Driving Educational Change: Innovations in Action

Driving Educational Change: Innovations in Action

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Introduction

Driving Educational Change: Innovations in Action was written as part of a graduate course on Learning Technologies Diffusion, Innovation and Change taught by Associate Professor of Learning Technologies, Ana-Paula Correia. This graduate course was offered in a blended format at The Ohio State University, Columbus, Ohio from January to May of 2018.

This eBook is the result of a collaborative endeavor between professor/editor and students/authors. The students/authors not only wrote this book collaboratively, but they have also worked together on a table of contents, title, book cover, selection of a publishing tool, and dissemination plan.

Thank you to Karen Bruce Wallace who diligently worked on editing the text and Caglar Sulun who created the cover design.

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Preface

The idea of creating the *Driving Educational Change: Innovations in Action* eBook arose from the opportunities encountered while teaching a graduate course in Technology Diffusion, Leadership and Change as part of my teaching responsibilities at The Ohio State University. Learning Technologies bring change into organizations, classrooms, groups, and online environments. They have been quickly changing the landscape of learning and teaching with the diffusion of innovations ranging from learning analytics to simulations and virtual reality. Learning how to diffuse innovation, manage change, and lead innovation are critical to graduates in Learning Technologies.

The purpose of this graduate course was to introduce practices and principles of technology diffusion, innovation, and strategic change in education. In order to accomplish such, students would experience an innovative learning and teaching practice. As part of the course, they became authors of and contributors to an open content book, which was both thrilling and at times a bit daunting. Both my students and I embraced this novel way to learn and teach. Not only did we write this book collaboratively but worked together on all the elements that go into book development, such as rigorous content, enticing title, attractive cover and design, and distribution through social media channels and our personal networks of scholars and friends. The following paragraphs introduce each chapter of *Driving Educational Change*.

Under adoption and diffusion theoretical underpinnings, **Marcia Ham** distinguishes between technology adoption and diffusion theories and models. She examines Rogers' Innovation Diffusion Theory, Hall's Concerns-Based Adoption Model, the Technology Acceptance Model and Dormant's

Chocolate Model. Ham's chapter ends with an examination of two cases of diffusion of innovation of technology use at the higher education level at institutions in the United States: (a) Starbucks College Achievement Plan, and (b) Oklahoma State University's Mixed Reality Lab. Both cases illustrate the opportunities and challenges of adopting an innovation and diffusing it across an organization. She also highlights the commonalities among technology adoption and diffusion theories, and models that are instrumental to deciding whether an innovation is adopted or rejected.

Cara North proposes the concept of learning designers as agents of change. Through a set of interviews with influential learning and development professionals across the world, North establishes SHIFT as a set of guidelines and considerations that learning designers ought to consider in order to be a catalyst of change in their organizations, groups, and professional networks. SHIFT stands for **S**ustaining learning, **H**arvesting data, **I**nvestigating stories, **F**ostering knowledge, and **T**ransforming responsibilities. North goes on to explain that having a clear understanding of the rationale for change to occur increases the likelihood for the change-related implementation to be successful. She ends the chapter by conceptualizing each component of the SHIFT framework.

Design Thinking is analyzed by **Ceren Korkmaz**. She takes a look at the evolution of instructional design and the emergence of learning experience design (LXD) as well as the establishment of LXD as a new discipline. Korkmaz also stresses how important it is for learning experience design to consider universal design principles. In this context, design thinking may have multiple definitions ranging from creation of artifacts to reflexive practice. In this chapter, design thinking is presented as an approach to design learning experiences. It ends with an exploration of LXD for educational change, including the importance of empathy and emotional design, and the role of iteration.

Lauren Acree uses micro-credentials as an example of innovation in schools. She follows Dormant's Chocolate Model to analyze its adoption and diffusion. The chapter addresses three critical questions: (a) to what extent are micro-credentials an innovation? (b) Are micro-credentials a promising innovation? And (c) what variables might affect the rate of adoption of micro-credentials? Acree provides a rationale for micro-credentials, the background for this approach to professional development, and an analysis of the change that micro-credentials are bringing to teachers' professional development in schools. She focuses on five characteristics of change proposed by Dormant's Chocolate Model of change, ranging from relative advantage to adaptability and social impact. Acree argues that many educators are in the persuasion phase of adopting micro-credentials suggesting an opportunity for growth and innovation.

Caglar Sulun examines the adoption and diffusion of Canvas as a learning management system (LMS) in higher education. LMSs are actively used by instructors, students, and institutions in order to offer online learning experiences. This chapter explains the history of course delivery via LMSs, the transition process to digital course delivery, the current use and trends of learning management systems, and the specific case of Canvas LMS. The chapter ends with a discussion about the next generation of LMSs.

Throughout this eBook, the authors not only examine theories of innovation adoption and propose guidelines for learning designers to understand change, but, more importantly, they also analyze, problematize, and critique real innovations in practice. They write about concrete strategies to face and handle change, and adoption and diffusion of innovation in today's organizations. *Driving Educational Change: Innovations in Action* offers a thoughtful account of the drivers and factors that lead educational change in different contexts, groups, and networks.

Ana-Paula Correia
Columbus, Ohio, USA
May 14, 2018

About the Authors

Driving Educational Change: Innovations in Action is the result of a collaboration with graduate students in Learning Technologies Diffusion, Innovation and Change and Dr. Ana-Paula Correia. This graduate course was taught in a blended format at The Ohio State University, Columbus, Ohio from January to May of 2018.

***Ana-Paula Correia**, PhD, is an Associate Professor of Learning Technologies in the Department of Educational Studies and the Director of the Center on Education and Training for Employment at The Ohio State University*

Ana-Paula Correia

Dr. Correia has more than 25 years of experience in learning design and instructional systems technology. Specifically, Dr. Correia is an expert in distance education, online and mobile learning, collaborative learning and entrepreneurial education, and has been published in over 30 peer-reviewed journals. Dr. Correia investigates these issues with her research group in Learning & Experience Design at The Ohio State University.

Her work has been published in top-tier academic journals, such as Educational Technology Research & Development, Teachers College Record, British Journal of Educational Technology, Journal of Computer Assisted Learning, Computers in Human Behavior and Distance Education. Dr. Correia's research was awarded for excellence several times

by the Association for Educational Communication and Technology as well as the Association for the Advancement of Computing in Education. She has innumerable presentations at local, national and international conferences.

Dr. Correia has been involved with research projects funded by Bill & Melinda Gates Foundation, U.S. Department of Agriculture, Pappajohn Center/Kauffman Foundation, National Science Foundation, U.S. Department of Education and with the National Institutes of Health. She currently serves as the Program Chair for American Educational Research Association Special Interest Group in Online Teaching and Learning. Prior to that role, she was the Chair for Special Interest Group in Design and Technology. She was the President for Association of Educational Communications and Technology Research and Theory Division between 2010 and 2013.

Dr. Correia is currently the Faculty Co-Coordinator for the Master of Learning Technologies, an exclusive online program designed to serve educators interested in pursuing careers in learning technologies. She holds a M.S. and Ph.D. in Instructional Systems Technology from Indiana University-Bloomington.

Marcia Ham *is the Distance Education Professional Development Manager with the Office of Distance Education and eLearning (ODEE) at The Ohio State University.*

Marcia Ham

Marcia started up the Distance Education Learning and Teaching Academy (DELTA) at The Ohio State University with the purpose of providing a variety of training

and support services specifically for online faculty, students, and advisors of online students. Within the context of her work at ODEE, Ham's professional expertise focuses on teaching online and creating engaging experiences for online students while maintaining rigorous standards for student learning outcomes.

Prior to working at Ohio State, Ham taught high school social studies for 13 years while serving in various positions ranging from department chair, curriculum coordinator, and teaching with technology committee chair. She then worked for Bake College for five years as an instructional designer where she led faculty training seminars on online course design. She moved to Columbus, OH in 2013 to help ODEE establish their distance education instructional design department. She served as a senior instructional designer with the department while also starting up DELTA until the autumn of 2016 when she transferred to her current manager role in ODEE.

Along with teaching online and facilitating many workshops and webinars at Ohio State, Ham has presented at various conferences including the 2014 OSU Innovate Conference, the EDUCAUSE Annual Conference in 2016 and 2018, and the Ohio Valley Philosophy of Education Society (OVPES) Conference 2017. She was a guest panelist in October 2017 for the *Ethics and Big Data in Higher Education* discussion at The Ohio State University. She is the co-author of the chapter "Ethical Issues and Potential Unintended Consequences of Data-Based Decision Making" in *Responsible Analytics and Data Mining in Education: Global Perspectives on Quality, Support, and Decision Making* edited by Badrul H. Khan, Joseph Rene Corbeil, Maria Elena Corbeil (2019).

Marcia Ham has a Bachelor of Arts in Secondary Education from the University of South Florida, a Master's in Education Technology from Grand Valley State University and is a Ph.D. candidate at The Ohio State University in Educational Policy

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Cara A. North *is a PhD student in Educational Studies with an emphasis in Learning Technologies at The Ohio State University and a Learning Designer for the College of Education and Human Ecology.*

Cara North

Cara holds an M.A. with an emphasis in Workforce Development from The Ohio State University and a B.A. in Journalism from the University of Kentucky. She has worked in learning and development for more than 10 years as a trainer, curriculum developer, learning management systems administrator, and instructional designer. Her learning and development experience include Amazon.com and various non-profit and higher education organizations.

North is committed to lifelong learning and scholarship through her leadership in many organizations. She serves as President of the Central Ohio Association for Talent and Development (ATD), Community Manager for the Training Learning and Development Community (TLDC) and the Communications Officer for the Association for Educational Communications and Technology Research and Theory Division. She is also an inaugural member of the Learning & Experience Design research group at The Ohio State University.

North's research interests include social media and communities of practice. She is also interested in microlearning and the applications for instructional design.

North has been an invited presenter at many learning and development conferences speaking about these topics.

Ceren Korkmaz PhD student in Educational Studies with an emphasis in Learning Technologies at The Ohio State University and an inaugural member of Learning & Experience Design Research Group.

Ceren Korkmaz

Ceren is also a Graduate Research Associate at the Center on Education and Training for Employment (CETE) within The Ohio State University. Korkmaz received her B.A. in English Language Teaching from Middle East Technical University in Ankara, Turkey in 2013. She then pursued an M.A. in Human Resources Development in Education at the same university. While pursuing her degree, she has worked as an instructor of English and a curriculum developer for the Department of Foreign Languages (DFL) at a foundation university in Ankara, Turkey. Her work involved close contact with young adults as well as various units within the DFL regarding testing, educational technologies, extracurricular activities and professional development. She gave workshops to her colleagues on technology integration and conducted research on faculty technology use in classrooms.

Korkmaz's recent research at The Ohio State University includes machine learning and its relation to learning technologies and TPACK assessment in pre-service English language teaching. Her work on machine learning was presented at the 2018 OSU EHE Student Research Forum and is currently being developed into a manuscript for publication.

Additionally, she investigates model STEM schools in Franklin County, Ohio, USA, and how they can be leveraged to increase the quality of STEM education in the county at large. Her most current research interests are mobile and e-learning, learning experience design, emerging learning technologies and educational entrepreneurship.

Lauren Acree

***Lauren Acree** is a graduate student at The Ohio State University where she is pursuing her PhD in Educational Administration. Additionally, Lauren works at the Friday Institute for Educational Innovation where she serves as the program manager for the Learning Differences program and the Micro-Credentialing initiative at the Friday Institute.*

Acree has led the development of the Learning Differences Massive Open Online Course for Educators, 40+ micro-credentials in the areas of personalized and digital learning, and the Students Learn Explore and Advocate Differently course for students 13 and up. She has also contributed to content development for a number of projects including the Leadership in Blended and Digital Learning program for principals, Future Ready Summits, and more.

Acree is very comfortable leading learning face-to-face as well and has facilitated a variety of professional learning experiences for teachers, coaches, administrators, and district leaders. Acree's research interests include the role of leadership in the implementation of digital learning initiatives and innovative models of professional development and using

quasi-experimental methods to answer educational research questions.

Previously Acree worked as a special education teacher in Tulsa, Oklahoma and a teacher coach for Teach for America at their summer Institute. Lauren Acree earned her Bachelor's degree at the University of Richmond in Richmond, Virginia and her Master of Public Policy from Duke University.

***Caglar Sulun** is a PhD student in Educational Studies with an emphasis in Learning Technologies at The Ohio State University.*

Caglar Sulun

A native from Izmir, Turkey, he holds a Bachelor of Science degree in Computer Education and Instructional Technology from Necmettin Erbakan University (NEU) in Turkey and Master of Arts degree in Educational Technology from The Ohio State University. After graduation from NEU in 2012, he moved to the United States to pursue his academic career in educational technologies which he started in 2008.

He works at the Research Laboratory for Digital Learning since August 2014 on educational projects including state-funded projects. His professional interests are directed towards learning analytics, technology integration in teaching and learning in higher education, gamification, and online/mobile learning.

Sulun is also co-founder of Mor Portakal Digital Marketing Agency that is dedicated in using the new century's gigantic power of the Internet to help businesses grow in social media

management, developing websites and mobile applications, cloud solutions for companies, and SEO & SEM. His personal interests include graphic design, educational video production, and photography.

1. Theories of Innovation Adoption and Real-World Case Analyses

By Marcia Ham

Introduction

There are many innovations being developed every day around the world. Some make it to the national and international stage becoming a ubiquitous part of everyday life. Some innovations become important for select groups of people and unknown to individuals outside of those user groups. Many more innovations never make it too far outside their close circle of developers. What causes one innovation to change the manner in which society functions and another to be cast off into nonexistence has been the subject of research and analysis with experts drawing different models and developing overlapping theories as to the cause of successful diffusion of innovations. This chapter will highlight the main tenets of four diffusion theories and models – Innovation Diffusion Theory, Conerns-based Adoption Model, Technology Acceptance Model, and The Chocolate Model – and analyze two current, real-world cases in light of the frameworks presented by these theories. Each case relates to technology use at the higher education level at institutions in the United States, although

the potential impact of these innovations is not necessarily confined to within the United States.

An Overview of Four Theories and Models

Rogers' Innovation Diffusion Theory

Before diving into theories and models for innovation diffusion, it is worth taking a step back to understand what is meant by innovation, innovation adoption, and diffusion. In his editorial "What is Innovation?", Damiano, Jr. (2011) refers to the Merriam-Webster dictionary definition which defines it as "the introduction of something new" where that something could be an idea, process, or product. Straub (2009) describes adoption as when an individual integrates a new innovation into their life and diffusion as "the collective adoption process over time." Straub (2009) notes that adoption-diffusion theories, such as those that will be discussed in this chapter, "refer to the process involving the spread of a new idea over time (p.62)."

In 1962 Everett Rogers introduced his Innovation Diffusion Theory (IDT) which has been referenced often in case analysis since. It provides a foundation for understanding innovation adoption and the factors that influence an individual's choices about an innovation. Rogers' theory is broad in scope which lends itself to being flexible across many contexts but also difficult to use as a process model when planning for organizational change due to adoption of an innovation (Straub, 2009). There are four main components in Rogers' diffusion theory: the innovation, communication channels used to broadcast information about the innovation, the social system existing around the adopters/non-adopters of the innovation, and the time it takes for individuals to move

through the adoption process. The interaction of these components helps one understand why an individual chooses to adopt and innovation or not (Straub, 2009). A sub-process of diffusion in Rogers' theory is the innovation decision or process which leads to adoption or rejection of the innovation. Rogers presents five stages potential adopters move through in this process. The first is seeking knowledge about the innovation and its function. The second is persuasion when the potential adopter formulates an opinion about the innovation. The third stage is when a decision is made to adopt or reject the innovation. The fourth stage occurs when the adopter implements the innovation. Finally, the adopter reaches the confirmation stage where they seek reinforcement of their decision to adopt the innovation. Here they may continue implementing the innovation as they experience its benefits or they may change their decision and reject the innovation (Rogers, 2003).

Rogers extends beyond the adoption process by identifying five attributes that affect whether an innovation is adopted or not: relative advantage, compatibility, complexity, trialability, and observability. Relative advantage refers to how much greater or lesser the benefits of the innovation are compared with the alternatives. How well the innovation fits with a potential adopter's existing process or workflow is its compatibility. The more difficult to learn and implement an innovation is perceived to be, the less likely it is to be adopted. This is because its complexity is perceived to be too high. Potential adopters are more likely to accept innovations they have an opportunity to experiment with and test out before making a decision whether to adopt or not; this refers to their trialability. Observability occurs once an innovation has been adopted and diffused across enough people within a culture system that those who previously had not thought about adopting it, change their minds or at least begin considering adopting the innovation (Rogers, 2003). Many personal

technologies such as the smart phone and FitBit type devices have experienced widespread diffusion due in part to their high observability. Some universities have waited until there was high visibility of others implementing online courses before they began doing the same. This allowed them to see the success or failure of the strategy along with learning from the challenges of the early adopters. This example also demonstrates the impact of time on diffusion which Rogers (1962/2003) discusses in more depth in his book *Diffusion of Innovations*.

