THE FOURTH INDUSTRIAL REVOLUTION IN HIGHER EDUCATION
THE AGE OF LEARNING MANAGEMENT SYSTEMS

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ABSTRACT
The Fourth Industrial Revolution is transforming the higher education market. Enhancing the adult student learning experience requires developing multiple teaching methods that also includes the ability to navigate diverse forms of technology. A redefinition of success in academia means demonstrating competency with multiple learning management systems such as Blackboard, Moodle, D2L, and Canvas. This current and evolving approach is transforming the delivery of education and the academic job market. A global perspective suggests that Universities must develop the most effective training strategies to prepare faculty for the next level in the evolution of higher education to ensure that “no faculty are left behind”. As learning management systems transform traditional teaching into non-traditional facilitation this topic is important for educators who are willing to adapt to change, and intentionally seek knowledge, training and skills that will prepare them to not just survive but thrive in the Fourth Industrial Revolution. This will also be an opportunity to develop new theories of teaching and practical applications for adult learning that describe didactics for the digital age.

KEYWORDS: Didactics, digital age, higher education, learning management system, nontraditional teaching

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THE AGE OF LEARNING MANAGEMENT SYSTEMS

Current and future universities are encountering challenges to develop non-traditional curriculums requiring new adult learning models with more personal learning approaches (Cauthen, Halpin, 2012). Diverse faculty, in higher education, who are familiar with traditional education methods, must prepare for a future that requires a significant shift towards managing technologies associated with multiple learning management systems, non-traditional blended learning, and online facilitation. In addition, diverse companies are emerging such as Capsim and Toolwire that specialize in custom simulations for college level curriculums. Higher education practices, problems, and prospects are changing because of the significant increase in part-time faculty (NCES, 2015; 2016). A global perspective also suggests that future populations of faculty are part of the growing aging population (OECD, 2016). Stereotypes associated with older workers create other issues to manage in addition to diverse technologies. These are only a few of the challenges that are part of the fourth industrial revolution in Higher Education as the age of “learning management systems” continues to evolve.
Significant Changes in Higher Education

Review of these challenges will begin with the significant trends occurring in the higher education system within the United States. The U.S. Bureau of Labor Statistics (2015) provided positive projections through 2024 for postsecondary teachers who are employed in community colleges, universities, technical and trade schools, and other institutions of higher learning. 1.9 million Professors in postsecondary institutions were employed in 2014. Future projections indicate employment growth will increase faster than average resulting in more than half a million job openings! An interesting note is that over fifty percent of these openings are expected to be the result of needing to replace teachers who leave the postsecondary teaching profession (U.S. Bureau of Labor Statistics, 2015).

However, during the last decade the American academic workforce experienced dramatic changes. Full-time, tenure-track, faculty are no longer the norm. Emerging non-tenure track faculty (nttf), part-time faculty and contingent faculty are the current and future professoriate. In 2012 full-time non-tenured faculty consisted of 18.8 percent of the faculty however, part-time or contingent faculty revealed a significant increase of 47.7 percent (The Delphi Project, 2012). Revelations from the National Center for Education Statistics (NCES, 2015) supports this trend by indicating a 45 percent increase in full-time faculty however, part-time faculty increased by 104 percent from fall 1993 to fall 2013. During an eight-year period from 2006-2014 the number of full-time faculty with primary instructional responsibilities within private non-profit institutions revealed an increase of 44.73% while the instructional responsibilities of part-time faculty increased by 101.82 percent (NCES 2008, NCES 2008-172; NCES, 2015, NCES 2016-005). Higher education institutions are fulfilling the need for classroom facilitation with part-time, contingent, non-tenure track faculty who are willing to take non-tenure track positions with no additional benefits, larger student caseloads, lower salaries and scheduling that is not guaranteed but dependent on business needs (Delphi Project, 2012). The significance of these trends indicates that faculty members who are entering the fourth revolution in higher education are required to develop competency in navigating diverse learning management systems to facilitate blended learning and online teaching that may also include custom simulation technologies.

