Perspective Convergence of HIPs, Moments, and Active Learning in Construction Management Education: Comparing and Combining Findings From Multiple Research Projects

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The IAFOR International Conference on Education in Hawaii 2023
Official Conference Proceedings

Abstract
High-Impact Educational Practices (HIPs), the importance of memorable experiences throughout one's education, and active learning seek to magnify the student experience. The convergence of these strategies, known as Transformational Active Learning Experiences (TALEs), has importance to the student-centered educational experience in higher education. Four recent studies in construction management education have yielded separate and distinct findings. Two studies centered on faculty and student perspectives of learning spaces designed for active learning. Faculty and student perspective data included 65 faculty from 55 universities and 206 students, respectively. A third study focused on HIPs experienced by graduating students (N=145). Finally, representatives from industry who had completed an undergraduate degree in construction management were engaged in focus groups to gauge their most memorable and valuable educational experiences in higher education. This introductory study considers the collective results and explores congruence and divergence across sample populations using thematic analysis. Key findings include the importance of relevant and practical experiences, the potential of the educational space to enhance the experience, and the shared value of connection and engagement with others. Areas of divergence emerged in delayed realization of the value of the educational experience and the variability challenges with some activities. Key findings also included the importance of the appropriate environment and training for faculty. If synergies from HIPs, memorable experiences, and active learning could be more fully realized, the potential for improved cognition and retention, as well as improved development of metacognition, interpersonal skills, and emotional intelligence, can flourish.

Keywords: Active Learning, High-Impact Practices, Peak Moments, Student Experience, Transformational Active Learning Experiences

Introduction

College students demand flexible, quality learning experiences that are compelling. Long gone are the days where college is simply four years' worth of lectures, homework, and assessments. Student engagement does not reside solely with mastering knowledge and acquiring skills. For this, faculty should strive to curate learning experiences where their class is both memorable and meaningful and empowers students to propel their own learning. University administrators must foster this culture and provide resources where necessary. On-campus higher education programs have a tremendous ability to engage the human element within the educational system through items like social interactions.

Efforts to enhance the student educational experience in higher education have included active learning (with interactive learning spaces (ILS) specifically designed to support active learning), high-impact educational practices (HIPs), and peak educational moments. Active learning is defined as any instructional method that engages students in their learning experience and moves them beyond passive observers. ILS are facilities (i.e. classrooms, labs, etc.) that are purposefully built to engage a student in their learning experience and move them beyond passive observers. HIPs are a set of specific practices that promote active student engagement both inside and outside of the classroom. Peak moments are those educational experiences that are both impactful and meaningful in a way that last long after the classroom experience ends.

The authors of this paper have engaged in a series of four research projects focused on faculty, student, and industry perspectives of construction management education including the following:

- An Active Learning Classroom in Construction Education: Student Perceptions of Engagement. Journal of Construction Education and Research, May 2020. (A1) (Farrow & Wetzel, 2020)
- An Initial Investigation of Student Experiences with the Elements of High Impact Educational Practices. Associated Schools of Construction Annual Proceedings, April 2021. (A2) (Farrow et al., 2021)
- Faculty Perceptions of Interactive Learning Spaces within Construction Programs. Journal of Civil Engineering Education, April 2022. (A3) (Farrow & Wetzel, 2022)
- Initial Investigation in Peak Learning Experiences of Construction Management Graduates. Manuscript preparation ongoing. (A4)

This study considers the collective results of the above articles and explores congruence and divergence across sample populations using thematic analysis. If the combined impact from active learning, HIPs, and peak moments could be more fully realized, the potential for deeper learning and enhanced student experiences could be realized.

Literature Review

This study explores the themes garnered from four research projects on interactive learning spaces, active learning, high-impact educational practices, and peak moments experienced by students in construction management education. All topics are rooted and explored in the context of experiential learning. As an applied discipline where graduates typically move directly into professional practice, construction education is uniquely poised to benefit from transformational active learning experiences.