Examples of organizations applying IDT to help analyze current practices and plan for more effective diffusion of innovations may be useful to understanding the impact that Rogers' theory can have in different contexts. "Understanding Academic E-books Through the Diffusion of Innovations Theory as a Basis for Developing Effective Marketing and Educational Strategies" was a study of e-book usage among university students and faculty was conducted and the results plotted along Rogers' Innovation Curve shown in figure 1. Findings indicated which library patron groups were adopting e-books and at what level. These findings can be used to plan tailored marketing strategies for each group to drive further adoption of e-books which cuts costs to students and to libraries (Raynard, 2017). "Integrating Mobile Devices into Nursing Curricula: Opportunities for Implementation Using Rogers' Diffusion of Innovation Model" was a study relating to the integration of mobile devices into nursing curriculum was analyzed through IDT. The goal of the analysis was first to categorize strategies for the adoption of mobile technologies in nursing education then, once a decision to adopt is made, apply the phases of the theory to aid in stakeholder acceptance (Doyle, Garrett, & Currie, 2014). Another study, "An Innovation Diffusion Approach to Examining the Adoption of Social Media by Small Businesses: An Australian Case Study," was conducted in Australia around small business adoption of social media.

Researchers used Rogers' theory to help understand the experiences of small businesses using various social media platforms and where they stood on the adoption continuum and what factors impacted their decisions to either adopt or reject the use of social media in their business practices (Burgess, Sellitto, Cos, Buultjens, & Bingley, 2017).

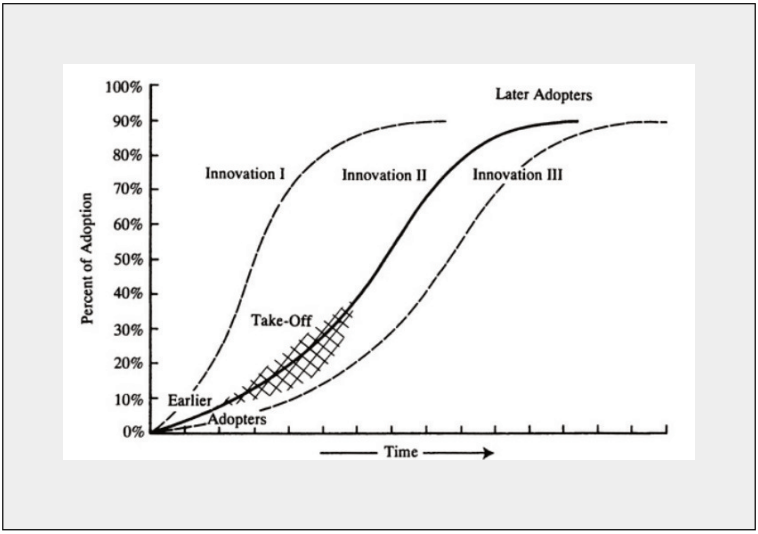

Figure 1 – The diffusion process by innovation with the percent of adoption over time (Rogers, 2003, p. 11).

Hall's Concerns-Based Adoption Model

Stemming from the need for a model particular to educational environments due to their traditional top-down approach to change, Hall (1979) developed the Concerns-Based Adoption Model (CBAM). CBAM approaches innovation adoption from the perspective of those impacted by the adoption of the innovation and also charged with implementing the

subsequent change – namely teachers in an educational context. The idea is that by addressing the concerns of the teachers during the adoption process, the challenges experienced during the change process will be lessened. There are six assumptions in CBAM:

1. Change is a process, not an event.
2. Change is accomplished by individuals.
3. Change is a highly personal experience.
4. Change involves developmental growth.
5. Change is best understood in operational terms.
6. The focus of facilitation should be on individuals, innovations, and context. (Straub, 2009)

Three components of the CBAM, formed from the six assumptions, that inform a leader planning for change are the stages of concern (SoC), levels of use (LoU), and innovation configuration (IC). The SoC refers to individual characteristics relative to teachers concerns for themselves and for their students during the adoption process and is the main premise on which the CBAM was created (Straub, 2009). The SoC scale breaks down teachers' concerns into seven stages during the adoption process. Stage 0 – awareness concerns – indicates that the innovation is of no concern to users, or adopters, because they do not know it exists. Stage 1 – information concerns – is when potential adopter are concerned about gathering more knowledge about the innovation. Stage 2 – personal concerns – is when the users perceive the innovation to pose a personal threat. They may have doubts or lack self-confidence about their ability to use the innovation. Stage 3 – management concerns – typically manifest after the first 24 hours of using an innovation when potential adopters struggle with the logistics, coordination, and the time it takes out of their schedules to learn and use the innovation. Stage 4 – consequences concerns – happens when potential adopters

reflect on the potential affect the innovation will have on others such as students in many educational contexts. Stage 5 – collaboration concerns – usually is shared by the change agents which are typically administrators or team leaders. In this stage, there is a concern around bringing user groups together in forming best practices in using the innovation effectively. Stage 6 – refocusing concerns – is when users consider whether the proposed innovation is actually the best approach to use in achieving their goals or perhaps another innovation would be more suitable and had a greater impact (Hall, 1979). The LoU and IC refer to innovation characteristics. The LoU scale breaks down the stages of behavior as teachers pass from a lower level of use to higher levels of use (Straub, 2009). The innovation configuration (IC) refers to the process for implementing the innovation and is sometimes more successfully carried out when presented in a map as shown in the example in figure 2 (American Institute for Research, 2010).

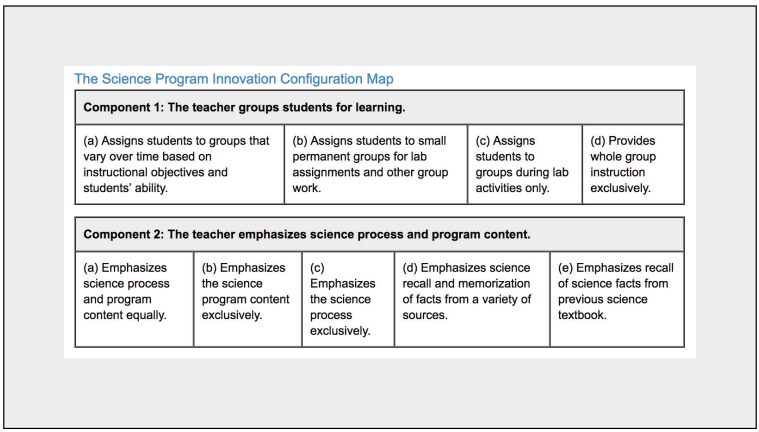

Figure 2 – An example of an IC map for a new science program. Individual components needing to be addressed are separated out then broken down into the (a) ideal state of adoption to the (d) or (e) least ideal state of adoption (image from "Innovation

Configuration: Concerns-based Adoption Model," copyright 2010 by the American Institute for Research).

Although the teachers are seen as adoptees instead of adopters in the CBAM model, they also have the role of change agent in order for successful adoption to occur in the classroom. One might then see the students as receivers of the change, yet the CBAM model only focuses on the concerns of the teachers because of their role as change agents. Another note about this model is its apparent focus on negative opinions from teachers regarding innovation. As was mentioned in the overview of Rogers' theory, opinions formed about an innovation – whether positive or negative – can each have an impact on the adoption of the innovation (Straub, 2009).

Technology Acceptance Model

Continuing along the theme of opinions and attitudes impacting innovation adoption, Davis' (1985) Technology Acceptance Model (TAM) asserts that it is in fact a potential adopter's attitude and expectations of the innovation that affects the chances for its adoption (Davis, 1985). Two focus concepts in TAM are how the innovation is perceived by the potential adopter related to its ease of use – how easy the innovation will be to learn and implement – and its potential usefulness – the degree to which the innovation will improve the user's personal or job-related performance (Straub, 2009). Of the two elements, Davis believed that ease of use has a direct impact on perceived usefulness as, the easier an adopter perceives an innovation to be able to use, the greater chance they will use it and experience higher productivity thus proving to be useful to the adopter (Davis, 1985). In a later study, Davis concluded that there was a higher correlation between perceived usefulness and technology adoption than between

perceived usefulness and adoption. From his test results, he surmised that it would not matter how easy a technology is to learn; people would not adopt it if they did not perceive it to be useful in increasing their productivity (Davis, 1989).

An example of the application of TAM to analyze adoption of an innovation comes from a study in the UK examining the key factors affecting whether someone participates in an online travel community. The study looked at compatibility, perceived ease of use, and perceived usefulness among other factors detailed in TAM but not discussed in this chapter. The researchers concluded that all factors played an important role in determining participation in online travel communities (Agag & El-Masry, 2016).

The Chocolate Model

These impactful factors can also be seen in Diane Dormant's more recent model – The Chocolate Model – for innovation adoption and change (Dormant, 2011). The Chocolate Model focuses on innovation adoption and change related to an organization. It is structured around four elements: change, adopters, the change agent(s), and the organization – CACAO when made into an acronym for ease of recollection and use for planning. Unlike Rogers' Innovation Diffusion Theory, the Chocolate Model can be applied when planning for organizational change and innovation adoption. The process flows as follows: first, analyze the change whether it is a new system or innovation (Dormant, 2011). This is similar to the first step of seeking knowledge that is in Rogers' (2003) adoption process. The second step is to analyze the adopters of the change. Third, identify the change agents. At this point, a plan is developed. The next step is to examine the organization where the change process is expected to occur as well as analyzing the larger context of the organizational change –

how it impacts other aspects of the whole organization. Before implementing, the plan may be revised based on the outcomes of the organizational analysis (Dormant, 2011).

The Chocolate Model aligns well with TAM in that change characteristics are similar. As in TAM, adopters look at the relative advantage of the innovation or change (Dormant, 2011) – referred to as the "perceived usefulness" in TAM (Straub, 2009). Adopters also look at the simplicity and compatibility the innovation represents – the "perceived ease of use" in TAM (Dormant, 2011; Straub, 2009). Two elements not discussed in TAM but called out in the Chocolate Model are the adaptability of the innovation to the specific needs of the adopters and the social impact of the change – what the change will mean for the social structure and climate of the organization (Dormant, 2011).

Adoption and Diffusion Case Analyses

This section of this chapter analyzes recent innovations and their adoption and diffusion in two higher educational settings using elements from the aforementioned theories and models. The first case focuses on the Starbucks College Achievement Plan which was developed as a partnership with Arizona State University (ASU). The second case looks at Oklahoma State University's Mixed Reality Lab.

Case 1: Starbucks College Achievement Plan

It has been said that sometimes the adopter of a change is not the actual beneficiary of the change (Wisdom, Chor, Hoagwood, & Horwitz, 2013). Such is the case of the Starbucks

College Achievement Plan, introduced in 2014, that helps employees of Starbucks gain access to college and earn their degree. The program was developed in answer to the high number of undergraduate students having to work while going to school in order to pay for rising tuition costs. An increasing number of these students end up dropping out of school as the time demands become too unmanageable. The Starbucks College Achievement Plan allows eligible Starbucks employees to receive full tuition coverage from the company so they can work on one of over 70 online degree programs offered through ASU and taught online by ASU faculty. Beyond the financial aid offered, each employee-student receives support from an enrollment counselor, a financial aid advisor, an academic advisor, as well as a success coach ("Starbucks College Achievement Plan: Education meets opportunity," n.d.). In March 2017, Starbucks announced Pathway to Admission which allows those Starbucks employees who fall short of the academic requirements for enrollment in ASU to take a series of online courses through the university's Global Freshman Academy in order to become academically qualified for enrollment in a degree program (Faller, 2017).

The goal of Starbucks is to have 25,000 of their employees graduate through the College Achievement Plan by 2025. The first graduating class in 2015 through the program totaled 3 students (Rochman & Peiper, 2017). That number rose to 100 a year later ("The class of 2016," 2016) and the graduate numbers from the program in June 2017 was 330 (Rochman & Peiper, 2017). At that time, Philip Reiger, the university dean for educational initiatives and CEO of EdPlus at ASU, estimated the number of graduates through the program by the end of 2017 to reach 1,000 (Young, 2017). Reiger's estimate proved to be on target as the December 2017 graduating class from the program exceeded 1,000 students. At the same time, more than 9,000 Starbucks employees were students in the program

(Rochman & Peiper, 2017) indicating a growth in future graduation numbers.

Although Reiger did not think that ASU would continue to actively search out additional such partnerships with other large companies, in August 2017, ASU partnered with *adidas* as they prepared to pilot a similar program to the College Achievement Plan in January 2018. In the pilot, 100 full-time *adidas* employees received a large portion of their tuition in an ASU Online degree program covered by the company. "The program reflects both adidas' and ASU's commitment to social embeddedness detailed in the Global Sport Alliance. Its objective is to bring together education, athletics, research and innovation to explore topics including diversity, sustainability and human potential – all through the lens of sport" (Greguska, 2017). The goal of the partnership is to expand to international employees over the next three years (Greguska, 2017).

The case of Starbucks College Achievement Plan in partnership with ASU can be analyzed through Rogers' Innovation Adoption Theory with a few modifications. Looking at the four elements of diffusion – the innovation, communication channels, social system, and time – it is evident that the innovation in this case is the idea to leverage the online degree programs already offered by ASU to provide an avenue of educational access and achievement for Starbucks employees. Communication of the program happened through internal company channels, ASU News and the university website, other news media outlets such as *The Atlantic* magazine and higher education online journals, conference presentations, interviews, and, presumably, word of mouth among employees ("The Class of 2016", 2016). The social system and culture at Starbucks that encouraged this idea to come to fruition started at the founding of the company with Starbucks CEO Howard Schultz when he dreamed of a company based on the desire not just for earning profits but for giving back to the community and hiring veterans, refugees

and at-risk youth (Faller, 2017). It is apparent in the partnership that Starbucks is not turning a profit from the College Achievement Plan but, in the words of Schultz, "We as a company want to do something that has not been done before. That is, we want to create access to the American dream, hope and opportunity for everyone" ("Starbucks College", n.d.). The time given for implementation spans from 2017 to 2025 and possibly beyond.

Analyzing the attributes influencing the adoption of the Starbucks College Achievement Plan is where a focus on the adopter and beneficiary get a little muddled. If the company and university leaders drawing up the plan for implementation are considered the change agents – as they might be if analyzed through the Chocolate Model (Dormant, 2011) – then the employees carrying out the implementation such as HR officers at Starbucks handling employee benefits, ASU admissions and enrollment officers, financial aid advisors, academic advisors, success coaches, and others might be considered the adopters of the innovation. The beneficiaries are the Starbucks employee-students.

Although internal corporate politics are unknown, there appears to have been little resistance to adopting the plan for partnership between Starbucks and ASU to provide this benefit to employees of the company. Referencing the TAM and the Chocolate Model, the innovation was perceived to be easy to implement since the complex system for delivering the education was already in place at ASU thus satisfying the need for simplicity and compatibility outlined in the Chocolate Model. There was also a perceived usefulness – or relative advantage – of the change as it aligned with the foundational corporate mission at Starbucks to give back to the community. In this case, giving back meant opening access to the "American dream" to anyone willing to chase it. From Arizona State university's (ASU) perspective, the program would bring

in thousands of new students and tuition revenue to the university without additional effort on their part.

When looking at the change process Starbucks went through to make their program a reality through the lens of the Chocolate Model, they followed the steps outlined in the model. From analyzing the change desired, who the adopters and change agents were, developing their action plan, analyzing the change from a holistic perspective across their organization, they then saw a need to revise the plan even as it was being implemented. What they identified was that as wonderful as the College Achievement Plan was, it was not useful for many Starbucks employees because they couldn't gain admittance into ASU due to lack of academic qualifications. In order to increase the usefulness and success of the program, Starbucks expanded the program in spring of 2017 by adding Pathway to Admission which would allow Starbucks employees to gain the necessary academic credentials for ASU admission by taking missing credits through ASU's Global Freshman Academy (Faller, 2017). Reflecting back on the graduation rates from the program, it is interesting to note that by December 2017 there were over 9,000 students enrolled in the program and to wonder if opening up access to the program through Pathway to Admission may have spurred on that growth.

