

## **Is Summer Semester Effective Enough in Studio-based Construction Programs?**

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## Abstract

Lecture and lab course formats are still the dominant forms of course delivery in higher education. However, universities and international colleges are increasingly providing abbreviated courses usually lasting one to eight weeks during summer semesters. The definition of intensive course formats lends some key terms such as time-shortened, compressed, condensed, and block courses. Some research shows that quality of the learning in courses in which various creative teaching methods are employed and students' performance and outcomes are attentively assessed is comparable to methods when the same subject matter is taught in a traditional format. Yet, there are some studies that show while the learning outcomes from both traditional and intensive formats were perceived to be similar, students found the intensive method more interesting, and rated this format higher overall. On the contrary, some researchers have expressed their concerns about the negative impacts of intensive courses. They believe academic quality is compromised by the efficiency of time and cost. Additionally, another issue reported about intensive courses is their intrinsic requirement for a high level of self-discipline and self-regulation which impacts the success of students lacking self-management skills as compared with traditional course formats. However, there are not ample research studies addressing the preference of courses with physical activities and hands-on experiences in an intensive format offered in a regular semester. In this narrower area, two opposite arguments still contradict each other. One side positions itself with a claim on the benefit of physical activity continuation and believes in physical activity accomplishments in more frequent and longer sessions, as common in intensive courses, helps students to continuously be involved in such activities and ultimately learn more. On the other hand, the opposing group argues the short-term learning period does not allow students to fully comprehend a full semester course content.

The Building Construction Science (BCS) program at Mississippi State University is one of the only two construction programs in the United States with a studio-based curriculum. The program provides a project-based learning environment in which collaborative learning activities are designed and accomplished within the construction department and also between the construction department and other educational units in the same college. The backbone of BCS curriculum is eight consecutive, six-credit hour studios, each of which is offered in one semester. The major topics of construction programs such as construction equipment and methods, estimating, scheduling, contracts and regulations, and BIM technology are iteratively introduced and practiced through several activities and projects. However, the chain of studios prohibits students from completing their degree in a shorter period.

The BCS program offers the first two studios in summer so that students can decrease their program duration. In order to evaluate the effectiveness of the summer studios, the performance of two groups of students was compared over the course of four years. This paper briefly addresses the outcomes of a quantitative research method used to show the similarities, differences, and correlations between the subjects in traditional and intensive course formats.

**Keywords:** Studio, Construction, Education, Performance

## **Background**

### *Challenges and Misconceptions*

Time-compressed courses are gaining appeal for college students across America. The shorter time frame is preferable to the lifestyle and learning style of many individuals. However, this different approach of college teaching has its pitfalls. A main concern for faculty with time-compressed courses is the lack of formal training teachers and professors received in this special type of teaching (Giordano, 2011). A significant amount of research indicates how teachers can best approach and format their intensive-length courses, but this has not yet been incorporated into the majority of educators' training. Giordano also pointed out the problematic misconception of shorter length courses with students; there is a common perception that shorter courses require less work and commitment. Students often view summer, intensive courses as relaxed and less rigid as compared to fall and spring semester courses. Adult students with full-time jobs often mistake time-compressed courses as an easy fit into their busy schedules (2011). This inaccurate belief is one factor harming the effectiveness of time-compressed courses. Lastly, it is important for school and students to consider the cost implication related to a time-compressed course. These courses cost more administratively, and for commuting students, travel expenses could be high during the course duration (Austin & Gustafson, 2006).

