The Technological Landscape: An Overview of

Instructional Technology and the Support it Needs.

Abstract

Technology is driving change in our culture and in education. Some of this is budget-based as campuses across the country are asking faculty to take on distance courses to increase headcount, while not using up the limited seating on site. Some of this is due to the clip culture spawned by YouTube and Twitter. Tools employed within college distance ed programs and within K12 classrooms as well as a raft of new instructional technologies on the horizon will continue not only to blur the lines between methods of delivery, but even their target audiences.

The distinctions between distance education methods and the traditional classroom techniques have rightly been fading for some time. Courses are set up to focus on creating useful resources and powerful student interactions more than focusing first on *circumstance of delivery*. This is not a trend or fad, but is the new reality. Delivery/interaction methods will shift and vary to address learner abilities and preferences more than learner locale. Within this paper the goals of a mature technology adoption plan, tech training and support, and pedagogical integration include both secondary and college instruction. While there are often distinctions in the challenges and solutions of these two groups, many of the trends and solutions apply to both.

This document will describe current uses, barriers, and directions to the ongoing adoption of new technologies and techniques in education, and will conclude with a description of the type of support instructors will need to meet these new demands.

Instructor training must enable these content experts to create and adopt new tools and resources. Because for the first time, instructors are expected not only to be gifted speakers but also expected to be experts in mixed-media. As the sophistication of each of the tools increases, the job description for teachers will require greater technical sophistication as well.

Blurring Location

My son is a gamer. He has friends and cousins who are gamers. But instead of having his friends over when they are going to enter into some cyber-world, they do just the opposite. They go to their own homes. It makes sense really. In his room he has a large screen and his own console, headphone and controls. When he has a friend over— physically—they have to share a split screen and one of them is not on his own controller and so on. To be together in cyberspace they go to different places. Each kid sits in his own room with his headset interacting and speaking to each other with the benefit of their own monitor, headset, controller and space. I share this because this is a fundamentally different mode of interacting than we have had before: Together when Apart.

There are several types of interactions where students may do better apart than together, or, to clarify, to be social *internally* rather than social *externally*. This paper will discuss trends in educational technology and a few directions that outline where we are and where that implies we are headed. But I will begin with a few disclaimers. I don't feel that this technology is ever a "replacement for," but is always an "addition to." It offers choices for students and for instructors. Is this separation a bad thing? Is studying part of the time or all of the time away from the physical group

a bad thing? It is another option. Neither always good nor always bad. It is an option, and arguing about its value is like arguing against the advent of the record player or automated weaving loom. We may now not play instruments as much, or have the same sort of jobs, but our opinions of the "good old days" are of limited value.

The use of the term "virtual" is a problem for me. Virtual tends to mean, "almost," or "similar to." Yet when we speak with our mother on the phone we don't call this a virtual conversation. It is just a conversation. When students interact textually, through instant messaging or SMS, or Twitter-like services, it is conversing. I have heard the give and take that textual interaction is less meaningful, hence the use of emoticons so that "we are clear when communicating."[1] Yet text has a longstanding tradition of conveying expression and information accurately and comprehensively when crafted well. The concept that textual interaction is partial or necessarily virtual is nonsensical.

In a survey conducted by Dr. Gary Wyatt in the Spring of 2002, the results indicate that 44% of 266 students felt that they received more interaction with their instructor during online courses than during face-to-face instruction. (Wyatt 2005, p. 460) This is significant because this implies that quite the opposite thing happens in many "distance environments" than one might suspect. Instead of being more distant from the instructor they are closer in some regard.
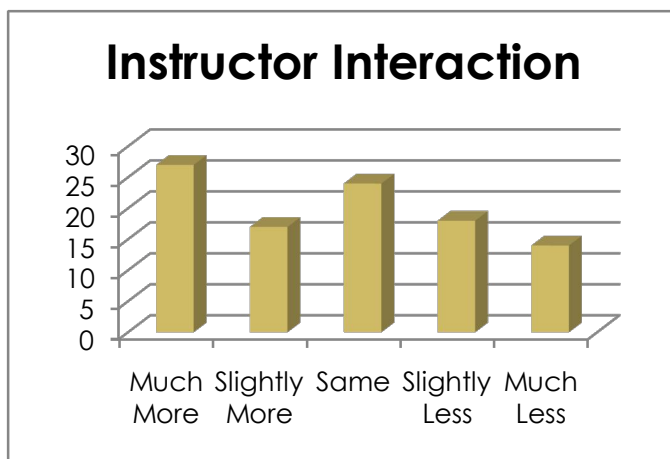
When looking at technologies, there is often a hesitation and a concern. The simplest example is the advent of the electronic calculator. As it came out there was some great concern that it would be a disservice to mathematical instruction. In short, that it was a bad thing. It is a thing. It is. If indeed there were a nuclear event that did away with all electronic calculators, there would be a few math-survivalists with slide rules who would rule. But, lacking that eventuality, the calculator became part of the environment and while one can discuss its relative merits, it was pointless to consider it some new-fangled method of instruction that can be adopted or not. New technologies are the landscape, not a path over it.