Case 2: Oklahoma State University's Mixed Reality Lab

Oklahoma State University established the Mixed Reality Lab in 2015 within the College of Human Sciences. The lab is affiliated specifically with Department of Design Housing and Merchandising (Department of Design, Housing, and Merchandising, n.d.). The lab is host to mainly design classes

although according to Chandrasekera, an associate professor in the department, they are working to inform other departments about the lab and hope to bring in classes from areas outside of design to innovate in the lab (Grush, 2016). The lab is outfitted with state of the art virtual reality (VR) and augmented reality (AR) equipment for students, faculty and researchers to use in their academic and research pursuits. Funding comes from the College of Human Sciences although Oklahoma State partnered with Crytek – a video game development company specializing in 3D games – to be one of the nearly 50 universities around the world collaborating as part of the company's educational virtual reality initiative – VR First – which supports the participating lab with the latest technology and supports research projects conducted in the lab space. VR First acts as a device and vendor agnostic incubator for innovative virtual reality ideas within lab spaces around the world, helping developers navigate the business and legal aspects of VR application development while creating the application itself. A current VR First project being conducted in Oklahoma State's Mixed Reality Lab centers around the development of an augmented reality mobile app to assist people with physical disabilities and those with mild memory loss in the location of objects (Ergurel, 2017).

In the spring of 2018, the College of Human Sciences ran a hackathon which was held in the Mixed Reality Lab. Teams of five – made up of students, faculty, community members – worked to solve real-world problems. The hackathon was co-sponsored by Wal-mart and presentations were judged by both Oklahoma State and Wal-mart representatives based on preset criteria. Team participants came from many departments around the university from design and engineering to educational technology. Data was collected throughout the hackathon on how the VR and AR technology was being used to solve problems and how the teams worked

together. The results of that research will be shared during conferences at the university in the fall of 2018 (Grush, 2018).

Examining the adoption of the Mixed Reality Lab at Oklahoma State through the four components of diffusion theory, innovation is arguably the most significant component. The relative advantage of the lab is its ability to provide one space for those interested in VR and AR technology to investigate it and work on projects using the most advanced technology, thanks in part to the partnership with VR First. Students with experience using this technology are viewed to have an advantage in the job market after graduating. Although integrated with design classes in the College of Human Sciences, compatibility with current university research and broader course delivery is not evident since the Mixed Reality Lab employed new technologies and was the first lab space of its kind on campus. Thus, the complexity of the lab is significant. However, those operating the lab are encouraging of all interested in trying out the technology to do so making the trialability of the lab space rate high. The observability of the work happening in the lab has improved with outreach efforts by faculty in charge of the lab to other departments to visit and use the lab. Observability improved during the promotion of the hackathon and will continue to increase as researchers using the space present their findings at conferences and in articles. There is also the matter of observability of the VR and AR technology itself which has increased in recent years as more individuals see others purchasing their own equipment for entertainment purposes. However, widespread use of the technology has not diffused across society or the Oklahoma State campus at a high rate yet.

Why the Mixed Reality Lab has not enjoyed regular use across university programs may be due to the social system of the university which is complex in itself. For faculty who are not familiar with the technology, who do not work with it or see a need to incorporate it in their teaching and research, the

Mixed Reality Lab is irrelevant to them. On Roger's innovation curve in figure 1, they would be the late adopters if and when the VR/AR technology diffuses across programs. At this point in time, those who are using the lab for research and classes would be considered early adopters. For all of the outreach the faculty running the lab have done across campus to bring in users from all colleges and departments, it may be that some faculty are more naturally inclined toward incorporating VR/AR technology in their research and course learning experiences while others are not. This circles back to the impact of perceived usefulness on technology adoption outlined in TAM (Davis, 1989). If faculty of certain departments do not see the benefits of changing their strategies for instruction or research to include VR/AR use, then the potential for them to adopt the technology is quite slim. No amount of support resources could be provided to overcome the perceived lack of usefulness the faculty may have for the technology. So it seems that use of the Mixed Reality Lab has not yet reached the rapidly rising part of the innovation curve showing the time to adoption highlighted in IDT (Rogers, 2003).

For usage of the Mixed Reality Lab to take off, the lab faculty and staff will need to target their communications about the ways different departments might use the technology specifically to those departments. General information about the lab will not suffice. VR or AR may not be appropriate integrations for all courses depending on the department and subject area taught. However, if just one, or a few, faculty members from each department open to investigating the technology become engaged in integrating VR or AR in their teaching and/or research practices and have opportunities to share their achievements and experiences with others in their department, then perhaps use of the lab will begin to grow. Those early adopters in each department would become more effective agents of change than the lab faculty because they are from the individual departments and would be seen as

having more credibility by their colleagues when communicating about the benefits of adopting the technology. This illustrates the importance of considering the culture of the organization in which the potential adopters operate on a daily basis. In this case, the action steps toward driving the adoption of the Mixed Reality Lab need to somewhat align with the culture and customs of departments before any movement toward adoption can be achieved.

Conclusion

Adoption of innovation can be a challenge let alone diffusing the innovation across an organization, group, or society. There are many theories and models for innovation adoption and diffusion which contradict each other in some aspects and overlap in others. Some models are best suited for specific situations, such as CBAM for education, and others such as Rogers' Innovation Diffusion Theory are so broad that their flexibility is also their weakness when trying to apply them in particular contexts (Straub, 2009). The commonalities that are found among most theories and models relate to the influence of the following on whether an innovation is adopted or rejected:

- Socio-political and external factors (e.g. environment, policies and regulations, social networks)
- Organizational characteristics (e.g. leadership, social climate, organizational structure)
- Innovation characteristics (e.g. complexity, compatibility, trialability)
- Staff/Individual characteristics (e.g. attitudes, knowledge, motivation)
- Client characteristics (e.g. readiness, capacity to adopt) (Straub, 2009)

Each of these characteristics appear in most models though under different descriptors as is the case with TAM and an adopter's "perception of usefulness" which is essentially the same as "relative advantage" in the Chocolate Model (Davis, 1985; Dormant, 2011).

Analyzing organizational change as it relates to innovation adoption can be useful for one's own organization when considering adopting an innovation. First, by analyzing another organization's change process using an appropriate model or theory, the results can help leaders avoid mistakes made by the analyzed organization. Given that each organization has their own particular social and operational culture, leaders may find it beneficial to apply a model to analyze previous change initiatives to uncover what worked well, what did not, and why. There is not one "right" model for every change situation and every organization. It may be that Rogers' Innovation Diffusion theory is too broad in scope to help change agents effectively carry out change in their particular organization. In that case, looking at the context of the desired change may help in the selection of a model such as CBAM when planning for adoption of an innovation in an educational setting. Based on CBAM, creating an innovation congifuration map for the change desired can help define the specific behavioral goals that would indicate successful innovation adoption. If the innovation to be adopted is highly technical in nature, change agents may look to TAM for guidance in planning for adoption focusing efforts on the ease of use and perceived usefulness of the technology to be adopted. If planning for organizational change, such as workflow processes, then the Chocolate Model may be useful as it focuses on the structures in place at an organization and the roles people play in making the change successful or not successful. If, however, the goal is to gather initital information on what should be considered before implementing any sort of organizational change around an innovation adoption, then

applying Rogers' Innovation Diffusion theory in studying how change occurred in a similar organization may offer insight into strategies for creating adopter acceptance of the new process or technology, the methods for communication about the change, and how to handle early, middle, and late adopters in accordance with organizational culture.

There are opportunities for gaining insight about innovation adoption outside of the theories and models discussed in this chapter when studying specific cases such as Starbucks' College Achievement Plan and Oklahoma State's Mixed Reality Lab. For example, Starbucks' made a shift in the middle of their program roll-out as they noticed many employees unable to participate in the program due to lack of academic qualifications. The company worked with ASU to come up with a supporting program to help those employees gain the qualifications needed to take advantage of the College Achievement Plan. If Starbucks had not been diligent in tracking enrollments and discovering why some employees were not involved in the program and then been flexible enough to add on to the initial plan with the Pathway to Admission program, the goal of the College Achievement Plan to graduate 25,000 student employees by 2025 would have been in jeopardy. Thus, applying models for analyzing an organization ready for change is only one part of the research that should be done before implementing a plan for change. Studying other organizations through specific models while being open to lessons learned outside of the model structure provides important insight for developing a plan appropriate to an organization's needs.

References

Agag, G., & El-Masry, A. A. (2016). Understanding consumer intention to participate in online travel community and effects

on consumer intention to purchase travel online and WOM: An integration of innovation diffusion theory and TAM with trust. *Computers in Human Behavior, 60*, 97-111.

American Institute for Research. (2010). *Innovation configurations: Concerns-based adoption model*. Retrieved from https://www.air.org/resource/innovation-configurations

Burgess, S., Sellitto, C., Cox, C., Buultjens, J., and Bingley, S. (2017). An innovation diffusion approach to examining the adoption of social media by small businesses: An Australian case study. *Pacific Asia Journal of the Association for Information Systems, 9*(3), 1-24.

Damiano Jr., R.J. (2011). What is innovation? *Innovations: Technology and Techniques in Cardiothoracic and Vascular Surgery, 6(2),* 65.

Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results.* (Doctoral dissertation), Massachusetts Institute of Technology. Retrieved from DSpace@MIT Database. (Accession No. 14927137)

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

Department of Design, Housing, and Merchandising. (n.d.) *Mixed Reality Lab*. Retrieved from http://trcf52.okstate.edu/x/index.html

Dormant, D. (2011). *The Chocolate Model of Change*. San Bernadino, CA.

Doyle, G. J., Garrett, B., & Currie, L. M. (2014). Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' Diffusion of Innovation mode. *Nurse Education Today, 34*(5), 775-782.

Ergurel, D. (2017). VR First is building virtual reality labs in 50 universities around the world. *Haptic.al*. Retrieved from https://haptic.al/vr-first-is-becoming-an-independent-vr-incubator-to-build-50-labs-in-universities-84a33ab99ecb

Faller, M. B. (2017). Starbucks, ASU Online partnership expands with Pathway to Admission. *ASU Now*. Retrieved from https://asunow.asu.edu/20170322-asu-news-starbucks-partnership-expands-pathway-to-admission

Greguska, E. (2017). Pilot program to cover majority of ASU Online degree costs for 100 adidas employees, with shared goal of helping people succeed. *ASU Now*. Retrieved from https://asunow.asu.edu/20170824-asu-news-adidas-digital-education-partnership-scholarships-employees

Grush, M. (2016). Mixed reality: From the design lab to the professions. *Campus Technology*. Retrieved from https://campustechnology.com/Articles/2016/11/15/Mixed-Reality-From-the-Design-Lab-to-the-Professions.aspx?Page=1

Grush, M. (2018). Hacking real-world problems with virtual and augmented reality. *Campus Technology*. Retrieved from https://campustechnology.com/articles/2018/02/12/hacking-real-world-problems-with-virtual-and-augmented-reality.aspx

Hall, G. E. (1979). The concerns-based approach to facilitating change. *Educational Horizons, 57*(4), 202-208.

Raynard, M. (2017). Understanding academic e-books through the diffusion of innovations theory as a basis for developing effective marketing and educational strategies. *The Journal of Academic Librarianship, 43*(1), 82-86.

Rochman, B., & Peiper, H. (2017). *Starbucks College Achievement Plan welcomes its 1,000th graduate*. Retrieved from https://news.starbucks.com/news/starbucks-college-achievement-plan-welcomes-its-1000th-graduate

Rogers, E. M. (2003). *Diffusion of innovations, 5th ed.* New York: Free Press.

Starbucks College Acheivement Plan: Education meets opportunity. (n.d.). *EdPlus at Arizona State University.* Retrieved from https://edplus.asu.edu/what-we-do/starbucks-college-achievement-plan

Straub, E. T. (2009). Understanding technology adoption:

Theory and future directions for informal learning. *Review of Educational Research, 79*(2), 625-649.

The class of 2016. (2016). *The Starbucks College Achievement Plan*. Retrieved from https://news.starbucks.com/collegeplan/2016graduationvideos

Wisdom, J. P., Chor, K. B., Hoagwood, K. E., & Horwitz, S. M. (2013). Innovation adoption: A review of theories and constructs. *Administration Policy in Mental Health, 41*(4), 480–502.

Young, J. (2017). ASU's Starbucks deal was just the beginning. *EdSurge*. Retrieved from https://www.edsurge.com/news/2017-06-21-asu-s-starbucks-deal-was-just-the-beginning

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2. SHIFT: Learning Designers as Agents of Change

By Cara North

Introduction

Instructional design is an interdisciplinary field that has continued to grow in the last 50 years. With the rapid growth of instructional design, which has roots in military training, has come the prominence of technology. The role of the instructional designer has evolved, such has titles for them including learning designer, learning experience designer, and curriculum developers. In a society where content and technology are ubiquitous, learning designer's roles in corporate and higher education are more critical than ever.

Like many in the profession, I fell into the role. After graduating college, I worked in a call center and was grateful to have employment in the recession. I was able to be promoted into the center into a role that introduced me to learning and development. Ten years later, I'm glad I found this interdisciplinary field. Throughout my career, I've seen many changes. Working in both corporate and higher educational settings, there has been a shift in the responsibilities and roles of learning designers. Learning designers now combine elements of graphic design, project management, computer science, education, communication, and more to create learning experiences for performance support.

In many ways, learning and development professionals are agents of change. Change agents have many roles including developing a need for change, establishing an information exchange relationship and diagnosing problems (Rogers, 2003). Some of the ways this is happening is through the need to support learning with data, content driven by users, even the way we approach projects. To help learning and development professionals with these changes, I suggest a SHIFT in mindset. SHIFT is a set of guidelines and considerations learning designers should consider to be a catalyst of change in their organizations. SHIFT stands for **S**ustaining learning, **H**arvesting data, **I**nvestigating stories, **F**ostering knowledge and **T**ransforming responsibilities. As technology continues to influence education and corporate learning, the learning designer must become an agent of change in order to provide learning experiences that prepare learners beyond the immediacy of the educational program. The learning designer has a responsibility to create experiences that set learners up for success to thrive in emerging roles and disciplines. This chapter will explore how learning and development professionals can leverage these areas of the discipline and explore how current professionals view these areas.

The SHIFT model

Sustaining Learning

The “S” in SHIFT stands for Sustaining Learning. Students and employees are becoming increasingly diverse in their learning needs. Enhanced diversity enriches learning and work environments due to a wide variety of perspectives, but it also emphasizes the need for learning instruction and materials to be inclusive of the needs of all learners (Kumar and Wideman,

2014). Students and employees want convenience when it comes to learning and development. This convenience means choices in the way they receive content including eLearning, blended, and face to face. A common criticism of eLearning in higher education and corporations is the amount of attrition and retention rates in online offerings versus face to face (Van Rooij and Zirkle, 2016). Often, common success criteria for learning is if a learner completed a course. This can be measured by their attendance in a face to face training or if they triggered a completion certificate in an eLearning course. Why would we want that to be a bar of success? Shouldn't the bar be how the learner applied the information either on the job or in an academic setting? How do we know the learner retained any of the information if learning is a "one time" experience in a course versus an ongoing part of their development?

Where does this leave a learning designer? How can they provide learning in multiple modalities that is built for the enhanced diversity of the learning and work environments? Diversity in this case, is how you can create a learning environment that fits the needs of each person. Scott Cooper, published eLearning author and Vice President of Marketing for GO1, emphasizes for learning designers to have a big impact, they need to look beyond current learners.

"The most critical part of designing accessible learning is to look beyond our immediate users and think about how the wider organization may be using learning materials. This might mean that you need to expand on the concepts you are using to convey the learner, look into alternate delivery methods beyond your current capabilities, and research more about how ALL areas of the business go about learning rate than just creating one generic program for everyone to use" (S. Cooper, personal communication, March 24, 2018).

Accessibility can be difficult to define for learning and development professionals (Kumar and Wideman, 2014). Some

of the reasons for the difficulty of defining accessibility includes the type of learning project, client and organizational budgets and scope, and the type of media used to build the learning project. A way that learning designers can plan for various audiences and modalities is by using Universal Design for Learning (UDL). UDL is a flexible and supportive framework for instructional design that helps plan accessible assessments, methods, materials, and learning objectives (Hall, Cohen, Vue, and Ganley, 2015). Figure 1 goes shares how the UDL framework is based in brain science and focuses on three networks.

