

Exploring the Effect of Time and Duration of Class on Student Learning and Perception: The Case of Design-Build Studios in a Construction Program

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Abstract

This study investigates the impact of varying class durations on student learning and perceptions within design-build studios in a construction program at Mississippi State University. By comparing two cohorts—one from regular fall/spring semesters and another from an intensive summer session—we aimed to understand how different class schedules affect student engagement, productivity, and interest in the construction industry. Utilizing a two-phase survey and thematic analysis, we found significant similarities and differences between the groups. Both cohorts valued hands-on learning and the tiny house project for real-world construction experience. However, differences emerged in their perceptions of lectures, exams, and project management skills, influenced by the distinct time constraints of their respective schedules. The fall/spring cohort highlighted challenges related to balancing studio hours with other commitments, whereas the summer cohort faced intensified demands but reported higher engagement. These findings highlight the importance of tailoring educational approaches to optimize learning outcomes in construction education, suggesting that immersive, intensive formats may enhance practical skills and industry interest while also requiring effective time management strategies and instructional support.

Keywords

Construction Education, Design-Build Instructional Delivery, Class Duration, Project-Based Learning, Student Perception

1. Introduction

Construction education in recent years has seen many challenges in response to the ever changing and demanding environment in the construction industry. In preparing students to enter the construction workforce, providing opportunities to gain experience and understand the actual tasks and responsibilities in any construction site is essential for a seamless transition. (Becerik-Gerber et al., 2011; Lee et al., 2011; Olanrewaju et al., 2015) Additionally, exposing students to even small opportunities to design and build while they are also responsible for managing the construction process is of utmost importance. (Huang, 2018; Valdes-Vasquez & Clevenger, 2015) This, in fact, allows for obtaining a broad understanding of construction management at an early stage of students' educational experience.

On the other hand, the recent research into higher education and in particular construction education clearly indicates the value and impact of Project Based Learning (PBL) and integrated course delivery as opposed to traditional lecture lab courses. (Ali, 2019; Guo et al., 2020) Research indicates students experience higher levels of productivity, self-engagement and positive affect when engaged in problem-based learning.

At Mississippi State University (MSU) Department of Building Construction Science (BCS), a studio-based curriculum is employed to deliver the fundamental content in construction management and building sciences. (Garshasby & Rokooei, 2023; Rokooei et al., 2022) Therefore, a standard eight semester curriculum entails eight building construction science studios in a sequence as a chain to prepare students while they are taking other relevant science, management, humanities, and elective courses.

The first two studios in this chain are focused on delivering construction materials and methods to students. Therefore, first-year students are introduced to these concepts, typically for the first time in a formal capacity, and

throughout extended hours inside the studio and in fabrication spaces (indoor shop and outdoor courtyard) they will experiment with materials and methods to implement their learned concepts in a practical setting. The product of these first two studios is what is known as “modular/tiny homes”. (Team, n.d.) Figure 1 shows the completed tiny home built in Summer 2023, note that students are painting the exterior finishes. These buildings are built out of fabricated modules typically constructed out of wood framing and lightweight steel framing.



Figure 1. Students completing the exterior finishes at the end of the semester.

One of the significances of this project and this type of instructional delivery method is the process that students take from learning about drawings and plan reading to understanding and engaging in the design process. At this point, all students are provided with basic requirements of the physical program and then engaged in this process for an extended period. Students are advised that one design out of all students’ work will be chosen, refined, and developed for construction. Figure 2 shows students working on the design process and developing construction details for their project. This procedure in fact generates a sense of ownership for all students to construct a small building. Once the design development is final, students begin fabrication, which normally starts with early fabrication of concrete slabs or wood floor deck for the modules to be later framed.



Figure 2. Students engaged in discussions about the design process and construction details before fabrication begins.

Certain aspects of fabrication as well as intensive safety instructions and equipment will be demonstrated to students via the instructor, shop technicians or other professionals so students have the sufficient understanding before beginning the construction process. Students will be divided into several groups, each responsible for one module of the whole building. Each group is then tasked to elect a project manager, superintendent, safety officer and quality control officer so coordination between team members and assigned trades happens swiftly.

Students are required to document tasks performed as well as keep up with daily logs to check for consistency in schedule and progress. It is essential that students are exposed to these processes and concepts early on so they can practice and implement these tools more efficiently as the project moves forward and becomes more complicated. Figure 3 shows students working on completing wood framing for the walls.



Figure 3. Students engaged in wood framing of the walls.

