
Enhancing Construction Workforce through Joint Education and Industry Efforts: A Collaborative Co-Teaching Model

John Annor

John Annor holds a Master's degree in Civil Engineering from the University of Wyoming and is currently pursuing a doctorate degree in same. He works as a Graduate Research/Teaching Assistant in the area of Workforce Training across the state of Wyoming, which is being spearheaded by the Department of Civil and Architectural Engineering & Construction Management (CAECM).

Francois Jacobs

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Abstract: The purpose of this paper is to examine a collaboration between secondary (high school) and post-secondary (college or university) education institutions and construction industry professionals aimed at boosting the construction workforce. The paper seeks to address the shortage of skilled workers in construction and to drive an increase in the construction workforce by connecting faculty and industry to provide students with practical, real-world experience and to ensure that the skills they learn are relevant and in-demand in the industry. Wyoming added 5,672 jobs in 2018, with the construction industry accounting for more than half of the increase. This positive feat may be unsustainable going forward due to a projected decrease in high school graduates between 2020 and 2030. Thus, the state has created construction education programs in high school Career and Technical Education and community college which are supported by the Associated General Contractors of Wyoming and have teamed with the University of Wyoming to provide a pathway from secondary to post-secondary education and, eventually, a bachelor's degree in Construction Management. The program's unique feature allows students to acquire construction industry experience while continuing their education. A pilot program promoting educational collaboration across various educational institutions in the state of Wyoming was implemented using Zoom Meetings and Meeting Owl Pro technologies. The findings provide insight into connecting secondary and post-secondary construction education and training programs to meet career demands. A follow-up study is currently being conducted to re-test the methodology employed in the initial piloted study, in which three instructors of record and six industry practitioners from various institutions were connected via the adopted video conferencing technologies (i.e., Zoom Meeting and Meeting Owl Pro).

INTRODUCTION

In a survey conducted by the Associated General Contractors of America (AGC) and Autodesk, 91% of the responses from over 1000 construction firms in the US, expressed facing challenges in finding workers, leading to increases in construction costs and project delays [1]. With the US being part of nations around the world who seek to improve considerably their education systems to enhance learning outcomes and preserve learners' rights, quality assurance is crucial. Thus, these findings emphasize on fit of purpose, and student change[2] [3].

Efforts to improve the dissemination of knowledge to young graduates in academia have therefore led to a call for partnership with industry professionals. This may also include extending a mentorship program to high school students to achieve aligned learning outcomes. One potential binding platform is to leverage the surge in the use of virtual technology platforms for multilateral engagements. These platforms provide an opportunity to connect various educational institutions from the secondary to post-secondary levels and with industry participation to better prepare students for the workforce [4].

This paper will delve into the collaboration between a high school, community college and university, in partnership with invited construction industry professionals, mainly aimed at increasing construction workforce by providing students with practical, real-world experience and to ensure that the skills they learn are relevant and in-demand in the industry. The partnership effort would be an attempt to negate the potential influence of the projected decline in high school graduation rates on enrollment in construction related programs.

Anticipated Decrease In The Number Of High School Graduates

The U.S. Bureau of Labor Statistics predicts an increase in construction jobs by 11% nationally, between 2020 and 2030, resulting in the need for 11.9 million more workers[5]. This projection is a stimulant for more developmental projects and provide an incentive to train more people for critical positions.

However, the Western Interstate Commission for Higher Education (WICHE)[6] is predicting a sharp and immediate 9% drop in the number of high school graduates through 2026 and beyond (see Figure 1). This contradicts the perceived positive trend highlighted by research in the growth of total employment in construction jobs between 2020 and 2030. Hence, a looming shortage of skilled workers in construction stares at us in the very recent future.

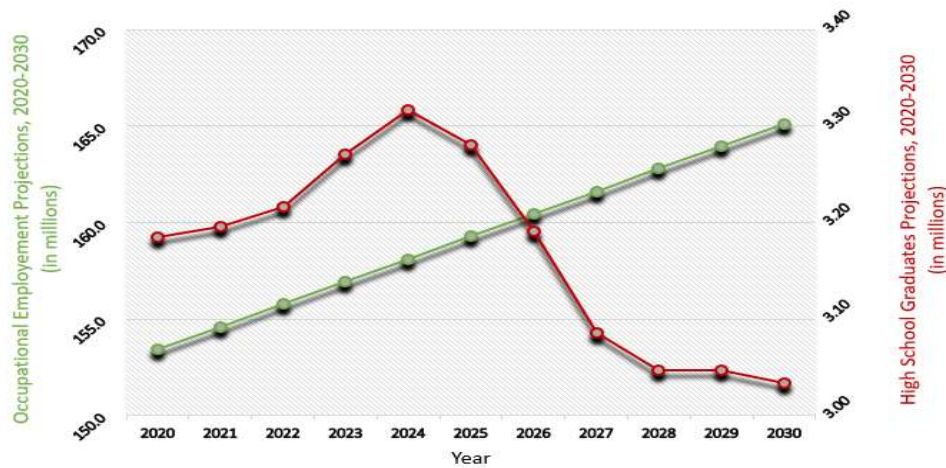


Figure 1: Occupation Growth Versus Anticipated High School Graduation

To address the expected drop in high school graduates and its potential negative influence on the construction workforce, programs to train and add additional professionals to the pool of construction workers are critical. The expanding Construction Management program offered by the University of Wyoming's Civil Engineering and Architectural Engineering & Construction

Management Department is one example of such supporting endeavors. The co-teaching model with students from high schools in construction-related subjects creates a pathway to earning a bachelor's degree in construction management. Thus, the understanding created in high school graduates will enable them make educated decisions in selecting construction related programs, which will eventually offset losses in the building professions due to retirement and other exits.