Simply put, social technologies including instant messaging, email and the ubiquitous cell phone are not going away. While one can bemoan what, self-described "cranky geek, John C. Dvorak called "tethered nature of laptop living" and the fact that our messages follow us around whether we like it or not, we are not going to abandon our phones-- and our phones will become progressively more sophisticated networked devices. (Dvorak, 2004) As educators, we will need the ability to provide material in many different modes. If one teaches pottery, it is debatable that this can be complemented by many bit-based technologies. Yet even within a class that is fully hands-on, and can be studied in isolation, there are affordances such as class schedule that should be available on line. The term online is also becoming progressively less meaningful, as the question arises, "how connected?" If we are connected by phone, then a given set of agents can reach us. If we are connected by text, another-- and also with blogs, or with instant messaging and so on.

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[1] *Yet we do not see that Shakespeare had to draw little pictures of a smile when he wrote a comedy nor did he have to use all caps when writing dialogue between Macbeth and MacDuff.*

Blurring Methodology

What will happen is that we will refine and discriminate whether we are available and to whom and when. Some of these new modes are helpful in some circumstances. Although college and secondary education often have different populations and varied modalities of instruction, both systems require a mature adoption and adaptation of transforming technologies to help meet their needs. We contend that the distinctions between traditional/in-class tools and methods and distance/out-of-class tools and methods are often merely semantic. The term "distance education" has progressively less meaning. Not because there is less of it, but because as time passes we are not so hidebound to notice if the instruction is occurring in a face-to-face (F2F) setting or not.

There is a tendency to write about emerging technology and new "tool use" in a fashion where the newness of it becomes the story, not the efficacy of the experience. When Marconi developed the radio it was first called the *wireless*, and when cinema added a sound track to films they were first called *talkies*. This makes sense, but the faddish nature of description belies the inevitability of these advances. Likewise the *wow* factor was exceedingly high with the Internet and the myriad things that became possible in a world where we could transmit to all, and we could receive from all at any one time. Our information and our resources could be made available at any time, at any distance. What is teaching if not communicating information in an organized, efficient, and meaning-bearing fashion? Now one can clearly imagine that this communication could be altered in terms of scale and method.

It is exciting to think about reaching out beyond our physical environment to instruct. But now we are there. This is the new reality. Rather than being impressed by tech, we just need to use it and predict the best ways to have it serve our bidding. Tech has some dandy advantages. Isolated students in Brazil are shown to have made great strides when being allowed to use internet "chat" to interact with other students. (Suguri, Matos, Castro, Castro, Jung, Rusten, 2004 p. 223) Likewise Baglione and Nastanski state their opinion in the article title as they describe "The Superiority of Online Discussion." (2007) They state that online discussions "provide more substantive discussion than…the formal classroom." (p.148) In a study of educational methods out of Iceland, they stress that the different distance ed techniques allow a "wider range of instructional strategies, and recognizes that not all students learn in the same way." (Johannesson, Baldursdottir, 2004, p.244) Of course the idea of incentivization and motivation has long been associated with instructional technologies, and is reaffirmed in the Czech study by Mannova as he shares that a full 90% of respondents agreed or strongly agreed that this…made the lessons more fun." and by Keller in a 2008 article entitled "First Principles of Motivation to Learn." (Mannova, 2006) (Keller, 2008)

These and many other examples can be shared to indicate that instructional technology can be helpful. The entire slate of delivery options that exist now allow instructors to have students access a limitless array of possible resources. Further, the options for contacting, reminding, prodding, verifying, assessing, hearing from students continues to grow with the proliferation of handheld devices, the ubiquity of broadband and the connectedness of an increasing large portion of the population. The idea of "delivery" is also becoming foreign. The content exists in many places. The interaction chosen that best matches the content to the user is key. But when all information can be all places and when there is some transparent cloud of information to which the student is ever connected, then the idea that information is being *delivered* is less accurate than *interaction*.