Normally, after wall framing, construction is followed by wall sheathing, weather barriers, insulation installation, placing doors and windows and eventually installing cladding and exterior and interior finish systems. The objective is to close the envelope, so the building is weatherproof before the semester ends. Figure 4 shows students putting on weather barrier on the building. If time allows, interior finishes will be applied, and partial cabinetry and electrical systems will be installed. A critical aspect of design of construction for this project is connection details and methods of attachment between modules as the modules must come apart for disassembly and transportation to be put together at a later stage. It is noteworthy to mention that the finished buildings will be placed for auction on a government website and are sold to private entities, which in turn brings financial profit to the program and allows for future investment for material procurement for later semesters and projects.



Figure 4. Students install weather barriers on the sheathed walls.

A specific component of the BCS program at MSU is that the two studios are offered once during the regular fall and spring semester, and another time during the summer months of June and July. The curriculum and course content are the same; however, due to limitation of time, the summer students meet every day during the week from 8am-5pm while the fall and spring students meet three times a week for four hours, which equates the total duration for both semesters. In this study, we are investigating the effect of this difference in time and duration of class on students' learning, perception, productivity, and potential impact on their opinion about the construction industry.

2. Settings

This study utilizes a survey instrument to collect students' votes on specific parameters related to productivity, learning, impact, and their perceptions of the construction industry. IRB approval was obtained via the Office of Research Compliance and Security at Mississippi State University (IRB-23-312) in the summer of 2023 and consent was collected from participants electronically via the survey. As mentioned earlier, the participants' pool comprised of two cohorts: the Fall/Spring (FS) group and the Summer (SUM) group. Once data collection was completed, a set of processes including data cleaning and filtering was conducted to ensure data accuracy and removed duplicates (n:58).

We utilized a two-phase survey instrument to look at students' votes and analyzed the data. It is noteworthy to mention that this is the second step of a larger study, parts of which were analyzed and published earlier. (Garshasby & Rokooei, 2023) For the current study, we distributed the second phase of our survey looking at variables to compare between the two cohorts. For analysis, a thorough review of comments and participants responses was conducted by the authors of this paper. Thematic analysis was performed to carefully review the responses and therefore, common themes were coded to categorize results for further analysis.

3. Results

The results for this study were categorized based on the questions asked. The questions were open-ended, so the participants had the opportunity to freely express their opinions. Questions included aspects of learning activities that took place during class, the potential impact that taking this class had on their opinion on the construction industry and their future. Additionally, we inquired on certain aspects of the design build studio followed up by asking what aspects they enjoyed the most or the least. Finally, participants were asked to share the challenges they faced, and how they dealt with them during their experience in the studio. For all questions, participants were asked to provide examples from their experience to better illustrate certain elements of their perception. Through using a post-positivist approach (Creswell et al., 1996; Glaser & Strauss, 2017; Marjan, 2017), participants' experience could be better understood, compared and analyzed.

4. Discussion

Participants in this study exhibited similarities and differences in responding to questions about the design-build process practiced in their studios. In addition, similar and different perspectives were identified based on the time/duration of studios. Generally, participants took design-build studios either in a regular fall/spring semester (FS Group) or in a compacted summer semester (SUM Group). However, the total number of class hours for both groups was the same. In this paper the design build studios are also referred to as Studio A and B.

4.1 Learning Activities: The first part of the survey was concentrated on the learning activities during the design-build studios, including collaboration, model making, hands-on fabrication, lectures, and tests. The analysis of data showed similar and different perspectives between the two groups.

4.1.1 Similarities between FS Group and SUM Group

The first similar theme between the two groups was the emphasis on hands-on learning. Both groups appreciated the hands-on aspect of the studio, highlighting its effectiveness in teaching construction skills and providing real-world experience. "The tiny house projects were very helpful and gave me a lot of experience and showed me how a real project would look like in the real world" (FS Group participant) and "I enjoyed the hands-on work much more than

the paper tests or assignments" (SUM Group participant) are examples of this emphasis. The next similarity was the value of the tiny house project, as the continuous term project. Both groups found the tiny house project to be valuable in learning about construction processes, teamwork, and project management. Participants from both groups expressed similar opinions about the value of their tiny house project. For instance, "the tiny house projects were very helpful and gave me a lot of experience and showed me how a real project would look like in the real world" and "the tiny house project taught me most of what I know about building buildings and is an excellent learning opportunity" were stated by FS Group and SUM Group, respectively. Another similarity between these two groups was challenges with grading and workload. Both groups expressed concerns about grading criteria, workload management, and the challenges of balancing studio hours with other classes and personal life commitments. For example, a participant from FS Group stated that "the grade was based almost entirely on out of class hours, which were impossible for the professors to verify" and similarly, another student from SUM group expressed "I think there shouldn't be tests and that grades should be based on hours put in. Exams were too high of a percentage for mine."

