclical upgrading of the chosen solutions, will generate the best educational outcomes. Rejecting an artificial division between theoretically oriented educational research and practically oriented design, development, and production, we blend these two realms of endeavor in a process that can be summarized in a simple phrase: "build to learn." In the course of developing working prototypes, we assess the problems encountered, the assumptions underlying our practice, the expectations of all participants, the complexity of the range of imaginable solutions to the problems, and the resource requirements associated with these approaches. CCNMTL and its faculty partners have found that this system is well suited to the production of useful, robust instruments that facilitate teaching and enhance learning.

The results of such a practice are not only particular solutions to individual learning challenges, but also a body of generalizable design principles that can guide future development efforts at Columbia and beyond. Design Research, by focusing on the process and outcomes of the educational experience as it unfolds in its actual context, provides a framework in which we can capture, reflect upon, and evaluate how students and instructors work within a learning environment in order to accomplish their goals and what particular learning activities best facilitate meeting those purposes. As design research is a classroom-based research enterprise, it is concerned with understanding the complexity of learning in a technologically enhanced learning environment.

The goal of our framework is not only to construct propositions about learning and teaching but also to engineer and construct effective learning environments that allow teachers and learners to make these propositions actionable. The presentation illustrates how we utilize multiple data streams, with the primary goal being not only global warranted propositions, but also the creation of tools, study environments, and processes that leverage learning and teaching by making insights usable, actionable, and adoptable. We concluded our presentation with a question that flows from the general Design Research model, but can only be addressed by the wider educational technology community. How should educational research resources be allocated so as to successfully move a promising innovation toward widespread adoption, and how should the processes of adoption be viewed as a research object?

See more info on Educause <http://www.educause.edu/>

See more info on Design Research <http://www.ccnmtl.columbia.edu/designresearch/index.html>



## About CCNMTL

CCNMTL (Columbia Center for New Media Teaching and Learning) is a service of Columbia University whose goal is to enhance teaching and learning through the purposeful use of new media. We form partnerships with faculty, providing them with as much support as they need in everything from the construction of course Web sites to the development of more advanced projects. CCNMTL is committed to remaining a leader in its field, engaging with its faculty partners in the reinvention of education for the digital age.