### *Effectiveness and Benefits*

It is evident that a system for teaching time-compressed courses is still a work in progress, for both professors and students. Despite the issues at hand, the already apparent effectiveness of intensive length courses could alter the future of college programs. Scott and Conrad found that "based on the evidence, intensive courses seem to be effective alternatives to traditional-length classes regardless of format, degree of intensity, or field of study" (1992, p. 452). Further and more recent research performed by Austin and Gustafson based on over 45,000 observations of students in summer, spring, and fall semester courses, the latter two being traditional length, showed that the intensive length (summer) courses presented higher grades than the traditional length courses. The study confirms that this statistic was not due to the intensive courses lowering their standards, a potential weakness of shorter courses (2006). Also proved in this research, courses of 4 weeks showed best performance levels (compared to 3, 8, and 16 weeks). Undergraduate marketing students used in a study on intensive delivery in summer courses versus traditional, semester courses noted that they did not see substantial differences in learning. Despite this, they did prefer the summer courses for their intensity and found the subject more intriguing (Ho & Polonsky, 2007). Several years later, participating students in Kucsera and Zimmaro's study (2010) ranked the instructors' effectiveness for a traditional and intensive course comparatively; however, the course effectiveness was indeed higher for the intensive course. Expanding the use of time-compressed courses creates more opportunities for all students and may be a better alternative for certain students. According to Austin and Gustafson, "the primary benefit of reduced course lengths would be increased student learning" (2006, p. 36). Online classes are another medium through which students can take courses, both traditional and intensive-lengths. One of the most common benefits as noted by students of online courses is the self-paced learning. Students can work at their own speed and convenience. Time management skills are important for students to learn and develop when taking online courses (Enkin, 2017).

### *Contrary Findings*

Although many students have noted their support of the short, intensive-length courses, it is important to note that this type of learning is not best for every student. As stated in *A Critique of Intensive Courses and an Agenda for Research*, "academic time should accommodate - not ignore - educational needs, and colleges and universities should consider a wide variety of course formats which vary according to length, pace, and intensity to temporally match course formats with the educational goals of each course and the needs of all students" (Scott & Conrad, 1992, p. 452). This statement is represented in other research that has been conducted and found neutral or opposing results to time-compressed courses. In a community college, the effectiveness of a 5-week, intensive hybrid course was compared to that of a regular 11-week course. Course effectiveness was measured by grades, passing rates, intellectual growth, student perceptions, and instructor remarks. Results for the two course methods did not show a significant difference (Corgan Monto, 2016). While neither positive nor negative, these findings do not support the continued growth of intensive courses. A study of freshman students at the international branch of Shiraz University of Medical Sciences selected students to either take a non-intensive two-day-per-week class or an intensive class that met 10 hours a week with a different result. According to their findings, students took more advantage of the non-intense course and achieved more (Nasiri & Shokrpour, 2012).

### *Best Practices*

A major downfall in the current state of intensive learning is the lack of training and accepted common practices. Research has shown varying success of time-compressed courses. Such results show the need for improvement. Quality summer learning programs share common traits including smaller class sizes, differentiated instruction, high-quality instruction, aligned curricula, engaging yet rigorous programming, maximized participation and attendance, long enough duration, involved parents, and effectiveness evaluations (McCombs, et al., 2011). Administering effectiveness evaluations to the students regarding the teaching style and course load are essential to any intensive-length course to determine how the students viewed the success of the course and what aspects needed improving. The best practices for teaching a summer course according to Kops (2014) are to restructure the course, reconfigure assignments, organize and plan, and maximize support to students. Giordano emphasized that for effective time-compressed courses, it is essential to have clearly outlined objectives, enthusiasm and process, active classroom discussion and peer interaction, interactive lecture demonstrations, and problem-based learning in homework, recitation, and lab (2011). Strong principles and good practices in intensive length courses are paramount for student success. Professors that exhibit these encourage student-faculty communication, student cooperation, active learning techniques, and prompt feedback (Sampson, Brogt, & Comer, 2011). The professionalism and consistency of the professor establishes high expectations for the students and the work they submit. To help students with the material, teachers should maintain an organized, easy to follow course with materials that are not overly lengthy (Enkin, 2017). Research conducted by Bell and Carrillo on summer learning programs found that these types of programs accelerate academic performance and support positive youth development. For these benefits to be maximized, Bell and Carrillo noted nine characteristics of the program that must be in place (Bell & Carrillo, 2007):

- Intentional focus on accelerating learning
- Firm commitment to youth development
- Proactive approach to summer learning
- Strong, empowering leadership
- Advanced, collaborative planning

- Extensive opportunities for staff development
- Strategic partnerships
- Rigorous approach to evaluation and commitment to program improvement
- Clear focus on sustainability and cost-effectiveness

Professors that can master these guidelines have the strongest chance of achieving student success in an intensive length course. These courses are not easy to teach and take a lot of focus, planning, and drive. If more teachers can effectively manage a time-compressed course, students can reap the benefits.

