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The LXD, and its parent organization: the CAI, aim to increase and develop equity in informational and knowledge dissemination through the development and design of courses, courseware, and other pedagogical material. Recently, the LXD has largely worked in the development of Massive Online Open Courses (MOOCs) and aided educators in the improvement of course design and the growth of their (the educators') pedagogies.

Jacob is the coordinator of the LXD student internship program, and his work largely revolves around the coordination of the students and which projects students are assigned to. This involves both consideration of scheduling and project specific skill requirements. As the LXD program grows, the process through which this is managed has become less sustainable for Jacob to handle alone, raising the need for procedural streamlining.

Questions Addressed :

What are the differences between designing for traditional versus online courseware, and the implications these differences have in the design of courses?

Designing for the Bits & Bytes of Online Courses

With the onset of the Sars-Covid 19 pandemic, a majority of educational institutions shifted their teaching modality from in-person to online, despite the on-going discourse on the effectiveness of online instruction. Although research has shown that the ultimate learning outcome of students can be independent of teaching modality, it has also shown that the two are not equivalent in nature (Ni, 2013), as the shift from in-person to online instruction carries a new and unique set of challenges and considerations (Varonis, 2014). The current models and systems for the design, development, and evaluation of online courses aims to address these through guidance on the structure and alignment of course material as well clear communication of course related information. The differences across online course formats and contexts, however, also bring additional challenges that are ill-addressed by the current systems and models (especially when considering Massive Open Online Courses (MOOCs), the unique niche it occupies, and the socio-pedagoical goals that drove the innovation of MOOCs).

From In-Person to Online Instruction:

Although iterations of distance learning have existed since the 1700s, with online instruction being the latest, the debate between traditional (in-person) versus online learning environments continues (Varonis, 2014). Proponents of online instruction argue that: it is a possible solution for the minimization or elimination of the current barriers that prevent access to education and, when compared to in-person instruction, can bring increased: “convenience, flexibility, currency of material, customized learning, and feedback” for students (Ni, 2013). Opponents, however, argue “that students in an online

environment may feel isolated, confused, and frustrated and that students' interest in the subject and learning effectiveness may be reduced" (Ni, 2013).

A 2013 study by CSU-San Bernardino's Anna Ya Ni¹ comparing learning effectiveness, through the lens of student interaction and performance, of online versus traditional environments evidences the theory: while the success of students can be independent of teaching modality, the two modalities "are not equal" in nature; the shift to online learning environments causes significant changes in student persistence rate and interaction, possibly due to fundamental changes in various aspects of interaction and the outside contexts of students of online courses.

Interaction

Ni explains that:

"An important component of classroom learning is the social and communicative interactions between student and teacher, and student and student. A student's ability to ask a question, to share an opinion, or to disagree with a point of view are fundamental learning activities. It is often through conversation, discourse, discussion, and debate among students and between instructors and students that a new concept is clarified, an old assumption is challenged, a skill is practiced, an original idea is formed and encouraged, and ultimately, a learning objective is achieved".

In his seminal editorial in the American Journal of Distance Education, Three Types of Interaction, Michael G. Moore² delineates the forms of interaction within educational contexts as: student-content interaction, student-instructor interaction, and student-student interaction. Student-content interaction is "the process of intellectually interacting with content that results in changes in the learner's understanding", without which, Moore argues, "there cannot be education". Student-instructor interaction is the medium through which student interest and motivation is fostered or bolstered, and the medium through which content is made

¹ Anna Ya Ni is the associate dean of the Jack H. Brown College of Business and Public Administration and a professor of public administration. "Her research focuses on e-government, information assurance, public-private partnership, organization performance, and learning effectiveness" (Ni, 2013).

² Distinguished Professor Emeritus of Pennsylvania State University

digestible for individual students allowing for the proper and full application of course content and its derived knowledge (Moore). Finally, student-student interaction is vital as it enables the development of students' skills in effective collaboration (Moore).

