Transforming Teaching and Learning through the Virtual Classroom

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Introduction

There is a perfect storm brewing in post-secondary education (PSE) in Ontario. Four major forces are combining in this storm, an ever growing higher education participation rate the growing demand for effective and timely knowledge delivery, the need to drastically alter how we view teaching and learning, and accelerated technological changes. These forces are compelling educators to re-think their roles in, and out of the classroom. During the summer of 2012, Glen Murray, the Minister of Training, Colleges and Universities (MTCU), hosted a number of round table discussions with stakeholders from colleges and universities across the province to discuss these critical issues and attempt to formulate a strategy for sustainable change in PSE in Ontario (Ministry of Training, Colleges and Universities [MTCU], 2012)

Today's knowledge-driven global economy requires that graduates not only possess post-secondary credentials, but that they have developed a wide range of transferable skills that allow them to collaborate, build upon, and work with their acquired knowledge. To achieve these ends requires a transformation of our current PSE system to enable us to provide teaching and learning spaces that are accessible anywhere, anytime, with the aid of technology and with guidance from educators acting as facilitators of knowledge creation and collaboration. I view this sort of change in the way we educate ourselves and future generations, using technology that allows us to collaborate on a global scale and contribute to the collective world intelligence. This paper reviews the forces driving the need for change in teaching and learning and presents emergent and existing technologies that may help to transform PSE in Ontario.

Participation Rates

Clark, Moran, Skolnik and Trick (2009) described the current system of PSE in Ontario as similar to the system first cobbled together in the 1960s. From the mid-sixties to today, fulltime enrolment in colleges and universities has grown to 12 times the original number, while at the same time we have seen the addition of five new universities and only two additional colleges (Clark et al., 2009). Although colleges and universities continue to grow their campuses to accommodate higher enrolment, the system of credentialing has not significantly changed in the past 45 years. Until quite recently, universities have had the sole responsibility of granting degrees, leaving colleges to diploma and apprenticeship training, all without a formal transfer function between institutions (Clark et al., 2009). Over the same period, universities have transformed from primarily teaching, to research and teaching institutions, putting a severe strain on their teaching capacity, resulting in larger class sizes and an increase in part-time teaching faculty (Clark et al., 2009).

Currently 12 Ontario colleges offer Bachelor degrees through more than 60 program offerings (College Degree Operating Group, 2011) with Colleges Ontario (2012) petitioning the Ontario government to allow all colleges in Ontario to grant three-year degrees. Rather than focus on degree granting, there needs to be a renewed focus on rebuilding Ontario's apprenticeship and skilled trades programs through Ontario colleges. It is estimated that due to high retirement and low enrollment, Ontario faces a shortage of 190,000 skilled workers by 2020, and this number is projected to increase to 560,000 by 2030 (Ministry of Economic Development and Innovation, 2012). In their 2009 position paper, Colleges Ontario recommended apprenticeship reform and increasing recruitment of international students. These two recommendations in combination with the accelerated development of degree programs will also put a strain on our colleges' abilities to continue to deliver diploma programs in the traditional manner.

Reviewing enrolment, graduate, and employment statistics, it is evident that although there is an increase in participation in PSE, in the case of Ontario's colleges, it is clear that not all graduates end up working in their field of study, nor does all participation result in graduation (MTCU, 2010). Survey data of Ontario college graduates from 2008, taken six months after graduation, revealed a provincial graduation rate of 65.1% with only 67.5% of those graduates working at a job related to their field of study (MTCU, 2010). The data show that 26.6% of graduates are not participating in the labour force; with the assumption being that the majority of those individuals are pursuing additional PSE credentials (MTCU, 2010). The 2009 Ontario Universities Graduation, Employment and OSAP Default Rates report reveals an impressive 95.7% employment rate within two years of graduation from an Ontario university with the provincial graduation rate for the same period at 78.3% (University of Toronto [U of T], 2009).These numbers on their own appear acceptable, however, if you factor in that a mere 21.7% of graduates responded to the government survey, it leads to a questioning of the overall employment rate of university graduates and the percentage of those who have reengaged in PSE for additional credentials (U of T, 2009).

Breaking from Tradition

As a Professor in the high demand Information Technology (IT) field at Durham College, I have witnessed an increase in first year students who enter with a college diploma, university degree, or previous PSE exposure of some kind. In fact, statistics show that 41% of Ontario college applicants have previous PSE experience with 23% of those having already completed a college or university credential (Colleges Ontario, 2011). The possession of multiple credentials demonstrates to potential employers that the graduate has the hands-on skills required to hit the ground running, as well as theoretical learning and established knowledge acquisition skills that allow for professional growth within an organization (College-University Consortium Council [CUCC], n.d.).