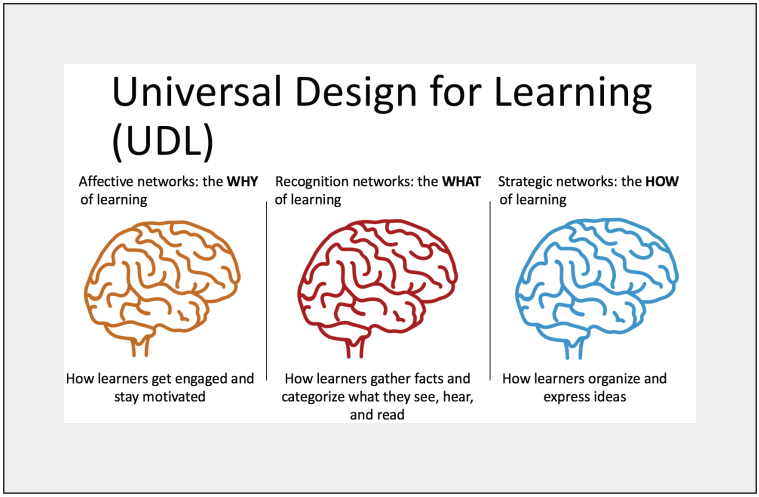

Figure 1 – Universal Design for Learning (image adapted from: http://www.udlcenter.org/aboutudl/take_a_tour)

By creating learning experiences that consider all potential audiences, learning designers can work towards a sustainable learning ecosystem. What does learning and development currently look like at your organization? Is UDL a consideration? If it is not meeting the needs of multiple groups of learners, it may be time to SHIFT.

Harvesting Data

The “H’ in SHIFT stands for Harvesting Data. Data security and utilization are topics that learning designers should consider when creating learning interactions. For many years in eLearning, the way to obtain data is through Learning Management Systems (LMS) tracking the data through Sharable Content Object Reference Model (SCORM). By utilizing a LMS and SCORM, this adds a considerable cost to learning and development (Wang, Woo, Quek, Yang, and Liu, 2012). With added costs and a system that is not flexible, many learning designers are turning to xAPI. xAPI stands for Experience API which is an eLearning software specification that makes it possible to collect data about the learning experience outside of SCORM. In other words, it opens the possibilities of publishing learning objects outside of a LMS and tracking multiple types of data.

By using xAPI, learning data now is more robust and complete. Throughout the history of eLearning and with the rapid rise of eLearning Authoring tools such as Adobe Captivate and Articulate Storyline, learning designers have added quizzes and knowledge checks to modules. Once a learner completes these assessments and receive a certain score, they complete the module. This is the type of data that is usually gathered from the learner. In learning and development, many learning designers evaluate their learning impact by the Kirkpatrick Model of Evaluation. The Kirkpatrick model has four levels of evaluation in which the complexity of the behavioral change increases as evaluation strategies ascend to the next level (Moldovan, 2016). According to Myra Roldan, a Senior Instructional Designer at Amazon.com, not many learning professionals collect data beyond traditional Kirkpatrick Model Level 1 reactionary and Level 2 quiz-based learning assessments of their courses. There are many reasons for this including work load, organizational factors, and project

costs. Regardless of the reason, only collecting this type of data from a learner makes it difficult to assess and validate the effectiveness of a learning solution or analyze the overall impact on employee performance.

With xAPI, learning professionals can mine and analyze online and offline learning data. Roland has used xAPI in augmented reality and Amazon Echo (Alexa Skills) applications. Here is how she defines and frames xAPI:

"Data is a compilation of opinions (subjective data) and facts (qualitative data). The Kirkpatrick Model (1) framework attempted to enable learning professionals to distinguish the type of data they collect about their courses. The problems is that we don't do a very good job of it. xAPI is a framework that automates the data collection so can it can be analyzed, measured, and used to answer relevant business questions and evaluate outcomes. But we are still missing the mark because most learning professionals aren't sure what data they should be collecting and then figuring out how to use that data to drive change in their organizations. Developing the ability to gather data from all available sources – traditional Level 1 and two assessments along with xAPI data, and analyzing and synthesizing that data is where the artwork begins. Learning Professionals can write a full story around their learning solutions, identifying gaps in curriculum, alignment to business goals, and overall ROI of their solutions just buy looking at all their data. This ability alone can change the way the business looks at learning and development and allow us to make decisions backed by data." (M Roland, personal communication, March 24, 2018).

Soon, learning designers will not have to rely on pre-made tools and data collection methodologies. With xAPI and new ways of delivering curriculum, the only limitation to how the learner will experience the content is the limitation of the imagination of the learning designer. This continued use of learner analytic data can help learning designers create better

learning experiences for performance and help their organizations change the way they approach learning.

Investigating Stories

The "I" in SHIFT stands for investigating stories. As content and information become more ubiquitous, learning designers need to find ways to create learning experiences that relate and resonate with learners. One way to do that is by using the power of storytelling. Multiple scholars have identified that storytelling is an effective instructional strategy for promoting learning motivations and improving the learning performance of students (Chung-Ming, Hwang, and Huang, 2012). Furthermore, storytelling can enhance memory by allowing learners to frame prior experiences and use them to bring the story to life. Stories give learners the power to put themselves in the shoes of the character and it can be a great methodology for content that require role playing such as soft skills.

Storytelling captures and moves people, which is why it is such a powerful tool for learning designers. Great stories prompt action, change minds, and foster learning curiosity. Put simply, stories make people care about the issue at hand. Story elements, when incorporated into eLearning, can improve learner engagement. Kim Lindsey, Senior Instructional Design Manager at Cinecraft shares why she uses storytelling in her instructional design methodology:

"Storytelling can have a tremendous influence to effect change. When well implemented, stories bring the content into the learner's own experience, allowing risk-free practice for critical processes. The most effective stories come from the closest to the task: rank-and-file workers and learners who have attained the rank of "expert" not higher-level stakeholders. Learning designers, however, must consider that stories experts find interesting are often extreme outliers and are not

helpful to novices. Balancing the needs of their target audience against the input of subject matter experts and the demands of stakeholders is always a challenge of learning designers" (K. Lindsey, personal communication, March 24, 2018).

Learning experiences should challenge the learner to think beyond their own reality. Stories are a great way to push your learners to think about situations and content in a different way. Stories can also come from your learners, which allows them to be a part of the learning process in a new way!

Fostering Knowledge

The "F" in SHIFT stands for fostering knowledge. With rapid changes in technology, leveraging technology to curate and funnel information is a great way to keep abreast with new developments. Developing a Personal Learning Network (PLN) can allow a learning designer to share information with peers. (Tour, 2017) defines PLNs as informal networks of teachers who interact online for professional purposes. Learning designers can cultivate PLNs by using tools such as Twitter or Yammer to connect with other professionals across the world. Another way learning designers can share knowledge is through communities of practice (CoP). Communities of practice are defined as groups of people who genuinely care about the same real-life problems or hot topics, and who on that basis interact regularly to learn together and from each other (Pyrko., Dörfler, & Eden 2017).

If learning designers use PLNs and CoPs to enhance their own professional development, they can also use them to establish thought leadership. By sharing ideas and collaborating with others, learning designers can share their expertise in certain aspects. Bethany Taylor, Global Digital Learning Advisor for COSTA has used both to not only grow in her own expertise but use it to demonstrate her skills.

"Learning is a tool that can be wielded by every person, but not every person knows how or has the innate desire. A learning designer is there to make learning easy to access, create connections and cultivate motivations. The only way a learning designer is going to be successful is to maintain their own learning. Through networks, communities, mentoring, chats, reading, or whatever else that may contribute to their learning: the learning designer should be fostering their own knowledge. Their motivation and excitement of continuous learning will trickle down to the people they aim to inspire and will incite internally motivated change."(B. Taylor, personal communication, March 24, 2018).

Beyond the power of individual personal development for the learning designer is the ability to foster a culture of learning. Jo Cook, owner and virtual classroom expert of Lightbulb Moment understood the power of understanding resources and access are key to unleashing the power of learning.

"When I designed the Lightbulb Moment Community website about virtual classroom and webinar topics, I wanted it to enable people to change their own practice and support the change in others. To do this people coming to the free community would need to have access to knowledge in the forms of references, blogs, articles and more, as well as the discussions and other people contributing. One of the main elements in the design was to have categories that made sense to the topic (software/platforms, design, delivery) as well as levels of expertise (beginner, intermediate, advanced) so people could easily find what they wanted help on or share information about. From the organisation perspective, roles for supporting the community are essential. I had a Lightbulb Moment administrator who is the community manager, providing platform support, encouragement and linking people and questions together. I take the role of topic expert and I invited people I knew and trusted to be early adopters

to get the community feel going and ensure that there was a vibrant conversation from the outset." (J. Cook, personal communication, March 25, 2018).

Levering networks of knowledge and resources and curating these artifacts for their learners are skills learning designers who want to incite organizational change should do. It is imperative to model this behavior to inspire others to be curious and add to the knowledge base. Furthermore, the role of learning designers as knowledge gatekeepers are diminishing. More and more, knowledge is not treated as a currency in organizations and empowering learners to create content and share is a great way to foster change.

Transforming Responsibilities

Finally, the "T" in SHIFT is for transforming responsibilities. Looking at job descriptions for learning designers will show you that the amount of responsibilities they have are vast. From project management to graphic design, learning designers not only have a vast array of skills but also responsibilities. With the focus on learning design providing performance support to an organization, the power of the learning design to be a change agent is evident.

One way to own the change agent status is for a learning designer to flip the paradigm. Instead of thinking about themselves as the gatekeepers of knowledge, they should consider thinking of themselves as support pillars to learners. In other words, learning designers are not the only ones that can create content. By allowing users to create content, it brings a new element to the learning content that the learning designer can then refine and development. Sam Rogers, owner of SnapSynapse explains that a learning designer's position in the organization can help bring a unique perspective to content.

"Learning and Development holds the keys to the kingdom. No other part of the organization has more insight into the problems of the employees, the flaws in the processes, the bugs in the systems, the quirks of the culture, or resistance of the entire organization to change. No other part of the organization is more critical to surviving change, or thriving within it. No other part of the organization is more directly responsible for attracting and retaining the very people who make or break the success of the organization: those who care enough to develop, to innovate, and to advance." (S. Rogers, personal communication, March 25, 2018).

Learner generated content allows the learning designer to focus on what they do best: the process expert of crafting learning experiences. Regardless of where the learning designer is employed, at most organizations the content is the hardest part. By utilizing the talent of the organization and leveraging the expertise of those doing the work, more authentic learning experiences can be created.

Conclusion

Regardless of how you became a learning designer or your tenure, you have the capacity to be an agent of change for your organization. Perhaps you already are, but there is always room for improvement. By combining the elements of SHIFT (Figure 2) into organizational learning and development strategies, learning and development professionals can provide targeted insights into their corner of the institution. It also can help provide organizational leaders with the information they need to provide learning and development with the financial and organizational support to provide the best learning experiences to strengthen the organization.

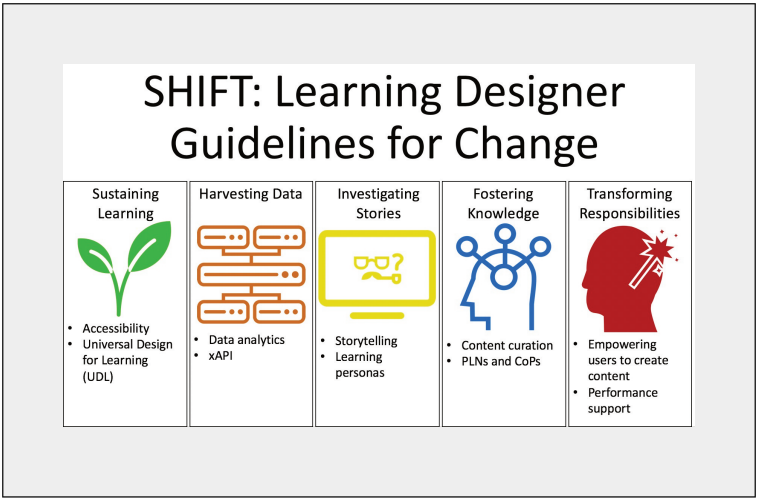

Figure 2 – The SHIFT model.

SHIFT: Sustaining learning, Harvesting data, Investigating stories, Fostering knowledge and Transforming responsibilities. These guidelines allow learning designers to grow and take the skills they currently have and enhance them in multiple ways. All learning designers should be accountable to their organizations for assisting in performance support. Take a moment and evaluate your organization's learning strategies. Do they focus on supporting the performance of the organization? Or do they need to SHIFT?

References

Catarci, T., De Giovanni, L., Gabrielli, S., Kimani, S., & Mirabella, V. (2008). Scaffolding the design of accessible eLearning content: a user-centered approach and cognitive perspective. *Cognitive processing*, *9*(3), 209-216.

Chun-Ming, H., Hwang, G. J., & Huang, I. (2012). A project-based digital storytelling approach for improving students' learning motivation, problem-solving competence and

learning achievement. *Journal of Educational Technology & Society*, *15*(4), 368.

Cook, J. (2018, March 25). Personal interview with C. North.

Cooper, S. (2018, March 25). Personal interview with C. North.

Hall, T. E., Cohen, N., Vue, G., & Ganley, P. (2015). Addressing learning disabilities with UDL and technology: Strategic reader. *Learning Disability Quarterly*, *38*(2), 72-83.

Kumar, K. L., & Wideman, M. (2014). Accessible by design: Applying UDL principles in a first-year undergraduate course. *The Canadian Journal of Higher Education*, *44*(1), 125.

Lindsey, K. (2018, March 24). Personal interview with C. North.

Moldovan, L. (2016). Training outcome evaluation model. *Procedia Technology*, *22*, 1184-1190.

Pyrko, I., Dörfler, V., & Eden, C. (2017). Thinking together: What makes Communities of Practice work? *Human Relations*, *70*(4), 389-409.

Rogers, E.M. (2003). *Diffusion of Innovations* (5th edition). New York: Free Press.

Rogers, S. (2018, March 25). Personal interview with C. North.

Roldan, M. (2018, March 24). Personal interview with C. North.

Taylor, B. (2018, March 24). Personal interview with C. North.

Tour, E. (2017). Teachers' personal learning networks (PLNs): exploring the nature of self-initiated professional learning online. *Literacy*, *51*(1), 11-18.

Van Rooij, S. W., & Zirkle, K. (2016). Balancing pedagogy, student readiness and accessibility: A case study in collaborative online course development. *The Internet and Higher Education*, *28*, 1-7.

Wang, Q., Woo, H. L., Quek, C. L., Yang, Y., & Liu, M. (2012). Using the Facebook group as a learning management system: An exploratory study. *British Journal of Educational Technology*, *43*(3), 428-438.

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3. “ID 2 LXD” From Instructional Design to Learning Experience Design: The Rise of Design Thinking

By Ceren Korkmaz

Introduction

Stanford’s *d.school* is no ordinary design school. They boast that they do not teach “how to design” but rather “design thinking”, which is a concept taking over creative disciplines nowadays. That being said, design is basically a process of creative problem solving, and it can be applied to a vast variety of fields. With an immense amount of challenges to be tackled, education is no exception.

For years, instructional design was discussed by scholars and professionals alike in terms of how it could be utilized for optimizing learning. At heart, it is a concept of programming instruction to achieve better learning outcomes. The concept has branched out to be a profession rather than being a sole methodology for in-class practices. Nowadays, when a person puts “instructional designer” as a line in their resume, the common perception is that they are somehow involved in e-learning authoring. Meanwhile, the fast pace of technology has

caused e-learners to have new demands from the format of the content they are learning, the number one being immersion. With the appearance of new learning technologies, instructional design is now shifting towards *learning experience design*, which has *design thinking* at heart. As design thinking values interdisciplinarity above everything else for problem solving, fresh opportunities for driving educational change emerge.

Now that the diffusion of design thinking is underway, it's affecting the way learning designers approach their work. This chapter aims to focus on how instructional design (ID) is evolving into learning experience design (LXD), the underlying reasons, the place of Design Thinking during this process, and perspectives on the future of learning design.

"Instructional Design est. 1945": The evolution of Instructional Design

Instructional design (ID) has many meanings attached to it. Nowadays, within educational settings, it is usually the careful planning, regulation, and assessment of learning activities that comes to mind. On the other hand, in professional environments, the immediate connotation is related to building training modules, most probably with technological aids. While instructional design might sound like a recent phenomenon due to technology utilization, its roots actually date back to the times of World War II (Dick, 1987).

The psychologists called out to action during this time were assigned the task of carrying out research to develop trainings for the military. They were also responsible for skills assessment and conducting "needs analyses" to select participants for a particular training. Among the people who were influential on the characteristics of the trainings developed were the

psychologists Briggs, Gagné, and Flanagan (Reiser, 2001). Their influence comes from the fact that they based these training characteristics on instructional principles shaped by instructional theories, and research on human learning and behavior.

