Leveraging digital media across the higher education campus

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Introduction

In his seminal article *The Age of Social Transformation*, Peter Drucker noted that knowledge workers—a term he coined to describe the role(s) of people engaged in creating value from information—would constitute one-third or more of the workforce in the United States by the turn of the 21st century. He observed that this segment of workers would be as large a proportion as manufacturing workers ever made up, except possibly during war. He predicted that the majority of knowledge workers would be paid at least as well as, or better than, manufacturing workers ever were. He also observed that the great majority of the new jobs would require qualifications that industrial workers did not possess. These qualifications would require a good deal of formal education and the ability to acquire and to apply theoretical and analytical knowledge. Knowledge workers require a different approach to work and a different mind-set toward continuous learning. (Drucker, 1994, p. 5) *http://www.providersedge.com/ehdocs/transformation_articles/Age_of_Social_Transformation.pdf*

In reflecting on the impact that this shift toward a knowledge-based society was likely to impose, he acknowledged that schools would be particularly hard-pressed to help society make this shift: *"Indeed, no other institution faces challenges as radical as those that will transform the school. The greatest change, and the one we are least prepared for, is that the school will have to commit itself to results* (1993, page 209)."

Fast-forward to 2010. The nation is wresting itself from an economic downturn unlike anything experienced since the Great Depression of the 1930s. While the reasons for the downturn are many, one of the consequences has been quite clear. The knowledge economy predicted by Drucker and others has come to pass. Labor economists, employers, and social scientists have made it clear that a well-educated citizenry is vital to our collective well-being and national competitiveness. Beyond Drucker's prediction of a need to acquire and apply theoretical and analytical knowledge, it is also clear that success in today's digital economy requires abilities to creatively express new ideas in compelling, engaging ways. It calls for being able to represent complex data in visual representations that are easy to understand. Success demands that education practitioners know how to empirically evaluate patterns of success and patterns of failures so that solutions that enable real educational achievement can be ready when and where they are needed most.

The recent creation of the U.S. Department of Education's Investing in Innovation (i3) Fund is an example of a new national commitment to education excellence, teacher success, and student achievement (*http://ed.gov/programs/innovation/factsheet.html*). This program was created to accelerate the creation of an education sector that supports the rapid development and adoption of effective solutions in several broad categories, including:

· Recruiting and training effective teachers and school leaders

· Improving the use of data for professional development and high-quality assessments

· Implementing high standards and improving early learning outcomes

· Supporting college access and success; and improving education in Science, Technology, Engineering, and Math (STEM)

· Supporting the unique needs of English language learners and students with disabilities

· Promoting digital learning models

· Exploring approaches for digital learning

· Supporting extended learning time

Calls for improving student retention, supporting learner progress, and promoting program completion reflect a demand for solutions that engage and inspire faculty and students alike. This level of engagement comes from learning experiences that capture attention and present information in novel, memorable, multimodal ways. The value of digital fluency is increasingly self-evident in all facets of post-secondary education. Faculty members and researchers find that using digital media immerses students in learning experiences that engage and inspire. They find that displaying results of research in dynamic visual forms helps make key points clear, which increases impact and improves relevancy. Students quickly understand that those who develop the skills to work with market-leading digital software tools like Adobe® Photoshop® and Dreamweaver® and create video and animation with tools like Adobe Premiere® Pro and Flash® distinguish themselves in all facets of academic life. Smart employers and new graduates alike appreciate the value of effectively expressing ideas using a full range of digital media—from documents and images to animations, videos, ePortfolios, mobile applications, and any number of mash-ups.

The Multimedia Landscape in Higher Education

In higher education, the effective integration of rich multimedia assets and platforms (and the requisite design and development skills demanded for their effective use) has become an expectation from schools of design, art, and communications. Engineering and journalism programs have recognized that as technology transforms industries, students with design and development proficiencies are in high demand. The obvious value of improving analytical and digital communications for teachers is now being addressed through initiatives such as the i3 Fund. Relatively less attention has typically been given to the integration and use of multimedia in other disciplines.