A primary claim we are forwarding is that the distinctions between distance education and "old school" class environments (which is a telling colloquialism) are largely artificial. This is discussed at length by Rob Phillips, (Phillips, Cummings, Lowe, Jonas-Dwyer, 2003) as he describes the choice made by those at Murdoch University in Perth Australia to make every *course delivery neutral*. This allows students to choose to attend a course on campus or from a distance or any combination of the above. They report that this "dramatically shifted the focus from the

university 'delivering the unit' to a model based on students accessing the resources they need to successfully complete a unit".[2]

If we had always had the affordances of handheld devices, streaming media and so forth we would not draw unnecessary distinctions between distance ed and traditional methods of delivery. If students had always been able to be "in class" or be "out of class" all the while still approaching a unit of instruction, then less explicit attention would be given to the medium and more would given to the content. But this is always the case with delivery media. Just as reading a textbook should be a transparent experience and the most is obtained when the act of reading itself is "second nature" or natural to the learner… or without any meta-cognition. There is no thinking about thinking. It is best when the instructor is so proficient in the various skills required to create all of these resources that the tools don't get in the way of the content creation.

The downside

This may sound Orwellian, and it is important to add some caveats. As we proceed forward, the understanding will be that there are multiple ways of accessing class information. Multiple ways of accessing lousy information is no better than one. The tools--in this case the tech-- does not replace good instruction, but it can be part of it. In the article "Effects of Distance Education on K-12 Outcomes: A Meta-Analysis," the authors share that these tools often "enjoy limited success," and students in their study "experience similar levels of academic success using telecommunications and …classroom settings." (Cavanaugh, Gillian, Kromrey, Hess, Blomeyer, P. 21, 2004) This is not a panacea but a direction. Further, as David Chapman points out in the meta-study of "Adapting Technology for School Improvement," to be effective it has to be good, and he goes on to share that "there is clear and compelling evidence that technology-based instruction can improve the consistency and quality of instruction." But this happens only when the instructor knows content, pedagogy and, now, the appropriate technology.

Catching up on the Technology Side

The main point made so far is that the tools and methods for what is called distance ed are useful to the point that they should not be relegated to a separate category of instruction, as though, as an afterthought, universities had each decided to run correspondence schools on the side. The techniques used there should be employed alongside traditional methods. The assumption is that, as time passes, all courses will find a place on a continuum with the University of Phoenix model on one side and the daycare model on the other. The former being a model based on fully-remote interactions with no possible face time, and the latter being model of seat time/attendance being the primary measure.

In the current or future models, the technical skills, the time commitment, and the academic culture shifts each come into play. To look at the skills required in the center of the continuum, we will begin with what is required in distance education efforts. By looking at these situations it is clear that substantial roadblocks stand in the way of making hybridized courses the expectation rather than the exception across the curriculum. In Folkestad and Haag's work, "Conflicting Ideologies and the Shift to E-Learning," they share an extended look at the frustrations of faculty and institutions as they observe that the "extraordinary growth of e-learning has created an imbalance in the system. Although the demand for online education is on the rise, the infrastructure to support it has lagged behind." (2002, P.4) This includes the technical and political considerations of the school.

In a study by Scott McDaniel of 60 faculty members, teaching distance-ed courses, he discovered that the two dominant variables that indicated course quality were "technical abilities and previous online teaching experience."

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[2] This is not as easy as just saying it is so. The article addresses the difficulties in this transformation but also describes the response from students and staff as "very positive."

