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Research Methods: Measuring the Impact of Instructional Technology

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Introduction

As the University Director for Learning Technology in higher education, my initiatives revolve around the digital delivery of curriculum and other learning materials. In the past few years, online curriculum has migrated from classroom PowerPoint presentations that have been uploaded into a content manager, to current technologies that allow curriculum to be downloaded to iPods and other mobile devices. It is truly an exciting time for the field of Instructional technology.

It was my interest in leading these technology initiatives that caused me to enter the EDLI program. My professional background has been in the corporate world, particularly in training, marketing and branding. These skills are particularly useful in my current position, as the university where I work is a for-profit, proprietary institution with programs in technology, business and health care. While our academic standards are rigorous, at the end of the day we all have jobs because people choose to obtain their education with us, as opposed to other learning providers. At my institution, we not only pay attention to enrollment numbers, we pay attention to all the numbers that any for-profit business would watch: retention, marketing costs, the number of leads that result from a particular marketing purchase, and net cost per enrollment.

My research topic foci reflect this balance between learning and business. I am as much concerned with preparing young people (at the high school level) to use technology as a tool for prosperous living as I am using instructional technology as a way to differentiate my institution from other, similar universities who offer multiple methods of delivery. At the core of these foci is my desire to know which delivery methods actually cause a student to become so engaged, so immersed in the material and how it is delivered, that transformative learning takes place.

The purpose of this paper is to consider how to most effectively conduct research on this core focus and to answer: (a) can the type of instructional delivery method offered have a direct effect on retention and proficiency, depending on the affordances (the methods by which curriculum is delivered) offered by the medium, and (b) based on interviews with instructors and students, is there a reliable enough cause and effect relationship to create a survey that can be given to every incoming student, as a way to predict success for a particular delivery method. Many parameters that can be quantitatively measured when considering the cultural composition of our student body: age, race, mathematical ability, full or part time, financial need and proficiency on outcomes (grades). What is less obvious is what causes a student to choose one delivery method over another and if the delivery method is primarily chosen for the student's convenience, as opposed to the option that may best facilitate their success. These traits can't be easily measured, and will require some process of qualitative analysis to determine if there is a relationship among culture, affordances, and academic success with regard to how curriculum is delivered.

Research Methods: Measuring the Impact of Instructional Technology

In an effort to deliver learning materials efficiently and to as many people as possible, universities are looking to offer degree programs that enable a student to obtain learning material through a variety of methods. What was once the domain of the ground-based classroom can now occur on-demand, synchronously or asynchronously, from anywhere in the world. As an instructional technology researcher, one might expect to find most hybrid and online classes taken by advanced students, with higher household incomes and employers who are reimbursing their tuition, such as the many defense contractors within a short distance of our flagship campus in Colorado Springs. This all sounds reasonable, yet making this assumption without critical examination and comparison to other assumptions may give rise to harmful or inaccurate interpretation of the data (Yanchar & Williams, 2006).

Non-traditional Students

The majority of enrollments in degree-seeking programs at my institution are from students who would be considered non-traditional: time separation between high school and college, most likely working adults with families, and more likely to attend on a part-time basis. These students are also commuters, as the university doesn't have residence facilities. Many of these students are unprepared for the academic rigor of higher education, particularly in math (State of Colorado, 2005). Many of these same students are also ignorant in the use of technology for learning. They know how to make a MySpace personal web page, but they don't know how to use the Internet for research, preferring to believe if something is in a wiki (a Wikipedia entry), it is a matter of record (Weiler, 2001). Some of these students may be at a disadvantage to learn, creating a business risk in keeping them enrolled. Our challenge as

educators is to balance the academic rigor necessary to maintain our accreditation with the delivery method that best suits the learning style of the student, enabling them to ultimately graduate.

Affordances in Curriculum Delivery

At Colorado Technical University (CTU), curriculum can be delivered by several methods, depending on the needs of faculty and students. While some tools are made available to all students, it is largely the decision of the individual faculty member whether they are used. Thankfully, the administration is very forward thinking with regard to alternative delivery methods, enabling me to experiment with several tools and initiatives. Leadership buy-in is essential in the adoption of technology programs, and can make the difference between success and failure (Anderson & Dexter, 2005).

