Honors Thesis Proposal

13 June 2017

Working Title: Visualizing Cognitive Loads

I. Statement of Intent or Purpose

For my creative thesis I plan on creating an exhibit that visualizes how the design of systems may prevent—or cultivate—cognitive overload. I have specifically researched the user experience of Course Management Systems (CMSs) and Cognitive Load Theory (CLT). While current research about CMSs typically analyzes the impact on student academic performance, I am interested in whether the systems of information dissemination via a CMS relieves or increases a user's cognitive load. For this exhibit, rather than solely critique the design of CMSs, I wanted to examine how CMSs fit into the information pipeline of a student in today's digital age. I want people to walk away from my show understanding the importance of system design and how changes to a system affects user experience.

II. Project Importance

In an increasingly digital world many experiences, processes and systems are being transferred to digital mediums. Many of these systems are not being designed with user's needs in mind, even though best practices call for user experience (UX) designers. As of now, CMS design has not been academically studied by researchers, even though these digital systems impose significant cognitive loads on both students and teachers. My thesis will address the

consequences of ignoring UX principles in educational systems, and the ineffective overall system created in the transition from analog systems to digital CMSs.

I am interested in studying these topics because of a recent personal experience where I felt cognitive overload when dealing with CMSs. Returning to school after undergoing treatment for cancer, I became overwhelmed and had a small anxiety attack. I subsequently identified that the work itself was not stressful, rather, it was the way the information was being disseminated. I was enrolled in five classes; each professor used a different method of communication. One of my classes exclusively used email while two used Learning Suite. One professor only used paper handouts while another had a separate website for submitting homework. Yet another required me to utilize an entirely different CMS. Receiving information from all these different mediums initially overloaded my ability to function. After understanding my cognitive limits, I settled into the semester with an interest in how the design of CMSs, and systems in general, can contribute to mental cognitive loads.

III. Project Overview

I have already conducted research and written a research paper on the topic of Cognitive Load Theory and the design of CMSs. Using this research, I plan to create an original piece of work that visualizes educational cognitive loads in an exhibition setting. The show will be in the B.F. Larsen Gallery in the HFAC for two weeks.

CMSs essentially act as an "e-copier, e-publisher, e-communication, and e-classroom" (Jarrahi 258). As such, they seek to replace previously analog processes by streamlining myriad services of the educational ecosystem into one hub. While that may be the ideal, research has

shown that professors struggle transitioning from analog processes to using digital CMSs (Weaver) and that using CMSs may not have any positive impact on student performance or satisfaction anyway (Lohman).

BYU started developing their own CMS, Learning Suite, in 2012, during my sophomore year in school. Prior to the introduction of a university-wide CMS, some professors used Blackboard, the dominant CMS at the time, while others maintained traditional analog methods such as using physical copies of syllabi, assignments and quizzes, making materials available at the library course reserve, verbally assigning homework, and having physical sign up sheets for office hours. Some professors also experimented with transitional methods: having a class blog, sharing a Dropbox folder, using Google Docs for in-class exercises, or relying heavily on email. Over the course of my seven years as a university student I have been a user of many types of digital CMSs as well as analog and transitional systems. With my experience using so many different methods of receiving information, I wondered, "Does the current system consider the cognitive burdens placed on students and professors? Would an all-in-one system improve their cognitive loads?"

For this project I initially considered designing my own version of a CMS, but realized the task is too large for one person to complete on their own. Not only is the sheer scale of the project beyond the scope of this thesis, but it also requires input and feedback from the professors, students, and administrators who use the system. One of my goals for this project is to help viewers of my show understand how CMSs fit into the surrounding educational ecosystem. Designing a "better" CMS would not highlight that relationship—in fact, it might hinder it. Only once professors, students, and administrators fully understand the scope of the

problem will they be able to collectively work toward a solution. Exaggerating the problem will help reveal the true systemic problems that would otherwise go unseen.

Using exaggeration or speculation to highlight a problem is at the heart of Dunne and Raby's book *Speculative Everything*. They assert that "literature deals with the possibilities of human nature whereas design deals with the possibilities of human nature manifested in machines and systems. At their most abstract, speculative designs are a form of speculative philosophy of technology that questions the meaning of technology itself" (Dunne and Raby, 102). With this exhibit I plan on constructing an exaggerated reality of a university student's experience with both analog and digital technologies. By designing an extreme experience of information dissemination within a fabricated class, I hope to question the role that CMSs currently play in the university ecosystem. Ideally, viewers will begin to understand the cognitive loads associated with highly complex or inefficiently integrated systems place on the users.