"Online learning" however, "requires adjustments by instructors as well as students for successful interactions to occur" due to fundamental shifts in the dynamics of interactions that occur through learning management systems (LMSs)³ (Ni, 2013). Virtual discussions boards, for example, occur through text only and are dense, limited, and permanent (Ni, 2013). In such discussion formats, there is a decrease in: sense of instructor control, group hierarchies (which become "hidden, but traceable"), and anxiety (interactions become less intimidating), and increases in: "stress of rejoining", divergence, flexibility, and transparency ("No one can 'hide'") (Ni, 2013).

Finally, although "greater online interaction was not significantly associated with higher performance for students achieving passing grades... students who failed in their online classes tended to interact less frequently" (Davies and Graff, 2005) (Ni, 2013).

Performance

"Student performance is a multidimensional concept" that comprises of a wide array of aspects such as: course completion (versus withdrawals), grades, added knowledge, and skill building (Ni, 2013). Although there is no significant difference in student success, in terms of final grades and the number of passing and acing students, between online and in-person modes of instruction, online-courses consistently reported higher drop-out rates—averaging 10-20% higher than equivalent in-person courses; with some courses reporting drop-out rates as high as 80% (Carr 2000) (Ni, 2013). Ni (2013) also found that the failure of online research methods courses was consistently higher than that of in-person counterparts, a result which was not evident in similar introductory courses, suggesting that the courses of specific subject material also consistently elicit higher failure rates in online courses than in-person (Ni, 2013). Ni also found that a significant percentage

³ Virtual learning environments such as Canvas and BlackBoard

of students reported that online learning experiences were unsuccessful (13% compared to the 0% reported by students of in-person courses).

Current Systems & Models of Online Course Design, Development and Evaluation

The current systems and models of online-course design, development and evaluation provide instructors with practical guidance (and, in some instances, training) on what is needed in order to develop high quality online-courses, as well as provide means on how to evaluate the quality of online courses. These current systems focus on the establishment of standards and best-practices.

A 2017 study by Baldwin et al. on the composition and foci (including the procedures and guidelines) of six publicly available online-course design and evaluation systems (which are used state-wide or nationally) found the following 12 criteria were present in all six models.

1. *Objectives are available* (Baldwin et al., 2017).
2. *Navigation is intuitive* (Baldwin et al., 2017).
3. *Technology is used to promote learner engagement/facilitate learning* (Baldwin et al., 2017).
4. *Student-to-student interaction is supported* (Baldwin et al., 2017).
5. *Communication and activities are used to build community* (Baldwin et al., 2017).
6. *Instructor contact information is stated* (Baldwin et al., 2017).
7. *Expectations regarding quality of communication/participation are provided* (Baldwin et al., 2017).
8. *Assessment rubrics for graded assignments are provided* (Baldwin et al., 2017).
9. *Assessments align with objectives* (Baldwin et al., 2017).
10. *Links to institutional services are provided* (Baldwin et al., 2017).

11. *Course has accommodations for disabilities* (Baldwin et al., 2017).
12. *Course policies are stated for behavior expectations* (Baldwin et al., 2017).

The six systems studied were:

- Blackboard's Exemplary Course Program Rubric (2012) & California Community Colleges' Online Education
- Initiative (OEI) Course Design Rubric (2016)
- The Open SUNY Course Quality Review Rubric (OSCQR) (2016)
- Quality Matters (QM) Higher Education Rubric (2014)
- Illinois Online Network's Quality Online Course Initiative (QOCI) (2015a)
- California State University Quality Online Learning and Teaching (QOLT) (2015b)

Of these 12 universal criteria, six criteria (1, 5, 6, 7, 8, 10, and 12) address the availability (and clarity) of course-related information. Three criteria (2, 3, and 4) address the utilization of the LMS and the structuring of content on the LMS. Two criteria (4 and 11) address learner needs, with criterion 11 addressing accommodations for students with disabilities. In isolation, this shows a focus on the communication of course-logistics rather than the fundamentals of the designing of online courses. When looking at the individual foci of the six systems, the foci of: the utilization of the LMS, structuring of content for virtual environments, and the student accessibility can be synthesized (see Appendix 1).

