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Conducting In-Person Project Critique Sessions to Enhance Communications Skills in Technology Educational Programs

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Abstract

The Building Construction Science (BCS) program at Mississippi State University is a studio-based program. Course learning objectives are assessed in studios through traditional graded written assignments and tests, and through face-to-face critique sessions in which students explain the details of their in-progress assignments and projects verbally prior to submitting their written work.

During critiques, student explain their designs or thought rationale in verbal presentations which often include substantially completed written draft summaries of their work used to outline their presentation. When students present a project, their peer students are present, and these peers learn from each other as students practice their presentation skills. Instructors weigh student critiques and presentations in the project grades which often reduces after class grading times. This paper will provide a detailed description of studio course based operational characteristics, and the advantages and disadvantages of in-class student critiques to enhance mastery of student learning outcomes and student presentation skills.

Keywords

Construction Design Studio, Academic Critiques, Technology Lab

Introduction

The construction technology program at Mississippi State University, Building Construction Science (BCS), includes a twelve contact hours studio course in each of the eight semesters of the program. The studio courses are sequential, requiring a minimum of eight semesters to complete. The program resides in the College of Architecture, Art and Design, and was conceived through and has strong ties with the School of Architecture. BCS is accredited by the American Council for Construction Education (ACCE). ACCE requires demonstrated achievement of twenty student learning outcomes to maintain accreditation (ACCE, 2022). These required outcomes are assessed in the studios through assigned projects.

Eight of the required ACCE student learning outcomes are higher level Revised Bloom's Taxonomy (Anderson and Krathwohl. 2001) outcomes, well suited to project assignments in technical academic programs. "Remember and Understand" are lower order thinking skills and are better suited to multiple choice or true false assessments than are "Create" or "Analyze" learning objectives which often must be assessed in project or essay assignments.

For ACCE and Accreditation Board for Engineering and Technology (ABET) accredited technology programs, project-based courses are a necessity to acquire the skill of learning how to learn. Engineering, engineering technology and construction management post-secondary educational programs are designed to reduce the learning curves of graduates who enter industry. Industry will train these technologists the required, detailed professional skills to perform their technical specialties, but graduates must be quick to learn the skills employers require in the workplace.

Technology students must practice critical thinking to improve their lifelong, technology job performance. Project-based courses are the best environment for technology students to practice critical thinking. Written assignments, such as essays, are often the tool used for evaluation of student performance, but technology professors may also use oral presentations, individually and in groups, to evaluate students' written assignments.

BCS at Mississippi State is different than nearly all other technology, academic programs in the United States because the program includes project-based, studio formatted courses in each of the eight semesters of the program. Critiques are used to evaluate student performance and understanding, in addition to other traditional techniques such as essays, quizzes and exams. The design studio is characterized by a teaching model that is distinctly suited for problem-solving (Maturana 2014). Many technology programs have senior design project courses, but only Mississippi State University has a 12-contact hour studio course included in all eight semesters of the curriculum.

Literature Review

Critiques used for student evaluation in higher education programs are very common, but are usually found in architectural, art or fine arts academic programs (Tolbert, et al. 2016). There are numerous examples in the literature where verbal student critiques are used to improve student learning. Oral communication is central to the learning goals in the discipline of design. The feedback intervention process within the critique plays a large role in determining the overall communicative climate of the teaching and learning event. (Dannels, 2011)

At Mississippi State University, individual, oral presentations are a critique format most often used in an iterative process to assist students to progress in the intended manner for assigned construction related projects, and to evaluate the ability of individual students in the concepts under study in the construction studio. Critiques are the most common manifestation of the studio's pedagogy (Goldschmidt, et al, 2010), and have a fundamental role in design education and the practice of designing (McDonnell 2016). Boudhraaa describes the personal nature of oral discussions during critiques which provides opportunities for storytelling by both the instructor and the student (Boudhraaa, et al, 2021). In addition to the intellectual and practical learning goals of critiques, he relates cultural and social aspects gleaned by critiques.

Students at Mississippi State University sometime claim a lack of clarity as to the objectives of the critique which is also shown in the literature. Critiques entail four teaching goals: the transfer of cultural knowledge, the development of the intellectual, as well as the practical competences of the student, and the shaping of social values (Sprague 1991). Some of the drawbacks of critiques are their fuzzy organization and insufficient clarity regarding their aims and a shortfall in the participation of students to their peers' critique (Nicol and Pilling 2000). The current design studio critique method has been developed upon generations of students and educators (Fasli, 2017).

Discussion

During critiques, students explain their designs or thought rationale in verbal presentations which often include slide presentations with substantially completed draft summaries of their work used to outline their progress. When students present a project, their peer students are present, and these peer students often learn from the critiques. Students practice their presentation skills while instructors ask questions and comment on the project and student progress. Instructors may weigh student critiques and presentations into assignment and project grades, which reduces grading time durations by grading the project during critiques based upon their evaluation of students' progress and mastery of the learning outcomes associated with the assigned project. Oral critiques may be well suited to lecture/lab structured technology programs to improve students' communication and presentation skills, and in design teams, better social skills in a professional setting.

Studio-based courses can be expensive and time consuming due to the additional contact times required but learning outcomes can be taught with more depth. In-class critiques in these studios may provide additional depth of learning beyond typical lecture/lab courses. A description of a studio course, and operational characteristics, and the advantages and disadvantages of in-class student critiques to enhance mastery student learning outcomes and student presentation skills may prove helpful to the discussion.

There are eight, sequential, 12 contact hour studios in the BCS program at Mississippi State University. The Estimating Studio is the third of the eight. Student critiques are used in the Estimating Studio in the second year, spring semester of the BCS program. The Estimating Studio is the first formal estimating experience for students in the BCS program after receiving instruction in materials and methods, drafting and 3D design. There are several student learning outcomes (SLOs) associated with the Estimating Studio, but the primary SLO is to create construction project cost estimates which may be assessed during critiques. Small commercial projects such as a medical office or a convenience store are used to generate project cost estimates. Students are assigned projects with a week, or two weeks for larger projects, to complete. Project benchmarks are set to provide a base the specific critiques' purpose. All students get the same number of total critiques during the semester to ensure grading consistency.

In the Estimating Studio, critiques often count as much as 60% of the project grades. Students are informed that their numeric answers are not the primary objective of the project, but the

ability to understand the source of their detailed estimates and the ability to recite theses sources is weighted heavier than the accuracy of the estimate submitted. The importance of accuracy and precision in construction estimates in real life is explained to students, but the more difficult task for instructors is to convey student understanding of how they generated the quantity and cost estimates submitted in their projects. Students who cannot explain their numbers will not receive full credit for their work submitted.

Conclusion

Learning outcomes may be assessed in real time for assignments which are often difficult and time consuming to grade with student oral defenses, critiques of their work. In class assessment reduces the amount of after class time needed by instructors to grade assignments. Students gain more in-depth understanding of assignments by preparing for critiques and explaining content not explicitly addressed in their submitted work. Peer students often glean knowledge not gained in the lecture or course materials from their colleagues' presentations. Students learn presentation skills which may prove helpful to them in their future jobs.

The BCS program at Mississippi State University is just over ten years old and is an on-going experiment in using the studio format and also in providing collaborative projects with the School of Architecture. For future work, the authors hope to produce empirical data to support the results of curriculum containing critique components to justify the additional contact times in the studio generally needed and to show more in-depth understanding of the curriculum. The eventual results could provide superior skilled program graduates, ready for industry in the United States and the World.

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