## **Methodology**

This study was designed and developed using existing data. The first step was completing the requirements of an internal review board (IRB). Then, to explore possible correlations between the times that studios are offered and students' performance, the academic performance data of the construction program's students within the past five years were extracted. To protect the students' privacy, no identifiable information was recorded. The gathered data included the university grade point average (GPA) and transfer credit as well. Their ACT scores and sectional scores were recorded along with the construction studios grades. A data model was created by compiling all data and grouping them into two groups of students who 1) took or 2) did not take studios A and B in the summer. Studio A is a twelve hours laboratory which presents an introduction to construction materials and methods, construction drawing and modeling, building systems, project life cycles and management, and professional thinking and action. Studio B is also a twelve hours laboratory in which the development of building assemblies and construction sequencing, drawings and computer applications, project management skills, and professional thinking and action are practiced. Since the main objective of this study was to figure out if the time that construction foundation courses has any impact on students' performance throughout their program of study, the semester that students took Studio A and Studio B, as the foundation courses, is considered as the variable in this study. According to the BCS curriculum, these two studios are offered in the fall and spring of the first year. Alternatively, these two studios can be taken during the condensed summer semesters. Since there is a sequence of eight studios (Studios A, B, 1, 2, 3, 4, 5, and 6), each planned for one semester, offering Studio A and B in the summer allows transferred students who have taken general education courses to decrease their stay time in the BCS program to three years.

## **Results**

Current students of the BCS program were considered as the statistical population in this study (N=162). The population was categorized into two comparative groups; first, Group 1 which included all students who took Studio A and B in the fall and spring semesters (normal plan of study), and Group 2 that consisted of all students who took Studio A and B in the summer. Male students comprised the majority of both groups (Group 1: 94% and Group 2: 96%).

### *General Performance Indicators:*

The overall performance of both groups is shown in Table 1 which includes both university and transferred credit hours (CrHr) taken and their GPAs. In both University and Transferred sections, the

GPA of Group 2 is higher than the GPA of Group 1, which indicates a better overall performance of this group.

Table 1: General Performance Indicators

		University	Transferred
Group 1	CrHr	55.77	20.16
	GPA	2.62	2.34
Group 2	CrHr	71.5	27.98
	GPA	2.73	2.56

*ACT Scores*

Act scores of both groups are depicted in Figure 1. As shown, the averages of overall scores as well as in all four sections in Group 1 are higher than those in Group 2. the difference between the averages of each group varies from 0.3 (Math) to 1.27 (English).