Construction Education

The construction industry has experienced rapid innovation since the 2008 recession, challenging the current practice of construction education. The American Council of Construction Education (ACCE) is one of the accrediting groups that addresses construction management education, and they have shifted to an outcomes-based criteria for accreditation requirements (*Document 103B: Standards and Criteria for Accreditation of Bachelor's Degree Construction Education Programs*, 2018). One of the key shifts in accreditation standards over the past ten years has been the shift toward emotional intelligence quotient with a lesser emphasis on technical knowledge. Several of those essential or people-related outcomes relate to one's ability to collaborate and communicate effectively with others (*Document 103B: Standards and Criteria for Accreditation of Bachelor's Degree Construction Education Programs*, 2018, p. 103):

SLO 1: Create written communications appropriate to the construction discipline
SLO 2: Create oral presentations appropriate to the construction discipline
SLO 6: Analyze professional decisions based on ethical principles
SLO 9: Apply construction management skills as an effective member of a multi-disciplinary team

Other groups like ABET have similar requirements (*Criteria for Accrediting Applied and Natural Science Programs*, n.d.). As the industry continues to evolve, further changes in required competencies is possible. Key future changes to industry are expected to include expanded number and type of stakeholders, new technology, and workforce demographics.

Construction education of the future will be required to respond to these changes. Additional cognitive and leadership competencies will be required (Arian, 2010; Wiezel & Badger, 2015). In this context, experiential learning which "gives prominence to soft skills such as the ability to collaborate, work in groups, read social cues, and respond adaptively" will be key (Davies et al., 2011, p. 13). Active learning strategies, HIPs, and peak educational moments all require learning approaches that are self-assessing and reflective which have been shown to enhance how students translate their learning to new settings and events (Bransford et al., 1999).

Learning Spaces and Active Learning

The traditional college classroom has changed little over the last 80 years of construction management education. Typical rooms have been lecture-rooms with chairs facing a podium (Park & Choi, 2014). Active learning and spaces designed to support interactive learning – interactive learning spaces (ILS) - provide an opportunity to deeply engage students in the educational material. Studies on active learning have identified enhanced learning, retention, stronger relations between peers and faculty, and improved social skills when students were engaged in active learning (Astin, 1993; Carmean & Haefner, 2002; Johnson et al., 2014).

In recent years, colleges have made significant strides to develop new and renovate existing classrooms and labs into improved ILS. These spaces can be costly to build and add operational and maintenance challenges. In addition, these spaces typically hold fewer students, increasing the per student cost of instruction. These issues drive the need for understanding their importance and impact (Park & Choi, 2014).

High-Impact Educational Practices (HIPs)

Active learning forces students to apply new knowledge and connect the newly acquired information with their existing understanding, extending their learning. Reflection exercises where learning experiences relate to reality are common and often cause students to reconsider established thoughts or opinions. Active learning also leans heavily on a collaborative environment where social interactions are supported (Vigotsky, 1971).

Multiple studies point to increased learning through active learning approaches. One study explored 225 evaluations of class sessions of active learning as opposed to traditional learning (Freeman et al., 2014). Students in passive classes were 50% more likely to fail and scored one-half a standard deviation lower on assessments than students engaged in classes with at least some active learning. This meta-analysis was proved consistent across a range of disciplines including science, computer, engineering, math, and liberal arts disciplines.

George Kuh suggested a group of educational practices (High-Impact Educational Practices-HIPs) that attempted to elevate the educational impact for students by leveraging some of the above mentioned active learning approaches (Kuh, 2008):

- First-Year Experiences
- Common Intellectual Experiences
- Learning Communities
- Writing-Intensive Courses
- Collaborative Assignments/Projects
- Undergraduate Research
- Diversity/Global Learning
- ePortfolios
- Service Learning, Community-Based Learning
- Internships
- Capstone Courses and Projects

While Kuh identified eleven specific practices above, Kuh and O'Donnel (2013) found that the eleven practices share eight key elements:

- Performance expectations set at appropriately high levels
- Significant investment of time and effort by students over an extended period of time
- Interactions with faculty and peers about substantive matters
- Experiences with diversity, wherein students are exposed to and must contend with people and circumstances that differ from those which students are familiar
- Frequent, timely, and constructive feedback
- Periodic, structured opportunities to reflect and integrate learning
- Opportunities to discover relevance of learning through real-world applications
- Public demonstration of competence

