

Construction Education Delivery Method Changes During COVID-19: Student Perspectives

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Abstract

The paper examines students' perspectives that impact the student learning activities' transition due to COVID-19. The study seeks to determine how face-to-face or in-person teaching to non-traditional or online methods has affected the student, particularly in the construction program. Additionally, as construction courses typically include labs and capstone projects, it is essential to determine how these courses were delivered as the programs transitioned to the online mediums. The research study compares content delivery before and during COVID-19. The survey questions are used to determine the challenges students face in accessing the course management system, familiarizing themselves, and being satisfied with the course management system, and student's satisfaction with the instructors' delivery of the course content. Online survey instruments were created to circulate among construction students to a) evaluate the student learning experience during COVID-19 and b) identify student adaptation of content delivery during COVID-19. The students' perspectives are analyzed with the challenges faced by the students. The survey results will be used to assist faculty in identifying construction curriculum requirements based on the student's perceived ability to learn for any future move to online learning, either due to weather or illness.

Keywords: Online Learning Environment (OLE), COVID-19 impact, Course management system, Construction courses.

Introduction

Faculty and students alike were thrust into course modality changes as academia globally responded to the novel Coronavirus (COVID-19) pandemic. Although some countries had previously responded to epidemics and had some policies for their response, not all countries had a recent experience with this pandemic level. In the US, the most recent response to a global pandemic of a respiratory illness was the Spanish Flu of 1918. At that time, and when tuberculosis was prevalent, the response was much like the response today before their vaccines. Schools were closed, and public gatherings were limited. Masks were encouraged, and those who were known to be sick were quarantined or isolated from others [1, 2]. However, since that time, academia has evolved. It has included numerous components such as online education delivery, adopting and implementing technology, and its components such as Learning Management Systems (LMS). While some universities provide online degrees, not all faculty and students believe that online coursework offers the same level of quality or engagement as in-person classes [3]. Lab-based courses present challenges during delivery in the Online Learning Environment (OLE) [4]. Also, online courses can easily have a bigger class size as the physical class constraints do not govern them. The bigger class size can then impact the impacts student learning [5, 6]. Literature indicates that the bigger class size can increase problems between students and faculty, impacting lower

interaction, retention, and academic success [7, 8, 9]. Therefore, OLE can be used in exogenous situations. However, at the same time, students' perceptions of the online environment need to be assessed, especially when the transition is sudden and not expected.

Background

OLE has been adopted across the US in the last twenty years, and its increasing presence had been felt before the COVID era. In a review of the American Society for Engineering Education conference proceedings, online education became a research topic in 1996 with seven papers. Online education conference papers increased to 200 annually in the early 2000s and continue to increase as a topic today, with over 1,000 papers on online education in 2020. The jump in research in the early 2000s corresponds with a move from dial-up to broadband internet services. In 2006, broadband internet became readily available for educational purposes [10]. Multiple benefits such as scalability, lower potential costs for the enrolled students, convenience and flexibility to the learner and educators, easy access to students, and others can be attributed to the rapid adoption and diffusion of OLE within the academia pre-COVID [11-15].

Numerous construction programs across the US offered online education to students before the COVID-19 transition in March 2020. These experiences with the OLE (before COVID-19) provided perspectives on the performance of the online courses [16, 17]. Research has highlighted challenges and strategies to enhance the OLE implementation among Architecture, Engineering, and Construction (AEC) Programs. Researchers have also identified best practices/procedures implemented in construction-specific courses to enhance student learning [18, 19]. Researchers have also depicted how new content areas (such as Sustainability, Building Performance, and Building Information Modeling) can be implemented using the OLE [20-22]. Thus, one can argue that educators in the construction programs across the US were familiar with the OLE to a certain degree. However, in March 2020, almost all universities within the US began calling for closures and moving to OLE [23]. The transition to OLE was sudden for both the students and educators, especially for educators and programs where face-to-face education was the primary content delivery method. Scant literature investigates the impact of transition on the student experiences with the OLE, especially when they are vulnerable to exogenous circumstances. Therefore, the research investigated the construction student's perceptions of education delivery in the OLE.

Methodology

The study utilized a survey methodology to determine the student perceptions. An online method was selected because of the value generated and the students' ability to participate in a safe environment. The survey instrument had two sections, with the first section collecting the demographic information and the second section collecting the experiences about the OLE. The online instrument was hosted via Qualtrics and was designed so that it could be completed within ten minutes. The survey was administered during the April-May 2020 timeframe. The survey was emailed to 400 students in the three states. Approximately 123 students completed the study, and

the subsequent section discusses the results of the investigation. The study population was the students enrolled in construction programs within universities located in Georgia, Oklahoma, and Texas who had experienced a transition to OLE during Spring 2020. The states purposively selected as the locations matched the research team's geographical affiliation. Therefore, the research team was confident that the population in those states was experiencing OLE and the transition.