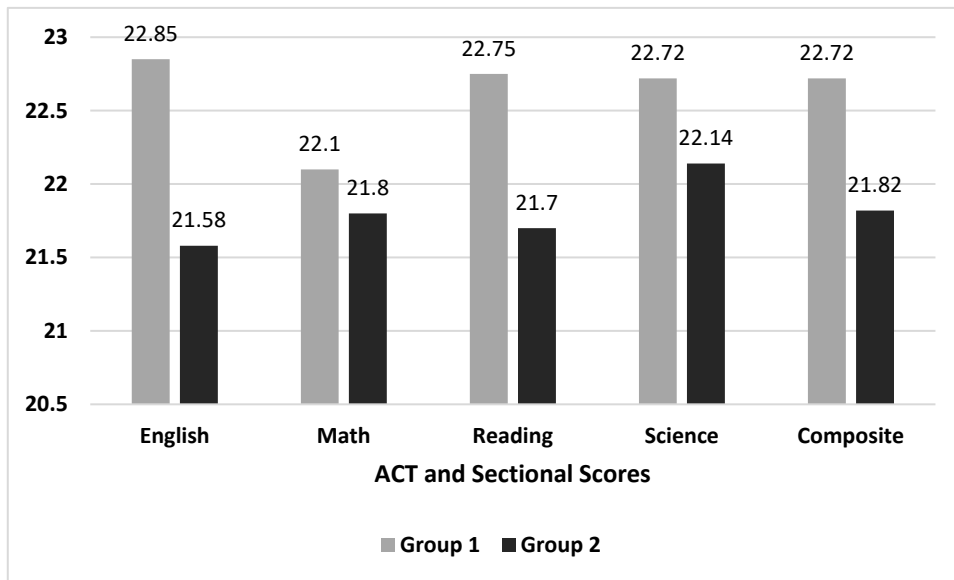


Figure 1: ACT Scores in Groups 1 and 2

### Studio A Performance

The comparison of Studio A in the past five years shows that students in Group 2 (summer semester) have received higher grades than Group 1 (fall semester). The average of grades in Group 2 was 3.46 (out of 4) while it was 2.9 (out of 4) in Group 1.

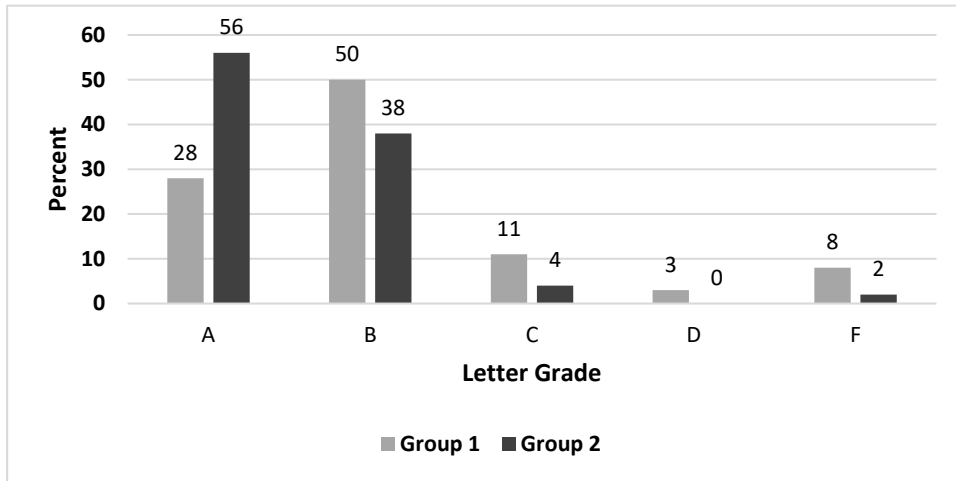


Figure 2: Studio A Grades in Groups 1 and 2

### Studio B Performance

Similar to Studio A, the average of grades in Group 2 (3.69 out of 4) is higher than that of Group 1 (2.83 out of 4). In Studio B, 69% of students in Group 2 received the grade letter A while only 17% of Group 1 students received an A, which emphasizes a considerable difference between the distribution of grades in two groups.