There also seems to be a great deal of movement from one program to another as a result of the student's search for alignment of knowledge content and personal career goals. In an effort to meet this shifting demand, as well as the continued growth in enrolment, there has been incredible growth in program development at colleges across Ontario. The

Ontario College Quality Assurance Service (OCQAS) works at arm's length with colleges and the MTCU to provide quality assessments of new program proposals and provide approval for new programs. The Director of OCQAS, Tim Klassen, revealed that 171 new program applications from all Ontario colleges were approved between February 2011 and January 2012 and that on an annual basis the number of new program offerings in the province has been on an upward trend since 2007 (T. Klassen, personal communication, October 19, 2012). Klassen supported my supposition that much of the program development is in an effort to answer a job market need in a high-demand or emergent area. Furthermore, Klassen suggested that the majority of the new program development over the past year has been in one-year certificate programs in very specialized disciplines with an aim to turn trained graduates out in a timely manner to meet those high-demand and emergent areas.

There is growing evidence of a movement toward demand for education that is delivered just-in-time to address an immediate academic need or career goal, as opposed to the current just-in-case approach. Currently we deliver a broad spectrum of content through traditional course offerings that may or may not all be relevant to the needs of the student at that time in their academic or working life. As Siemens and Matheos (2010) outlined, students today have the ability to gather knowledge from a variety of sources as required, while interacting outside of the constraints of the bricks and mortar of the campus, and without the aid of an educator being present.

In my own classes, which can range in size from 12 to 140, students feel empowered to access content outside of the classroom, and I recognize that students will find some information they require to solve a problem with or without my assistance. In fact, I believe that students require less formal presentation of content, and more scaffolding to help them organize the information they discover into working knowledge. If students prefer to "Google" their way through the course content, why would I stop them? This is not wildly dissimilar to the environment in my Principles of Learning class, where students commonly use the online chat to discuss content and are frequently "wikiing" terms and concepts that are being presented by the instructor.

Technological Change

The pace of technological change has accelerated with the evolution of the World Wide Web to Web 2.0, referred to as "the document Web," and it continues to be the driving force behind changes in the way we do business, the way governments work, how we socialize and communicate, as well as the way we learn and educate (Berners-Lee, 2008). In 2010, there were 2.08 billion household Internet connections worldwide. Estimating at least two or more persons on average per household leads to an approximation of over four billion people connected to the Internet worldwide, more than half the population of the planet (International Telecommunications Union [ITU], 2011).

The most recent iteration of the web, Web 3.0, referred to as "the Web of data," will enable the collective power of computers connected through the Internet to work together, accomplishing valuable processing for business and the sciences (World Wide Web Consortium [W3C], 2010).

The true power of Web 3.0 is that raw data currently held by organizations and businesses around the world can be linked through the Web of data under an open standard, thus providing a new level of knowledge creation that could conceivably change the speed at which corporations change their business models in response to market demands (Berners-Lee, 2008). Additionally, the future power of a worldwide network of linked data may allow us to learn more about how the human brain develops and functions, aid research on the root causes or cures for disease, or solve issues with the world economy (TED Talks, 2009).

The knowledge and skills required to work in the world of Web 3.0 are necessary for students and working professionals today and in the foreseeable future. These skills must be delivered in a mode consistent with the predominant preference for learning; on demand and on the students terms, using the technology of their choosing. The growing choice across the globe for retrieving information and building knowledge by means of the Web is mobile technology. In 2010, there were 0.94 billion mobile Internet connections (ITU, 2011). With the proliferation of smart phones and tablets over the last year, the current estimate for worldwide mobile connections is nearing 1.3 billion (ITU, 2011).

Technologies to Support Change in Teaching and Learning

The use of mobile devices such as laptops, tablets and smart phones, by students to access content outside of the classroom environment, is increasing rapidly. That increase in use is accompanied by a growth in expectation from all students for further open access to content (Johnson, Smith, Willis, Levine, & Haywood, 2011). The processing power and portability of these smart devices will most likely lead to the number of Internet connections from mobile devices surpassing that of PCs within the very near future (Schilit, 2011). As the need for further access to just-in-time content increases, it is evident that the advancement of mobile devices will continue to support that need.

The workplace is becoming progressively more collaborative on a global scale and the social elements of Web 2.0 have driven much of that movement. With the use of video conferencing, social networking sites, social bookmarking, Really Simple Syndication (RSS), blogs and mini-blogs, people are connecting and creating communities of collaboration and inquiry (Conole & Alevizou, 2010). With the prevalence of these Web 2.0 tools, we are now experiencing a global teaching and learning environment.

Learning Management Systems (LMS) have been in use for over a decade and have evolved to include tools that allow for mobile access, Short Message Service (SMS) messaging, and video integration. There are some robust open-source LMS products arriving on the market that allow institutional, departmental and instructor customization. In a recent announcement from Desire2Learn (2011), it was revealed that with their newest version of LMS “Individuals can now use the Notifications area to choose how information is pushed to them from the Learning Environment via numerous delivery methods including email, SMS and RSS formats as well as Facebook notifications” (para. 5). This is an example of another existing technology that is evolving to meet the needs of students who desire to learn anytime, anywhere.

