THE IMPACTS OF ONLINE LEARNING IN HIGHER EDUCATION

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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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COVID-19 has changed the way that everyone across the world is living their lives. An entity that went through a large change are universities. Professors now have their lectures, assignments/activities, exams, and more all online and students have to learn and collaborate on a computer. The pandemic and transition to/increase in online learning has made my research more significant as universities and professors not having an appropriate amount of time to adjust their courses to an online setting has caused gaps in current online education for students. Additionally, course management systems could be useful in creating a successful online learning environment as it "allows teachers to manage their classes, assignments, activities, quizzes and tests, resources, and more in an accessible online environment" (Simonson, 2007, p. 1). Being able to host online office hours, create an interactive learning environment, contact professors, give feedback, and a lot more features in a course management system are beneficial in making an online learning environment where students can excel. For the technical project, my team and I are building onto a course management system created last year called Satori. The STS project focuses on the impacts of online learning, "learning that uses internet technology that allows teachers and students to carry out learning wherever and whenever outside the classroom", on higher education and analyzes what methods and designs should be used when making online learning environments for students (Verawadina et al., 2020, p. 2). Pinch and Bijker's framework of the Social Construction of Technology (SCOT) is used to explain the different relevant social groups that influence online learning and what they can do to improve students' learning in online courses (1984). The technical and STS topics relate as they are co-dependent in an online course setting.

SOCIAL CONSTRUCTION OF TECHNOLOGY (SCOT)

A SCOT model is used to understand the needs of students in an online course, how the relevant social groups for online learning can work together, and paves a way in providing an online learning environment where students can succeed. The relevant social groups for online learning are students, professors, and universities. As shown in the studies discussed in previous sections, students' quality of learning is better when they are more engaged in courses/lectures and when they receive timely and thorough feedback from instructors. Additionally, as the global pandemic forced universities to transition their courses to an online setting, both students and instructors were given just a few weeks to prepare which has caused many issues. Universities also need to extend the utilities of online course management systems to provide additional support to students to partake in their courses in this online learning setting. Figure 1 shows the different problems that each of these relevant social groups, students, instructors, and universities, have with respect to the artifact of online learning. In describing the issues with online learning, the crucial role that each group concerned with the artifact plays to contribute to the improvement of online learning is portrayed.

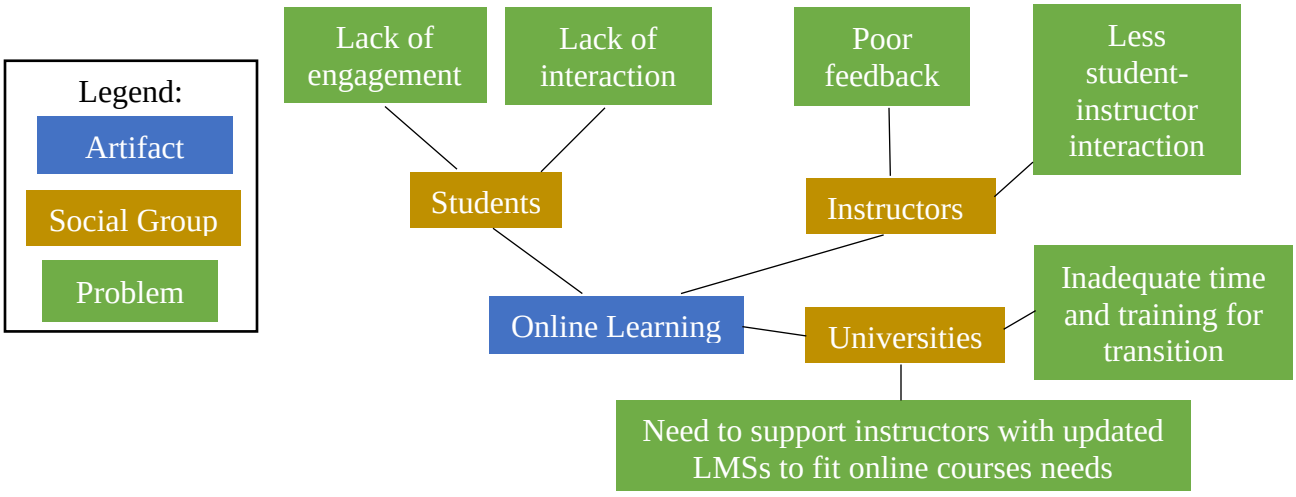

Figure 1: SCOT Model for Online Learning: The depiction shows the bigger problems that relevant social groups need to address to implement online learning successfully in higher education. (Adapted by Flynn (2020) from Bijker, Bonig, & Oost 1984).

