

Analysis of Industry Trends for Improving Undergraduate Curriculum in Construction Management Education

Namhun Lee, Ph.D.
East Carolina University
Greenville, North Carolina

Robert Ponton, Vice President
Barrett Paving Materials, Inc.
Jamesville, New York

A. W. “Jeff” Jeffreys, Vice President
Hamlin Roofing Company, Inc.
Garner, North Carolina

Ron Cohn, Vice President
Rodgers Builders, Inc.
Raleigh, North Carolina

For the last decade, the construction industry has been rapidly and sophisticatedly changed to catch up with the current demands. Also, dramatic changes in social, economic, and environmental issues force construction management (CM) programs to produce more prepared personnel. East Carolina University attempted to analyze important concepts/trends across the construction industry with a goal of determining their impacts on the future of construction and ultimately how these concepts and trends may be incorporated into the CM curriculum. This paper shows how this research has been performed to determine the current industry trends and what recommendations are given to incorporate them into the CM program. This will be able to lead the CM program to meet the challenges of the 21st century and align the CM curriculum and program with industry requirements. Furthermore, this paper indicates that the CM program will benefit from an annual review of trend related topics to determine their relevance in the program. As determining what concepts and trends should be included systematically throughout the program, instructors can decide on how best to implement these important topics into their courses, thereby aligning with the CM program in educating students to be well prepared for industry.

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Introduction

For the last decade, the construction industry has been rapidly and sophisticatedly changed to catch up with the current demands. Also, dramatic changes in social, economic, and environmental issues force construction management (CM) programs to produce more prepared personnel. Therefore, it is worthwhile to analyze the current industry trends across the construction industry with a goal of determining their impacts on the future of construction and ultimately how these concepts and trends may be incorporated into the CM curriculum. This will be able to lead the CM program to meet the challenges of the 21st century and align the CM curriculum with the industry requirement.

To determine new and evolving concepts and trends, it should be considered that the perceptions between industry and academia might be different. Some studies show that there is a discrepancy between what the industry wants and what the higher education offers (Smallwood 2002, Chileshe and Haupt 2007). Thus, the industry-university cooperation is a prerequisite to reducing the discrepancy of important concepts and trends. There is no doubt that the frequent communication between industry and academia can improve the CM curriculum and program. As a result, CM students will be more adequately prepared for the industry.

The CM program at East Carolina University (ECU) asked the Construction Management Advisory Board, consisting of industry representatives from multiple construction disciplines, to form the Construction Trends Committee. The major goal of the committee was simply to review trends and/or concepts within the industry and evaluate whether they should be incorporated into the program so that the CM program can remain on the cutting edge of industry changes and students receiving an education from ECU Construction Management can be up to date when they enter the workforce. The committee members were selected from the Construction Management Advisory Board to determine the current industry trends and share the common goal of providing an industry leading education to students in the CM program at ECU. The committee was in charge of accomplishing aforementioned goal by performing the following.

- Reviewing the CM program curriculum to determine existing concepts and trends included in the program, evaluate their impact, and recommend changes or enhancements to the Advisory Board where applicable
- Connecting with alumni and peers to determine new industry concepts and trends for evaluation
- Soliciting input from CM faculty at ECU on industry concepts and their implementation in the classroom.
- Making recommendations to the Construction Management Advisory Board on new concepts and trends from industry that can be effectively integrated into the CM program

Methodology

To research and evaluate the current industry trends, the committee has chosen discussions with peers/industry professionals, Construction Management alumni surveys, and faculty surveys. Since the committee was formed, much time has been spent on evaluating the current Construction Management Program and discussing important trends with alumni and peer throughout the industry. Simultaneously, faculty surveys were performed to have faculty input on the same topic. Additionally, comments from the Construction Management Advisory Board were considered as valuable data, resulting from a communication between industry and academia.

Alumni Survey & Interviews

The alumni survey included a combination of individual interviews and discussions. Ten recent graduates ranging from two to ten years since graduating from the CM program were personally interviewed and asked a series of questions. The interview questions ranged from areas that prepared the students well for the workforce to suggested areas of improvement in the CM program. Each interview was arranged and structured. The interviewees responded to the questions and freely shared their own opinions. The questions were open ended to provide the maximum amount of feedback. The followings are three examples of questions asked:

- Looking back on your education in the CM program, what did the CM program prepare you well for when you entered the workforce?
- On the opposite end of the spectrum from the previous question, is there anything that the CM program should have covered but did not that would have better prepared you for the workforce?
- Can you comment on any expectations that you may have had leaving the CM program and that were different when you actually started in the workforce, either positive or negative?