Once the war ended, in an attempt to solve the problems in instructional design, American Institutes for Research were founded. It was during second half of the '40s that the researchers started considering a training as a system, and developing planning, development, and assessment procedures (Dick, 1987).

What came afterwards was the Programmed Instruction Movement (Skinner, 1954). In this work that spans until mid '60s, they argued that the instruction should be given in small chunks, and the frequent questions that require explicit answers should be addressed to learners. Due to the immediate feedback they would receive, the learning would be maximized due to reinforcement. Upon the careful evaluation of the materials used, they would be revised and refined according to learner needs, which would enable learner self-pacing.

As much as Ralph Tyler is known as the originator of behavioral objectives, Benjamin Bloom and colleagues came up with their famous "Taxonomy of Educational Objectives" in 1956, having an impact on instructional design as we know it forever. Additionally, in an attempt to aid those who would like to design materials for programmed instruction, Mager (1962) wrote a book called "Preparing Objectives for Programmed Instruction" (Reiser, 2001).

In 1962, Glaser and Klaus introduced criterion-referenced measures in order to define entry-level and post-instructional student behaviors. This piece was published in a book edited by Robert Gagné who introduced another canonical concept to instructional design in Conditions of Learning (1965). He categorized five domains of learning outcomes as intellectual

skills, cognitive strategy, verbal information, motor skills, and attitude. His theory argued that there needs to be certain prerequisites met under each of these domains for learning to occur.

The 1970s were marked by rising interest in creating various models for instructional design. During this period, instruction began to be perceived as more of a system, and many principles were suggested for systemizing it (Gustafson & Bratton, 1984). It was also around this time that graduate programs on instructional design began to be established (Reiser, 2001) and that Programmed Logic for Automatic Teaching Operations (PLATO) was created, and it could be dubbed as the first computer-assisted instructional endeavor. Along with the innovative advances such as PLATO and invention of personal computers, this era could be named as the emergence of distance learning as we know it.

By 1990s, the line of research shifted through cognitive psychology to constructivism, in which Dewey, Montessori, Piaget, Vygotsky, and Bruner are among the influential names. This theory prioritized authenticity, real-life problem solving, and self-pacing. Regarding instructional design, constructivism led the way of computers being utilized in more interactive ways rather than solely incorporating drilling. With the rise of the Internet use in the mid-90's (Reiser, 2001), distance learning slowly started taking over, and it was instructional designers' job to create online learning environments that did not solely transfer textbooks into digital platforms.

The 2000s brought along technological advances one after another, and in a very fast pace at that. Especially towards the end of the decade, the computers and devices went smaller and cordless; the Internet went wireless with bigger bandwidth; and social networking and media began to take over. Right now, as we are approaching the second decade of the millennium, the only way to describe the current state

of instructional design is "Imagine the possibilities!" with the immense number of tools available. Although designers are indeed imagining, the highlight here is that instructional design is evolving into LXD which lies heavily on personalization / customization of learning and empathy.

"LX Designer Wanted:" The Emergence of Learning Experience Design

LXD is actually not a brand-new phenomenon, and it has been around for over ten years now. The term was coined by Niels Floor, a Dutch LXD pioneer in 2007 (Floor, 2018a). While there are many definitions of LXD out there, let's look at the one that the originator created to offer a general understanding:

> Learning experience design [...] is the process of creating learning experiences that enable the learner to achieve the desired learning outcome in a human centered and goal-oriented way. (Floor, 2018b, para#1).

Then, what makes LXD different from instructional design? Just looking at the terms from an etymological perspective, instructional design emphasizes the *source* of knowledge — in other words, the planning of the teaching activities. However, LXD concentrates more on the *destination* of the knowledge, or the *learner*. As Matthews et al. (2017) also conclude, there is a heavy emphasis on empathy in LXD. It is plausible to claim that LXD pays attention to emotional design as Floor (2018) describes the fundamentals of LXD as (Figure 1):

1. Human-centered
2. Goal-oriented
3. Theory of learning, i.e. familiarity with human cognition
4. Learning put into practice
5. Heavily interdisciplinary

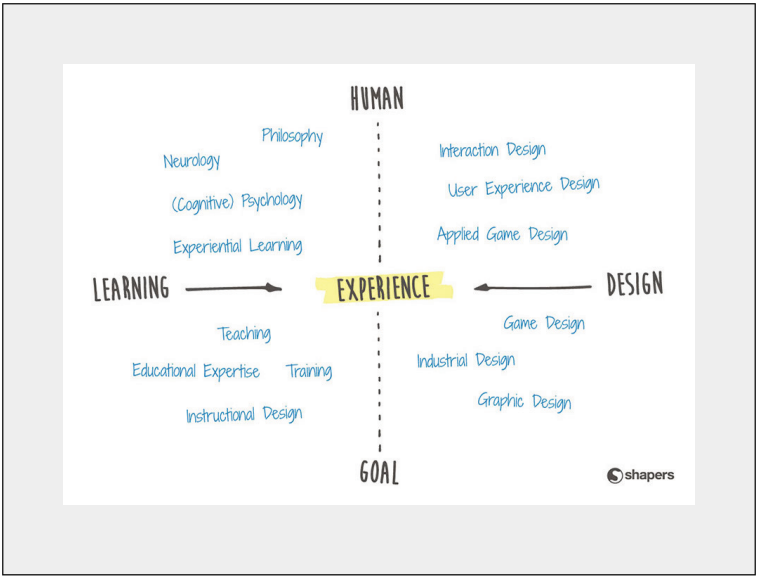

Figure 1 – The Interdisciplinarity of Learning Experience Design Model (image from: http://www.learningexperiencedesign.com/learn-2.html).

A Universal LXD?

An internationally reputable architect, designer, and educator Ron Mace coined the term "universal design". In 1997, he formed a committee of ten people and established The Principles of Universal Design (Connell et al., 1997). While these principles are aimed at creating a universal design mainly for architectural and industrial products, they are still valid for educational contexts, especially learning design, as well (Connell et al., 1997):

- Equitable use: The design is useful and marketable to people with diverse abilities.
- Flexibility in use: The design accommodates a wide range

of individual preferences and abilities.

- Simple and intuitive use: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
- Perceptible information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
- Tolerance for error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.
- Low physical effort: The design can be used efficiently and comfortably and with a minimum of fatigue.
- Size and space for appropriate use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

Combining these with the foundations of LXD should give us an idea about the universal design of learning experiences. Although universality might give off the impression that universal design hinders personalization, it is still possible to customize the experience.

There have been multiple attempts at creating universal design principles for education as well (Palmer & Caputo, 2002; Deaton, 2016; CAST, 2018). In particular **Chapter 2** of this eBook, recommends Universal Design for Learning as a way to sustain learning.

CAST established a set of guidelines for the "universal design for learning" framework whose principles were set forth by Anne Meyer and David Rose in the 1990s (Meyer, Rose, Gordon, 2014). The purpose of this work is to enable educators to optimize learning experiences with the help of learning technologies. Figure 2 shows a version of these guidelines as of July 2018.

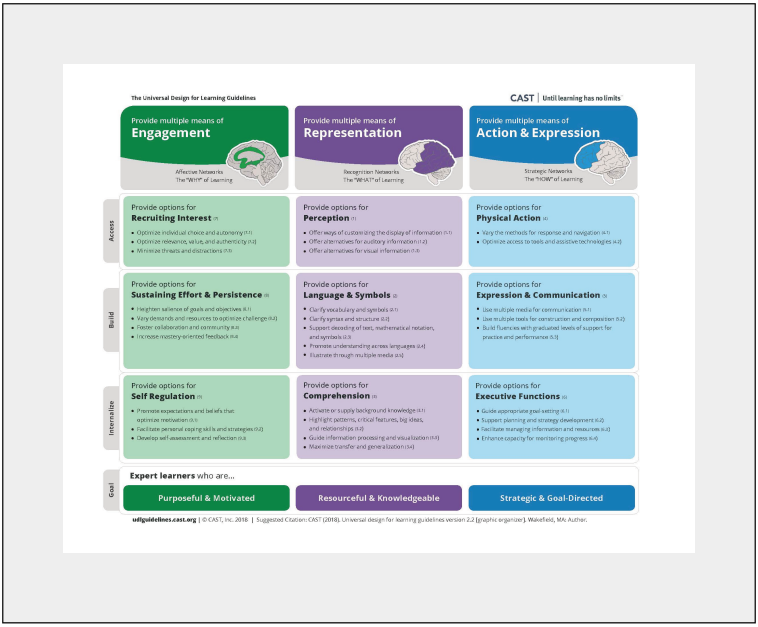

Figure 2 – Universal Design for Learning Guidelines Version 2.2 (CAST, 2018). Image source: http://udlguidelines.cast.org/binaries/content/assets/udlguidelines/udlg-v2-2/udlg_graphicorganizer_v2-2_numbers-yes.pdf

In her article, *UX to LX: The Rise of Learner Experience Design*, in which she focuses on the rise of LXD, Kilgore (2016) explains "User experience research methods and design thinking help us unpack the intangibles of the student experience" (Knott as cited in Kilgore, 2016, para#6). Then, what exactly is design thinking and why does it matter?

Design Thinking: An Approach for Diffusion of Innovation

A very explicit explanation of design thinking would be Wu's (2017) title to her article in UX Collective, *Is Design Thinking*

a Method of Design? In a similar vein, Johansson-Sköldberg, Woodilla and Çetinkaya (2013) found that there are multiple definitions for what design(erly) thinking means through doing a discourse analysis. Below are the multiple meanings found in the literature. One meaning that is particularly relevant to this chapter is "design and designerly thinking as a *problem–solving activity"* since design thinking is approached as a way of solving problems. Others meanings are (Kimbell, 2009):

1. Design and designerly thinking as the *creation of artifacts*
2. Design and designerly thinking as a *reflexive practice*
3. Design and designerly thinking as a *problem–solving activity*
4. Design and designerly thinking as a *way of reasoning/ making sense of things*
5. Design and designerly thinking as *creation of meaning*

As much as the definition of design thinking as a problem-solving activity goes back to early 1990s, the concept of design thinking has gone mainstream with the CEO of IDEO, Brown's book (2009) *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation* (also Brown & Katz, 2011). In their work, Brown and Katz mention that design thinking's aim is to help people be as creative and innovative as possible in their problem-solving endeavors. So, rather than being a new way of designing for problem solving, it is a way to approach the problem itself. In order to get creative, the importance of interdisciplinarity is boldly emphasized much like LXD does.

That is not to say that design thinking is only contained within the frame of practitioners. The framework has made its way into educational research, as well, with the project *Design Thinking for Educat*ors (Riverdale Country School & IDEO, 2012) observing: "Design thinking [...] is a mindset. It's about being

aware of the world around you, believing that you play a role in shaping that world and taking action toward a more desirable future. It is human-centered, collaborative, experimental, and optimistic" (Riverdale Country School & IDEO, 2012). Figure 3 shows what the design thinking process looks like.

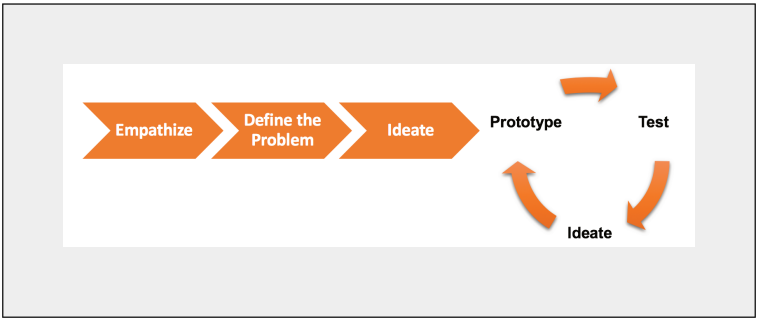

Figure 3 – Design Thinking Process (Brown, 2009).

Utilizing this process, what a learner experience designer should do is, as repeated many times before, to empathize with the learners. Having open polls for potential learners or conducting interviews with them to learn about what kind of an experience they would want would surely help. In this phase, as the learners' emotional needs are prioritized for optimal engagement, this step can be dubbed as the "emotional needs analysis". The next step is naturally to define the problem. However, since we are talking about design thinking here, the approach should be out-of-the-box, approaching the problem with awareness and from many angles. After the problem is identified, the ideation, i.e. the brainstorming process, will begin preferably with the company of an interdisciplinary team. The next steps are prototyping, testing/piloting, and iterating this cycle until satisfactory results are achieved. Figure 4 depicts how design thinking can drive the LXD process.

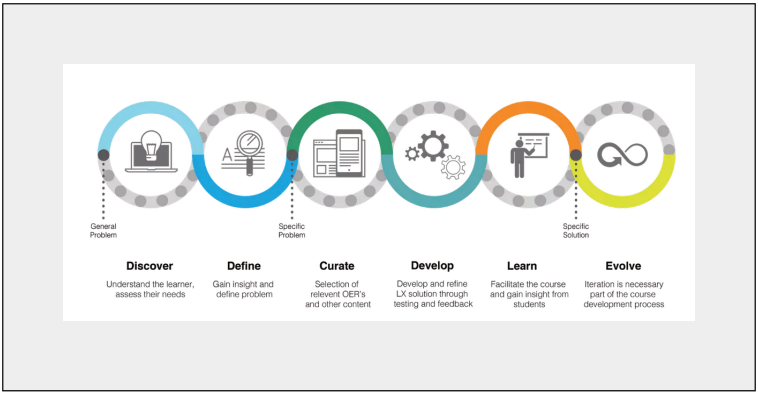

Figure 4 – Design thinking in action in learning experience design (image from: https://www.edsurge.com/news/2016-06-20-ux-to-lx-the-rise-of-learner-experience-design). Image Credit: iDesign.

What's Next for Designing Learning?

With the prevalence of virtual and augmented reality nowadays, the talk of LXD will not go anywhere soon. As instructional designers are slowly being replaced by LX designers, and schools like Stanford's d.school claims that they are "not teaching design, but design thinking," the question of "How can this be leveraged for the sake of educational change?" comes to mind. *d.school* offers tools for action exactly for this purpose.

Then, what are some things a learning experience designer can do to meet the rising expectations of "a good learning experience"?

Designing just for the learner

Empathy and emotional design lies at the core of LXD. As long as the learner gets the feeling of personalization from the experience, it is plausible to assume that it would be deemed as a "good" one (Milam, El-Nasr & Wakkary, 2008). This is the

reason that stories that have multiple endings are really popular (Tyndale & Ramsoomair, 2016). In order to customize the experience for the learner, data analytics, i. e. their digital footsteps, are the number one source to go to.

Distance learning still rules supreme

The platform of choice to consider for the end-design should be mostly mobile due to the prevalence of handheld devices and the speed of learning, but laptops are still relevant (Pandey, 2018).

"The book or the movie?"

Books are becoming a nostalgic object as much as we would like to argue that leaving things to imagination is the better option. The busyness of day-to-day life creates impatience and leads to not investing long periods of time for trainings. Thus, videos are preferred over plain text, and everything shrinks down to "pill-size" portions that are, of course, as interactive as possible to engage the learner. For example,**Chapter 4** discusses microcredentials as an innovation in teachers' professional development. According to Trifecta Research (2015), 70% of Gen Z watches two hours of YouTube per day, which depicts the landscape of video consumption. At this point, it is up to the learning experience designers to rise to the challenge of not leaving out the vital details in the "book", i.e. text that they are integrating into an online module.

Iterate, iterate, iterate

The more the module (product, training...) is revised based on the feedback gathered, the better it will be. Most important of all, it is vital not to restrain creativity throughout the design process. The teamwork of an interdisciplinary team is essential here so that the experience is a product of various fresh perspectives.

"Design" the experience

The Learning Design Starter Kit, Interaction Design Foundation, and Stanford's Life Design Lab are good starting points to be familiarized with the idea of LXD and design

thinking. The starter kit has been developed by the partnership of St. Petersburg College and Smart Sparrow, with support from the Bill & Melinda Gates Foundation. It serves as an introduction to the concept with tools to utilize in classroom, case studies as examples, and publications regarding learning design. Interaction Design Foundation functions as a guide for technical skills to possess for designing better learning experiences. Finally, *Life Design Lab* of Stanford serves as an illustration of what LXD looks like in action. Additionally, Arizona State University's Habitable Worlds is a good example regarding its leverage of adaptive technologies and aligning it with rich multimedia and hands-on experience.

It is plausible to assume that in the next five years or so, LXD will be more prevalent as both a profession and a line of research. Considering "two hands are better than one", the collaboration of various fields and the power of technology can certainly be leveraged to drive educational change. One recommendation to consider for higher education institutions is to offer design thinking courses in educational disciplines at large. The more the students collaborate to solve real-life problems with their peers from various fields, the more possible it is to tackle educational problems and bring about change. In the professional field, on the other hand, institutions and independent designers alike can shift their professional development towards design thinking and collaborating across disciplines as well as designing more emotional, thus immersive "experiences" for learners.