Our programs are taught using the Professional Learning Model, TM an outcomes-based measure of course mastery. If an instructor is using the PLM correctly, then more course assignments are project based, as one would expect to find in the professional world. As with other tools at their disposal, faculty are the ultimate authority of how curriculum is presented, as long as course objectives are met.

Ground Campus

The University has six ground campuses in four states. These campuses all contain administrative functions, classroom space and faculty (full-time and adjunct). For many students, this physical presence is necessary in order to not only house learning, but to also hold them accountable to attend. From a business perspective, this is an expensive way to deliver learning; our non-traditional student base means most of our classrooms are empty during the day. The irony of this situation is in the shortage of available space in the evening, making it difficult to

increase enrollments with classrooms that are already crowded. Instructors who teach ground classes tend to be traditional as well, using PowerPoint lectures with testing to measure rote memorization. Our effort to change this model to outcome-based objectives has met with a measure of resistance from our more experienced faculty; they believe there is a culture to protect, even if instructional technology has moved past the lecture model (Barbuto Jr, 2000; Barker, 2001).

For those ground instructors who are willing to adopt some of the tools at their disposal, we have two content management databases that allow faculty to upload course documents for their students. These content managers include a discussion board, with asynchronous discussion threads that enable something of a virtual chat, but are not good at delivering multimedia. These content managers not only enable ground students to have anytime delivery of static curriculum material, they also allow the university to offer hybrid classes, as a way to introduce ground students to online learning. Often, just meeting once per week instead of twice can make the difference in whether a student may pursue a degree or not. Adding an online component to a ground class can affect a student's ability to succeed (and alter retention levels). For students who aren't good time managers, don't learn well independently or have small children at home, having an online component may not complement their culture and learning style, becoming more of a hurt than help.

Pure Online Programs

In addition to ground and hybrid programs, Colorado Technical University has a large online division that offers similar programs to the ground campuses, in a purely online format. These online courses are offered in an accelerated model; classes are five and a half weeks long, as opposed to the eleven weeks of class that occur with ground classes. The content manager

used for online programs is a proprietary system, with multimedia capabilities and the ability to have live, synchronous chat via Breeze, a cross-platform meeting tool. Chats in online courses occur twice per week; the multimedia is limited to Flash-based interpretations of the instructor's lecture material, which is submitted to the appropriate department for production. This type of curriculum delivery is more visual than static material; however, there is no opportunity to make last minute changes in what is taught, since everything is submitted and produced in advance. The result is a very highly efficient, impersonal delivery system that prescribes how a student will interact with little alteration. Because of the lock-step nature of the online programs, students need to be excellent time managers and must be independent in their ability to learn. The synchronous chats allow for some social interaction, but the program is largely independent study by design.

Virtual Communities

An emerging technology that has become a large portion of my position at CTU has been in the area of instructional technology as a way to deliver curriculum in virtual communities such as Massive Multiplayer Online Roleplay Games (MMORPG's). One such game is Second Life, an immensely popular, global virtual economy that has attracted numerous education providers as a way to deliver the real-time social interaction found in ground courses with the convenience and global scope of an online program. Second Life is less of a game in the strict sense (no points, no conquering an opponent) but is more of an independent, free-market economy, with the ability to buy and sell land, own a home and conduct business for a profit. Because it is an environment created by and for its players, Second Life has a large sub-culture of educators using the medium for teaching and learning, all occurring in 3D with "avatars," digital people created by their users, to conduct business and learning.

Many universities are building virtual campuses in Second Life (Colorado Tech among them) as a means to both differentiate their institutions and as a way to augment existing delivery methods. Because a Second Life account holder chooses an alias for their avatar, he or she can live in virtual anonymity and can conduct business as their avatar. This may present some trouble for accreditation purposes if the avatar becomes a student only in the virtual world; at CTU it is used as a supplement to students who are already enrolled in our programs. From the perspective of an educator, virtual communities such as Second Life are incredibly engaging, drawing the user into an immersion where all sense of time is lost (Anderson, 2004).

