Re-Imaging Learning Environments
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DIGITAL LEARNING IN HIGHER EDUCATION – "LESSONS FROM AMERICA"

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Introduction

The U.S. is the undisputed leader in digital (online and distance) higher education. 5.8 million students are taking at least one digital course, and some 2.7 million higher education students are studying exclusively via digital. Furthermore, growth in digital learning continues, even as higher education enrolments overall are declining (Allen et al., 2016; NCES, 2014; Ginder et al., 2015). What can European higher education institutions learn from this U.S. experience? In this research the author focuses on; the drivers of growth in digital learning, impact on learning outcomes, and institutional costs.

This research grew out of a 2014 academic sabbatical held in the U.S. In-depth face-to-face interviews were completed with 85 experts (institutional leaders, faculty, instructional designers-technologists, open educational resource experts, librarians, consultants, analytics experts and learning managers). Institutions represented included; 11 research universities, and 28 universities/community colleges (public, private, not-for-profit, and for-profit). In addition, educational consultancies and MOOC providers (Coursera) were involved. 35 video interviews were produced (plus transcripts) to complement the empirical research. That supplementary material was made freely available online (Online learning in Higher Education, n.d).

For the purpose of this paper, digital learning involves courses and programs offered as a normal part of higher educational institutions programs. Digital courses have at least 80% of their course content delivered online (Allen et al., 2016).

Digital enrolments in U.S. Higher Education

> *"Online learning is far more efficient and effective in allowing access. Furthermore, early participation in online learning and distance education predicts higher rates of degree attainment, even when self-selection bias is controlled for" P. Shea (SUNY, Albany).*

Digital higher education enrolments in the U.S. are growing faster than higher education enrolments as a whole. Digital enrolments account for 3/4 of the total growth in higher education, and 13% of all higher education students are exclusively enrolled in digital courses (see Table 1). The overall growth rate for digital enrolments is approaching +4% per annum

(Allen et al., 2016; NCES, 2014; Ginder et al., 2015). By comparison, traditional enrolments are declining, which may represent a challenge for the continued sustainability of some institutions (Cota et al., 2011).

Table 1: Higher Education Exclusive (100%) Digital Enrolments 2013

Category	Exclusive Enrolments	% Total Enrolments
Public	1,282,863	8.7%
Private (non-profit)	520,594	13.1%
Private (for-profit)	856,269	51.7%
Enrolments	*2,669228*	*13.1%*
Undergraduate	1,974,656	11.3%
Graduate	675,922	23.3%

(Allen et al., 2016; NCES, 2014). Online Report Card (2014) and Enrolment in Distance Education (2015)

Despite the impressive growth in digital enrolments however, many remain sceptical about comparative academic performance, retention rates, completion rates, and the overall quality of digital learning (learning outcomes). Furthermore, digital adoption barriers (primarily due to faculty resistance) remain a concern for institutional leadership (Allen et al., 2016). However, despite these concerns, many view digital modalities as a means to increase access to higher education, and to redress the prohibitively high cost of higher education.

Research themes

Multiple forces are at play within U.S. Higher Education (some of which are unique to that market). These forces have contributed significantly to the growth of digital learning. Therefore, a holistic empirical methodology was employed in this research, encompassing seven different contexts:

- Student Learning Outcomes, Institutional Policies (including costs), Teaching Experiences, Instructional Design/Technology, Open Educational Resources (OER), The Role of Libraries, and Competency Based Education.

For the purpose of this paper, the author will focus only on the primary drivers of growth in digital learning, the student learning outcomes, and finally institutional-level impact (costs).

Digital drivers of growth in U.S. Higher Education

Before reviewing the findings on learning outcomes, and institutional-level impact (costs), it is important to define the primary drivers which are impacting U.S. Higher Education, and contributing to the growth of digital learning (see Table 1). The author has determined that three dominant drivers are at play (demographic, economic and competitive). Furthermore, each of these primary drivers is exhibiting unfavourable sub-conditions. In fact, there are simultaneously three or more unfavourable sub-conditions occurring within each of the dominant drivers. The dominant drivers and sub-drivers are:

- Demographic: Declining target-population + flattening graduation rates + stagnant immediate-transition-to-college rates (WICHE, 2013; U.S. Census Bureau, 2015; Kena

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et al., 2015). The traditional target-population (high school students) is declining in numbers. In addition, high school graduation rates have peaked. Furthermore, the Immediate-Transition-To-College rate is stagnant (+1%). Therefore, higher education institutions are struggling to achieve sustainable levels of growth (+3.5% annual enrolment rate according to McKinsey).

- Economic: Increasing tuition costs + rising student debt + decreasing public funding (Ma et al., 2015; SHEEO, 2015). Tuition and textbook cost increases have outpaced inflation for decades. Tuition inflation combined with sky rocketing student debt ($30,000 per student and $1.16 trillion +10%), along with decreasing public funding for higher education, have created fragile market conditions. Therefore, higher education has become prohibitively expensive for a broad range of the population.
- Competitive: Declining enrolments + new entrants + disruptive innovation (Allen et al., 2015). Enrolments are declining however; for-profit institutions continue to enter the market. In 2013-14 the for-profit sector awarded 16% of all associate, 7% of bachelor's, and 9% of graduate degrees (College Board, 2015). Furthermore, enabling technologies (digital plus other modalities) are disrupting legacy delivery mode.