Peak Moments

Some events in life are so impactful and meaningful that they can change one's perspective. In "The Power of Moments", these are called peak moments (Heath & Heath, 2017). Moments to educators may not seem like time periods long enough to experience true education, but the Heaths' definition of moments recognizes that even in longer experiences, people tend to remember only distinct moments – "duration neglect". Research indicates that

moments occur through at least one of four elements that may include elevation, insight, pride, and/or connection.

Peak moments represent flagship experiences. Some of these may occur naturally through a HIP, like an internship or undergraduate research project. Others could occur through purposeful planning in a class. For example, a presentation by a student to a faculty member might provide a baseline approach. In contrast, a presentation to a panel of industry faculty who provide real-time and appropriate feedback could create a peak moment for a student (Farrow et al., 2022).

TALEs

Until recently, active learning, interactive learning spaces, HIPs, and peak moments have been explored in isolation. Recent research has been more intentional about how these items may combine to form transformative active learning experiences (TALEs) for students (Farrow et al., 2022). Such research suggests that if these approaches to teaching and learning could be linked in a cohesive and intentional fashion, the opportunity for creating outstanding learning experiences for students in a variety of class types exist.

Methods

Using the four research projects completed by the authors, a thematic analysis of all results of those studies was conducted. Thematic analysis carefully examines the data that exist to identify comment themes - topics, ideas, and patterns of meaning that repeat (Caulfield, 2022). First, the authors read through the text of all articles taking notes and refamiliarizing the authors with the previous data. Sections of the text for all four research articles were then highlighted – usually phrases or sentences, and notes were added in the margin of existing research articles to label key content. After completing a review of the text, the data was grouped into codes. This approach allowed a condensed overview of the data.

Once all articles were coded, some codes were found to occur only in a single paper and discarded for the purposes of this thematic study. These codes that occurred infrequently across all studies may have value, but this study focused specifically on code intersections occurring across multiple articles.

The final step in the study was an attempt to develop action items that readers of this study could employ based on the collected data. These action items were broader than the previously developed codes and provided as potential steps to enhance the educational experience. Action items were reviewed to assure a useful and accurate representation of the data that existed from the articles.

Summary of Previous Research

A1 used a mixed-methods approach to consider student perceptions of an active-learning classroom (N = 122). Students found their learning enhanced by the space (68%) and perceived stronger engagement (82%). When methods other than active learning were used in the space, students felt less positive about the space and thought that the space may have impeded learning. For example, when a passive lecture format was employed the space made it easier to carry side conversations with classmates or do non-related activities. Students also

suggested some topics are more appropriate for these type spaces, but perception is likely tied to how the instructor utilized the space.

A2 used a quantitative approach to explore HIPs experienced by graduating Construction Management students (N = 145). A total of 326 HIPs were experienced by 145 graduates (2.2 HIPs per student) with internships, study abroad, and co-ops as the most common experiences. Undergraduate research had noticeably lower participation. Seven of eight HIP elements scored relatively highly which indicates student engagement. Extended effort and engagement was the most identified HIP element. The "presentation" element scored substantially lower than others.

In A3, faculty perceptions and experiences with ILS were obtained using a mixed-methods survey. Several types of ILS were common, including BIM/Visualization labs, team spaces, traditional labs, and Active Learning Classrooms (ALCs). 67% of faculty reported positive experiences with ILS. Technology, layout/design, and organization within the ILS were cited as the biggest challenges for faculty. Faculty commented that ILS do not work for passive lecture format, a congruence with the data collected from the A1 study.

A4 employed focus groups to identify key learning experiences among recent graduates (last 10 years) of construction management programs (N =37). The questions posed solicited feedback regarding college memories that resonated with them as instrumental to their career and life. Real-world experiences that connected student learning with their future careers were the dominant peak experiences. The research found that these can be enhanced if they happen over extended time periods, include meaningful engagement with faculty and peers, exposure to diverse populations, and shared connection with classmates.