Research Methods

As a corporate education provider, CTU is accountable to a board of directors and to its shareholders. As a result, a large number of statistics that are generated as a course of business that can be helpful in determining some generalizations about who our students are and their rate of success. What is less tangible are all the cultural, personal and learning style factors that make one delivery method a better fit than another. These intangible cause-and-effect relationships are no less important to the field of instructional technology and require a complementary relationship between quantitative and qualitative research methods. The key is to create a culture of inquiry within the academic community, executing methods that can be critically examined by others (Feuer, Towne, & Shavelson, 2004)

Quantitative Measure

Many of our students are meeting the costs of their education through some type of financial aid. The “packaging” of financial aid for these students requires them to share detailed information regarding family status, income level, and other personal details. In addition, most students are required to take a math and English placement exam, which determines if additional

preparatory classes are necessary before taking regular college-level courses. As an accredited institution, all grades are recorded and sent to the registrar, along with information on courses that were dropped or not completed. All this information is available to create a demographic on any number of things, including who is taking our classes, how big a course load is taken each semester and what majors are being declared. If personal demographics were the phenomena under study, these statistics would produce a reasonable basis to understand, predict and control an end result (Berliner, 2002; Slavin, 2002).

Qualitative Relationships

Statistics alone cannot determine success, particularly where culture, delivery medium, and affordances are concerned. Given two students who are statistically similar, what explains the preference of the first to be in ground classes, and the second to be in an online game? Is there some way to observe these intangible traits and determine a relationship with what delivery method is most suitable? How can these traits be discovered with any reasonable reliability?

Can we assume, for example, that all students from low-income households have better retention and success in ground classes because they may not have had Internet access during their k-12 experience? If that relationship can be established, will advising that student not to take online or hybrid classes result in that student finding their education elsewhere, or will it honestly result in a better learning experience? An understanding of causality where culture, medium, and affordances are concerned is fundamental to qualitative research, producing regularities in relationships between cause and effect (Maxwell, 2004). In the case of instructional technology, affordances that attempt to be similar regardless of medium can act as mediators between delivery methods and results (see figure 1).