Aspects III-addressed

One of the prime arguments for the shift to online modalities is the minimization of the barriers currently preventing access to education (namely location (residence), costs, and, in the case of courses open to the public, preselection (admission)) these decreases in barriers to entry, however, stem

from corresponding increases in the variance of student learning contexts/environments since students of online-courses may participate in the course from within any environment that supports the students' access to the LMS in use and the course's materials (recorded lectures, readings, etc). Learners not affiliated with institutions may, therefore, also partake in online courses that are open to the public, such as with MOOCs. This increase in variance of contexts from which students are able to partake in online-courses, however, introduces additional considerations that must be addressed in the designs of online courses, and that which are illaddressed by current systems of design and evaluation. These additional considerations point to the need for greater learner-centricity and greater differentiation between formats of online courses⁴.

Differentiation of Online-Courses

Online-courses may primarily be sub-divided into those which are developed for students affiliated with the providing institution and courses that are developed for learners that are not enrolled at the providing institution or party. Students affiliated with institutions have access to the various sources of support and resources provided by the institution in question, where as those that are not do not have access to the same institutional support and resources and might not have access to the necessary resources to fully utilize or even access course material (Lane, 2016). Students of institutions have also passed the pre-selection (application) process of the institution, which, in most cases, implicates a certain (suffcient) degree of prior educational experience, where as non-affiliated learners might not have had the same degree of education (due to any of the various barriers to entry of traditional education) (Lane, 2016). Students of institutions might also be required to take courses (based on specific criteria delineated by the institution's cirriuculum), whereas non-affilliated students likely do not have the same or similar requirements.

⁴ Format being defined by the intended audience, and means of delivery.

The Special Case of MOOCs

Massive Open Online Courses, derived from the Open Education Movement and MIT's Open Course Ware initiative (Guttenplan, 2010), came on to the educational scene as disruptive innovation, which aimed to rapidly change the higher-educational landscape and **rapidly increase educational equity through the minimization of barriers to entry, bringing an alternative to higher education to learner's of previously excluded populations** (Lane, 2016) (Oudeweetering and Agirdag, 2018) (Zemsky, 2014).

Practically, MOOCs are semi-self-paced courses open to the public for free, often with the option for course certification for relatively small fees⁵ (Lane, 2016) (Oudeweetering and Agirdag, 2018). "A good-sized mooc can attract upward of ten thousand students, who watch videotaped lectures, have weekly assignments that are for the most part peer graded, and on occasion participate in course-related chat rooms" (Zemsky, 2014). Despite the conceptual target audience of MOOCs being learners in demographics underserved by traditional-forms of higher education, a majority of MOOC student populations are highly educated learners (learners already served by traditional forms of higher-education), at times with 80% of the student population holding a Bachelor's degree or higher (Oudeweetering and Agirdag, 2018). This is due to a combination of formal and non-formal barriers to entry still presented by MOOCs. Even though MOOCs have aimed to mitigate these barriers, the formal barriers still presented by MOOCs comprise of technological access, educational background, and cost. The current costs and technological requirements needed to participate are still higher than the cost-benefit threshold for less-privileged learners (Oudeweetering and Agirdag, 2018). Almost a third of all MOOCs also require some level of prior educational background, further preventing enrollment of less-privileged learners.

Due to the composition of MOOC student populations, the pedagogical role that MOOCs occupy has also shifted to that of a limbo state, where, for the educated majority of students, MOOCs function as a supplement to traditional higher education, while for those without substantial educational backgrounds, MOOCs occupy the conceptual alternative to higher-education (Oudeweetering and Agirdag, 2018) (Zemsky, 2014). MOOCs as a supplement to higher-education is further reinforced by the general lack of overarching

⁵ When compared to the costs of traditional forms of higher-education.

curricula that would otherwise tie the sporadic catalog of course offerings, each covering not-designatedly-related individual topics (Zemsky). The catalog-like-state of MOOC offerings and the dual-purpose state of MOOCs as a concept has lead MOOCs to become the metaphorical “Swiss army knife” of online-courses, where the second O in MOOC ‘stands in for “one-size-fits-all”’ (Zemsky, 2014); more appropriate, however, is “one-size-fits-none” as MOOCs aren’t fully designed for either of the spaces it currently occupies. Therefore, in order to properly address the needs of students and the socio-pedagogical vision of MOOCs as accelerators of social mobility, future iterations of MOOCs requires the delineation and differentiation of MOOCs into sub-categories.