Table 2: Drivers of U.S. Higher Education and Digital Learning

DEMOGRAPHIC	ECONOMIC	COMPETITIVE
Population Growth	*Costs*	*College Enrolments*
-1.0% for under 18's	Tuition/Textbook +3%	(declining)
Under 25's	*Student debt*	*Completion Rates*
60% of all students (saturated)	1.16 trillion (+10%)	(40% in four years & 60% in six years)
High School Graduation Rates	*Students Working*	*Under-served Markets*
(80% – saturated)	80% study & work	Adult, military etc.
College Transition Rate	*Public Edu. Funding*	*For-profit Institutions*
66% (+1%)	-50% in past 14 yrs.	8% enrolments 51% digital
Ageing Population	*Performance-based Funding*	*Disruptive Innovations*
Growth of over 65's	25 States have or plan	MOOCs, OER, Analytics

The above drivers have contributed significantly to growth in digital higher education enrolment rates, and are expected to do so in the near future.

Learning outcomes

Learning outcomes are a highly contentious topic within U.S. higher education (Jaggars & Xu, 2011; Jaggars, Edgecombe, & Stacey, 2013; Shea & Bidjerano, 2014; Lokken & Mullins, 2015). Up to recently, outcomes were primarily driven by a necessity to meet accreditation standards. However, a more substantive application of outcome assessments at the program and course levels is currently on the agenda within many institutions. However, there are numerous learning outcome criteria which can be deployed/measured (see Table 3), and those criteria are often institutional, program, and course-specific (Kuh et al., 2015; Kuh et al., 2014; Koedinger et al., 2012; van der Kleij, Feskens, & Eggen, 2015).

Table 3: Learning Outputs, Outcomes, Assessment and Validation

Learning Outputs	Learning	Assessment	Validation

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Outcomes			
Access, Persistence, Retention Rates, Additional Enrolments, Time-to-Completion, Graduation Rates	Skills, Competencies, Abilities, Workplace Readiness, Employability	Evidence-based, Formative (low stakes), Summative (high stakes), Learning Objectives, e-Portfolios (artefacts), Pre and Post Assessments	Analytics, Benchmarking, National Testing, Faculty Focus Groups, Qualitative Criteria (faculty-driven)
Certifications, Student Feedback, Job Placements	Ownership of Learning	Self-grading, Learner-centred Assessment, Gamification, Adaptive Learning	Councils, External Experts
Teacher/student Ratios, Research Output	Satisfaction, Experiences	Define Optimum Student Profile (contextual), Engagement Levels, Problem-based, Enquiry-based	Information Systems, Analytics (time online, engagement etc.)
Cost, Tuition Increases/decreases, Broader Societal Impact	Opportunity Costs	Minimize Duplication, Forced Concept Inventory, Cognitive Tutor Authoring Tools, Critical Thinking Inventory	Separation of Teaching & Assessment, Knowledge-Learning-Instruction Framework (KLI)

The Lumina Foundation Degree Qualification Profile of standards for validation of learning outcomes was a framework being employed by many institutions interviewed in this research (Lumina Foundation, 2014). According to those guidelines, learning outcomes should distinguish between; generic, specific, basic, transferable and non-transferable skills (different kinds of knowledge and understanding), and should be specifiable in outcomes and available for objective assessment.

> *"Taking a careful design approach with a focus on improvement…can be a very powerful tool in the hands of instructors" N. Bier (Carnegie Mellon University)*

The use of assessment evidence is increasing within U.S. digital learning, although it is not pervasive (guiding institutional actions to improve student outcomes), and is currently driven by accreditation requirements (Kuh et al., 2015; Kuh et al., 2014). However, a more purposeful use of student learning outcomes in decision making has the potential to enhance academic quality and institutional effectiveness. This will require a shift from a culture of compliance to a culture of evidence-based decision making (policies and practices informed and evaluated by measurable impact on student learning and success. Despite these shortcomings, many of the output and outcome assessments for digital learning have been shown to be more favourable, with the exception of academic performance i.e. grades (Shea & Bidjerano, 2014).

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Validation of learning outcomes

> *"Are the types of students who should take online courses different from students taking brick-and-mortar courses?" E. Bettinger (Stanford University)*

According to experts interviewed in this research, digital learning has received a disproportionate amount of scrutiny with regards to learning outcomes. As a result of this scrutiny, the subject of learning outcomes continues to be a research priority (Kuh et al., 2015; Kuh et al., 2014). However, rather than delving further into this highly contentious area, for the purpose of this research the author has focused on what might be the optimal instructional design framework (including assessments), which can best support the achievement of desired learning outcomes. Based on the extensive interviews made with faculty and instructional designers during the research, the following framework was constructed.