Learning Management System Competency

Educators, who have a vision of continuing in the field of higher education, are encouraged to seek knowledge, ability and skill that define what this author describes as Learning Management System Competency. Characteristics of facilitation methods that involve blended learning and online classroom environments continue to reflect the need to be familiar with multiple learning management systems that support diverse types of modern technology, are accessible, and allow mobility. The experience of this author includes a history of facilitating at four different universities that used significantly different learning management systems. The pace is fast, with expectations for self-directed learning, review of multiple instructional videos and minimal webinar or face-to-face hands on training. A higher level of competency is expected with each phase of training during the implementation of a learning management system. Some
universities provide group coaching; however, individual mentoring requires additional costs that most universities are not willing to provide. Updates are included in a document with “frequently asked questions” or a troubleshooting guide that are available on faculty websites. However, strong recommendations include seeking education and training dedicated to achieving “LMS Competency” in order to remain relevant and marketable in the field of higher education.

Although there are multiple examples of learning management systems available, the purpose of this article is not to provide extensive details of these systems. However, the author has chosen four learning management systems that are a part of her current adjunct faculty experience. Brief descriptions of the learning management systems highlight unique features. Figure 1 is an illustration of four current learning management systems used in universities with a blended learning format and online universities (Blackboard, Moodle, Canvas, and D2L). Common goals associated with each learning management system is the ability to use the system on any electronic device at any time; improvement of the learning experience; the ability to provide an engaging online environment for students; synchronous interaction and collaboration that occurs in real-time. In addition to asynchronous communication, using a multi-functional LMS will also include an “app” for smart phones and diverse mobile devices. Efficient use of time for participating in discussions, engaging in online activities, managing assignments, and locating resources are essential for diverse students and faculty in a modern technology-driven society.

### Learning Management Systems

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This particular system indicates versions that are available for K-12 grade levels, Higher Education, Government and Business. General descriptions of the blackboard learning management system include “innovative and transformative learning management system technology” (Blackboard, 2017). A brief summary located on the Blackboard website suggests that the learning management system “creates a new way to teach and learn online”. The system is learner-centered which allows faculty to build the best learning experience while providing innovative technology that attempts to meet the needs of a student population that continues...
to evolve. The unique feature of this learning management system is to reduce the amount of
time to locate and navigate through information and resources. However, it is important to report
that this particular learning management system has evolved to a new version by the name of
Blackboard Ultra. Additional features within the Blackboard Ultra platform includes SafeAssign, a
tool used to promote originality; a time-saving workflow which allows instructors to copy content
between Ultra Courses; and the ability to send email notifications to students while outside of the
learning management system (Blackboard, 2017). Additional information regarding the
Blackboard Learning Management System may be found in their website. However, Moodle is
another learning management system that was designed for students and educators.

**Moodle**

Moodle (Modular Object-Oriented Dynamic Learning Environment) has been in development
since 2001. Moodle is an “open source” or free learning management system designed for
educators to develop and manage courses in an online environment. Educators need the most
cutting edge tools to provide students with an online format that is simple to navigate, provides
helpful resources and is engaging for non-traditional learners. In addition to supporting entire
online courses this learning management system may also supplement traditional brick-and-
mortal classroom experiences. A unique feature of the Moodle learning management system
is the addition of Google Apps that are “a suite of programs that use cloud-based technology”
(Moodle, 2017). Google Apps allow students to “create spreadsheets, documents, PowerPoint
presentations, access multimedia presentations and other programs required for their courses.
Using Google Apps and Google Docs, students can access and submit assignments using diverse
computers, computer software, tablets or other devices. Students are able to automatically gain
access to a University-sponsored Google account when they register for a course” (Moodle,
2017). Additional information regarding the Moodle system may be found in their website.
However, Canvas by Instructure is another example of a unique learning management system that
may also be part of the experiences of persons in higher education during the fourth revolution.