In Canada, we have a rich history of distance education reaching back almost 100 years, originating from a request to the British Columbia government from a rancher seeking school lessons for his children. In Alberta, a response to the need to deliver curriculum to students across the expanse of the province began in 1923. That need has driven the development of distance learning from the correspondence courses of the early days to today's rapidly evolving distributed learning environments afforded through the advances of the Internet and mobile devices (Haughey & Muirhead, 1999).The convergence of online education and traditional, face-to-face learning has been evident since the mid-nineties (Muirhead, 2000). This convergence continues today through the use of Web 2.0 networking and learning tools allowing for access to course materials and digital collaborative learning environments.

Athabasca University (AU), based in Alberta, offers a full range of degree programs using a variety of digital technologies that allow anytime, anywhere access to content by the global community. AU offers the ability to study independently or enrol in "grouped study" courses that follow a more structured schedule of delivery and completion (Athabasca University, 2012). The Open University (OU), based in the UK, offers approximately 600 courses ranging across 60 subject areas toward a variety of credentials including 60 different degrees (The Open University [OU], 2011). They have two types of distance education; fully open learning, which allows students to work whenever and wherever they please, as well as supported open learning, where students have contact with other students and tutors through a variety of online technologies, from social networks to video conferencing (OU, 2011). Western Governors University (WGU), based in Washington State, is an exclusively online university that has only been in existence since 1997 and now boasts over 16,000 graduates with over 33,000 students currently enrolled in online degree programs (Western Governors University, 2012). The University of Phoenix's online campus with enrolment topping over 307,000 in the fall of 2010 (National Center for Education Statistics, 2011) is the largest university in the US by enrolment. The University of Phoenix offers degree programs fully online with rich student support coming from individual "learning teams" that include other students and faculty (University of Phoenix, 2012).

A new phenomenon in online learning, the Massive Open Online Course (MOOC) first emerged in 2008 and is growing rapidly with MOOCs emerging throughout PSE (Downes, 2011). Utilizing existing technologies such as video conferencing, wikis and Twitter, MOOCs offer an opportunity to connect with people from all over the world who have similar interests in solving a problem or investigating an idea through collaboration and engaging each other in the learning process (Gillis, 2010). MOOCs are open to anyone; they continue on as long as there are participants, there is no registration, and there are no fees of any kind, although you could pay for course credit based on your work in the MOOC. There is no defined path through the content because you, as a participant, help to create the content as you engage in the MOOC (Gillis, 2010). The establishment of this sort of networked collaboration in an effort to discover new ideas and learn collaboratively fits perfectly with the advancement of Web 3.0. Once

MOOCs become more widely available, and Web 3.0 is fully realized, open linked data will be accessed by participants in the MOOC and we will see the development of collective world intelligence.

"The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators in sense-making, coaching, and credentialing" (Johnson et al., 2011). The real change that is necessary to see a transformation of PSE fully realized is a complete transformation in the way we approach teaching and learning. As outlined by Conole and Alevizou (2010) this new world of teaching and learning will be built on a cognitive constructivist approach. Learners will be immersed in the cognitive processes of self-awareness and metacognition that comes from expressing their learning through self-publishing and reflective blogging. The constructivist activities of online interactions and collaborative learning, all under the guidance of a facilitating educator, will together define the path of knowledge creation (Conole & Alevizou, 2010). This amounts to a complete redefinition of what teaching and learning means to most educators in PSE, therefore, they may encounter many challenges along the way. Essentially, educators will be asked to give up control of content and assessment; it has been stated, "We need a pedagogical DNA for the 21st century" (Torres, 2009).

A second significant challenge to this transformation of PSE in Ontario is the granting of credentials based on the model of open social learning. I believe the solution is within reach; our existing colleges and universities have extensive expertise in granting credentials. Traditional bricks and mortar campuses will likely never disappear; enrolment in those traditional institutions will continue to rise in the foreseeable future but that traditional system is approaching full capacity. Ontario has the ability to become a world leader in ubiquitous just-in-time education; all it takes is an innovative approach to credentialing. The changes being afforded by the advancement of digital technologies in teaching and learning will inevitably lead to a massive disruption in the way most institutions conduct their business. Selingo (2012) states that "innovators will figure out a way around the credentialing hurdle" and that the resulting disruption in the PSE system will result in a rebuilding of the system, with students at the centre, just as they are in their learning. What is required is a massive expansion of existing prior learning assessment (PLA) protocols and some significant changes to the way all PSE institutions collaborate on pathways of learning. These changes would not only set us apart in PSE, on a global scale, but could also create a significant new revenue stream.

Is there really a breakthrough in technology looming on the horizon that can enable this transformation of PSE in Ontario, or do we already have the technologies to get us there? The transformation is well underway today and could be fully realized within the decade if we force ourselves to truly challenge the way we view education. A breakthrough is required by all of us who work in education, by reflecting on our current approach to teaching and learning, and the administration of credentialing through PLA. We have to start making the hard choices required to break free of the bounds of our teaching and learning traditions if we are going to keep pace with technological advances and become part of the emerging collective world intelligence.

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