While institutions have continued their efforts to systematically integrate practical, high-impact content and applications to engage learners, the pace at which multimedia integration has been actively addressed has been slow. Much of this resistance can be traced back to the expectations around faculty productivity. Traditionally, faculty achievement has been defined by teaching, research, and service, a tripartite structure upon which promotion and tenure are based. With rigid performance-related expectations in each of these areas, faculty members are known to approach innovation with a high degree of trepidation, with warnings from senior faculty about the risks of deviating from the "tripartite path" ringing in their ears. They fear that when interacting with technology, they will assume a novice status, causing significant disruption to the fluid, refined teaching styles they have developed over the years (Bennett & Lockyer, 2004). Underscoring how difficult implementing successful technology can be, a 2008 CDW Government survey of CIOs found that 72% believed the biggest impediment to successful technology deployment was faculty buy-in and subsequent training. Overcoming such resistance requires that the benefits of technology integration must be clearly defined, with demonstrable institutional and personal benefits. Nevertheless, there is growing recognition that developing the skills to creatively express new knowledge in a variety of forms and digital formats is no longer the domain of artists, designers, scripters, and coders. Unless, of course, those artists, designers, scripters, and coders also happen to be physicians, historians, dentists, or humanists.

Multimedia Technology's Impact on Transparency

Thanks to the data generation that comes along with the digitalization of so many of the processes of higher education, it has become so easy to document just about everything that it is simply no longer possible to claim ignorance about evidence (or lack thereof) of student achievement. Academic leaders are beginning to understand the need to initiate accountability and transparency efforts from within their organizations, or relegate themselves to scrutiny that will intrude from outside the organization. The increased transparency, connectedness, and speed resulting from these technologies provide academicians with a mix of both incredible opportunities as well as daunting challenges. By more fully integrating creative and collaborative technologies into their curricula, academic leaders will be able to capitalize on opportunities these technologies provide while proactively addressing the challenges that result from increased transparency in organizations.

The Value of Knowledge Management in Education

Knowledge Management provides an excellent framework for exploring how educational technologies can help academic leaders respond to sensible demands for increased accountability and transparency in the academy. Knowledge Management (KM) refers to the practice of leveraging collective wisdom to increase responsiveness and innovation (Frappaolo, 2006, p. 8). It is the deliberate and systematic coordination of an organization's people, technology, processes, and organizational structure in order to add value through reuse and innovation (Dalkir, 2005, p. 3).

KM involves a variety of activities. These activities typically include one or more of the following:

1) Generating new knowledge

2) Acquiring valuable knowledge from outside sources

3) Using this knowledge in decision-making

4) Embedding knowledge in processes, products, and/or services

5) Coding information into documents, databases, and software

6) Facilitating knowledge growth

7) Transferring knowledge to other parts of the organization

8) Measuring the value of knowledge assets and/or the impact of KM

(Gupta, Sharma, & Hsu, 2004, p. 3)

One foundational premise of KM in organizations is the importance of converting tacit knowledge to explicit forms. Within any academic institution, there resides a wealth of tacit knowledge that is not fully capitalized because it cannot easily be shared. At a very basic level of utilization, the conversion and warehousing of text-based assets has long been a mainstay of institutional document management and consumption. However, as Katz (2007) notes, the static nature of largely text-based assets that have traditionally been used to convey and project an institution's body of knowledge falls short in its ability to capture and share the massive volumes of information that are continually being created in academia and beyond. In other words, academicians need to expand their notions of how to effectively communicate the results of their work.

The benefits offered by collaborative, creative software solutions extend to so many aspects of teaching and learning. Woolgar (2002) champions the concept of using digital technology to support, and not replace, social interactions and learning environments. Teachers can create digital experiences where students, learning a concept in the classroom, apply new skills and knowledge in a digitally derived scenario. This form of digital storytelling enables instructors to more easily conduct formative assessments of their students and appropriately intervene by modifying the curriculum accordingly. Learning can be better facilitated and greatly enhanced through the use of rich content and digital technology. Just as supplementary uses of social networking can enhance student connectivity and sense of community, audio and visual media can further engage a student, and therefore increase the prospect of learning (Mott & Benus, 2006).