Results and Discussion

Figures 1a to 1d depict the respondent race distribution, university degree level, geographical location, and declared majors at the study time. The majority of the student respondents indicated to be 1) Caucasian (CA) (63%); 2) enrolled in the senior program (50%), 3) were located in Georgia (45%), and 4) had Construction Management (45%) as the declared major (Figure 1a-1d).

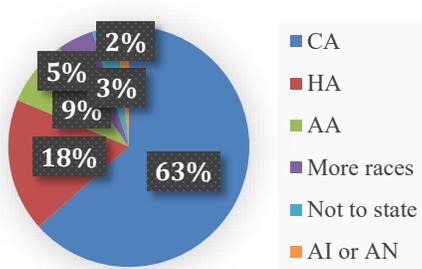


Figure: 1a Race distribution

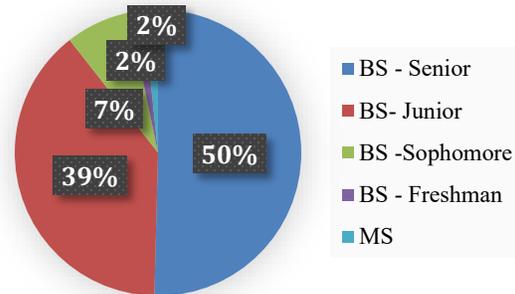


Figure: 1b Respondent university degree level

■ Georgia ■ Oklahoma ■ Texas

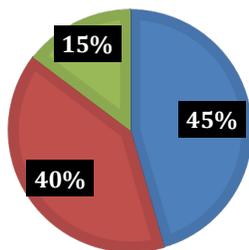


Figure: 1c Respondents from each state

■ CM ■ CET ■ CSM ■ Arch ■ BC

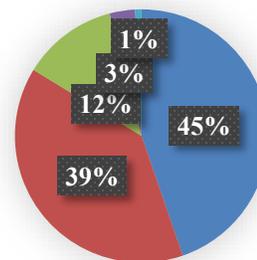


Figure: 1d Distribution of declared majors.

Figure 1: Respondent Demography

The research team wanted to determine the respondents' current course load and, with that aim, asked the following question: "How many classes were you enrolled in the Spring 2020 semester?" The course load of the respondents ranged from seven courses (maximum) to two courses (minimum) for the respondents. The average course enrollment was 4.6, and the median was 4.3.

There were 123 students' respondents from the class enrollment data in the Spring 2020 semester during COVID-19.

The research team also wanted to determine the difference between the primary method of content delivery before and during COVID-19 and found that 87% of the respondents experienced face-to-face content delivery before COVID-19. However, during the COVID-19, 93% of the respondents experienced online content delivery, and 4% experienced hybrid content delivery. Figure 2 shows the different methods of content delivery before or during COVID-19.

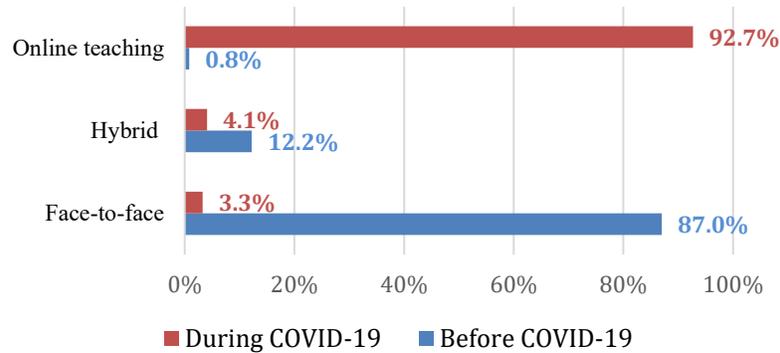


Figure 2: Content delivery methods before or during COVID-19

The research team aimed to determine the CMS used in construction course delivery and found that most of the responding students identified D2L Brightspace and Canvas each at 41%, followed by 15% of the students indicating Blackboard as the system used in construction programs (Figure 3). Thus, Course Management System (CMS) implementation plays an integral role in student learning.

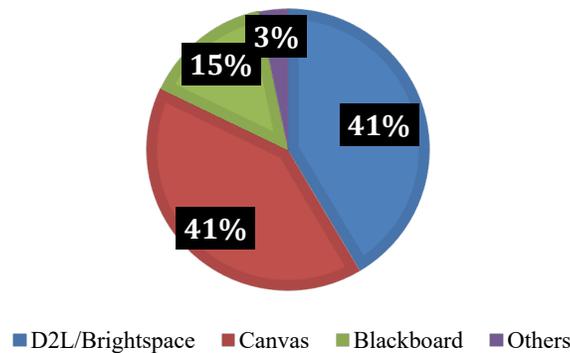


Figure 3: Course Management System (CMS) used at university.

