Educational Technology Research Proposal

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Motivation and Context

The Universal Design for Learning framework promises to aid course designers in addressing the cognitive needs of all learners in a broad population, including those with any number of physical and/or learning disabilities. Its authors ground its guidance in contemporary neuroscience and educational psychology. In courses designed with UDL principles, the framework explicitly disallows a damaging, pervasive attitude that treats physical and learning disabilities as aberrations from a mythical completely-abled student. UDL flatly states that all learners vary in predictable intervals along identifiable axes of cognitive and emotional capabilities, *therefore* curriculum designers have the final responsibility to structure multiple pathways of content and delivery that could engage any learner with any combination of capabilities. The foundational work on UDL comes from David Gordon and his coauthors in their book *Universal Design for Learning: Theory and Practice*. (Gordon, 2014)

I find this framing refreshingly radical, the neuroscience behind it persuasive, and the expansion of online learning opportunities to all students a noble goal.

As online learning has grown substantially in the past decades, it takes in students that traditional classrooms identify as special needs. However, research into online learning has rarely focused attention on these students and their important, solvable challenges. In concluding a review of two virtual schools with substantial special needs populations, (Fernandez, 2016) bleakly concludes that continuing to neglect research into these populations could constitute “a path to failing our students”.

To answer that challenge, I want to make a contribution to research into UDL. I propose to spend my semester extending the work of two Kansas University researchers who measured UDL alignment in a large body (n=984) of online courses in the Khan Academy (Smith & Harvey, 2014). At the time, they broadly found that the sampled courses missed the mark on providing cognitive support structures for students with disabilities, limited English proficiency, or other disadvantages, as UDL guidelines would stipulate. They created two tools for their research: first, a survey for online students to answer about a course, of around 40 questions. The answers fed into a second companion tool the researchers used to measure alignment across the major principles of UDL. KU’s Center for Online Learning and Students with Disabilities now provides the survey and the companion analysis tool as Google forms and Excel spreadsheets for the research community (COLSD, 2016).

Broadly, I want to pick those tools up and point them at other bodies of online courses, analyzing them on the basis of what UDL guidelines they do and don't follow. This will identify what courses, subjects, and providers can and can't engage students sitting in the intersection of online learning and special needs.

UDL has acceptance in published research as a valid framework for considerations of addressing learner variability. Now, I will follow a similarly accepted path of applying it to new course materials, and expand the scope of what materials have undergone an analysis for alignment. I think this has utility on its own, however, I would like to attempt to go further and search for correlations between alignment per the COLSD tools and available course ratings or reviews. My search for freely available course review data continues as I write this proposal. While I have found some "clearinghouse" repositories such as CourseTalk[1] with written reviews and 1-5 star ratings for many courses in some subjects, I have not decided which subsets of that data I can reliably use. I feel comfortable leaving this vague as a stretch goal for now. First, I want to concentrate on the narrower UDL alignment questions that professionals have already framed.

Initially I want to pick courses from MIT OpenCourseWare[2] and edX[3] to answer the survey. I have some experience with edX, having taken courses there for work, so I feel I can get started quickly. MIT OCW I have no experience with other than my informal research the past few weeks, and one of its captioning features impressed me greatly in a linear algebra lecture. I would like to see how the overall platform does overall against the UDL Scan Tool survey.

Tasks and Schedules

- Week 6 (Mon Jun 18 – Sun Jun 24)
    - Survey 20 OCW/edX courses with the scan tool (10 hrs)
    - Finish prerequisites and apply for access to Stanford online learner dataset (5 hours)

- Week 7 (Mon Jun 25 – Sun Jul 1)
    - Survey 20 OCW/edX courses with the scan tool (10 hrs)
    - Prepare and submit intermediate milestone (5 hrs)

- Week 8 (Mon Jul 2 – Sun Jul 8)
    - Survey 20 OCW/edX courses with the scan tool (10 hrs)
    - If Stanford grants access, scour their data for identified cases of special needs students and use the scan tool on those students' courses. If Stanford does not,

[1] https://www.coursetalk.com, free registration required
[2] https://ocw.mit.edu/index.htm
[3] https://www.edx.org

conduct further research for case studies of online learners and specific struggles with differenty types of content. (5 hrs)

- Week 9 (Mon Jul 9 – Sun Jul 15)
    - Slice and dice 60 courses of scan tool data into buckets such as institutional author, subject matter, level of prominence given on platform (5 hours)
    - Collect review data for scanned courses where available, attempt to design metrics to correlate with scan data, discuss with mentor and decide feasibility of the stretch goal (5 hours)
    - Prepare and submit intermediate milestone 2 (5 hours)

- Week 10
    - If the stretch goal is alive, allow time for wrangling that data. If the stretch goal is not alive, sample more courses, possibly expand to new platforms, or cover blind spots identified in my sample so far (10 hours)
    - Start writing final paper (5 hours)

- Week 11
    - Assemble intermediate milestones and last week's writing into final text (10 hours)
    - Wrestle with ACM formatting and do final submission (5 hours)

Intermediate Milestones

I want to produce intermediate milestones that explain the importance and context of my research, while remaining useful in the final delivery. The summer does not provide enough time to waste any words.

- Intermediate milestone 1 (Sun Jul 1)
    - Write my own distillation of UDL principles and the science behind them, around 500 words.
    - Visualize one major component of the data coming out of the scan tool for the first 20 courses

- Intermediate milestone 2 (Sun Jul 15)
    - Visualize another major component of data coming out of the scan tool for the whole sample
    - Write a summary of a few exemplary alignments with UDL, with screenshots, showing how course designers or platforms scored very well, and could serve as inspiration for others

References

COLSD. (2016). UDL Scan Tool. Retrieved from http://www.centerononlinelearning.res.ku.edu/udl-scan-tool/

Fernandez, H., Ferdig, R. E., Thompson, L. A., Schottke, K., & Black, E. W. (2016). Students with special health care needs in K-12 virtual schools. *Journal of Educational Technology & Society, 19*(1), 67-75.

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Smith, S. J., & Harvey, E. E. (2014). K-12 online lesson alignment to the principles of Universal Design for Learning: the Khan Academy. *Open Learning: The Journal of Open, Distance and e-Learning, 29*(3), 222-242. doi:10.1080/02680513.2014.992402