Examples from The Academy: Using Multimedia to Create New Knowledge

- In 2008, students in Carnegie Mellon's Human Computer Interface program collaborated with the University of Pittsburgh's School of Dental Medicine to solve workflow and information sharing problems within dental practices. Using Adobe Creative Suite® Design Premium software, in conjunction with Flash Builder™ and Adobe AIR,® the students created a 3D application that allowed dentists, hygienists, and support staff to rapidly communicate through a common visual display, increasing the accuracy and speed of prescribed treatments.

- The University of Massachusetts Medical School (UMMS) used Adobe Photoshop, Illustrator,® and InDesign® software to create medical atlases that present anatomical structures alongside diagnostic criteria. Through this delivery mechanism, students can interact with realistic models and engage in authentic learning scenarios. Notably, UMMS has noted that many students continue to use the atlases while on rotations, illustrating the power of knowledge dissemination beyond traditional academic settings. Not only do these new media formats help students more effectively learn medical knowledge, they also help the respective institutions build a more informative repository of complex codified knowledge.

- A case study from the University of Southern California's Division of Animation and Digital Arts (DADA) illustrates the potential for utilizing media to promote innovation and capitalize on collaboration. Students from DADA, working in conjunction with the Wrigley Institute for Environmental Studies, used a host of features in Adobe Creative Suite to add visual effects to video, produce animations, and create 3D applications to create awareness of research being conducted on Catalina Island. In this process, DADA students and the Wrigley researchers gained insights into how their respective professions could be enhanced by cross-disciplinary and cross-institutional collaboration, including the potential for programmatic expansion.

The benefits of using robust content-creation tools extend beyond teaching and learning to evaluation. Consider the documentation processes for faculty tenure and promotion or program accreditation. If we encourage faculty members to regularly codify evidence of their productivity in teaching, research, and service, we not only make it easy for them to construct an electronic portfolio for either annual evaluation or tenure, we also make available to our respective department and college a warehouse of information that can be electronically searched and catalogued. Similar advantages exist for the codification of student work. By providing them access to integrated creative tools, students can begin to construct an electronic portfolio of their academic work that, upon graduation, serves as a better body of evidence of their qualifications that they can share with prospective employers.

These examples, however, fail to capture fully the advantages offered by constructivist-oriented software solutions or KM approaches. In fact, these examples just begin to scratch the surface. Even Adobe Acrobat® Pro, which is just one of many applications in the Creative Suite, has seemingly nuanced features that have remarkable implications for academic work. Acrobat Pro allows users to combine different types of electronic documents generated in any electronic file format into a single PDF file that serves either as a unified document and/or an electronic portfolio, thus providing users of disparate software programs a *common language* for sharing work. This feature is crucial in facilitating collaboration among members of the Academy worldwide. Along with the attention currently given to online learning, we need to also consider the respective implications for online *working*, which is revolutionizing how academicians do what they do.

These examples also only begin to scratch the surface of the potential benefits gained by KM, which necessitates codification of information and knowledge produced in academia regardless of the format. Two changes brought about by emerging KM approaches have serious implications for how we should currently collect, analyze, and disseminate data, information and knowledge within the Academy. Both changes are the result of Moore's Law (1965), which suggests that over time, computational technologies steadily increase in quality and decrease in price. Coming soon, the first of those changes is the availability of affordable technologies that allow us to analyze large electronic warehouses of either text or audio data in an automated fashion, a feature that distinguishes KM approaches from conventional repositories limited to quantitative data. The second of these changes is that whereas most academic work of students and faculty is currently codified in a text format, in the future these will take on new manifestations of multimedia. One of the more instructive examples of this phenomenon exists at Indiana University, which has made Adobe software available to all its faculty and students. Faculty and students in disciplines as diverse as Fine Arts, Business, and Biomedical Sciences all use Adobe software to create more visually dynamic representations of their work. This type of comprehensive access to software like Creative Suite helps address both changes alluded to above, in that it provides mechanisms for both warehousing data and information and creating respective multimedia representations.