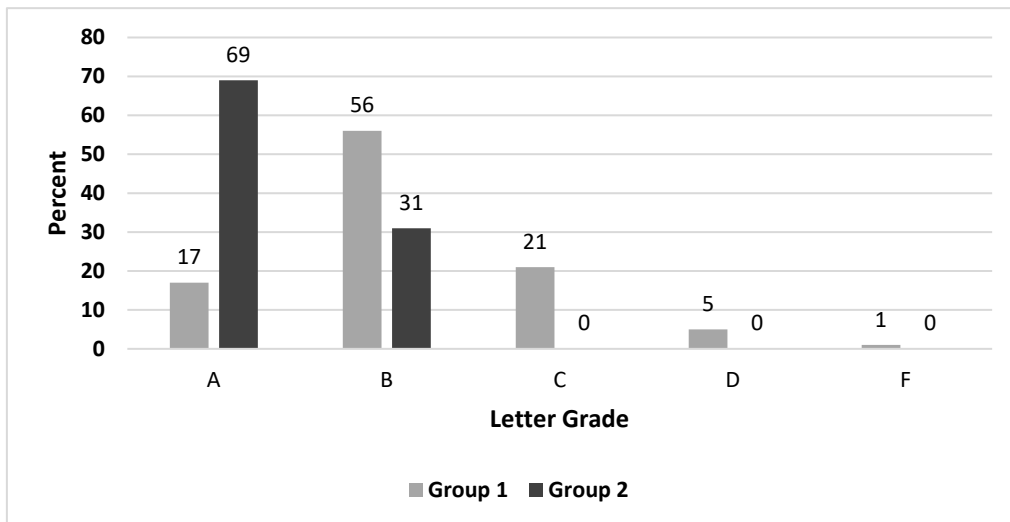


Figure 3: Studio B Grades in Groups 1 and 2

### Studio 1 Performance

Both groups showed a 0.19 (out of 4) difference in averages of grades in Studio 1. While the average of grades in Studio 1 was 2.74 (out of 4) in Group 1, it was 2.55 (out of 4) in Group 2 which indicates a slightly better performance of Group 1. Also, the difference of both groups was evenly distributed between letter grade subsets.

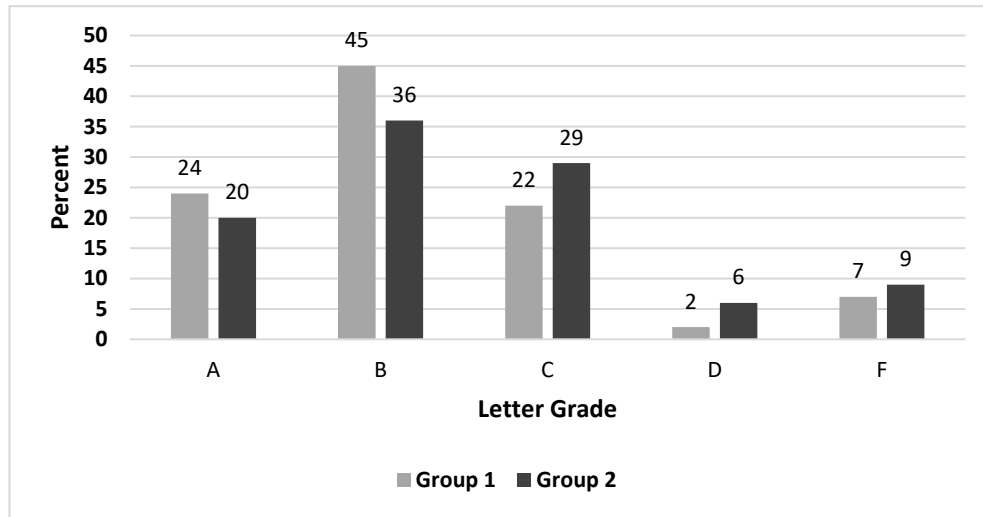


Figure 4: Studio 1 Grades in Groups 1 and 2

### Studio 2 Performance

Similar to Studio 1, Group 1 showed a better performance in Studio 2. The difference between the averages of two groups (3.31 vs. 3.0 out of 4) was higher in this Studio. In addition, the difference between the grade A subgroups is higher.