Proposed Instructional design framework

1. Define Outcomes: Establish learning objectives (student-centred), sub-skills (measureable, actionable, and 3rd. party verification).
2. Create Student Activities: The activities should support learning outcomes (active tasks, examples, assessments, feedback, help etc.).
3. Design Analytics: Measure interactions (low-stakes, high-stakes, aggregate, individual etc.).
4. Construct Learning Environment: A team effort involving; faculty, instructional designers, and instructional technologists.
5. Implement Analytics and Dashboard: A user-friendly and effective instructor tool to link performance with learning objectives (aggregate + subskills).
6. Provide Faculty Training: Peer-to-Peer consultation, Webinars, dashboard/technology orientation, and instructional design consulting.

More effort needs to be directed towards measuring quality of evidence. Furthermore, there is an increasing interest in defining more precisely; who is the optimum student that can benefit the most from digital learning? Comparisons of students in much of the current research have not accounted for (natural experiments and A/B experiments) the necessary variation (Kuh et al., 2015; Kuh et al., 2014).

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Institutional level impact (costs)

Throughout this research, the author raised the issue of costs saving attributed to digital learning. U.S. higher education costs per student have risen faster than inflation for decades. Average full time tuition was $9,410 in 2015-2016 (+2.9% on previous year before adjusting for inflation). Furthermore, digital learning is regarded as the best hope for cost-savings (Figure 1), based on the projected reduction in labour costs, scale economies due to larger class size and less face-to-face interaction (Lumina Foundation, 2014; Bakia et al., 2012; Deming et al., 2015; Hollands, 2011). However, during this research, costs data was hard to extract from the institutions interviewed, and in many cases there was an admission that costs are very hard to define. Furthermore, the impression was given that the reduction in costs was not the primary objective for those institutions pursuing digital learning initiatives (increasing revenue through enrolments, improving learning outcomes, and supporting the market attractiveness of institutions were cited more frequently).

However, research findings (Bakia et al., 2012) do suggest that institutions with more online students can charge lower prices (due to economies of scale, increased teacher/student ratios, productivity gains, elimination of duplication, increases in adjunct faculty etc.). For public sector institutions (the largest population of enrolled students), a 10 percent (1 standard deviation) increase in the share of students taking all courses in a digital mode, has been associated with a decline in prices of about 1.4 percent. Furthermore, 60% of Chief Academic Officers have indicated that the costs per degree for digital delivery modes are better that brick-and-mortar (Allen et al., 2016).

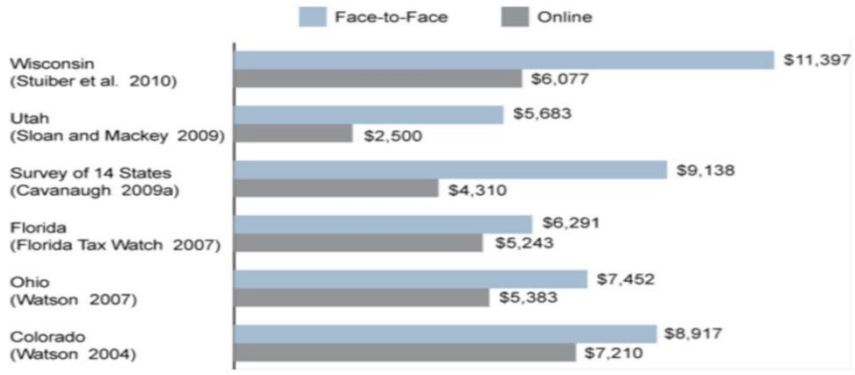

Figure 1. Cost Comparisons Face-to-Face vs. Online (Bakia et al., 2012), Implications of online learning for educational productivity

Conclusions and future research

Digital learning touches every dimension of the higher education, because it's about learning, and that's what universities, colleges and all higher education institutions do, they promote learning. One of the goals of digital learning for a long time has been to increase access to higher education. This is an important goal, which to a large extent has been realized. Furthermore, there are certain efficiencies which can be gained from employing digital learning (shortened time-to-degrees, students spending less money in doing so, and there are opportunity costs which are not lost). However, one should not neglect the aspect of personal

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enrichment and intellectual life which higher education can provide and the consequences in terms of unemployment, health outcomes and happiness outcomes that citizens may not otherwise have access to. As a result of higher education, students can begin to engage in the world of work, and begin to pay off loans that they've incurred. Those social and economic consequences can in the aggregate be profound.

Digital learning not only appears to increase the attainment of credentials but also increases the efficiency by which students attain those credentials. Therefore, students are attaining credentials earlier and faster if they are using digital learning. However, one of the major challenges is the availability of adequate data to support these arguments. Institutions could learn more about how digital learning is helping or hindering student outcomes if there were better data available. In addition, greater efforts should be made to specify how digital learning can enhance learning outcomes further for; specific types of institutions, programs, courses, and learners. There initiatives would also be of value because, digital learning provides the opportunity to personalize learning in a way that was not achievable earlier.

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