

Undergraduate Thesis Prospectus

Online Educational Support: How Online Course Tools  
Improve Student Support in University Classes  
(technical research project in Computer Science)

Accessibility and Interaction: How Online and  
In-Person College Classes Compare  
(sociotechnical research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **General Research Problem**

*How does online technology affect formal college-level education?*

Universities have rapidly adopted some of the newest technology. This has taken a variety of forms, from increasing communication through email and discussion platforms to organizing collections of available resources on specific class websites. Students can now watch lecture videos and view class materials at any time (Baldwin, n.d.). Besides additional resources, technology has also made advanced degrees possible without a common physical location. Virtual tools, such as WeBWork, have been created to allow students to submit assignments online (Visual Academy, 2009). With the help of educational technology, some teachers have transformed their classes, expanding discussions at the expense of lectures. Many universities are afraid of falling behind and strive to make their classes up-to-date with the latest in educational technology (Baldwin, n.d.).

Throughout these changes, college education has remained important. Employees with college degrees are more likely to report higher job satisfaction and felt more job stability. The average salary for a university graduate is \$20,000 more than the average salary for a high school graduate who did not attend college, leading to a massive earnings gap. College graduates are more likely to enjoy better benefits and have a plethora of opportunities for personal growth and networking while obtaining their degree (Loveless, n.d.). This dramatic impact for millions of current and future college students makes it crucial that the effects of these technological changes are understood.

## **Online Educational Support: How Online Course Tools Improve Student Support in University Classes**

*How can the office hours queue and support requests procedure be effectively handled for a large university class?*

For my technical project, my team and I will build onto an open-source online course management system called “Satori” that was started last year. The other students on my team are Madison Flynn, Jelena Liu, and Daniel Mizrahi, all of whom are in the School of Engineering and Applied Sciences. This will be a year-long project directed by Professor Aaron Bloomfield in the Department of Computer Science. Our project is mainly focused on expanding onto a waiting queue for office hours and creating a support request feature. When students need help during office hours, they can join this queue. When a teaching assistant is ready to help the student, they can take them off the queue, ensuring other teaching assistants are directed towards the remaining waiting students. After assisting the student, the teaching assistant can then mark the student as “helped” and move on to the waiting students still left in the queue. The support request feature will allow students to submit a ticket if they need an extension on an assignment or to reach out to the course staff. The instructors are then able to respond to the student within this system. This ticketing structure prevents emails from getting lost in a professor’s large email inbox and lets any of the current class professors respond, allowing for faster responses when more than one professor is teaching the class. Our new system will help large courses, like CS 2150, manage students and allow the course staff to assist as many students as possible. Studies have shown that going to office hours increases students’ overall learning and class grade so it is important that large classes have an effective system to support everyone in the class (Guerrero & Rod, 2013).

These features are adaptations of a similar existing system used in CS 2150: Program and Data Representation that was created in the early 2000s. The class size has since more than doubled and this initial queue was not designed to handle the sheer volume of students during busy office hour times. The system becomes glitchy, with students being removed from the queue randomly, the queue freezing at inconsistent times, and having a slow response time during especially busy office hour sessions. Furthermore, the support request tool has a slow response time when there are many tickets in the system and it is not compatible with the new automated grading system Gradescope. The many users for this system have also led to the suggestion of smaller features, such as displaying the current waiting time on the office hour queue, to better improve the overall user experience.

We plan to test our web application once each major feature is done, starting with the 50 CS 2150 teaching assistants. Afterwards, the system will be made available to the current CS 2150 class, allowing many more users to test the application. We hope that this project will give instructors and students alike an easier-to-use course management system.

### **Accessibility and Interaction: How Online and In-Person College Classes Compare**

*How do students and educators comparatively evaluate remote and in-person higher education in the U.S.?*

Remote education has received much more attention in light of the COVID-19 pandemic; however, it has existed for decades. Before computers were widespread, remote learning occurred through the mail, with the first program starting in 1873. The first completely online college program for both bachelor's and master's degrees, the University of Phoenix, began in 1989. As technology has advanced, these programs have grown more popular. Now, more than a

quarter of college students take at least one course online. However, before the pandemic, the majority of college students participated in an in-person program, leading to the question of how students and educators evaluate these online and in-person college educational experiences (Visual Academy, 2009).