4.1.2 Differences between FS Group and SUM Group

While several similar themes were identified between two groups through the analysis of the responses, distinct viewpoints were determined as well. One of the differences was the perception of lectures and tests. While FS Group generally found lectures and tests less effective compared to hands-on activities, SUM Group specifically mentioned exams as being too high a percentage of their grades. Another noticeable difference was the perception of instruction and guidance in which FS Group expressed an instruction gap due to the lack of clear instructions and guidance on assignments, while SUM Group felt that the activities were in-depth and well-explained. "Sometimes it felt like we were given a big project with little to no instruction causing us to lean on our peers for help", expressed by a student from FS group was contradictory the statement stated by a student from SUM group, as instructions "were very in-depth and explained very well to us students." Another different point was the experience level and background knowledge. FS Group included first-year students who had varying levels of prior experience in construction, whereas SUM Group included individuals who had little to no background in construction before the studio, highlighting differing starting points for learning.

4.2 Impact on Career Interest: The next section of the survey explored how and to what extent the interest of students changed due to the completion of the tiny building as the studio project. Similar to the previous section, responses were thematically analyzed and categorized. Then, similar and different themes between the two groups were identified. Noticeable subjects were determined as follows:

4.2.1 Similarities between FS Group and SUM Group

One of the obvious common themes between the two groups was the increase of interest in construction. Both groups experienced a growth in interest in construction after completing Studio A and B, indicating the effectiveness of the studio in enhancing their enthusiasm for the field. "After the studio A and B, my interest in construction has grown" and "after completion of these two studios I decided I will stay in this program and graduate with its provided degree" were example statements, indicating the increase of interest in both groups. Another common theme was the affirmation or intensification of existing interest as both groups either had their existing interest in construction affirmed or intensified after participating in Studio A and B, demonstrating the positive impact of the studio on their career aspirations. In addition, recognition of the breadth of construction was the next similar theme between the two groups. Both groups acknowledged the comprehensive nature of construction learning through Studio A and B, recognizing its depth and the potential rewards of mastering various aspects of the field. For example, two participants from two groups stated that "my interest in construction has increased since the taking of studio A and B. I believe that these studios show me how in-depth construction can be and how rewarding it is if the task is completed properly", and "No my interest has not changed but has significantly increased my interest in BCS".

4.2.2 Differences between FS Group and SUM Group

The analysis of the responses showed some variant viewpoints as well. One of these differences was the specific impact on career plans. While some members of FS Group expressed intentions to pursue careers in construction post-graduation directly, members of SUM Group highlighted a significant increase in interest in the Bachelor of Construction Science (BCS) program without specifying direct career plans. In addition, the degree of engagement with hands-on learning was one of the distinct areas too. While both groups found hands-on building engaging,

members of SUM Group specifically emphasized the enjoyable nature of the hands-on activities in Studio A and B, suggesting a high level of engagement and enjoyment. "After building the Tiny House, I knew that this was the field I wanted to pursue. It was difficult but it really challenged and made me think if this major was right for me" and "I become a lot more interested during studio A and B. Hands on building made the class very engaging" were instances indicating the engagement of students with hands-on activities.

4.3 Opinions on Aspects of the Project: In the next section, participants expressed their thoughts and opinion on aspects of the Tiny Building Studios such as design-build process, designing, building, managing the construction process, etc. that they enjoyed the most or the least. The analysis of themes from both groups revealed similarities and differences between the two groups as well.

4.3.1 Similarities between FS Group and SUM Group

One of the identifiable themes was the appreciation for hands-on experience. Both groups valued the hands-on aspect of the studio, indicating a preference for practical learning experiences. Both groups' participants reflected on their interests with statements such as "I enjoyed the hands-on experience and the team working skills I gained the most" or "I enjoyed the hands-on aspect of the studios the most". Interest in design and building was another common theme between the two groups. Both groups expressed enjoyment in both the design and building phases of the project, highlighting their interest in both creative and practical aspects. For example, a participant from FS Group stated that "I enjoyed all of the aspects of the tiny house." Similarly, a participant from SUM Group reflected that "I enjoyed designing it or building it was my favorite." As shown in the previous section, another similar theme was the positive impact on interest in construction. Both groups reported that their interest in construction grew as a result of their experience in the studio, indicating a positive impact on their career interests. "My interest in construction has grown because of what the tiny house taught me" from FS Group and "It has increased my interest in construction and made me knowledgeable on what the different positions of building a house were" from Group SUM were instances of such perceptions.