Differentiation, Delivery, and Student-Centricity

Due to the lack of: institutional support & resources, ensurance of prior educational experience (or its equivalent), and set institutional requirements, courses designed for non-affiliated students require a greater degree of consideration for the variance of student backgrounds and student learning environments and contexts. Accordingly due to the contexts of affiliated students being relatively more controlled (less variability)⁶, courses designed for affiliated students are, to a greater degree, able to tailor the course content and structure to the likely context of the student population. This distinction implicates a the need for more nuanced approach to online course-design and the explicit differentiation of approaches amongst formats. The current approach, the communication of course-related information, arguablely functions as a learner-side differentiator, however, it does not address the matter of *how* to design, develop, and evaluate quality-online courses for student populations of varying learning contexts. The considerations found in the differentiation of courses also greatly impacts the application and even applicability of established guidelines as is the with the third universal criteria found by Baldwin et al. (2017), which calls for the use of technology to promote student learning. Although access to the internet and basic technology to access LMSs and course materials are universal requirements for all students of online courses, the quality of internet access and hardware vary for students of different geographies and socio-economic statuses. Not all students have the internet access and

⁶ This is in account of the increased variability that the shift to an online learning environment brings in-and-of itself.

hardware, for example to attend virtual lectures or discussions. Instructors' utilization of technology to promote student learning for one student demographic is a potential barrier or reason to drop-out for students of another demographic.

Rather than the common content centric approach or learning-objectives centric models, such as the case with QM (Gibson and Dunning, 2012) (Baldwin et al., 2017) (Varonis, 2014), a learner-centered approach, whereby the learning environments / contexts of a course's projected or targeted student population (equally: the range/variability of learning contexts) become the center, from which course content, structure, navigation, etc is aligned, allows the designing of courses that better accommodate the needs and context students.

Such an approach has the potential to equalize the differences in overall student performance even with the special case of MOOCs as demonstrated by Oudeweetering and Agirdag (2018) in their analysis of the current effectiveness MOOCs as accelerators social mobility; MOOCs whose instructional design was specifically tailored to accommodate the needs of less educated learners saw a positive impacted student performance and persistence and garnered student populations with more less-educated students.

Conclusion

Online learning and in-person learning are not equal, not just in overall student performance, but also in the added complication and differences afforded by online learning—differences in physical, geographical, socio-economic, and educational contexts of the students made apparent through the differences afforded by online learning. Current models of designing, developing, and evaluating online-courses aim to provide the baseline best-practices, however, in the ever-increasing dominance of virtual environments, the necessity for new iterations of online-course design models is correspondingly ever-increasing.

The design for virtual learning environments requires the careful consideration of the very real: physical, geographical, socio-economic, and educational contexts of students.

Appendix:

1. The individual foci of the six systems studied by Baldwin et al:
 - “The Blackboard Exemplary Course Program Rubric focuses on course design, interaction and collaboration, assessment, and learner support” (Baldwin et al., 2017)
 - The OEI Rubric focuses on establishing standards for ‘course design, interaction and collaboration, assessment, learner support, and accessibility’” (Baldwin et al., 2017)
 - “The OSCQR standards focus on course design from the perspective of the Community of Inquiry model” and “concentrates on helping instructors and instructional designers improve the quality and accessibility of online courses” (Baldwin et al., 2017)
 - “The QM Rubric focuses on the alignment of learning objectives, assessments, learner in- teraction, and course technology”
 - The “QOLT focuses on helping faculty and instructional designers ‘more effectively design and deliver online-blended courses’ (California State University 2015c) by identifying exemplary practices”(Baldwin et al., 2017) .
 - “QOCI’s emphasis is on helping faculty develop quality online courses and identify best practices” (Baldwin et al., 2017).

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