Jaggers and Xu (2014) examined the comparative outcomes of students in online and in person classes in Virginia community colleges, finding that online students were more likely to fail or withdraw from the course. These students were also less likely to remain at the school long enough to get a degree or to transfer to a four-year university. It is worth noting that there are some differences in the general characteristics of students who choose online classes as opposed to those who choose to take classes in person so other factors may be at play (Jaggers and Xu, 2014). The Government Accountability Office conducted a study in 2011 where it planted “students” and recorded comparative costs, course structures, and instructor reactions to mistakes. Some instructors repeatedly attempted to contact the student to provide additional help. Others gave passing grades for assignments that were clearly plagiarized or did not fulfill the assignment requirements (GAO, 2011). Bettinger et al. (2017) evaluated online education at a large university that offered the same courses both in-person and online, with nearly identical syllabi. While opinions were not directly measured, the research did find that students who took courses online were more likely to dropout. They were also more likely to get a worse grade in future courses that built on the material from this class (Bettinger et al., 2017).

[Teräs](#) et al (2020) examined online educational technology, especially in response to the COVID-19 pandemic. For-profit companies have been campaigning for their own platforms with relatively little regard to the potential educational value their system could have. These companies have tried to create a tool for every part of the educational system and this

solutionism may have negative consequences. As students and professors become more familiar with a certain system, schools become more hesitant to remove or replace it, even if potentially better alternatives exist. A current marketing campaign could impact how future students learn or how college classes are organized. Universities may also continue to look to technology as a solution to any educational problem, even after the pandemic. This mindset can be detrimental as it can ignore many other resolutions and may seek to solve trivial problems that do not need to be dealt with ([Teräs et al, 2020](#)).

From the perspective of managing these programs comes three participants groups: school administrators in support of increasing online education (University of Arizona, 2020), those favoring exclusively in-person learning (Fain, 2019), and those preferring to focus on in-person education but provide free online resources (Harvard, n.d.). College students make up two participant groups with some students in support of the remote opportunities (Jaggers, 2014) while others greatly prefer in-person classes (Lederman, 2020).

College administrators who favor remote online education argue that it offers flexibility and convenience; students can take classes at any time, from any location (University of Arizona, 2020). Completely virtual programs are likely to focus their advertisements on appealing to adults who already have a lot on their plate and need this flexibility, such as parents, as opposed to current high school students. (University of Phoenix, n.d.).

Many educators want to avoid completely online classes as they feel it is impossible for students to have the same level of interaction between each other and their professors as they would in an in-person environment. These interactions have been shown to be crucial to successful student outcomes, raising some concern that students may not retain the same amount

of material in an online program. Some educators criticize online education for its cost, noting that it has been much more expensive than anticipated (Fain, 2019).

Some prestigious universities allow anyone to audit many of their classes for free online. While students must pay to get credit for taking the course, these resources make knowledge much more accessible. Harvard and MIT even created the online edX learning platform to host these classes. The courses are pre-recorded, so they do not force the university to redirect significant time or money from their in-person classes as the same recordings and materials can be used for future semesters. Students cannot earn formal degrees from these programs, allowing these universities to still be selective about their alumni and maintain their prestige. However, they do assist anyone interested in expanding their knowledge (Harvard, n.d.).

Students have a variety of perspectives regarding online and in-person education. Some reported appreciating the flexibility online courses offer. They enjoyed the time saved by avoiding a commute to and from campus. These students also reported that their instructors felt more comfortable ending class early than instructors for in-person classes, allowing online courses to save even more time (Jaggars, 2014). However, other students felt it was harder to absorb information. One University of Wisconsin student said, “I personally struggle with learning remotely. My learning style is very visual and I like to connect with other students and my professors.” Many also felt increased anxiety and uncertainty regarding what was expected of the students (Lederman, 2020).

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