4.3.2 Differences between FS Group and SUM Group

A noticeable difference between the two groups was views on designing versus building processes. FS Group favored the building aspect over designing, whereas SUM Group enjoyed the design process more. A participant from FS Group stated, "I enjoyed building the most" while a member of SUM Group expressed "I enjoyed the design process of the Tiny Home studios the best." The other noticeable difference was the perception of the design process. FS Group expressed frustration with the long hours involved in the design process, while SUM Group found frustration in learning specific design software tools. A student from FS Group stated that "My least favorite part was being up at the studio long hours into the night to work and pick up the slack of my team or others." On the other hand, a participant from SUM Group stated that "The only thing that was a little frustrating was using SketchUp and learning how to use it."

4.4 Challenges and Issues: Challenges and issues that participants faced throughout their studios were the subject of the next section of the survey. These challenges ranged from instructional topics to course layout. Responses were analyzed and similar themes were grouped into various categories. In the next step, similarities and differences between the groups were identified.

4.4.1 Similarities between FS Group and SUM Group

One common theme between the two groups was time management. Considering both studios as students' first studios and the intense nature of the expected work, students need to develop their time management skills. In this case, both groups encountered challenges related to time management, whether it was balancing workload within the studio or managing online submissions effectively. As both groups similarly commented, time management was a challenge, indicated in statements like "time management was the biggest problem of the project for the entire group" or "one challenge I faced was submitting things online. I eventually figured it out after many attempts on the many assignments." In addition, issues related to group work were another common theme between the two group. Both groups faced challenges related to group dynamics, whether it was dealing with varying levels of effort from team members or learning how to apply classroom knowledge in practical scenarios.

4.4.2 Differences between FS Group and SUM Group

Students in both groups also showed different opinions about their challenges as well. For example, test-taking versus practical application was reported differently by both groups. FS Group struggled with traditional test-taking methods, while SUM Group found practical application of classroom knowledge more beneficial for learning, as indicated in the following statements: "I struggled with the tests just due to the fact I am not a very good test taker" (FS Group) and "taking what we were taught in class and actually doing it was very helpful in learning it" (SUM Group).

5. Conclusions

This study offers significant insights into how different class durations affect student learning and perceptions in design-build studios within a construction program. Both the fall/spring and summer cohorts expressed a strong appreciation for hands-on learning and the comprehensive nature of the tiny house projects, which not only enhanced their practical skills but also deepened their interest in the construction industry.

The summer cohort, experiencing an intensive daily schedule, reported higher engagement and enjoyment of hands-on activities. However, they also faced unique challenges such as managing their time effectively and learning specific software tools. Conversely, the fall/spring cohort, which met less frequently but over a longer period, struggled more with balancing workload and perceived gaps in instruction. These differences highlight the impact of class scheduling on student experiences and underscore the need for tailored educational approaches.

The findings suggest that while both scheduling formats can be effective, the intensive summer session may provide advantages in terms of immersive learning and practical engagement. However, to optimize these benefits, it is essential to implement robust support structures that address the heightened demands on time and resources. This includes providing clear instructional guidance, effective time management training, and additional resources to help students cope with the intensive nature of the program.

Moreover, this study underscores the importance of continuous curriculum assessment and adaptation to meet the evolving needs of the construction industry. As technological advancements and industry standards shift, educational programs must remain agile, incorporating feedback from both students and industry stakeholders. By fostering a learning environment that balances theoretical knowledge with practical application, and by adjusting instructional methods to the specific needs of diverse student cohorts, educational institutions can better equip future construction professionals with the skills and insights necessary for successful careers.

Future research could explore additional variables such as long-term retention of skills and knowledge, and the impact of different instructional methods within these varied schedules. Investigating the psychological and physical effects of intensive learning environments on students could also provide valuable insights for improving educational practices. By understanding these dynamics, construction education programs can better design their curricula to maximize student learning, enhance student well-being, and prepare graduates for the complexities of the construction industry.

In conclusion, this study highlights the critical role of class duration and structure in shaping student experiences in design-build studios. By leveraging the strengths of both intensive and extended learning formats, and by providing the necessary support mechanisms, educational institutions can create a more effective and engaging learning environment. This proactive approach will not only improve educational outcomes but also contribute to the advancement and innovation within the construction sector, ultimately leading to a more skilled and adaptable workforce.

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