Emerging New Media Literacy in Academia

This paper has thus far explored the implications that collaborative, creative software solutions have on how we evaluate academic work. Just as importantly, one needs to consider the changing nature of how we communicate that work within the Academy. As the prices for video cameras continue to fall, the expectations for manifesting our work in new media formats will continue to rise. Given the availability of software such as Adobe Premiere Pro, we are finding that it is increasingly quite reasonable to expect that students possess the tools and skills necessary to produce representations of their work in dynamic visual formats, as is evidenced by www.YouTube.com. Although for a while it was believed that YouTube was an online version of America's Favorite Home Videos, it is dangerous to assume that this phenomenon is merely a fad among the younger generation. Today's YouTube is a marketing machine used by commercial and nonprofit entities alike, an online school and a news portal as well. YouTube serves as an accurate indicator of how newer generations will express themselves personally, artistically, and academically through what is commonly referred to as *new media* literacy.

Today's adolescents, many of whom will become college students in a few short years, have never experienced a world without the Internet. Understandably, they have a difficult time imagining research that does not involve consulting the World Wide Web. As Tsai and Tsai (2010) found, Internet skills among middle-age students are now considered ubiquitous, with students using this foundation to leverage both research and involvement in social media. A recent ECAR study found as students mature, three of four will become active users of graphics software and one in three will engage in significant audio- and video-editing activities. While some of these usage patterns can certainly be attributed to constant exposure to media, they reinforce the fact that today's students are eager to express themselves through a variety of rich digital modalities.

Data from a 2009 CDW 21st Century Campus report clearly illustrates the proclivity of students to base institutional selection on the technological adequacy of the campus. The numbers clearly illustrate that weight given to this factor is exceedingly high, with a baseline of 73% for Education majors to 90% for those enrolled in Vocational and Technical studies. When examining causation, the study revealed that similar proportions of students believed access to technology to be critical for future success, ranging from 76% for Fine Arts students to 100% for Engineering students.

Furthermore, it's not just the availability of these technologies, but their sound integration into the curriculum, that will help institutions become more competitive. The more colleges and universities can design course assignments and examinations to authentically mirror the actual work for which students are being prepared (i.e. technology), the more effective and competitive they become. Authentic assignments of this nature emphasize real-life experiences and instructional strategies that help students learn how to face the complex world of task performance (Van Merrienboer & Kirschner, 2001). Studies focusing on foreign language courses, for example, demonstrate that learners exposed to authentic assignments and technology developed literacy skills (Kasper, 2000), increased their motivation to communicate in the target language, and had a positive attitude toward the whole learning experience (Gu, 2002).

While some administrators may be skeptical of the need for pervasive technology in all disciplines, it is informative to examine work by Nguyen (2009) in which the ability to utilize media-creation software in the liberal arts was found to significantly enhance the ability of students to project themselves via digital storytelling. Specifically, the ability to express oneself visually and audibly catalyzed higher levels of intellectual curiosity and the desire to more explicitly depict narrative descriptions of findings from course-based inquiry. Though storytelling, and its digital extension, is a well-established practice in the liberal arts, the methodology can be extended, with great effect, to other disciplines. When asked to create a narrative explanation of a problem, students must engage in reflection and elaborate on their personal paradigms through activities such as image manipulation/creation, video editing, audio editing, and animation. The resultant product is one that reveals not only the products of academic exploration but also elaboration of personal understanding through rich media that makes sharing personal understanding easily accessible to other students and concurrently increases understanding among groups of learners.

Conclusion

Members of the Academy should anticipate that in the future conventionally printed papers will be replaced by much more dynamic multimedia representations of academic work. This applies not only to student assignments, examinations, and theses; it also applies to faculty work. Even as we begin to struggle with the fundamental shift from paper-based publication of work to electronic formats on the Internet, we also need to anticipate that in the near future, this research will take on new media formats. To help our faculty prepare for these changes, academic institutions must develop formal and informal faculty development initiatives to address the changes. In anticipation of these changes, it is imperative that academic departments and colleges begin to embrace technologies like Adobe Creative Suite such that we continue to develop our own intellectual capital as well as that of our respective institutions and the Academy.

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