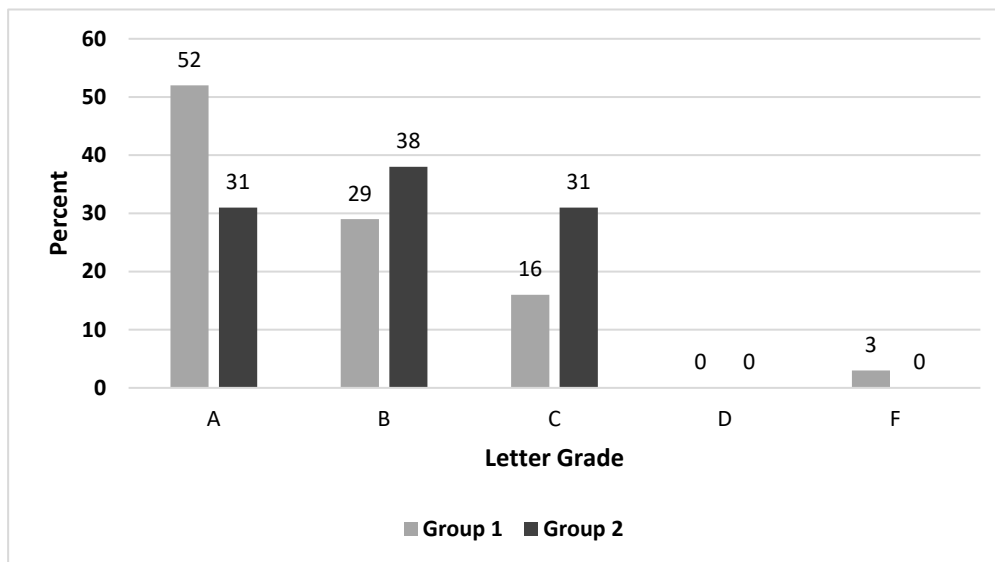


Figure 5: Studio 2 Grades in Groups 1 and 2



### Studio 3 Performance

The average of Groups 1 and 2 in Studio 3 was 3.06 and 2.93 (out of 4), respectively. While grade A, B, and C subsets showed a similar percentage in two groups, only Group 2 had a 12% in grade D subsets.

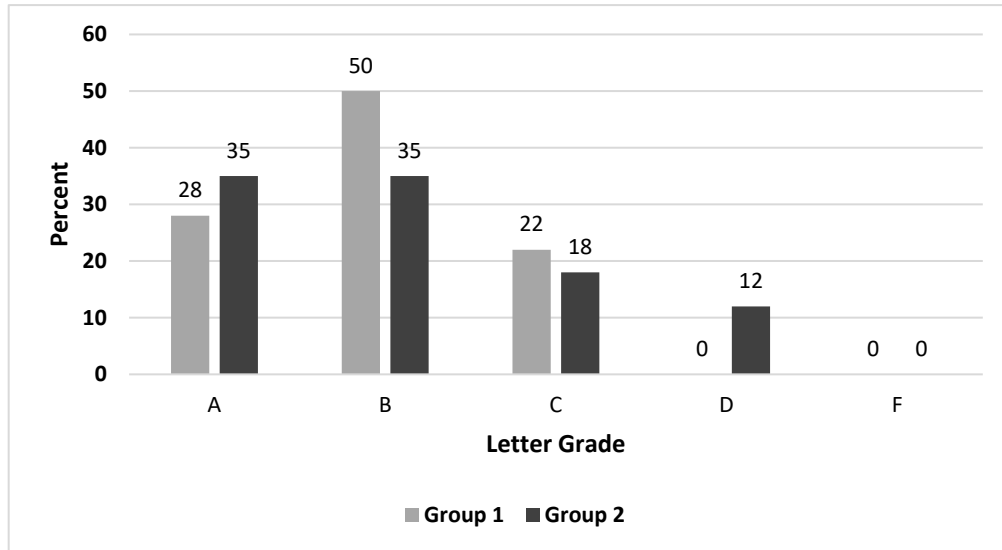


Figure 6: Studio 3 Grades in Groups 1 and 2

### Studio 4 Performance

The difference of performances of two groups is at the minimum level in Studio 4 (3.17 and 3.09 out of 4 in Groups 1 and 2, respectively). In Group 1, both grade A and B subsets have a similar percentage (39%), and the percentage of grade B (59%) subset is considerably different from other subsets in Group 2.