After ascertaining the CMS, the research team determined the students' familiarity with the CMS before and during COVID-19. A Likert scale was used to assess the CMS familiarity among the participants, with one allocated to "not at all familiar" and five to "extremely familiar". Before and during COVID-19, the CMS familiarity results are almost the same regarding the extremely or very familiar range. Similarly, students were asked to rate CMS's satisfaction level on a scale of

one (*not at all satisfied*) to five (*extremely satisfied*). Based on results (Figure 4), even though students are familiar with CMS software, their satisfaction rate is lower. Students thought instructors did not help engage in the CMS during the COVID-19 pandemic (Figure 4).

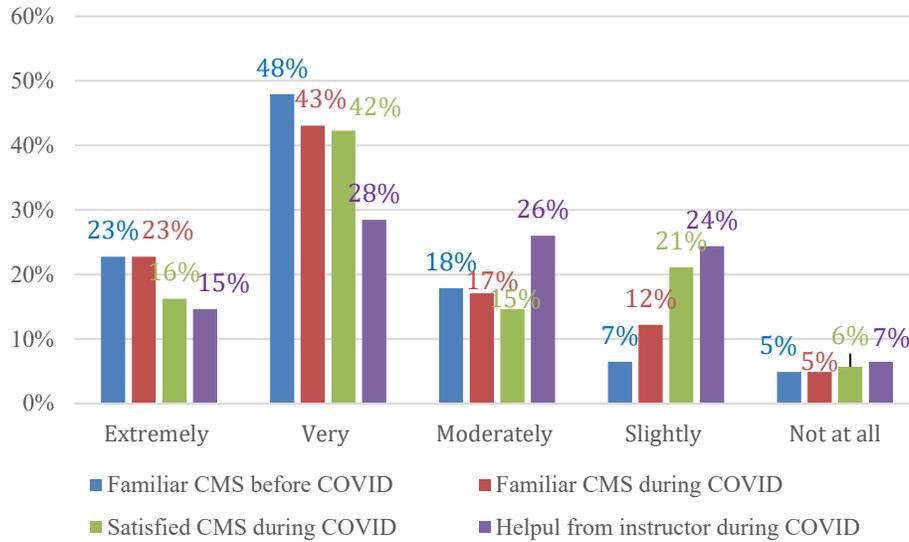


Figure 4: Student’s perspective of Course Management System before and during COVID

During the COVID-19 transition, synchronous delivery education was used actively by educators. To determine the medium for synchronous delivery education, the majority (39%) of the responding students identified Zoom, followed by 31% of the responding students indicating Microsoft Teams as the live class session used in construction programs (Figure 5).

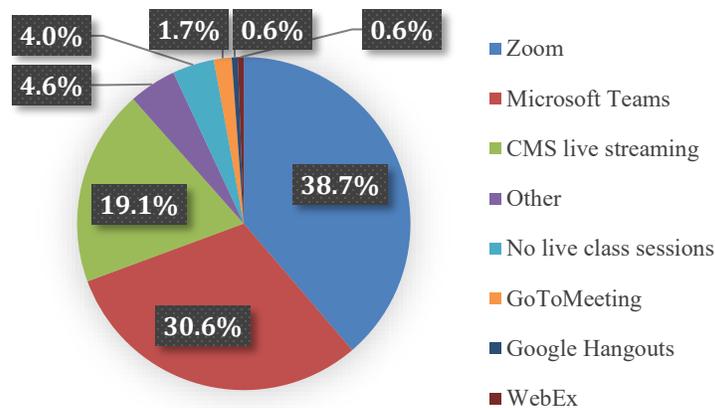


Figure 5: Faculty used live class sessions during COVID-19

The students’ experience with the learning environment forms an integral part of student learning. To ascertain the student experience, "*enjoyment of online classes*" and "*online teaching was successful*" were the two attributes identified and measured by the research team. A five-point Likert Scale was used to evaluate the students’ perceptions of the online class. Most of the

respondents (29.3% + 22.8% = 52%) indicated that they did not enjoy the classes, and only approximately 31% of the respondents enjoyed the courses. Regarding online teaching success, 39.8% (27.6% + 12.2%) of the respondents indicated that "online teaching was successful." However, approximately 25.2% of the respondents were "unsure of the success," and nearly 35% stated that they were not successful (Figure 6). Therefore, this indicates the majority had mixed reactions to the student experience with the learning environment. This is critical, as a negative perception of learning and enjoyment can impact the future adoption of OLE and impede student learning.