(2004, p. 5) To restate: He found that across the many fields the MOST IMPORTANT INDICATOR of success was technical skill, or previous experience, where these skills would have been acquired. This finding must be unsettling for those who are master teachers in their domain but feel that the lack of tech skills will compromise their impressive field knowledge, or academic prestige. While Lee and Busch reported that instructors found no difference between their interactions with students, contact with students, motivation, or student success, they did report that instructor reluctance was due to "inadequate training and lack of recognition." They go on to share that instructor's willingness to participate in on line learning environments (OLE's) was tangent more on the quality of preparation and technical support they received than remuneration. (2005 P.109) A study at University of North Carolina Wilmington agreed and stated at length how the lack of support or understanding by department chairs and their administration served a s significant disincentive. The less the faculty knew about technology, the more negative they were about teaching online. (2004 P.5)

Beyond these factors Folkestad and Haag found

- that e-learning or teaching in OLE's was not rewarded financially

- at research institutions, honing teaching skills took away from research time

    o and increased class size was a negative

- non-tenured faculty do not feel that this is scholarly work that is rewarded

- OLE courses were open to more public or peer scrutiny

- as information is posted online, concerns about intellectual property arise (2004)

With these and other disincentives such as the amount of time to create, update, and administer individual courses, it is not surprising that distance education techniques and methods are not as widely practiced as the benefits might warrant. Rather, it takes increasingly stern administrative action to grow many tech-friendly learning environments.

Hard goods on campus: computer collections

While this paper will not address it in detail, part of the discussion about adopting educational technologies for school use should at least touch on-school, purchased hardware. In K12 one cannot assume that all students have access to computers. If there are school-owned stations they still tend to collect in libraries and learning labs. These environments are helpful in theory but, as will be noted, the segregation of technology sometimes contributes to its under-use. It is also common that there are budgets that fund these labs on college campuses where CPU's congregate.

When describing the uses of tech, one must address this in passing. This is a discussion about total cost of ownership (TCO). As I was told by a professor some years ago, "technologies *cost more than they cost*." If a campus purchases computer stations there is power, networking, and appropriate air handling that can cost more than the stations. The software can more than double that price. Then there are maintenance and upgrade issues. The North Central Regional Tech in Ed Consortium (NCREL) has a great website where the numbers are shown in several case studies. http://www.classroomtco.org/ Looking at these studies, the direct costs for hardware and software are often only 1/3 the price of each station after indirect/labor costs are factored in. That is an enormous cost, but these costs are ever shifting in a downward curve.

There are also a series of dilemmas that lie in wait after a campus has made this investment. In "Adapting Technology for School Improvement: A global perspective," Chapman and Mahlick point out another ongoing disincentive for instructors who might otherwise adopt technologies. Instructors have a fear that if something does

not work, they will be compromised in front of their class, and they need technical support that appreciates this concern. (2001, P. 285) This should not be passed over too rapidly. Decisions for use are often tangent upon instructor familiarity and appearance. If an instructor is put in a place where he/she is at risk of looking foolish, or not, they will likely choose not.

There is also the downtime traveling to and from labs, booting up stations, and the difficulty of ensuring on-task behavior, not to mention acceptable-use issues. The administration and scheduling of these spaces is often the bane of too many instructors who have set aside a class period for a given activity just to find that the space is in use by another group. These and other practical use barriers are very real cost-of-ownership issues as every hour misspent with a group of students is critical time that is lost for instruction every time these time-killers occur.

To summarize, with the ubiquity of technology now, and the projected technological landscapes on the horizon there are still needs of having the basic computer station and the training that it necessitates. There is far more to cover even as an introduction to cost/benefit analysis of technology budgets in all school settings, but it is vital as one considers the best way to integrate technology—that we consider not only what is expected of instructors as the tech terrain matures, but to remember the simple CPU and the basic training that accompanies it is still a concern.