In addition, the figure above can be used to show the ethical relationships between the relevant social groups. There are aspects that are missing in online learning that students are accustomed to having during in-person learning that are beneficial to students' overall education and are represented by the problems of relevant social groups. Utilitarian ethics seeks the greatest good and in this case, for all groups involved, that would be a place where all students have equal opportunity to excel and succeed in an online environment. This could be done with the help of all social groups to play their roles in improving the artifact. Ethics tests can also be considered such as utilitarian tests to see how many people are impacted by the gaps in online learning now and how many people will it help to try to improve the issues associated with online learning, and a reasonable persons test to see that if a rational person was given all the facts of the current problems in online learning that they would consider the suggested improvements to online learning as a wise choice.

NEED TO CONSIDER FEEDBACK, ENGAGEMENT, AND A COURSE MANAGEMENT SYSTEM WHEN DESIGNING ONLINE COURSES

Students are missing out on factors of in-person education that are vital to their education and need to be made up for in an online learning environment. These include but are not limited to feedback, student-instructor interaction, personal interaction, and extended use of a course management system.

INSTRUCTOR-STUDENT FEEDBACK

Timely and quality feedback from instructors has a large influence on students' learning of course material and satisfaction with an online course as there is not a direct interaction

between instructors and students. Two studies, one on 120 online graduate nursing students and one in a survey given to 304 online undergraduate and graduate students, found that the timeliness and quality of instructor feedback is an important predictor of overall course satisfaction. There was also another survey of 186 online graduate students that found a significant relationship between instructor feedback on assignments and learning results by measuring student satisfaction and final grades (Croxton, 2014, p. 318-319). These studies bolster the idea that in an online setting it is more important for students to have easy access to instructors and detailed feedback to see ideas on their work, so they can improve and increase their satisfaction in online courses. Feedback is also beneficial in contributing to their overall learning which is significant now more than ever and as more students are exposed to online learning, this could become a challenging task. Conversely, if instructors lack timely and quality feedback, it could negatively impact students' learning. This was a significant pet peeve in the survey of 304 undergraduate and graduate students (Croxton, 2014, p. 319). If students become frustrated with the professor's way of communicating results back to them, it is a possibility that they could become less interested in the course material or in improving their scores as they are not receiving adequate feedback on how to progress which could impede their learning. Overall, the way that an instructor interacts with their students could have a positive or negative impact on their learning.

ENGAGEMENT

There are multiple differences in online and in-person courses that need to be more focused on during online course development. A study that was conducted between students taking classes online and in-person showed that students were able to master both courses, but in-person students attributed their success to the organization of the class structure, their teacher,

and personal interaction. Online students attributed their success to the website structure, feedback from and access to their instructor, and self-regulation. They also noted that there was a lack of personal interaction, but it allowed them to be more productive (Reisetter et al., 2007, p. 61-64). Being online allows students to regulate their schedule more than in-person classes, especially if courses are asynchronous, but could also lead students to procrastinate or tune out of the course. It could also potentially put a strain on teacher-student and student-student interactions as more scheduling needs to be involved to meet up or ask questions instead of just being able to walk up to someone and start a conversation during an in-person class. Furthermore, data collected through subjective experiences and interpretations of online learning found that students are bored in online courses and desire a more engaging experience. It is also not as easy to ask questions and get answers when courses are not face-to-face. However, the data also mentions that online classes give flexibility to students to learn at any place and if a course is asynchronous, students could learn at any time, which gives flexibility to instructors as well (Goralski & Falk, 2017, p. 275). These student experiences represent the pros and cons of online learning. It also demonstrates the difficulty of keeping students engaged as it is easier to get distracted and is a completely different experience now for a student to raise their hand and ask questions during class. Likewise, it is a different experience for professors to engage their students in lecture as they could see students' reactions in real time in a classroom instead of black Zoom squares and adjust how they are teaching a concept to a way in which more students could understand. For students to be successful in their online courses, they need to be engaged and all relevant groups need to do their part.