References

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive Domain.* New York: David McKay.

Brown, T. (2009). *Change by design: How design thinking transforms organizations and inspires innovation*. New York: Harper.

Brown, T. & Katz, B. (2011). Change by design. *The Journal of Product Innovation Management*, *28*(3), 381–383.

CAST (2018). The UDL Guidelines. Retrieved from http://udlguidelines.cast.org/binaries/content/assets/udlguidelines/udlg-v2-2/udlg_graphicorganizer_v2-2_numbers-yes.pdf

Deaton, P.J. (2016). Accessible learning experience design and implementation. In F. H. Nah & C. H. Tan (Eds.), *HCI in business, government, and organizations: Information systems: Third international conference, HCIBGO 2016* (pp. 47-55). Springer, Cham.

Dick, W. (1987). A history of instructional design and its impact on educational psychology. In J. Glover & R. Roning (Eds.), *Historical foundations of educational psychology* (pp. 183-202). New York: Plenum.

Floor, N. (2018a). Learning Experience Design.com. Retrieved from http://www.learningexperiencedesign.com/index.html

Floor, N. (2018b). What is Experience Design? Retrieved from http://www.learningexperiencedesign.com/learn-1.html

Gagné, R. M. (1965). *The conditions of learning and theory of instruction* (1st ed.). New York: Holt, Rinehart & Winston.

Glaser, R., Klaus, D. J. (1962). Proficiency measurement: Assessing human performance. In R. Gagné, (Ed.), *Psychological principles in system development* (pp. 421-427). New York: Holt, Rinehart & Winston.

Gustafson, K., & Bratton, B. (1984). Instructional improvement centers in higher education: A status report. *Journal of Instructional Development, 7*(2), 2-7.

Johansson-Sköldberg, U., Woodilla, J., Çetinkaya, M. (2013). Design Thinking: Past, Present and Possible Futures. *Creativity and Innovation Management, 22*(2), 121-146.

Kilgore, W. (2016). UX to LX: The Rise of Learner Experience

Design. Retrieved from https://www.edsurge.com/news/2016-06-20-ux-to-lx-the-rise-of-learner-experience-design

Kimbell, L. (2009). Design practices in design thinking. *European Academy of Management*, 2009. Retrieved from: http://www.lucykimbell.com/stuff/DesignPractices_Kimbell.pdf

Mager, R.F. (1962). *Preparing objectives for programmed instruction.* Belmont, CA: Fearon.

Matthews, M.T., Williams, G.S., Yanchar, S.C., McDonald, J.K. (2017). Empathy in Distance Learning Design Practice. *TechTrends, 61*(5), 486-493.

Meyer, A., Rose, D.H., & Gordon, D. (2014). *Universal design for learning: Theory and Practice*. Wakefield, MA: CAST Professional.

Milam, D., El-Nasr, M.S., & Wakkary, R., (2008). Looking at the Interactive Narrative Experience through the Eyes of the Participants. In *Interactive Storytelling* (pp. 96-107). Berlin: Springer.

Connell et al. (1997). The Principles of Universal Design. North Carolina State University's Center for Universal Design, College of Design. Retrieved from https://projects.ncsu.edu/design/cud/about_ud/udprinciplestext.htm

Palmer, J., Caputo, A. (2002). The Universal Instructional Design Implementation Guide. Retrieved from https://opened.uoguelph.ca/instructor-resources/resources/uid-implimentation-guide-v13.pdf

Pandey, A. (2018, April 17). 10 Mobile Learning Trends for 2018. Retrieved from https://elearningindustry.com/mobile-learning-trends-2018

Reiser, R.A. (2001). A history of instructional design and technology: Part II: A history of instructional design. *Educational Technology Research & Development*, *49*(2), 57–67.

Riverdale Country School and IDEO (2012). *Design Thinking for Educators* (2nd ed). Retrieved from http://www.designthinkingforeducators.com

Skinner, B.F. (1954). The science of learning and the art of teaching. *Harvard Educational Review, 24,* 86-97.

Trifecta Research (2015). Generation Z Media Consumption Habits: True Digital Natives. Retrieved from: http://trifectaresearch.com/wp-content/uploads/2015/09/Generation-Z-Sample-Trifecta-Research-Deliverable.pdf

Tyndale, E.,and Ramsoomair, F. (2016). Keys to Successful Interactive Storytelling: A Study of the Booming "Choose-Your-Own-Adventure" Video Game Industry. *Journal of Educational Technology, 13*(3), 28-34.

Wu, S. (2017, December 14). Is Design Thinking a Method of Design? Retrieved from https://uxdesign.cc/is-design-thinking-a-method-of-design-no-7c7fca1ba7c6

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4. Unwrapping Micro-credentials with the Chocolate Model of Change

By Lauren Acree

Introduction

Micro-credentials are an innovation that reflect one alternative to traditional sit-and-listen professional development workshops for teachers. Rather than awarding teachers credit for sitting through a set number of hours of professional development, micro-credentials award teachers for demonstrating a set number of skills. While teachers and school and district leaders across the country are showing interest in this latest innovation in professional learning, micro-credentialing at scale is still rare. This is, in part, because the shift from a credit-hour paradigm to a competency-based paradigm represents a major change.

This chapter will leverage two frameworks, The Chocolate Model (Dorman, 2011) and Diffusions of Innovation theory (Rogers, 2003), and try to understand the proposed shift in professional learning that micro-credentials require and the potential for micro-credentialing. In particular I address three key questions:

- To what extent are micro-credentials an innovation?
- Are micro-credentials a promising innovation?
- What variables might affect the rate of adoption of micro-credentials?

In using the Chocolate Model (Dormant, 2011) and Diffusions of Innovation theory (Rogers, 2003) I show the potential levers and barriers micro-credentials might encounter as educators determine whether to adopt and use micro-credentials.

The Rationale for Micro-credentials

In the modern age of accountability for student learning, there is focused attention on student outcomes, particularly as measured by standardized assessments. As a result of these assessments greater attention has been given to the overall level of student achievement as well as the vast gaps in performance between advantaged and disadvantaged students. While there are many factors that contribute to student learning, research has shown that having a high-quality teacher is the most important factor in predicting a child's performance (as measured by standardized assessments) (Louis et al., 2010). Unfortunately, many of the most effective educators are concentrated in more affluent, advantaged districts leaving struggling students with inexperienced or less effective teachers.

Given this problem many policies have focused on how to ensure all students have a high-quality teacher. The natural solution is to invest in building teacher capacity through professional development. Traditionally, professional development consists of a series of one-day, sit-and-listen workshops that teachers attend during the school year. Schools and school districts spend millions annually on this professional development, but research has repeatedly shown

that it is largely ineffective at changing teacher knowledge, skills or mindsets and therefore will not result in changes in student learning as measured by performance on the standardized tests (TNTP, 2016; Joyce & Showers, 2003).

Hammond et al. (2009) conducted a meta-analysis examining the current state of professional development activities and found that effective professional development focuses on developing teacher content knowledge, provides opportunities for active learning, and aligns with the other learning activities going on in the district or school. Further, professional development that lasted many days and engaged groups of participants collaboratively (by school, subject, or grade level) was more predictive of positive changes in teacher practice (Garet et al., 2001; Darling-Hammond, 2009). Additional research shows that instructional coaches play an important role in connecting the information learned in professional development to classroom practice (Joyce & Showers, 2003). However, coaches are not available in all schools and the need to build teacher capacity effectively has encouraged many to consider alternative, innovative models of professional development.

Micro-credentials represent a shift in the way we build teacher capacity, how we hold teachers accountable for professional development, and how we provide ongoing support in hard to staff places. They can provide coaching style feedback in schools where instructional coaches are otherwise unavailable and give teachers an opportunity to reflect on their classroom practice.

What are Micro-credentials?

A micro-credential is a competency-based measure of professional development. Where professional development traditionally awards credit for a set number of *hours* of learning,

micro-credentials award credit based on the successful demonstration of a set *skill*. Micro-credentials challenge the assumption that "teaching is necessary for learning to occur" and instead enable teachers to learn in whatever way works best for them (Thomas & Brown, 2011, p.34).

Micro-credentials are part of an online ecosystem with issuers, earners, and recognizers. Issuers are the organizations who design, evaluate and award the micro-credential. Earners are the educators demonstrating the competency. Recognizers are the schools and district agencies that provide credit or value for earning a micro-credential and recognize them as part of the system of professional learning (The Alliance for Excellent Education, 2013; Acree, 2015).

A micro-credential has the following information on it: 1) a clearly and narrowly defined skill or competency, 2) information about the skill or avenues for the educator to learn more about the skill, 3) questions for the educator to answer and/or provide evidence of the skill in their context, and 4) a digital badge or icon that educators can display when they've successfully earned the micro-credential.

Educators earn a micro-credential by learning about the skill described in the micro-credential, demonstrating the skill in their classroom and gathering artifacts that demonstrate the skill (photos, videos, student work), and then submitting the artifacts to the issuer who provides feedback and either awards or denies the micro-credential based on a rubric. Educators who earn the micro-credential receive a digital badge they can display on their website, in their digital portfolios, or in their email signatures, for example.

Micro-credentials could improve opportunities for continuous improvement and professional growth for educators. Additionally, there is a long-term hope that micro-credentials will improve hiring practices so that principals can know more about the skills and mindsets of potential teachers before they are hired (Sykes & Wilson, 2018). However, micro-

credentials are still in the early phase of their adoption and much of their potential has yet to be realized.

Analysis: Unwrapping Micro-credentials

To what extent are Micro-credentials an innovation?

Micro-credentials differ from traditional models of professional development in a number of ways. First, rather than measuring *learning time*, micro-credentials measure *skills demonstrated*. At best, traditional modes of professional development could tell what was taught, but not what teachers are able to do in their classrooms. Micro-credentials can provide evidence that a teacher demonstrated a competency or skill at least once in their classroom. Second, micro-credentials can act as a digital portfolio of all of the skills and professional learning an educator has accrued. Because micro-credentials are digital, they store metadata, including digital artifacts and videos, that can be shared with supervisors, hiring managers, and licensure agencies.

In short, micro-credentials are innovative both in format (being a digital vehicle for storing professional development artifacts) and in terms of how we frame professional development (from hours-based to skills-based). For the purposes of this chapter the teachers are the adopters and the change agents are the school/district leaders as well as the organizations that are creating the micro-credentials and using them for professional development.

Understanding the Change

Micro-credentials Represent

In her book, *The Chocolate Model of Change,* Dormant (2011) proposes a way to understand the extent to which a proposed change is "ideal." She focuses on five characteristics of change:

1. Relative Advantage: to what extent does the proposed change offer an advantage to users?
2. Simplicity: to what extent is the change easy to understand?
3. Compatibility: to what extent is the change compatible with the adopter's existing practices?
4. Adaptability: to what extent can the change be adapted to fit local needs?
5. Social Impact: to what extent will the change impact social relations? (Dormant, 2011, p.16)

Similarly, Rogers (2003) describes five characteristics of an innovation: relative advantage, compatibility, complexity, trialability, and observability (p.222). These models overlap on many characteristics so I use a mixture of these characteristics to better understand the extent to which micro-credentials are ideal: relative advantage, simplicity, compatibility, adaptability, triability, and observability. I combined these characteristics to avoid overlap.

These frameworks provide a useful tool for analyzing the change micro-credentials represent. In this analysis I focus on teachers as the primary adopters of this change, though principals and district leaders charged with leading professional learning should also be considered separately.

Relative Advantage

Micro-credentials offer both advantages and disadvantages to teachers. In my experience working with teachers I have heard them articulate that they appreciated the fact that micro-credentials allowed them to express choice in their

professional learning opportunities. Where sit-and-listen sessions are limited to what is offered in the school or district, micro-credentials are open and online and there are hundreds available online for educators to pursue based on their needs and interests. For example, if an educator is interested in exploring Project Based Learning (PBL) but there isn't any professional development available for him, he can look up the relevant micro-credentials, review resources and videos online, and start using PBL in his classroom and submit materials related to the micro-credential for feedback. Through the micro-credentials there is a clearly articulated approach to follow with resources and rubrics a teacher can use. Further, the educator receives feedback as part of this process enabling him to make improvements in his classroom based on the artifacts he submits.

Teachers also appreciate that micro-credentials offered credit (both in terms of certification hours and in terms of acknowledgement) for things they already do in their classroom. Rather than assume teachers don't know how to do a skill until they've sat through a session, micro-credentials allow educators to submit evidence and receive the micro-credential as soon as they feel ready. This might be helpful in particular for an experienced teacher who wants to pursue the micro-credential immediately. Teachers appreciate that they can both challenge themselves with new skills and receive credit for the things they already do in their classrooms.

However, many teachers also find that there are disadvantages. Micro-credentials reflect more work for teachers than the traditional model of professional learning. They require the time to learn the skill, time to plan to integrate the skill into the classroom, time to record evidence of the skill in use, time to write up and submit the narrative/reflection components, and then waiting time while waiting for feedback from the micro-credential issuer. Then, if the submission is unsuccessful, there is additional time to do the process all over

again. This is all during a time when teachers report feeling overworked and underappreciated (Herman, Rosa, & Reinke, 2017).

Simplicity

Perhaps the barrier is the fact that micro-credentials are so complicated. While the initial idea is easy to explain (many liken micro-credentials to Girl Scout badges), once teachers start interacting with the system surrounding badges it gets very complicated very quickly. The actual process of logging into the system, navigating the resources, curating artifacts, uploading artifacts, and submitting the appropriate documentation is not simple. For many teachers that first submission is very difficult. However, once they have navigated the process one time they tend to have an easier time in the future. That said, the first experience can be quite complex and might deter teachers from adopting micro-credentials in the future.

Compatibility

For some teachers, micro-credentials will be fairly consistent with their past practice whereas for others they will reflect a major shift. The teachers I have interacted with who felt that micro-credentials were compatible with their practice tended to be teachers who led their own professional learning even without receiving recognition. They identified a skill they were interested in learning more about, identified resources and learn about the skill, and created a plan to use that skill in their classroom if it felt like an effective use of instructional time. Micro-credentials add in the need to create a narrative, provide artifacts, and submit evidence of this learning/implementation but the process of self-guided learning is largely the same for these teachers.

There are, however, teachers who rely exclusively on school- and district-provided professional development sessions for their own professional learning. This is, in my experience, a much smaller group. However, they should not be ignored in

understanding the extent to which micro-credentials are compatible with current educator practice.

Adaptability

One of the greatest strengths of micro-credentials is that they can be used in a number of different ways. One school may give educators freedom to choose any micro-credential they wish to pursue whereas another school may elect to focus on one or two sets of skills collectively. Micro-credentials can be entirely self-taught or they can be used to support in-person/traditional professional development workshops. A teacher doesn't have to be in a school doing micro-credentials in order to pursue them, either.

Social Impact

The introduction of micro-credentials does not involve any shifts in school social dynamics or relationships among teachers. It does introduce a new role into the ecosystem: the micro-credential issuer. However, many schools and districts contract with outside professional development providers frequently so, while the issuer exists only virtually, this does not represent a shift in the social structure for most teachers.

Trialability

The ability to try out micro-credentials without consequence is a major advantage of this innovation. Teachers can explore and attempt a micro-credential at any time, in any subject area, with no cost to them other than the time it takes to pull together their materials. Many express that once they've done one, they have interest in doing more. However, this feature is an advantage of micro-credentials as individuals determine whether to adopt them.

Observability

Micro-credentials can be quite visible. They are as visible as the educator who earned them chooses. Some teachers collect micro-credentials and do not share them anywhere – they stay in the teacher's account. Most put the icons representing the micro-credential in their email signature, on their twitter

profiles, or even print the icons off and put them on the door to the teacher's classroom. There isn't yet a standard practice for how to share micro-credentials. As more teachers choose to display these micro-credentials (essentially endorsing them as an innovation), other teachers will become interested.

Using the *Chocolate Model of Change* and *Diffusions of Innovation* as a framework reveals that the shift to micro-credentials is a very complex, multi-layered change for educators. The table below summarizes the characteristics that should expedite/slow down the adoption and then diffusion process. In short, simplicity and compatibility seem to be the biggest barriers to adoption of micro-credentials while adaptability, trialability, and observability are the biggest levers moving forward.

Table 1

Micro-credentials according to the Chocolate Model.