Faculty Survey

The faculty survey was performed to study two things: one related to overall industry trends/concepts and what might be beneficial to the CM program and the other related to implementation of the trends/concepts in the current curriculum. The purpose of this survey was to gain an academic perspective on trends within the industry. Faculty members were asked to respond to the survey. The following example questions were used for the faculty survey:

- From your perspective, what current trends are affecting the construction industry and are being included in the current curriculum?
- From your perspective, what current trends are affecting the construction industry and are NOT being included in the current curriculum? Please explain why you feel these are of importance.
- Of those listed in the previous question, are there any trends currently not being included in the CM program that you feel are important to incorporate at ECU? If so, why?

Committee/Peer Discussion

The committee includes three experienced senior level construction personnel. Committee/peer discussions took place within the committee, in trade groups or associations that committee members belong to, and with peers of committee members. Responses and information were shared during committee meetings and recorded in committee meeting minutes. Although somewhat not formally structured, interesting topics were uncovered. Moreover, the findings represent a sentiment of opinions within the industry from the informal polling.

Data Analysis

The data from the alumni survey, the faculty survey, and committee/peer discussion was compared for common themes. As mentioned above, the data pool is relatively small but the authors believe it provides a foundation to continue researching in an effort to keep the CM program up to date. The committee focused on trends that are currently evolving or will continue to impact the construction industry well into the future. Common themes emerged from the industrial and the academic perspectives.

Results from the Alumni Survey

When the authors reviewed the data collected from the alumni survey, several themes were commonly mentioned as the areas that CM students need to be prepared before they enter the workforce. Those common themes included:

- Green Building Techniques
- Economic environment and its impact on the construction industry
- Business Marketing/Sales for Construction
- Time Management
- Stress/Conflict Management
- Initiating change

Results from the Faculty Survey

Industry trends identified as important and already implemented at some level within the program included Building Information Modeling (BIM), LEED certification requirements, and risk management. Additional trends were identified that are not currently addressed in the program. Those were:

- Lean Construction Techniques / Process Re-engineering
- Green Building Techniques / Sustainability
- Globalization of Construction
- Differing Project Delivery Systems (Design-Build, CM at Risk, etc.)
- Innovations in Construction Materials and Methods
- Infrastructure
- Site and Building Layout Methods

The results from the faculty survey also related specifically to the current curriculum and the implementation of current trends. The following comments were included in the responses to the faculty survey:

- Basics of BIM are introduced as a tool for students to be familiar with.
- Differing contract delivery methods are covered in the contracts class.
- Differing project delivery methods are currently touched on at some level within the program.
- Risk management is covered in the Capstone class.
- Risk management should be systematically covered.
- Risk management is addressed on Quality, Schedule, and Safety.
- Sustainability should be incorporated throughout the program but must be defined at some level.
- Sustainability concepts are minimally discussed in the classroom.
- Sustainability inclusions could include life cycle costs and recycling technologies.
- New energy sources
- Globalization is brought into the classroom through relevant industry examples.
- Globalization is not covered specifically but is becoming more important.
- Global management of construction needs to be covered.

Additionally, the following were listed as important issues that could be included in the program but were not currently covered:

- Material Testing
- Workforce & Labor Issues
- Computer & IT Applications
- Spanish course

Comparisons of the Alumni Survey and the Faculty Survey

Based on the comparisons of the alumni survey and the faculty survey, some common issues were identified, such as Green Building techniques and economics/globalization. Some differences were also noted. Specifically, alumni are commenting on the human skills like time and stress management while faculty are commenting on the technical aspects like materials and contract methods.

In addition, there are other noticeable differences among the comments received from the faculty. Several comments suggest that a specific trend is addressed within the CM program at an acceptable level while others indicate the same trend is not addressed at all in the CM program. This is most likely attributed to the flexibility and individual nature of the academic process. Each instructor has a considerable amount of leeway on what to include within the classroom, which is an important academic characteristic. Nonetheless, the previous comment from a faculty member suggesting an annual review of important trends/concepts may have merit. At the least, it allows all parties to comment on important topics and agree to a level of inclusion within the CM program that can be consistent; much like the inclusion of ethics systematically across the CM program.

Results from the Committee/Peer Discussion

Committee meetings and discussions among peers also uncovered interesting topics that would qualify as new concepts or trends within the industry. Those with the most impact are listed as follows:

- Globalization of construction (Global ownership of construction companies is affecting all segments of the industry.)
- Changing demographics of the workforce
 - Baby Boomers are retiring
 - Generation X & Generation Y is moving into management positions
 - Language challenges within the labor pool (Spanish speaking managers are an important asset)
- Risk Management
- Building Information Modeling (BIM)
- Lean Construction Techniques
- Differing Project Delivery Systems

Once again, similarities and differences exist when compared to the alumni and faculty responses as previously noted.