Another source of engagement that could help students succeed in an online learning environment is office hours. Studies have shown that going to office hours increases students'

overall learnings and scores in the course, which is even more notable as the frequency of office hours use increases (Guerrero & Rod, 2013, p. 408-409). Unfortunately, a lot of students are not taking advantage of office hours, especially during the pandemic, but going to office hours can aid in bridging the gap between students and instructors in online courses which can help students gain a better grasp on course material.

Moreover, an instructor at Grand Canyon University offers methods that could help instructors increase student engagement. These methods include providing opportunities for additional student-instructor interaction, anticipating questions from students and making a FAQ list, putting effort into answering students' questions completely as that enhances students' experiences and an instructor's social presence, and making the course as personal as it can be in a virtual environment as it will keep students involved (Jackson, 2019, p. 4-5). These ideas express the importance of the interaction between students and instructors which sets the foundation of courses in general, whether they are online or not, and shows ways that they can be implemented into online classes to improve students' overall learning experiences. It also demonstrates the possibility that as instructor's dedicate more effort into maintaining a social presence and anticipating student concerns/questions, that students will be able to maintain involvement in the course as well. Overall, engagement becomes even more important in online classes and all the relevant social groups need to do their part on further developing engagement in online course design.

LEARNING MANAGEMENT SYSTEM (LMS)

Having a learning management system in an online course structure helps students as it contains all the information that students need to access to learn course material and participate in the class. It is useful for organizing information provided to students, and facilitating hand-ins,

text-based discussions, and group management tasks. This organization is even more vital in an online course and teachers should be clear in providing directions and information on the learning management system to avoid misunderstandings or missed information (Kyrkjebø, 2020, p. 101). Learning management systems are used during in-person classes as well, but not as extensively as an online class should to promote an interactive learning environment. It serves as a main passage point from students to the instructor and the course, which is essential in online learning and can benefit students if they take full advantage of this system. A learning management system is a very useful tool in courses, especially when they are online, and contributes to making online courses more interactive and giving students more access to instructors and ways to stay more involved in the course.

Furthermore, the benefits of distance learning systems include "greater freedom of access, lower prices of training, the possibility of dividing the content of the e-course into modules, the flexibility of training, the ability to keep up-to-date, and the ability to determine criteria for assessing knowledge" (Zi-Yu Liu et al., 2020, p. 18). These benefits are not as easily available in in-person learning. This demonstrates that learning management systems give students access, flexibility, and the ability to keep up with course essentials that will greatly aid them in an online setting and give them the tools they need to succeed and stay engaged in an online course. Additionally, learning management systems have been shown to improve student performance in online learning environments. A study that tested 300 students consisted of two parts – before learning with the help of the online platform and after. The results of the study were that the use of a remote platform had a positive effect on academic performance as the "quality of knowledge increased by 7%, the level of competence by 4% and the grade point average by 0.15 points" (Zi-Yu Liu et al., 2020, p. 18). Although these results are not to a large

extent, it portrays that the online platform was beneficial in progressing students' learning and success. The results also give hope that with improvements to learning management systems that learning, especially in online courses, could improve more than this study shows. It also displays the benefits of a learning management system and the improvements in learning that could occur when students and instructors are knowledgeable about or able to take advantage of these benefits.

INTEGRATING COURSE MANAGEMENT SYSTEMS AND FUTURE WORK

The mass transition to online learning due to the global pandemic has shown that there are gaps in online education and disconnects between relevant social groups. Creating more access points for student-instructor interaction and feedback and using a course management system to its full capacity in online courses is vital to students' learning and could help fill in these gaps. Course management systems give students a one-stop place where they can get all materials for the course, submit activities/assignments and get feedback on them, and interact with the professor or other course staff. These systems can also be used to facilitate group collaboration and student-student interaction as this type of interaction has been lacking and altered due to the shift to online learning as well. Students, instructors, and universities need to do their part in restructuring courses and/or restructuring their attitudes towards online learning for courses to succeed in an online setting. Depicted below in Figure 2 is a learning management system model with components that contribute to making online courses more interactive and giving students more access to instructors and ways to stay more involved in the course. Incorporating a learning management system, like Figure 2, into online courses is the start of the solution to bridge to current gaps in online education for all the relevant social groups.

