

Transforming Education with Research That Makes a Difference

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POSITIVE CHANGE IN EDUCATION happens when faculty gain insight into the relationship between student learning and their teaching behaviors through systematic research that they conduct, present, and publish. This grounded research can improve teaching and learning and create a positive return on investment for faculty innovation and student engagement. Such research can be game changing.

Technology frequently inspires pedagogical change, encouraging faculty to rethink their approach to teaching in light of what new digital tools can do. Faculty-driven research into the effectiveness of technological innovations can positively enhance this change, supporting and guiding it in constructive ways.

First, creating new, technology-enhanced learning activities is difficult. One consistent finding from fifty years of educational research is that small details of design and implementation can significantly impact the effectiveness of teaching methods. Every instructor is familiar with the great variability in student reactions and performance across semesters that makes it difficult to assess effectiveness through unsystematic observations.

Second, changing teaching methods requires effort. Incorporating more active, student-centered methods is not easy, particularly for those instructors who are most comfortable lecturing. Without solid evidence that new pedagogical approaches benefit students, change may not be sustainable, as many faculty may revert to older methods.

In this chapter, we present a case study of five faculty from the University of Minnesota (UM) and University of Central Florida (UCF) who have used classroom-based research to investigate the impact their creative uses of technology have had on their students and their instruction. Their experiences

serve as models for others in the classroom and illustrate the value in researching the impact of technology on education.

The University of Minnesota Initiative

Professor Sehoya Cotner of UM's biology program faced the first challenge just described when she created video podcasts, or "vodcasts," which combined custom animation and video segments with music and faculty voice-over, and which were designed to address topics known to be difficult for her introductory biology students. Initial reactions to the vodcasts were positive, but did they really help students learn? Dr. Cotner partnered with researchers to study their effectiveness using a comparative research design. One section of her introductory biology course received vodcasts while the other section had access to "class captures," which combined the output of the classroom's digital projector with a recording of the instructor's voice.

Dr. Cotner found that student reception of the custom vodcasts was more enthusiastic than reception of the class captures. Additionally, after controlling for potential confounding variables, including students' overall grade point average (GPA), major, gender, ethnic background, high school rank, year in college, composite ACT scores, and initial level of evolution knowledge, students who used the custom vodcasts achieved significantly higher scores on an end-term test of evolution knowledge than students who used the class captures.

Professor Catherine Solheim of the Department of Family Social Science utilized newly constructed "active learning classrooms" with physical layout and technological affordances designed to facilitate active, student-centered approaches to teaching and learning. Here, recent research shows that, when compared to traditional classrooms and while holding pedagogical approach constant, such new learning spaces can alter instructor and student behavior and improve student learning.¹

So space matters. When Dr. Solheim's introductory class was first scheduled in a new learning space, she taught using her usual lecture-based pedagogy. After that experience, she participated in an eighteen-month faculty-development program designed to encourage and enable instructors to employ active learning techniques in their classes. She then used a longitudinal research design to compare the first class with a second iteration of the same course, which had been revised to feature a student-centered pedagogical approach. After controlling for all available demographic variables, she found significant improvements in student learning in the second section, demonstrating that pedagogy matters too.

The University Central Florida Initiative

Class discussions in the online learning environment can take on transformational characteristics because the nature of learning engagement can change dramatically when students are separated through time and space. Professors Kerstin Hamann, Phillip Pollock, and Bruce Wilson of the Political Science Department investigated the effectiveness of discussion groups in online classes, controlling for GPA, major, class standing, ethnicity, gender, and instructor. When they examined the frequency and quality of students' postings in the asynchronous format, they found a strong relationship to learning outcomes in political science classes. Interestingly, these findings are moderated by students' reading behavior in the classes as measured by their actual replies to peers' postings in the discussion groups. Further, they found that reading behavior in online discussion groups interacts with students' GPA. Their study led them to conclude that course modality does not dictate students' engagement levels and that the benefits of class discussion transcend class modality. Finally, they concluded that a key enabling factor in developing successful online discussions depends on the instructor providing an effective framework in which those discussions can take place.

Professors Tim Brown of UCF's Nicholson School of Communication and Amanda Groff of the Anthropology Department are conducting long-range research into the learning value brought to the instructional environment by mobile devices and social networking tools when compared to learning management systems. They acknowledge the virtual explosion of social media tools readily available to students and ask questions such as, "Can we use Facebook and Twitter as effective instructional devices?" They are examining the reasons students use varying types of communication channels and the potential effectiveness of social media as a channel for communication for academic information. The results of their research show that students prefer to get their course-related information through official channels such as e-mail and course management systems. However, students are willing to get some course information through social devices so long as they are not required to share personal information. They conclude that students compartmentalize their communication tools into social tools for social engagement and work tools for work time. Rarely do they cross boundaries, as student motivations are perceived differently with each communication tool. In this research, "the medium seems to be the message."

Professor John Shafer of the Theatre Department is conducting research into theater transformation via contemporary digital technologies. Student actors participate from three universities: UCF in Florida, Bradley University in

Illinois, and the University of Waterloo in Canada. Professor Shafer, working with George Brown at Bradley and Gerd Hauck at Waterloo, produced *Alice Experiments in Wonderland*, merging three stages, casts, and audiences into one interactive experience through an Internet2 high-speed connection. Their research has developed a new paradigm for theater, illustrating that a common venue is not necessary and that audiences do not have to be in the same location in order to experience the artistic value of a performance. Their findings reveal a favorable audience reaction and a positive experience among the actors. This particular initiative produces a completely transformed model for teaching, learning, and theatrical production enabled by the Internet. Shafer and his colleagues found that no longer is common physical space a requisite for excellent theater.

These case studies demonstrate that creating a viable culture of scholarship at the classroom level yields information that can translate into immediate improvement, thereby supporting more effective learning. We know that students become more engaged in their education when they experience a respectful and facilitative learning environment, especially when concepts and information develop in a culture of effective communication. The scholarship of teaching responds to these needs by creating an environment wherein inquiry informs effective practice that in turn generates further research to the point at which the students become the real game changers.

Note

1. D. Christopher Brooks, "Space Matters: The Impact of Formal Learning Environments on Student Learning," *British Journal of Educational Technology* 42, no. 5 (2011): 719–26.

J.D. Walker manages the research and evaluation team in the Office of Information Technology at the University of Minnesota. The mission of the team is to investigate the ways in which digital educational technologies are affecting the teaching and learning environment in higher education. **Chuck Dziuban** is Director of the Research Initiative for Teaching Effectiveness at the University of Central Florida, where he has been a faculty member since 1970. He evaluates the impact of distributed learning in higher education. Currently, he is developing data models that can help with designing effective educational environments. **Patsy Moskal** is Associate Director for the Research Initiative for Teaching Effectiveness at the University of Central Florida. Since 1996, she has served as the liaison for faculty research of distributed learning and teaching effectiveness. Moskal specializes in program evaluation and applied data analysis, helping faculty and organizations improve education.