Results

The four articles were reviewed for key content with codes and themes developed as shown in Table 1.

Article	Key Content	Codes	Code Intersections
A1	• Learning and engagement enhanced by ILS • Group and collaborative work in ILS enhanced • ILS do not work with lecturing • Distractions can be more significant in ILS • Some classes work better than others in ILS • Use of Technology is Critical	• Space must match purpose of use (design and implementation) • Opportunity to expand interpersonal and communication skills • Passive lecture not best in ILS	• Alignment • Training • Begin with the end in mind • Strong opportunity for construction management education
A2	• Top HIPs included internships, study abroad, and co-ops (2.2 HIPs/student) with later work experiences most valuable	• Value of HIPs not always apparent to students • Opportunity to develop goal outcomes for internships	

	• Limited undergrad research • "Effort over an extended period of time" was dominant HIP element • HIP elements of interaction with faculty/peers and those different than themselves were only dominant in study abroad • Limited presentation of HIPs available for students • Students don't understand value of HIPs	• Interactions with others is opportunity for CM
A3	• Wide variety of ILSs • Resources needed to figure out active learning in traditional spaces • EALS do not work with lecturing • Opportunities for better design and use of tech inside ILSs	• Space must match purpose • Opportunities to enhance design and implementation of room • Training on use of spaces needed
A4	• Most significant moments stem from real-world experiences that connect education to future career • Opportunities to extend over time, have engagement with others, and make connections drive great experiences • Education on value	• Opportunities for real-world connections • Opportunities to curate experiences to produce peak moments

Table 1: Key content, codes, and overall themes from the four articles analyzed

Analysis and Conclusions

Themes from the four articles include alignment, training, beginning with the end in mind, and the strong opportunity for the combination of HIPs, active learning, and peak moments offered in an applied discipline like construction management education.

First, there is a strong need for alignment of experiential learning across administration, facilities, and curriculum. In short, recognition of the value of these experiences appears to be outpacing the implementation of some practices.

Action Item: Examples include an emphasis on high-impact practices for students with training for faculty and IT staff on how to support interactive learning spaces; design of active learning spaces without keen insight on how technology will be used or how sound will impact the room; and the implementation of spaces designed for active learning that are more Socratic in nature.

Instructors need to be made aware of the benefits/impacts that active learning and HIPs can offer and the types of teaching approaches that facilitate those opportunities.

Action Item: Faculty need training in teaching approaches that leverage the different spaces and technology, so their teaching elevates the learning experience rather than detracts from it.

Student alignment also needs to be addressed. Often, students complete HIPs but are not aware of the educational value of the same. Similarly, students are sometimes placed in active learning spaces without understanding how that space is intended to enhance the educational experience of students. Just because a student is placed in a specific environment or experience does not guarantee a positive academic experience.

Action Item: Faculty and advisors need to set appropriate expectations for students to fully realize the value of educational spaces and HIPs.

Students' experiences with HIPs, moments, and event-based active learning tend to be retrospective in nature. If education could be provided on the value of HIPs and moments, students could better plan and be a partner in curating a system where multiple HIPs and/or moments are experienced by students each academic year. And, if faculty engaged, opportunities exist for designing peak moment experiences into existing classes (Farrow et al., 2022).

Action Item: Develop robust curriculum models and academic badges that highlight value of potential HIPs and moments. Provide training to faculty so peak moments can be designed into classrooms that engage active learning.

Professional programs like construction management have an incredible opportunity to engage students in real-world experiences and enhance the learning experience in higher education. The collective data considered in this study provide strong evidence of the perceived value of real-world experiences by both students and industry. Curated classes taught in environments designed for the educational experience one is attempting to create provide an opportunity to significantly enhance the classroom experience.

Additional research is needed to explore the connection between active learning, interactive learning spaces, HIPs, and moments. As noted, much of the existing literature focuses on each of these items in isolation. Few studies have examined how they connect and build on each other in an academic setting. If these connections could be better understood, an opportunity exists to improve the educational experience.

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