**Canvas by Instructure**

Founded in 2008 and launched in 2011 brief descriptions of the Canvas learning management
system indicate that is an open, cloud-based system that expands the interactions of students
and faculty in a user-friendly environment (Canvas, 2017). Unique features allow audio and video
recording directly in the browser; and the system provides the ability to expand beyond “text-
only” interaction, that has been the traditional form of online classroom communication, in order
to connect voices, faces and names to students and faculty interacting in the online community.
Views of classroom and personal calendars provide more efficient management of diverse
schedules for students and faculty. Alerts are available to manage events such as grade posts,
course announcements and discussion posts.
D2L will be the final learning management system in this brief review.
John Baker founded D2L in 1999 during an active experience with an engineering class that was challenged to think about questions that no one previously considered. The question for John was, “How technology could have a dramatic effect on transforming learning?” (D2L, 2018). Reports from the website of this learning management system indicates a global customer base in Canada, United States, Europe, Australia, Brazil and Singapore that includes K-12, higher education, healthcare, government and enterprise sector (D2L, 2018). Brightspace is the learning management system for higher education. Unique features of this learning management system allow instructors to “create video-based course content, lecture recordings, and multimedia presentations” (D2L, 2018). Adaptive learning and learning analytic programs in Brightspace provides opportunities to improve student outcomes. Blackboard Ultra, Moodle, Canvas and D2L are only a few of the learning management systems that are emerging in the online and blended learning arenas. The ability to demonstrate non-traditional teaching strategies that engage adult learners will also become marketable skills.

**Non-Traditional Online Teaching Strategies**

A growing trend in non-traditional online teaching strategies suggests some universities of the fourth industrial revolution are integrating advanced simulation technology into the learning management system. Particular companies such as Toolwire and Capsim specialize in creating classroom simulation technologies. For this discussion the focus will remain on the adult learners in higher education.

**Classroom Simulation Technology**

**Games and Simulations.** In 2015, an expansion in games and simulations included topics associated with business communication writing, student success skills, critical thinking, psychology, environmental science and virtual medical internship. These examples of classroom games and simulation bring more depth to the student learning experience and elevates student individual and team engagement to a learning and meaningful experience.

**Toolwire.** The Toolwire website provides a thorough explanation of how interactive game and simulation can be a benefit to the facilitator. There is an introduction that establishes learning content and scenarios; pre-tests that help to evaluate skills and knowledge levels through auto-graded activities; digital learning objects that introduces and provides an explanation of skill-specific content; interactive games that provide opportunities to practice and apply concepts that will increase the students skills and knowledge; dynamic remediation to help address any errors and misconceptions as a result of the student’s responses during the interactive game segment; a post-test that measures the concepts learned and the skills achieved during the 5-question, auto-graded activity; mentor feedback is provided to deliver personalized feedback; and finally, the performance analytics that are delivered through a single score based on pre-
and post-test results so students can take steps to improve skills and knowledge in areas where improvement is needed (Toolwire, 2016). The effectiveness of computer-based simulation games is apparent. Sitzmann used a meta-analytic technique with diverse comparison groups who either received no training or alternative training. The results revealed a higher declarative knowledge, a higher procedural knowledge, a higher retention and, a higher self-efficacy than trainees in a comparison group (Sitzmann, 2011). The effectiveness of the simulation game; however, was not influenced by a perception of entertainment. Toolwire technologies could be a valuable addition to a blended learning environment combining online and face-to-face learning. The strong learning outcomes are associated with blended learning as a comparison to the traditional, face-to-face instruction method. Media embedded in the classroom is an additional non-traditional method that supports the benefits of technology in adult learning environment.

**Capsim Custom Simulations.** Dan Smith is the founder and CEO of Capsim, a company created in 1985 that supports business education by developing custom simulations, assessments, programs, and executive education. Custom simulations include business strategies for undergraduate business students; fundamentals of business strategy; a simulation based competency exam; ethical scenarios; a program that provides instructors with the ability to conduct online peer and team assessments; automated team development plans for students; assessments that assist MBA programs build self-awareness would influence student attitudes, thoughts and behaviors; a custom simulation for entry level business courses; and a custom simulation for behavioral soft skills assessment.