I decided to focus on the student's experience since that is what I am most familiar with, and because helping students is ostensibly the reason that administrators and professors adopt CMSs. Examining the cognitive loads and systems from the perspective of a professor or administrator would be interesting, and important to fully discovering a solution, but beyond the scope of this project.

In the gallery I plan on building a semi-enclosed space that will replicate the processes—both digital and analog—that students use to receive and return information in their classes. In addition to CMSs, there are other modes of information dissemination: what the professor verbally says in class, printed handouts or syllabi, online surveys or quizzes, group

Google Docs, and many other processes that are used for turning in assignments. The research I have conducted on reducing cognitive loads will inform how I design these materials. Rather than abiding by cognitive load reducing methods like segmenting, off-loading, signaling, spacial continuity, etc. (Mayer and Moreno), I plan to reverse-engineer the concepts to design learning materials with heavy cognitive loads. In particular, this ecosystem, with its interaction of many education materials and mediums should be burdensome and frustrating in order to highlight the student experience.

In my show I want to push the current university information dissemination system to the extreme by asking "What if this system was ineffective and cognitively overwhelming?" By exaggerating the system I hope viewers will think critically about how this system's design imposes cognitive burdens on system's participants. By bringing together a system that is physically spread across campus and digitally dispersed through a variety of mediums, I hope that insights may be gained from making visible what is currently an invisible, or at least diffused, system.

In the weeks following my exhibition, I'll document the process and show. My final written thesis will include the following sections:

1. Abstract
2. Introduction & purpose
3. Background and Significance
4. Project description
5. Methods and Procedures of creation
6. Presentation/Exhibition

7. Conclusion/Analysis
8. Appendix: Research Paper
9. Works Cited & Annotated Bibliography

IV. Preliminary Research

In addition to previously conducted research (see the Abstract from the attached research paper, *The Design of Course Management Systems: Interference of Enhancement of User Experience?*), I plan on using my personal experience as a student at BYU as a resource for examining systems that have been used during my time as an undergrad.

V. Qualifications of the Investigator

As a student interested in user experience design, data visualization, and education, the study of cognitive loads imposed by CMSs is at the intersection of all my interests. I have also been a student at BYU long enough to see different digital technologies tested and experimented by teachers and the university as precursors to CMSs. The graphic design program has prepared me to think analytically and critically about designing experiences. The program has also prepared me to visually communicate difficult concepts and ideas—like that of cognitive loads and system design—to an audience unfamiliar with the subject.

VI. Qualifications of the Thesis Committee

Douglas Thomas, faculty advisor, has experience with designing user experiences for apps and exhibitions through his professional and graduate work done at MICA. He also

completed his Honors Thesis as an undergraduate graphic design student in 2008 and is familiar with the unique challenges of doing a creative project thesis. Professor Thomas has worked with me as I have developed the exhibition and implementation of my thesis.

Eric Gillett, faculty reader, has taught the graphic design BFA Capstone Project class for many years and has guided hundreds of students through the ideation, development, writing and creation of their exhibitions. He worked with me as I researched, wrote and edited my paper for this project.

Justin Kunz, Design Department Honors coordinator, is an illustration professor with experience in video game art design and coin design. He has helped me develop my ideas for my thesis project while also meeting the Honors Program requirements.

VII. Schedule

June 2: Submit Thesis Proposal

June 8: Create working prototype to refine, begin designing elements

June 10: Begin purchasing/collecting supplies and printing, building off-site

June 15: Begin setup in B.F. Larsen main gallery

June 23: Opening reception, photograph/document show

June 23: Thesis defense (likely)

June 29: Take down show

July 14: Rough draft of Documentation

July 28: Submit Documentation according to Honors/MLA guidelines

VIII. Expenses/Budget

Printing costs	$400

Includes: printing posters and paper, spray mount and foam core, binding a book, vinyl

Materials to build	$200

Includes: hanging devices, mounting tools, wire, wood slats, glue, paint, painting supplies, plywood

Props	$200

Includes: filing cabinet, textbooks, binders, notebooks, sticky notes, clipboard, table and chair, corkboard, tacks, headphones, extension cords, bookcase, books, envelopes, stamps

Typefaces	$200
Total	$1000

IX. Culminating Experience

Following the completion of my thesis, I plan on submitting documentation to various graphic design publications. I'll explore these opportunities in depth after my thesis is completed.

X. Appendix

See attached paper for my research and bibliography of sources consulted.