Characteristic	**Lever (+) or Barrier (-)?**
Relative Advantage	+/-
Simplicity	–
Compatibility	–
Adaptability	+
Trialability	+
Observability	+

Using Dormant's scoring guide reveals that this will be a relatively difficult change to implement (to score the innovation, Dormant suggests using a + symbol to indicate whether something is a lever and a – sign to indicate if it is a barrier. A net positive suggests the innovation will be relatively easy to implement).However, with careful planning and a smart application of scale research and improvement science

(Dede, Honan, & Peters, 2005; The Health Foundation, 2011), I believe that micro-credentials can be successfully adopted.

Diffusion of Micro-credentials

Given that micro-credentials reflect a somewhat difficult change, I expect there to be a somewhat slow diffusion and adoption process. There are a number of theoretical frameworks that can be used to understand adoption of innovations (Straub, 2009). Rogers' Diffusion of Innovation (2003) is the seminal work explaining why and how practices diffuse through social systems. Innovation Diffusion Theory (IDT) considers individual adoption as a sub-process of diffusion and describes the five stages individuals go through when they evaluate whether to adopt an innovation (Straub, 2009; Rogers, 2003). The five stages are awareness, persuasion, decision, implementation, and confirmation. Awareness occurs when you learn *of* the innovation, but do not have enough information to make a decision one way or another. You know what micro-credentials *are,* but not enough to gauge whether or not to pursue them. Persuasion occurs when you learn more about the innovation such that you can better determine whether you stand to benefit from adoption. Decisions are made when you have enough information to accept or reject the innovation and either adopt it or continue with your current process. Implementation occurs only after you've decided to accept the innovation and describes the process of incorporating the innovation into your practice. Finally, confirmation occurs after you've experimented with the innovation and you either observe evidence that the innovation is worthwhile and sustain the innovation or opt out.

Rogers (2003) also outlines five variables that determine the rate of adoption: perceived attributes of innovations, type of innovation-decision, communication channels, nature of the

social system, and the extent of change agents' promotion efforts. I consider each of these characteristics in turn in the following section to better understand if and how quickly micro-credentials will be adopted and diffused by educators.

As of January 2016, one survey found that roughly one-third of teachers knew what micro-credentials are. However, once teachers were introduced to the idea, 31% said they are extremely or very likely to try micro-credentials and another 34% reported they are "somewhat interested" (Center for Teaching Quality & Digital Promise, 2016). This suggests that most people are between the awareness and persuasion stages of adoption when it comes to choosing to pursue micro-credentials. Thus, micro-credentials are still early in the diffusion process meaning that they could still either become widespread or fade away. Using Rogers' variables that determine the rate of adoption can help better understand the potential for this innovation and I explain more in the following section (Rogers, 2003).

There are three types of innovation decision processes: optional, collective and authority. Optional decisions are voluntary decisions made by the individual. Collective decisions are optional decisions made by a group. Authoritative decisions are top-down decisions made on behalf of the adopters wherein they receive a mandate to adopt the innovation (Rogers, 2003). Rogers points out that "innovations requiring an individual-optional innovation-decision are generally adopted more rapidly than when an innovation is adopted by an organization" (Rogers, 2003, p.221). Digital Promise, perhaps the leading organization in the field and one of the most prominent change agents, has surveyed both educators and state/local agencies about how they're using micro-credentials. They find that there is a mix of adoption models currently in the micro-credential space. In many cases, educators are coming to micro-credentials on their own, having heard about them through word of mouth. These are the early adopters

who are opting into the innovation. However, there are many cases where principals and district administrators are leading teachers to the micro-credentials, in some cases mandating teachers to complete one or more micro-credentials. In my work with teachers who have been required to complete micro-credentials I have seen a mix of reactions. Some immediately take to micro-credentials, finding the new approach to professional development refreshing, the feedback useful, and they are proud to display their micro-credentials. Others find it frustrating; one purpose of micro-credentials is to allow educators to choose – so why tell them they are mandatory? The success of micro-credentials may depend on who is determining whether to pursue micro-credentials and which to pursue.

Digital Promise hosts more than 250 micro-credentials from prestigious and well-respected organizations across the nation. As a result, Digital Promise has controlled much of the dialogue around micro-credentials. They have employed a variety of communication channels in spreading the word about this innovation. Using the hashtag #love2learn, Digital Promise encourages teachers to share their micro-credential experience via social media. They also use blogs, research, and other types of publication to share micro-credentials. Recently, they've shifted to communicating about micro-credentials to school and district leaders, in addition to individual teachers. This could be problematic for two reasons. First, using more of a targeted marketing strategy rather than spreading via word of mouth has been shown to slow the rate of adoption (Rogers, 2003). Further, by advertising to the school/district administrators the Digital Promise team has added a layer to the decision-making process. Research has shown that the further away from the adopter the decision is made, the slower the rate of adoption (Rogers, 2003, p. 221). However, there has been substantial communication about micro-credentials. Indeed, Digital Promise has partnered with some of the

biggest names in the field of education to get the word out. Both of the national teachers' unions, the National Board of Certified Teachers, and others have joined in promoting micro-credentials. These organizations are able to target their members effectively and give credibility to the movement as well as provide additional sources of communication. While the communication strategy leverages mass media which is less effective, it also involves interpersonal communication and trusted organizations that teachers turn to for recommendations.

The social system micro-credentials are trying to spread into is very diffuse. While teachers within schools are very interconnected, teachers across schools, districts, and states are less connected and are inconsistently organized. There are some organizations that connect educators across schools although it appears that the school is the organizational unit micro-credentials need to infiltrate. There are exceptions to this rule, however. The National Board for Certified Teachers has a fairly substantial number of member teachers who are engaging in micro-credentials and sharing their work nationwide; still, this organization is only one and it already has a great deal of social capital across state lines.

Finally, Rogers's (2003) model considers the extent of the change agents' promotion efforts as it affects the rate of adoption. If Digital Promise is the change agent in this model then the effort they have put in is tremendous. They have received major grants from the Hewlett Foundation, the Gates Foundation, and the Carnegie Corporation to build this work and effectively disseminate it. In just two years they have created and/or curated more than 250 micro-credentials and gotten thousands of educators from across the nation to engage with their platform. This is a major asset for increasing the rate of adoption.

The analysis above reveals that micro-credentials exhibit some characteristics that will expedite the rate of adoption by

individual teachers (and, therefore diffusion nationwide) and others that will slow it down. Levers include relative advantage, adaptability, trialability, and observability and barriers include relative advantage, simplicity, and compatibility. However, most of the variables described in Rogers's model highlight the fact that micro-credentials will likely continue to spread at a somewhat rapid pace. There are some elements that may result in some moderate slowing, including the type of innovation decision being pushed up to school/district administrators and the nature of the social system. However other variables suggest that there will be a quicker adoption process.

Conclusion

Micro-credentials reflect a major change for educators, the adopters, in how they engage with professional learning. Not only are they a new format for teacher professional development, they also reflect a major shift in philosophy of professional development from rewarding teachers for time and toward rewarding teachers for demonstrated skill.

- To what extent are micro-credentials an innovation?
- Are micro-credentials a promising innovation?
- What variables might affect the rate of adoption of micro-credentials?

The Chocolate Model of Change and IDT help illustrate that micro-credentials are an innovation that reflect a complex change that is somewhat promising. There are some major relative advantages for teachers: micro-credentials are highly adaptable, triable, and observable but micro-credentials are also very complex and somewhat incompatible with current professional development approaches.

Still, the research shows that the rate of adoption may be somewhat fast for micro-credentials. The type of innovation-decision process is widely varied and the social system is very diffuse but the communication channels and the extent of change agents' promotion efforts are strengths for micro-credentials.

Some of the biggest, most prominent names in the field are promoting and exploring micro-credentials. These groups should consider the various factors that can speed up or slow down adoption of this innovation as they strive to diffuse micro-credentials. Notably, moving the decision to adopt as close to the adopter as possible is critical. Aligning the communication channels and supports to reflect that is a major area of improvement organizations should consider.

Currently many educators are in the persuasion phase of adopting micro-credentials. This would suggest that there is still much potential growth for micro-credentials. Research into their effectiveness and continuing to better understand if and how they spread would be a worthwhile investment of time and resources for those pursuing this work.

References

Acree, L. (2016). *Seven lessons learned from implementing micro-credentials*. Retrieved from http://www.fi.ncsu.edu/wp-content/uploads/2016/02/microcredentials.pdf

Acree, L. & Hervey, L. (2015). *Personalizing professional learning with digital badges*. The Friday Institute for Educational Innovation. Retrieved from http://www.fi.ncsu.edu/wp-content/uploads/2015/03/badges1.pdf

Darling-Hammond, L., Wei, R., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the united states and abroad*. Retrieved

from https://learningforward.org/docs/default-source/pdf/nsdcstudy2009.pdf

Davidson, D. & Goldberg, D. (2009). *The John D. & Catherine T. MacArthur foundation reports on digital media and learning: The future of learning institutions in a digital age*. Cambridge, Massachusetts: MIT Press.

Dede, C., Honan, J., & Peters, L. (Eds.). (2005). *Scaling Up Success: Lessons Learned from Technology-Based Educational Improvement*. New York: Jossey-Bass.

Garet, M., Porter, A., Desimone, L., Birman, B., Yoon, K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945.

The Health Foundation (2011). *Evidence scan: Improvement science*. Retrieved from http://www.health.org.uk/sites/health/files/ImprovementScience.pdf

Herman, K., Hickmon-Rosa, J., & Reinke, W. (2017). Empirically derived profiles of teacher stress, burnout, self-efficacy, and coping and associated student outcomes. *Journal of Positive Behavior Interventions, 20(2), 90-100.*

Joyce, B., & Showers, B. (Ed.). (2002). *Designing training and peer coaching: Our needs for learning*. VA: Association for Supervision and Curriculum Development.

Louis, K., Leithwood, K., Wahlstrom, K., Anderson, S., Michlin, M., Mascall, B., Gordon, M., Strauss, T., Thomas, E., Moore, S. (2010). *Learning from leadership: Investigating the links to improved student learning*. Retrieved from http://www.wallacefoundation.org/knowledge-center/Documents/Investigating-the-Links-to-Improved-Student-Learning.pdf

Sykes, G. & Wilson, S. (forthcoming). *Micro-credentials for educator: Research to inform and interrogate an innovation.*

Straub, E. (2009). Understanding technology adoption: Theory and future directions for informal learning. *Review of Educational Research, 79*(2), 625-649.

The Alliance for Excellent Education. (2013). *Expanding education and workforce opportunities through digital badges*. The Alliance for Excellent Education and the Mozilla Foundation. Retrieved from http://all4ed.org/wp-content/uploads/2013/09/DigitalBadges.pdf

Thomas, D. and Brown, J.S. (2012) Cultivating the Imagination in a World of Constant Change, Forum Futures, *Forum for the Future of Higher Education*.

TNTP. (2015). *The mirage: Confronting the hard truth about our quest for teacher development*. Retrieved from https://tntp.org/assets/documents/TNTP-Mirage_2015.pdf

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5. The Evolution and Diffusion of Learning Management Systems: The Case of Canvas LMS

By Caglar Sulun

Introduction

Learning management systems are actively used by instructors, students, and institutions in order to provide better learning environments for teaching, learning, and administration in higher education. This e-book chapter explores Learning Management Systems (specifically the Canvas LMS) with the support of recent technologies, new design criteria and essentials of 21st-century course delivery. The chapter firstly focuses on the history of course delivery, the transition process to digital course delivery, and the history of learning management systems. Next, this chapter explains the current use of learning management systems and trends in the LMS market share (a specific case: Canvas LMS), and the next generations of learning management systems. Finally, this chapter explains the process of the adoption and diffusion of learning management systems in higher education and how such adoption influences course design.

The Evolution and Diffusion of Computers in Education

Nowadays, computers are being used in all areas of our lives and the use of the Internet in courses is increasing. The interaction between the teacher, the student and the course material is often facilitated or supplemented by the Internet in these courses. Due to the use of technological tools and the Internet, greater continuity in education can be ensured and the connections between both individuals and the course materials can be strengthened in the online environments of the digital revolution.

Learning Management Systems

There are several definitions for learning management systems in the scholarly literature of educational technologies. Based on the basic description by Ellis (2009) in *Field Guide to Learning Management Systems*, an LMS can be defined as a dashboard or web-based platform that enables instructors to plan, evaluate, automate administration, report training events and implement the learning process (Ellis, 2009). In addition to this brief definition of LMS, the author includes a list explaining what a robust LMS is able to assist with: automating administration, using self-services, conveying the learning materials, including scalable web-based platforms, portability and standards, and personalizing the learning content in order to use it again (Ellis, 2009). In other words, an instructor, using any type of LMS, should be able to prepare and manage the educational content in electronic format, as well as allow the learner to use the course materials and participate in their performance. Additionally, a LMS can provide support for instructors to use the curriculum to achieve learning goals,

plan class activities for course delivery, as well as to monitor, analyze and report student participation. From the standpoint of students, an LMS can help them to plan the process of their learning according to their individual progress, communicate with their friends and classmates, and collaborate together on the assigned tasks.

The history of Course Delivery

Integrating technological devices, like computers, into the educational process has been done in various ways at different times in the fields of education under distinct yet similar teaching approaches: Computer Based Instruction (CBI), Computer Assisted Instruction (CAI), Computer Assisted Learning (CBL), and Internet-Based Learning (IBL) (Ozan, 2008). Since the features of technological devices used in education have evolved over time (for example, the switching from overhead projectors to smartboards), these changes have also affected the adoption and diffusion of those devices throughout the history of educational technology. Because these teaching approaches had a widespread rate of adoption, the adoption period has led to new definitions for teaching and learning approaches in curriculum. Before the Internet was commonly used in education, the curriculum was named CBI or CAI because the focus for these types of curricula was on using computers only in the classroom rather than using the Internet for distance education. Educators started to realize the benefits of the Internet, such as fewer limitations of time and distance. Additionally, the perceived attributes of using innovation through the Internet was growing, so educators started to think about how to utilize these formats more widely for the purposes of teaching and learning. As a result, this realization by educators led to significant changes in curriculum design. The teaching and learning approaches used

were also renamed in the courses as the technology used in classes changed.

Furthermore, these changes that disseminated the benefits of incorporating Internet use at various levels of the education system have led to the development and transformation of the learning management systems, which serve to facilitate the administration of educational content and the monitoring of learners and teachers.

The Transition Process to Digital Course Delivery

As mentioned earlier in this chapter, courses of higher education have been offered in different ways throughout the history of educational technology. Before moving to computer- and Internet-assisted learning environments, course delivery was often limited to being offered only in the classroom. Now, course delivery has been diffused widely to other platforms or places (such as attending an online course from a different country) by means of the Internet. Especially with the spread of distance education, the necessity for instructors and students to share the same environment, the same time-zone, and the same working hours has started to diminish. Technology offered a new option for teaching and learning to take place at any time and from any place, provided that these activities are kept within a specific platform called a learning management system.

The History of Learning Management Systems

The history of the use of learning management systems in

education dates back a few decades. Learning management systems were first introduced in the late 1990s, and their adoption has been accelerated by the development of multimedia and the expansion of the Internet (Coates, James, & Baldwin, 2005). With each passing day, these systems become even more developed and are adopted by many universities around the world. In the first stages of their expanding use, there was no common name for these systems as there is today. They were referred to as learning platforms, distributed learning systems (DLS), course management systems (CMS), content management systems (CMS), portals, instructional management systems (IMS), and finally learning management systems (LMS) (Coll, 2015). Their main purpose was to facilitate the design of course arrangements, delivery of course content and learning tools, and management of course processes in asynchronous and synchronous learning environments. Since different course delivery methods have been created by diverse populations in various universities around the world, there arose a need for guidelines and standards for creating and developing LMSs. Therefore, some standards and models were designed for course management systems such as the Instructional Management System Standards (IMS 2003) and Sharable Content Object Reference Model (SCORM 2003) by the Advanced Distributed Learning community (Coates, James, & Baldwin, 2005).

Since learning management systems have now been developed by multiple groups and have various features differing from each other, one fixed general model for all LMSs may not include all the features of different systems. Thus, a typical LMS has not been identified to define the essentials for a learning management system. However, there have been common features across LMSs: asynchronous and synchronous communication, content development and management, formative and summative assessment, and classroom and student management (Kabassi et al., 2016). Moodle, an online

open-source course management system, is one example of an LMS that has been developed by the different groups mentioned previously. Moodle has released Dougiamas and Taylor's studies about creating successful open source development and Internet software development (Dougiamas & Taylor, 2003).