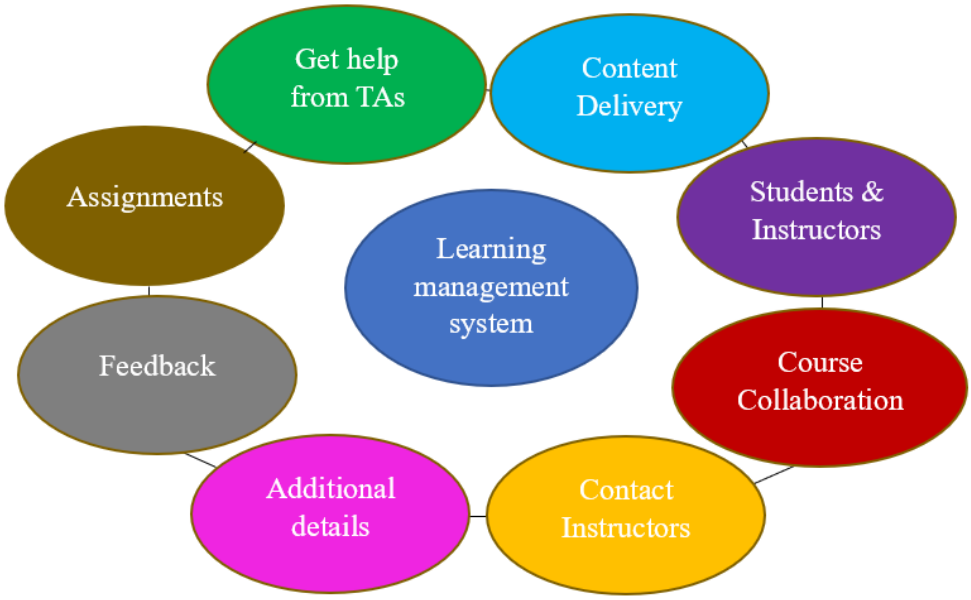

Figure 2: LMS Model for Online Learning: The model shows the important aspects of learning management systems in online course design that contribute to the overall learning of students. (Adapted by Flynn (2020) from Landeros & Fuentes 2016).

FUTURE WORK: LOOKING INTO DIFFERENT TYPES OF ONLINE LEARNING

There will always be activities and interactions that occur in in-person education that will not be exactly the same when taken onto a virtual environment. However, there are different types of learning that an online setting would better be suited for. These examples include game-based learning and competence-based learning. Game-based learning and competence-based learning require an online platform for learning and keeping track of learning as students progress.

Game-based Learning

One type of online learning that has the potential to benefit students is game-based learning which uses learning games to teach students course materials and allow students to practice them. In a software engineering course at the University of Nevada, a study had 14 participants (7 male, 7 female) to see if game-based learning was more beneficial to students

than regular learning. The participants took a paper quiz and quiz game, and took surveys after the study to see their opinions on each learning technique. The results showed that both male and female participants performed better in the game-based learning method and qualitative analysis indicated that participants were satisfied and learned more from the quiz game (Rajamohan, Santhapur, & Dascalu, 2020, p. 441-443). While this is a small study, as game-based learning does not have widespread use yet, it shows the possibility that game-based learning could keep students engaged and help them learn course concepts. This is pertinent in an online environment as the gamification of learning can make learning more fun, intuitive, and interactive. The study also indicates that gender was not a factor in if a student preferred game-based learning to regular learning which is a useful criteria when designing online learning with the intent of ensuring that the type of learning used in a course is beneficial to all students. This is just one study out of many that are starting to occur as the gamification of learning is becoming an increasingly larger field.

Competence-based Learning

Another type of distance learning that could improve students' learning in an online environment is competence-based learning which splits up domain competencies into individual capabilities where the achievement of specific skills is secured by online exercises combined with mastery testing. Furthermore, with this type of learning, learning sequences can be modified to enable more sophisticated and personalized learning paths for students (Linke & Landenfeld, 2019, p. 152). By using an online platform, students can learn and practice new skills to the point where they master these specific skills and can then move on to learn more. This type of learning can be very impactful as students have to ability to learn their course material at their own pace and mastery, and can have personalized learning paths that are more tailored to the way that they

learn. This is difficult to do in education, online or in-person, right now as instructors are not able to cater their teaching to all types of learners. Based on the structure of competence-based learning, it can be seen that this type of learning has the capacity to improve students' overall learning and future knowledge of materials years after they were first taught, which could be groundbreaking for online platforms and education.

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