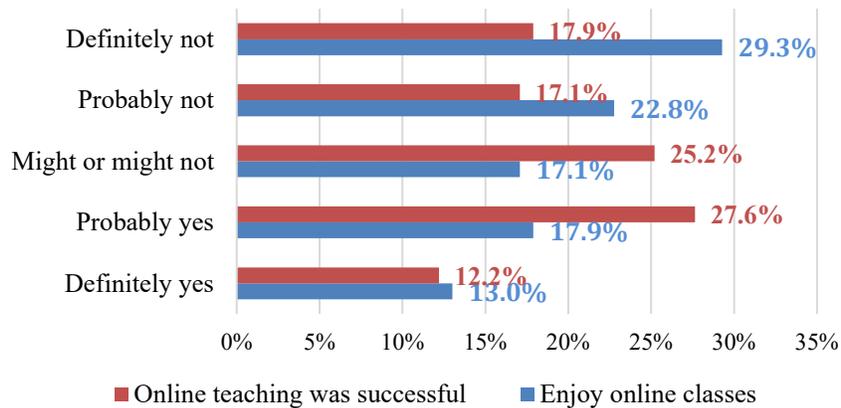


Figure 6: Students' perspective of overall online classes during COVID-19

The research team also aimed to determine how well the students adapted to the OLE during COVID and their perception of the OLE transition's faculty adaptation (Figure 7). A five-point Likert Scale was used to evaluate the student and faculty adaptation in response to the COVID-19 transition. Approximately 42.2% of the participating students indicated that they adapted "extremely or very well" in response to the OLE transition. However, the numbers declined when the respondents assessed the faculty adaptation to the COVID-19 transition. Only 32.5% of the participating students felt that faculty adapted "extremely or very well" to the OLE transition. Simultaneously, the researchers think bias exists from the students' perspectives, resulting in the participants having a slightly higher opinion about themselves.

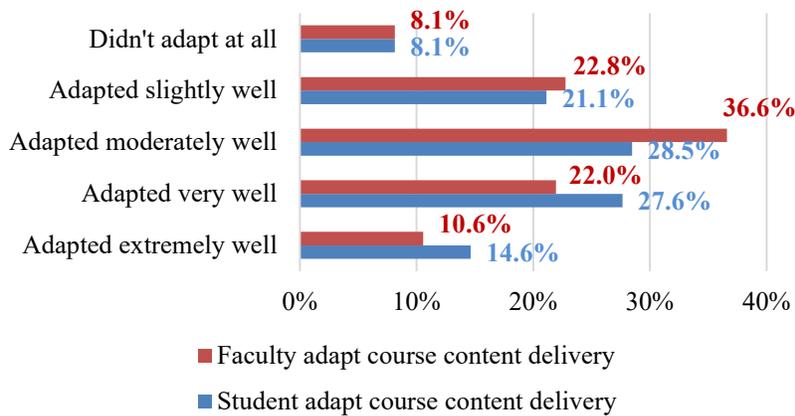


Figure 7: Faculty/Student adaption of course content delivery during COVID-19

Recommendations and Conclusions

The research sheds light on students' belief systems and experiences with the OLE during the transition to COVID-19. Students throughout the world were moved into an online environment during COVID. Although some commonsense assumptions can be made about the student's perceptions of the online learning environment, this survey was created to capture their thoughts during the pandemic. Although students believe they are proficient in using the Course Management System, they do not think their faculty helped use it. A similar divide was identified in the students' perceptions of online classes. Respondents stated they did not enjoy the online courses but felt like the online teaching was successful. In response to the perception of adaptation, respondents identified that they and their faculty adapted, with faculty to a lesser extent. Thus, students' perceptions reflect they are comfortable in an online learning environment but do not prefer it. The responses also indicate that students perceive that they may be better in the online environment and adapting to it than their faculty. This might be an expected outcome as faculty are older and perceived as slightly less capable of technology and adaptability. Most importantly, respondents believed that the faculty was successful in teaching but could be more helpful with using the CMS.

Study Limitations and Future Studies

Students form an integral stakeholder of the academic system. Therefore, assessing their perception of OLE in response to COVID-19 is extremely important, and this is one of the first few studies that has tried to do so for the students enrolled in construction programs. Simultaneously, one of the most significant study limitations is the generalizability of the findings, given the small respondent size. The results identified by the study in terms of student and faculty adaptation for OLE, student experience (success and enjoyment) with the OLE, and perceptions about the CMS need to be assessed using a larger sample that is representative of the construction students' population body to establish the generalizability of the study's findings.

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