The Need for Learning Management Systems

From the past to the present day, researchers have studied how to expand education beyond the limitations of time and place. Both letters and books in distance education and videotapes have been used to generate location-independent educational environments. In this way, new ideas have been developed by researchers for open learning. The rapid change in the Internet and technological tools has naturally affected the structure in course design. LMSs have also begun to develop in multi-dimensional ways along with the use of the Internet in courses. When LMSs were first used in classes, the purpose was to share the main content of the courses; since then, they have become increasingly more comprehensive by incorporating traditional classroom activities into those learning management systems. The most commonly used features of LMSs include checking participation, quizzes, examinations, and discussions, and these features are starting to be used in online settings through Internet (Paulsen, 2003). The rapid increase in Internet technologies and computer technology has caused people to become intertwined with media elements. These media elements, which are used in almost every field, have also penetrated into education. Both visual and auditory elements have begun to be used in course content which led to the inclusion of these elements in LMSs.

There is one essential advantage of using learning management systems: students, teachers and administrators can contribute and work together. Because of this advantage, LMSs have become more attractive for collaborative educational activities. Another important advantage of learning management systems is to keep track of all activities in courses including sharing course-related resources, conversations in discussion portals, and the progress of the course and students. Last but not least, another objective of learning management systems is to be used for course management in both traditional in-class education and distance education. Today, learning management systems are used for both synchronous and asynchronous delivery methods in educational settings. Additionally, LMSs have been used in the following different course types and course delivery types such as, Lecture, lab, lecture and lab, practicum. Course Delivery Types: Synchronous, Asynchronous, Hybrid.

Although there are many definitions about learning management systems by different researchers in the literature, there are only a few studies that include the definition of a well-designed LMS. One of those definitions, which is by Ellis (2009), is the most inclusive, explaining that learning management systems are computer software that perform management, monitoring and reporting related to teaching and learning activities. According to Ellis (2009), a well-designed LMS should:

- centralize and control management processes,
- be able to do self-service (registration to classes etc.) and use guided services,
- help to create and distribute learning content quickly,
- secure learning activities through scalable web-based platforms,
- support educational standards,
- allow users to create personalized and reusable content,
- be able to work in an integrated manner with other

institutional practices.

Canvas LMS

Next, we will review a particular case of a learning management system called Canvas. Canvas is built on modern web frameworks for use on computers, smartphones and mobile devices. The Canvas LMS user interface is well-designed for both instructors and students and allows the use of different technological systems on their own. There are some features that distinguish Canvas from other LMSs which has many options that enable it to interoperate with open source application programs developed by trusted resources in the area of education. For example, it allows instructors to integrate Google Docs, which is used for productive and collaborative projects in education (Kandemir, 2013). By using such leading educational resources that facilitate collaboration and allow changes to be instantly saved, the limits of teaching and learning can be further extended.

Instructure, the creator of Canvas, was founded in 2008 by two graduate students from Brigham Young University, Brian Whitmer and Devlin Daley (Instructure, 2018). In 2011, Canvas was developed as a new generation learning management system built to work on cloud computing and virtualization environments by Instructure.

Here are some quick facts from the company's website (Instructure, 2018):

- Founded in 2008
- Launched Canvas in 2011
- Launched Canvas Network in 2012
- 1,100+ employees
- Used by more than 3,000 universities, school districts, and institutions around the world

- Selected by Cisco Networking Academy to power “the world’s largest classroom”

Current Use of Learning Management Systems

Learning Management Systems are continuously used by institutions in order to provide a better learning environment. *Edutechnica*, a diversified data services company, has created annual reports about learning management systems since 2014. The company annually reports current LMSs in the market and LMS usage statistics. According to *Edutechnica* annual reports from 2013 to 2018, 2,835 institutions in higher education were using some type of learning management systems for facilitating blended and online courses. ANGEL, Blackboard Learn, Canvas, Desire2Learn, Moodle and Pearson are most commonly used LMSs in higher education institutions (Figure 1).

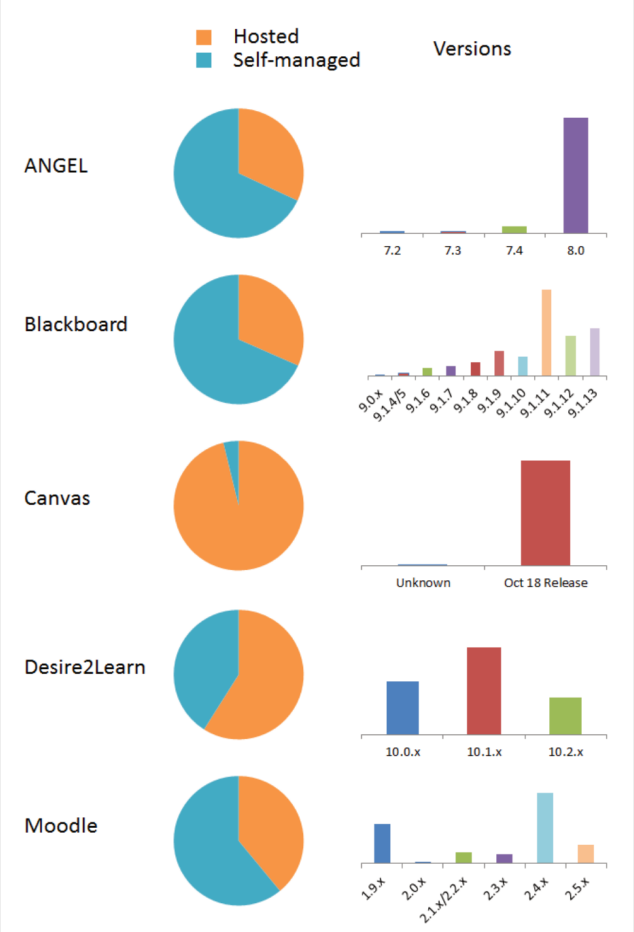


Figure 1- LMS usage by hosting management in 2013 (image from: https://edutechnica.com/2013/10/26/lms-by-the-numbers).

Tables 1 and 2 show the growth of LMS usage among different institutions in 2014 and 2017 in terms of enrollments.

Table 1

Spring 2014 LMS usage statistics for US higher education, greater than 1,000 FTE (image source: https://edutechnica.com/2014/05/26/lms-by-the-numbers-spring-2014-updates).

	ANGEL	BbLearn	Canvas	D2L	Moodle	Sakai	Other
Institutions	180	1030	258	272	566	116	413
	6.3%	35.8%	9.0%	9.5%	19.7%	4.0%	14.4%
Enrollments	989,922	7,619,598	2,204,231	2,154,285	2,820,549	1,114,403	2,135,602
	5.8%	44.6%	12.9%	12.6%	16.5%	6.5%	12.5%
Average Size	5500	7398	8577	7920	4983	9607	5171
Median Size	3735	4336	4709	5027	2352	4885	1986

Table 2

Spring 2017 LMS usage statistics for US higher education, greater than 500 FTE students (image source: https://edutechnica.com/2017/03/12/lms-data-spring-2017-updates).

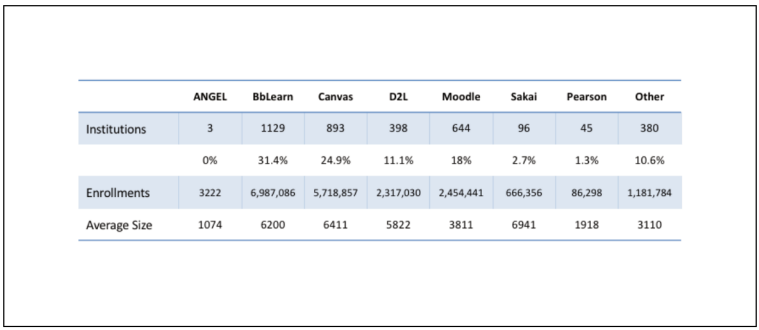
	ANGEL	BbLearn	Canvas	D2L	Moodle	Sakai	Pearson	Other	None
Institutions	34	1185	713	360	678	107	105	494	252
	1%	33%	19.8%	10%	18.9%	3%	2.9%	13.7%	7%
Enrollments	124,679	7,383,086	4,773,367	2,314,816	2,611,762	757,643	353,688	1,420,744	248,488
	0.7%	43.5%	28.1%	13.6%	15.4%	4.5%	2.1%	8.4%	1.5%
Average Size	3667	6246	6704	6430	3852	7081	3368	2876	990
Median Size	1597	3365	3295	3568	1899	2828	1022	1001	722

According to Edutechnica's Spring 2018 update of LMS market share data (as shown in Table 3), there are mainly seven LMSs, with the exception of a few others, used by faculty in all

accredited higher education institutions (over 3500 schools) in the United States with greater than 500 full-time equivalent students. The update reports that over 3500 institutions in higher education are using some type of learning management systems for facilitating blended and online courses. ANGEL, Blackboard Learn, Canvas, Desire2Learn, Moodle, and Pearson and Sakai are most commonly used LMSs by both faculty and students in higher education institutions. Furthermore, Canvas is one of the most popular learning management systems in the United States with greater than 500 full-time equivalent students.

Table 3

Spring 2018 LMS usage statistics for US higher education, greater than 500 FTE students (image source: https://edutechnica.com/2018/03/04/lms-data-spring-2018-updates)



	ANGEL	BbLearn	Canvas	D2L	Moodle	Sakai	Pearson	Other
Institutions	3	1129	893	398	644	96	45	380
	0%	31.4%	24.9%	11.1%	18%	2.7%	1.3%	10.6%
Enrollments	3222	6,987,086	5,718,857	2,317,030	2,454,441	666,356	86,298	1,181,784
Average Size	1074	6200	6411	5822	3811	6941	1918	3110

Canvas' Differences from Other Learning Management Systems

Compared to other LMSs, Canvas has unusually increased its usage by institutions with a high number of adoption rates when previous years are taken into account in the comparison of the tables above. Since Canvas' modern framework was

created for both computers and mobile devices, such as tables and smartphones, using Canvas with different devices was an important adaptation for early adopters in terms of flexibility. According to Edutechnica Report in 2015, the user interface of Canvas for both instructors and students has well-designed elements that are easy to access, understand, and use when facilitating educational activities in the learning management systems. Another reason why Canvas obtained higher market share in educational software was that it allows instructors to integrate trusted third-party applications such as Google Docs, which is used for productive and collaborative projects in education. According to the "About Us" section of Canvas' website (2018), the Canvas Network provides a platform that is designed for students, instructors and institutions in order to utilize some features of Canvas for professional development and academic inquiry worldwide. Since Canvas allows its users to collaborate on the same document simultaneously and save instant changes, it has been adopted more easily by teachers and students.

The Future of the Learning Management Systems

An improved and simplified technology integration may include multiple devices, allowing both instructors and students to make multimedia presentations, share, and collect data for projects with high level technology integration. There will be some key points in the future of the LMSs such as interoperability, automation, personalized learning, and collaboration.

Interoperability is the tendency for LMSs in order to be able to aggregate, integrate, and analyze student learning data (Brown, Dehoney, & Millichap, 2015).

The Society for Learning Analytics Research (SoLAR, 2011) describes learning analytics as the measurement, data collection, data analysis, and reporting of data about learners and their contexts. Automated and advanced learning analytics might be used for educational purposes in the future of learning management systems.

Personalized learning methods are increasingly being used in the field of education (Abbott et al., 2014). As individual differences are considered, a more complete learning experience is likely to result from this personalized learning. The new educational technologies like learning analytics may allow personalized learning methods to be used in learning management systems.

Since collaborative tools were key elements in why the Canvas LMS was successfully adopted, future LMSs should also focus on teacher-teacher, student-student, and teacher-student collaboration within courses at multiple levels. Future LMSs might interactively adopt Virtual Reality and Augmented Reality especially in online courses in order to establish more realistic and applicable solutions for educational contexts. Instant and automated feedback might be used in future LMSs, because this feedback is very important for enabling students to know the extent to which they achieve their target achievements, what they are missing, and what resources they need to reach after getting in-app feedback.

In Conclusion

In the previous few decades, some institutions and universities wanted to widely use computers in their organizational structure to adopt technological changes. Using technological tools reduces the workload for both instructors and institutions and contributes to having enhanced and more successful management in education. These changes in technology have

led to new developments and opportunities in the field of education. Thus, online learning management has been used in multiple ways in the field of education, such as class enrollment, delivering content, course management, evaluation, reporting and data storage. Online learning platforms have disseminated education to a global level. Since most of the course contents are transferred to the learning management systems, this allows more time for activities and collaboration between student-student and student-instructor interaction not only in classroom activities, but also on online discussion boards.

Since Learning Management Systems are becoming more and more indispensable in education, LMSs will continue to be increasingly used for improving the quality of teaching and learning in higher education. Since LMSs will be unavoidable tools in the near future, it is very important to select a suitable LMS in higher education institutions to improve teacher and staff education when it comes to keeping up with the modern innovations. As a result, according to the summary report in 2017 that was published by the Center for Educational Innovation at the University of Buffalo, many universities are trying to implement or regulate LMS subscriptions for the next few years.

References

Abbott, J., Basham, J., Nordmark, S., Schneiderman, M., Umpstead, B., Walter, K., & Wolf, M. (2014). Technology-enabled personalized learning: Findings & recommendations to accelerate implementation. *NC State University Summit on Personalized Learning*. Retrieved from http://www.fi.ncsu.edu/wp-content/uploads/2014/02/TEPLS_report-FINAL-051415.pdf

Brown, M., Dehoney, J., & Millichap, N. (2015). The Next Generation Digital Learning Environment. A Report on

Research. *Educause Learning Initiative paper*. Retrieved from https://www.digitallernen.ch//wp-content/uploads/2016/02/eli3035.pdf

Canvas Network. (2018). About Us. *Canvas Network*. Retrieved from https://info.canvas.net/

Coates, H., James, R., & Baldwin, G. (2005). A critical examination of the effects of learning management systems on university teaching and learning. *Tertiary Education & Management, 11*(1), 19-36.

Coll, S. D. (2015). Enhancing Students' Learning Experiences Outside School (LEOS) Using Digital Technologies (Doctoral dissertation). Curtin University.

Dougiamas, M., & Taylor, P. C. (2003). Moodle: Using learning communities to create an open source course management system. *Proceedings of the EDMEDIA 2003 Conference, Honolulu, HI*. Retrieved from http://dougiamas.com/writing/edmedia2003/

Edutechnica. (2014). LMSs by the numbers – Spring 2014 updates. *Edutechnica: EdTech Talk and Analysis*. Retrieved from https://edutechnica.com/2014/05/26/lms-by-the-numbers-spring-2014-updates

Edutechnica. (2017). LMS data – Spring 2017 updates. *Edutechnica: EdTech Talk and Analysis*. Retrieved from https://edutechnica.com/2017/03/12/lms-data-spring-2017-updates

Edutechnica. (2018). LMS data – Spring 2018 updates. *Edutechnica: EdTech Talk and Analysis*. Retrieved from https://edutechnica.com/2018/03/04/lms-data-spring-2018-updates

Ellis, R.K. (2009). *Learning management systems*. Alexandria, VA: American Society for Training & Development. Ellis, R.K. (2009). *A field guide to learning management systems*. Alexandria, VA: American

Society for Training & Development. Retrieved

from http://web.csulb.edu/~arezaei/ETEC551/web/LMS_fieldguide_20091.pdf

Instructure. (2018). Our Story. *Canvas Learning Management System*. Retrieved from: https://www.canvaslms.com/about-us

Kabassi, K., Dragonas, I., Ntouzevits, A., Pomonis, T., Papastathopoulos, G., & Vozaitis, Y. (2016). Evaluating a learning management system for blended learning in Greek higher education. *Springer Plus, 5*(1), 1–12.

Kandemir, C.M. (2013). Bulut tabanlı öğrenme yönetim sistemi: Canvas, ITTES 2013. *1st International Instructional Technologies & Teacher Education Symposium* (pp. 386-392). Trabzon: Karadeniz Technical University.

Ozan, O. (2008). Öğrenme Yönetim Sistemlerinin (Learning Management Systems- LMS) Değerlendirilmesi, XIII. Türkiye'de İnternet Konferansı, 2008, Orta Doğu Teknik Üniversitesi – Ankara.

Paulsen, M. F. (2003). Experiences with learning management systems in 113 European institutions. *Educational Technology & Society, 6*(4), 134-148.

Society for Learning Analytics Research. (2011). Open Learning Analytics: an integrated & modularized platform [Concept paper]. Retrieved from http://solaresearch.org/wp-content/uploads/2011/12/OpenLearningAnalytics.pdf

Center for Educational Innovation (2017). *Trends and the Future of Learning Management Systems (LMSs) in Higher Education*. Retrieved from http://www.buffalo.edu/ubcei/innovation/cei-reports.html

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