In January 2015 Capsim launched GlobalDNA, an international business strategy simulation that introduces the complexity of an international marketplace. The momentum continues with the CapsimGlobal initiative, launched in August 2017 that included a self-directed simulation designed to bring students together to experience business strategies from multiple global perspectives. Considering the evolutions associated with Blackboard, D2L, Canvas and Moodle learning management systems, exploring faculty perceptions of emerging technology from lived experiences reveals important information.

**Faculty Perceptions of Emerging Technology**

Faculty perceptions of emerging technology will be valuable towards developing the most appropriate models that assist with adapting to technological change. Results from a study performed by Dolan (2011) with adjunct faculty indicated satisfaction with the high-quality technology employed by the university in its learning management systems. “The institution’s state-of-the-art course platform was reason enough to remain part of the adjunct faculty” (p.70). Creating opportunities for social networking and exchanging diverse ideas were significant recommendations. However, a study performed by (Sinclair and Owston, 2006) revealed lower motivations for teachers to engage with peers or make consistent contributions to a group because of the reality of an isolated online environment. Vrasidas and Zem-bylas (2004) reported reluctance by teachers to use online technology because of feeling overwhelmed by the amount of information and inadequate training that did not result in preparation. Studies similar to this have not received recent updates regarding faculty perceptions of emerging
technologies. There is a significant gap in the literature requiring additional research to explore faculty perceptions of emerging technologies, integrating more media into classroom facilitation and managing multiple learning management systems. Considering that postsecondary faculty are also members of the global ageing population a good question to consider is what unique training needs would benefit these seasoned educators? Also, what types of technological tools are particular faculty using that enhances the student classroom experiences? What are recommendations to address stereotypes concerning older faculty and the ability to manage technology?

The Aging Faculty Population

Lockard and Wolf (2012) provided valuable employment projections through 2020: “The baby-boom generation is continuing to age and the population is shifting to reflect older age groups who are also remaining part of the workforce. In addition, changes include projections for individuals who are 55 and older. The members of this baby boomer generation will increase in the United States population. The increasing older population is moving up from 31.4 percent to 36.6 percent, during this projection period, that reflects individuals in an older age group” (p.84).

Global perspectives also indicate how “the teaching force is ageing as the profession fails to attract younger adults”. Teachers aged 50 or older grew between 2005 and 2014 in 16 of the 24 OECD countries with available data. In Italy and Portugal, fewer than 3% of primary teachers are younger than 30. Recommendations for continued research indicate a qualitative approach to exploring the experiences, characteristics, needs and behaviors of the ageing adjunct, contingent, non-tenure track faculty population who are part of the growing part-time faculty in post-secondary education.

Conclusion

This article provided diverse discussions regarding the reality of emerging trends in higher education during the fourth industrial revolution. According to the National Center for Education Statistics part-time faculty increased by 104 percent from fall 1993 to fall 2013 (NCES, 2015) and a global perspective suggests that faculty are also part of the growing ageing population. The population of adjunct, contingent, part-time, non-tenure track faculty who received a traditional education will continue to be required to make a significant shift towards integrating more technology into the classroom experience, managing multiple learning management systems and navigating diverse simulation technologies for adult learners. Higher education must prepare for changing practices, problems, and prospects associated with the significant increase in part-time faculty. Stereotypes associated with older workers are significant issues to manage in addition to diverse online learning technologies. Adjunct faculty members, who hope to thrive as the fourth industrial revolution evolves, are encouraged to seek knowledge, ability and skill that define what this author describes as Learning Management System Competency. Future research from this article will include a qualitative approach to explore postsecondary faculty perceptions and emerging trends for development of diverse training strategies that will ensure that “no adjunct faculty are left behind” during the digital age.
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