As a result, there is a need for a well-structured unifying platform that can bring together and connect numerous stakeholders through a common source of information sharing. This can be accomplished by creating a well-planned timetable for in-person or video conferencing engagements.

METHODOLOGY

The study examining the collaborative efforts between secondary (high school) and post-secondary (college or university) education institutions and construction industry professionals with the aim of boosting construction workforce was designed with a methodology framework (see Figure 2) which uses a teaching platform that enables the instruction of multiple classrooms through videoconferencing technology.

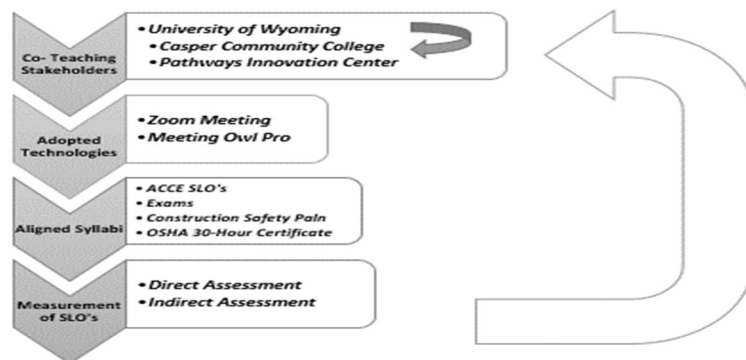


Figure 2: Methodology Framework of Research Study

Co-Teaching Stakeholders and Adopted Technologies

The Construction Management program at the University of Wyoming conducts a study using co-teaching and industry professionals to bridge the gap between the theoretical coursework and industry skills. The study involves three campuses, three instructors-of-record, and industry practitioners with 27 enrolled students from the University of Wyoming, 9 at Casper Community College, and 14 at Pathways Innovation Center. The instructors use videoconferencing technology to connect and collaborate with all stakeholders, and the industry practitioners are chosen based on their specialties.

The CM 2300: Construction Safety course (i.e., the course for piloting the study) has 21 topics shared between the three co-instructors and invited industry practitioners. Industry practitioners are responsible for developing their own presentations and are allowed to use personal professional experiences and expertise. Two videoconferencing technologies are used (i.e., Zoom Meeting and Meeting Owl Pro device). The Meeting Owl Pro provides enhanced features in virtual conferencing by remotely detecting any person speaking, allowing normal interaction and conversation flow, and giving a panoramic view of the classroom on one display feed while the other feed displays the student who spoke last and the student who is called to speak. It integrates with Zoom Meeting and other online video conferencing platforms. The adoption of the Meeting Owl Pro orients the classroom in different setups on a screen so that students can interact more efficiently with co-instructors and other students located on the other two campuses.

The classroom is set up with round tables for group activities and students in each location are shuffled, in between classes, to avoid sitting with the same group every time (see Figure 3). This is done by having students draw tickets from a bowl with different group numbers corresponding

to arranged tables. Within each group, open-ended questions related to the lecture topics are discussed as the lecture progresses.



Figure 3: Typical Classroom Setup with an Industry Practitioner in One of the Lecture Presentation Sessions.

STUDY RESULTS

This study by the University of Wyoming’s Construction Management program and the other stakeholders evaluates the effectiveness of the co-teaching platform (i.e., Zoom Meeting and Meeting Owl Pro) and the in-person presentations, to support the learning outcomes of the Construction Safety course. The study considers two learning outcomes for a construction course, namely creating effective written communications, and developing a Construction Project Safety Plan. The study evaluates the outcomes through Direct (i.e., quizzes and safety plans) and Indirect Assessments, which also involve survey responses from instructors, industry practitioners, and students. The measurable obtained from the surveys for analysis are presented in Table 1.

Table 1: Measurable Addressed by Survey Questions

Survey	Respondents	Co-Teaching Technology	Instructor Support and Collaboration	Industry Practitioners' Support	Students' Learning Outcome
Survey 1	Students	<i>Ease of use of technology</i>	<i>Support and collaboration among instructors</i>	<i>Support from industry practitioners</i>	<i>Applied learning and learning experience</i>
Survey 2	Instructors of Record	<i>Ease of use of technology</i>	<i>Collaboration among instructors</i>	<i>Collaboration with industry practitioners</i>	<i>Students learning experience and outcome</i>
Survey 3	Industry Practitioners	<i>Ease of use of technology</i>	<i>Support from instructors of record</i>	X	X

CONCLUSION

This study implements a collaborative teaching platform with industry to administer a construction safety course to improve aligned learning outcomes. The outcome of the piloted study showed a successful co-teaching model that could enhance student employability and connect industry practitioners with students through innovative classroom setups and video conferencing technologies.

Given the projected 9% decline in high school graduates between 2026 and 2030, as stated earlier, there is a risk of a negative impact on the construction workforce. By implementing a well-designed curriculum supported by industry practitioners and utilizing technologies like Zoom Meeting and Meeting Owl Pro to connect all participants, the increases in construction workforce projected by the Bureau of Labor Statistics could become a reality.

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