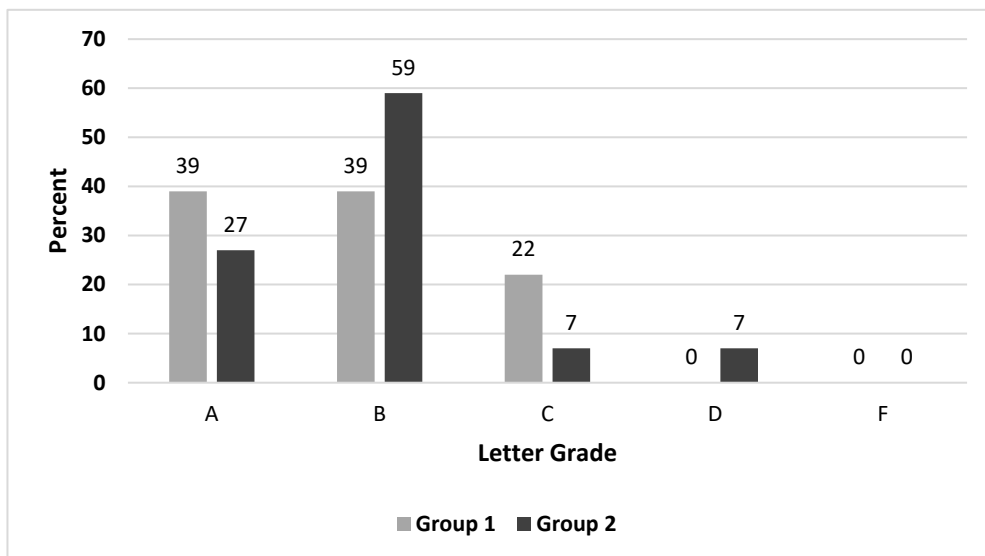


Figure 7: Studio 4 Grades in Groups 1 and 2

## Discussion and Conclusion

This study explored the impact of taking summer courses on the performance of students in their subsequent semesters and compared it with the performance of their peers who began their studies in fall and continued in normal academic setting in the BCS program at Mississippi State University. The variable that is considered for this study is the time that two foundation courses in the BCS are offered. These two courses are Studio A and Studio B, each of which delivers six credit hours. These two courses introduced basic concepts, subjects, and methods in the construction area, and therefore mastering them strongly helps students to satisfactorily perform in their next studios which focus on estimating, scheduling, and contracts. Lack of best practices in the studio-based learning method makes the planning and organization difficult for instructors. The outcome of this study provides inputs to administrators and instructors in the quality-quantity continuum. One extreme side of this spectrum concentrates on the flexibility that offering Studio A and B in the summer gives students and reduces the program length from four to three years. Undoubtedly this option ameliorates the situation for students, specifically the transferred ones, who have spent at least one year in other departments and have often taken several general education courses. This helps the BCS program to admit more students and grow. On the other hand, some are concerned about the quality of the education and believe condensing the content of two construction courses – especially the foundation ones – that are typically offered in the fall and spring into three months of summer work might compromise quality and leave students without exposing them to the in-depth construction problems that need a proper time to digest. In other words, although the meeting hours are the same in both settings, the shorter calendar durations in which students are learning the construction contents affects their learning negatively.

The analysis of the data gathered from all BCS students in the past five years reveals a few enlightening points. While Group 1 (normal path students) had higher ACT scores than Group B (students who took Studios 1 and 2 in the summer) had higher GPAs. Also, those who took two studios in the summer received better grades. This may be interpreted as a better performance for this group; however, considering other semesters grades may raise this question “due to the time factor, how is it ensured that evaluation methods in the summer semesters have been strict enough to be the same as those in the fall and spring semesters?”. The average grades of students in Group 2 is consistently below the other group’s average. Changing a differences between the average of grades in two groups from +0.56 (out of 4) in Studio A and +0.86 (out of 4) in Studio B to -0.19, -0.31, -0.13, -0.08 in Studios 1-4 indicates a decline which should be further studied. Although this study provides some information to explain the situation, generalization of the data needs more study and over a longer period of time. In addition, some confounding factors such as evaluation methods and the skills of the teaching professors should be carefully investigated. The next stages of this study will include the comparison of grades in other courses taken in the department and outside for both groups. In addition, categorizing the transferring of students based on their previous major may reveal more correlations.

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