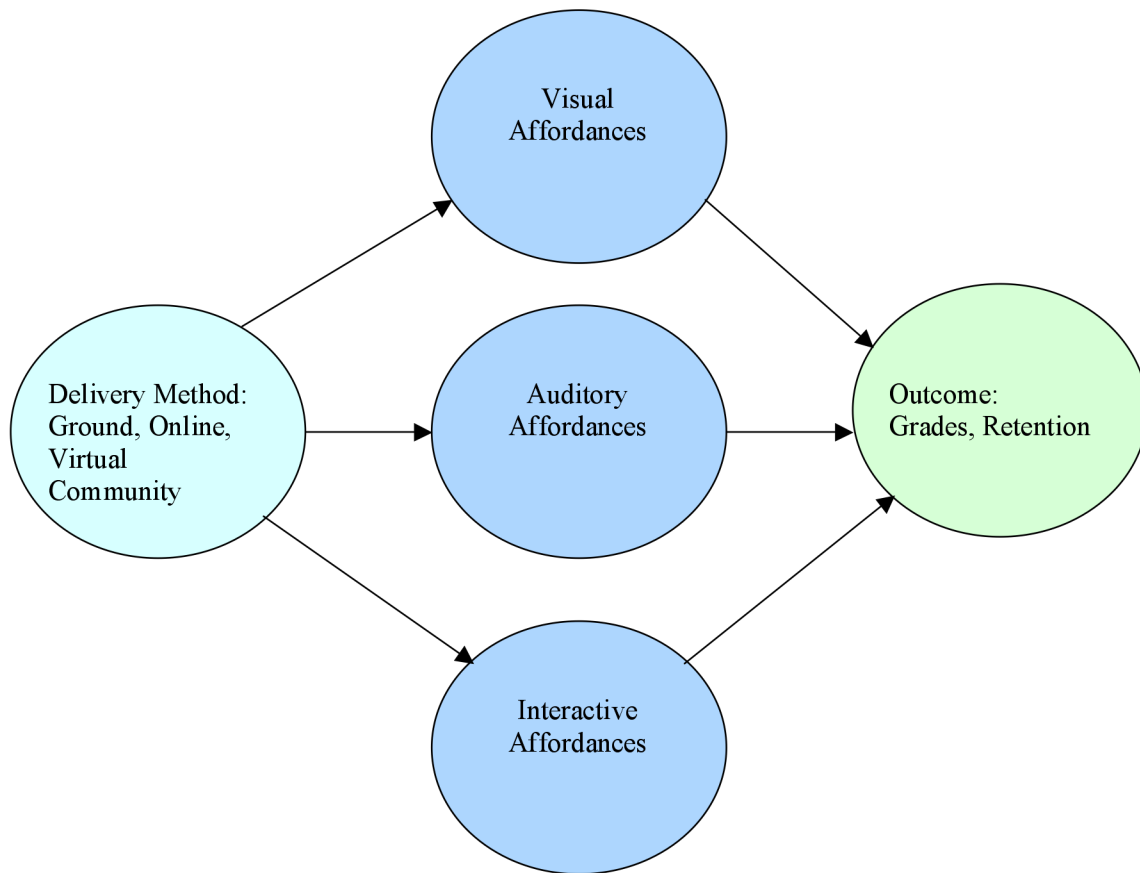


Figure 1. Culture, Personality and Learning Style Mediators

Experiment

As part of my doctoral research I hope to conduct an experiment that attempts to determine this very relationship between who are students are and what delivery method best works with their cultural composition as described earlier, and the affordances offered in the delivery method, Using Yanchar and Williams' Five C's of method use (Yanchar & Williams, 2006), my hope is to choose a general education class-something that all students need to complete-offering the same class, with the same course objectives, in each of our delivery methods (see table 1).

Table 1

Yanchar and Williams' Five C's of Method Use

Method	Description
Contextual sensitivity	Selection and deployment of multiple methods, tailored to the contextual demands problems, and subtleties of the research questions at hand
Creativity	Research programs and evaluations that emphasize creative theory construction, question formulation and problem solving
Conceptual awareness	Research and evaluation practices explicitly informed by some theoretical and historical sense of the topic of interest and what appear to be the most defensible procedures for answering questions and solving problems
Coherence	Research conducted in a reasonably coherent manner, so that theories, questions, methods, data analyses, and criteria for success form meaningful and interpretable accounts
Critical reflection	Researchers and evaluators view the assumptive framework that guides their choices and interpretations as fallible, alterable, and in need of critical examination

Unlike a “true” experiment that uses two groups (control and experimental) and two variables (independent and dependent), this research is situational in its context and makes use of three groups, variables, and mediators (Chatterji, 2004). Using the ground course as the control group, I hope to establish not only statistical parameters for who chooses a particular delivery method, but also use interviews and surveys to determine how the students respond to different affordances (visual, auditory, and interactive) that may be inherent in one delivery method and not another. These mediators may will allow us to predict with some reasonable certainty how successful a student might be with a particular delivery method or at the very least allow us to be creative with how affordances are presented, to create a similar learning experience no matter what the medium. These results can also help us from a business perspective, showing administration what programs and methods warrant expansion and which produce the most effective costs per student.

Conclusion

An Argument for Mixed Methods

There is no “correct” research method to determine what delivery method causes a student to become more engaged than another. Statistics alone cannot reveal why one student prefers taking a ground class, while another prefers attending an accelerated, fully online program. To determine a cause and effect relationship based entirely on statistical methods would lead to an incomplete assumption on what makes an individual unique (Berliner, 2002; Yanchar & Williams, 2006). A cultural and personal mediator that can help predict which method is in a student’s best interest might be helpful. A qualitative process such as student interviews can be used here to substantially strengthen the relationship between cause and effect

(Maxwell, 2004). Research methods have to be open to moving past the two-group, two-variable model (Chatterji, 2004), and move more toward a “what works” approach. In the end, what is important is to produce an outcome variable that everyone can agree upon—in this case grades or retention. It is not only important to move the field of educational research forward; students for whom this research is conducted should be the ultimate benefactors, enjoying their academic experience and completing their chosen degree programs (Olson, 2004).

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