Recommendations

The process identified many important aspects to consider within the CM program and opens the debate over what should and should not be included. Although all points cannot be covered in detail, the committee can offer several suggestions on important issues and their implementation from an industry perspective. Common themes were evident across all surveyed groups. The themes have been consolidated into five general areas. Those areas are noted below with a suggested implementation strategy.

Sustainability/Green Construction Techniques

All sectors of construction have been impacted in some way by the movement towards improving the environment. This trend seems to be addressed in some ways within the program through general discussions on environmental impacts and more specific sessions on LEED certification requirements. With sustainability being used as such a broad term, the program may benefit from narrowing the definition to fit the confines of the current curriculum.

This should include emphasis on environmental issues, LEED certification requirements, and recycling of construction materials. All can be incorporated systematically across the program through current classes.

Human Resources

Alumni noted that education in stress management, conflict management, time management, and initiating change would have been helpful tools as they entered the workforce from ECU. Industry professionals noted the challenges of a labor pool with limited ability to communicate in the English language. Experienced professionals also know that these are important tools for any management position in the construction industry. Some of these topics may be generally covered in basic education classes outside of the CM courses, but they are critical to the success of high performing students. The program would benefit from specifically ensuring that these are covered in the basic education courses, and then carried out through common themes within the CM program. Again, this could be done through existing classes. As far as the challenge of language within the labor pool, investigating a way to tie Spanish classes, which probably already exist within the University, into the CM program would be beneficial. This of course may have to be done as an elective, but could be a powerful asset for those students entering a workforce where Spanish speaking workers are common. The human resource trends have special significance when the general population changes currently underway are considered. The impact on the workforce will be challenging as baby boomers retire in force over the next 10-15 years and Generation X and Generation Y (current students) are called upon to fill the slots. Students will need to be prepared to develop in the workplace at a much faster pace. This plays well for the CM program and is an opportunity for the University to deliver high quality students to industry.

Economic Changes/Globalization

Alumni, faculty, and industry professionals agree that this is an important topic. Students should be educated on the role that construction plays in the national and global economy. The program should consider a way to specifically discuss this important topic, probably within a specific class currently taking place. Several classroom hours could be specifically devoted to the topic in an existing class and should be sufficient to cover this important information.

Risk Management

Another important topic threads through the construction business. The topic is relevant in estimating, project management, equipment, contracts, and every other facet of the business. This is a hot topic in industry and should be systematically incorporated across the program through existing classes.

Evolving Technologies/Concepts

This area includes several topics and while all are important to the industry, their success as a long term trend has not been determined. They include:

- BIM
- Lean Construction Techniques
- New Project Delivery Systems (Design-Build, Public-Private Partnerships, etc.)

Out of the three, BIM appears to have the most traction in industry and is gaining in popularity. Students should continue to be educated on this important technology. Lean construction techniques and new project delivery methods are also important topics for CM students to be aware of and these can be covered through existing classes.

Conclusion

Many topics exist and many are listed in the recommendations for inclusion in the CM curriculum. How can these reasonably be addressed? The research indicates that the CM program might benefit from an annual review of trend related topics to determine their relevance in the CM program. All faculties should be included in this review. This would be the time to determine and agree on what concepts or trends should be included systematically throughout the CM curriculum, and what concepts or trends can be covered through existing classes. Once these overall

concepts are agreed upon, instructors are free to determine how best to implement these important topics into their courses, thereby aligning with the CM program in educating students well prepared for industry. This research has been done originally with the intention of reviewing current industry trends and concepts and determining their impacts on the construction industry, thereby ultimately improving the ECU CM program to get CM students prepared for industry. This paper shows an effort to reduce the discrepancy of the perceptions between industry and academia. Furthermore, the CM program will upgrade and improve the undergraduate curriculum to meet the challenges of the 21st century, incorporating the recommendations. This will lead to the state-of-the-art and robust undergraduate program which can cater to the needs of all our stakeholders and serve as a regional and global model for institutions providing CM education.

References

- Chileshe, N., & Haupt, T. C. (2007). Industry and Academia Perceptions of Construction Management Education: the Case of South Africa, *Journal for Education in the Built Environment*, 2(2), 85-114.
- Smallwood, J. J. (2002). Practising the discipline of construction management: Knowledge and skills. In Ssegawa, J., Ngowi, A. B. & Kanyeto, O. (Eds.). *Proceedings of the 2nd International Conference of CIB Task Group 29 on Construction in Developing Countries*, Gaborone, Botswana, 60-71.