Instructional Designer and Instructional Technologists: The Needed Addition

In the text, "Implementing Effective Online Teaching Practices with Lewis and Abdul-amid," they state that the role of the online instructor is "neither static nor one dimensional. The thoughtful use of creative instructional strategies…. will assist managing the demands of web-based instruction while engaging students in learning." (2006, P.96)

Throughout the research for his paper we were struck by the abundance of work that has included a discussion of the type of support faculty need. In the collection of articles in the "Adapting Technology for School Improvement," the editors look at technology initiatives in a dozen countries and again and again the problem of technology training is at the fore. In the UNC Wilmington survey it was clear that those faculty "who used little technology knew less about and were more negative about teaching online." These same respondents on average felt that the quality of the online course was less than that of the F2F. Lee and Busch reference that "Lack of adequate training is one of the greatest barriers to teachers becoming involved in distance ed. However, they also conclude—not surprisingly—that providing more resources for training and improving technology may encourage more instructors to be involved." (2004, P.5) But in a quite unexpected turn, Haag and Folkestad report the faculty who were early adopters of e-learning were "excited and are now retiring and voicing concerns that put e-learning in jeopardy." Tech that has been around for some decades now is not only no longer new, but is being passed over as uninteresting. They go on to say that "demand has now surpassed initial faculty interest." McDaniel states in the "Faculty Attitude, Preparation: The Implications for Courses" that he doesn't think that "administrators realize how much up-front time it takes to develop these courses."

What we take away from this is that faculty are often under-prepared, under-appreciated, under-recognized, and under-remunerated for a task that requires as much as twice the prep time, for which they may find themselves no closer to receiving tenure. This combination of real concerns points to a problem that is not just faculty whining , but a pervasive negative reinforcement to prevent technologies from being considered much less adopted. Since this paper is aimed at not only addressing distance ed, e-learning, OLE's as they stand but suggests that these same skills should be appropriately enmeshed in all fields then these negatives require a serious response. In Egan and Akdere's work, *Distance Learning Roles and Competencies: Exploring Similarities and Differences between Professional and Student Perspectives*, they describe three separate studies that describe the main skills needed to conduct a distance ed program. The top skill all address being tech savvy. (2004) This may not seem surprising, but should.

Regardless of the skill and facility in a given field both the instructors and the graduate students gauged the strength of the class by technical merits and communication skills first and second. No wonder there are so many instructors who feel disgruntled by a class structure that seems to be unimpressed by one's major field of study and rate it at a distant third to tech skills. In this case the medium isn't the message. The medium is perceived as more than the message. This scenario pits technology as the enemy of the instructor.

In CB Meyers research she identifies, at several points, that faculty consistently desire to understand new instructional practices "**if** they believe that they will enhance general acts of teaching." (2004, P.84) Egan and Akdere's remarkable compare-and-contrast survey set defines another role for the faculty member: That of the "systems expert/consultant." It is here where one may describe the solutions and the road to fixing this new model and adapting it to more global use. Egan's reference of an expert consultant, and Lee and Bush's discussion of the need for more training combine to outline Need #1: an instructional designer/instructional technologist who can serve.

Earlier it was noted that the concern of the German faculty members is that they would be embarrassed in front of their students and that the support they got might exacerbate that feeling of incompetence. So it is not enough that the technologist can assist and can be available to repeat instruction at intervals. The expert/consultant has to empathize. In many of these studies it was clear that the lack of willingness to include differing technologies was at least in part due to a non-measureable: pride. The heuristic understanding is what this suggestion relies on. But it cannot be overstated. It is not enough that the learning is effective on line. It must be effective in regular class interaction. It is not enough that instructors are remunerated they must be also be recognized. It is not enough that faculty are trained, but they must be trained with an understanding of their rank and expertise.

Judith Davis describes the role of the educational technologist in a new light as she points out the many roles that an ed tech takes on:

- teacher
- technician
- school specialist (enrichment and remediation)
- curriculum specialist
- Administrator

One might add the word "champion" to that list. The word champion is to say that the individual would be in a place to advance the difficulties outlined previously to the administration. To help break trail for these many faculty who may feel under qualified and over taxed. While instructors may arrive well prepared with a complete technology toolbag at the ready in almost every institution there will be a large class of instructors who need the help, the vision, and the support that that the instructional technologist can offer.

Finally, with all the possibilities out there the goal is to choose the best tool or tools for the situation. To help instructors learn skills that have transfer to each mode of instruction that they employ. Along with all the bells and all the whistles instructors need to know how to plan meaningfully, focus on best practice and be assisted by the new technology not overwhelmed. As the first set of early adopters retire the next group need to be there to continue using new skills and new tools that best traverse the current technological landscape.

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