



Lessons Learned Integrating the National Association of Home Builders (NAHB) Certified Green Professional (CGP) Designation into University Construction Management Programs

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The Certified Green Professional (CGP) designation from the National Association of Home Builders (NAHB) has been recognized nationally in the residential construction industry for leading the way in green building and enhancing the professionalism of the residential construction industry. From fall 2009 to spring 2014, NAHB has partnered with ten university construction management programs to teach the CGP profession designation. In this time period, nine CM faculty has taught 21 CGP classes, with 329 students participating in the CGP Training. The addition of the CGP course and professional designation into construction technology education, the contractual relationship between the university and NAHB, the requirements of the educators delivering the courses, and the integration and administration of NAHB industry curriculum into an undergraduate residential construction management specialization program are discussed. This paper answers the question: What lessons have been learned through the incorporation of the NAHB CGP designation courses into construction management programs? A course evaluation survey was conducted at the end of each term to obtain the students' perspectives about the course. The researchers also interviewed the nine faculty who have taught the CGP courses to gain their perspective on the program. The results of the student surveys and faculty interviews are presented and discussed. The researchers discuss the challenges, lessons learned, and future course planning.

Key Words: Green Building, NAHB, Undergraduate Education, Designation

introduction

The process of what is considered construction is expanding in the ever changing global market^{1,3}. To keep pace with industry, construction management (CM) programs are changing the way they teach and prepare graduates for industry. Construction professionals now have to do more than just problem solve. They must be able to be innovative in design and execution, utilizing creative thinking along with understanding math and building science principles. They must also be able to work within multidisciplinary teams of other industry professions and communicate effectively across those disciplines. At the same time, economic conditions and a growing interest in sustainability are changing the way that construction is performed, especially in the residential market. This change has to do with areas that are required to effectively manage residential projects such as business plans, marketing plans, sales plans, and subcontractor agreements. The job market for CM graduates seeking jobs in residential construction has been competitive. In today's tight job market, a green building professional designation will not only help set a college graduate apart from their peers, but it will also keep their education current^{2,3,4,7,10}.

There has been a push by many universities to incorporate green building into their curriculum¹². While there are multiple green certification programs available for the residential market, the top two recognized programs are the United States Green Building Council (USGBC) with their Leadership in Energy and Environmental Design (LEED) for Homes, and the National Association of Home Builders (NAHB) National Green Building Program. Both programs offer

3rd party green certification of homes. The NAHB National Green Building Program is based on the American National Standards Institute (ANSI) ICC 700-2012 National Green Building Standard (NGBS) for residential green building certification and offers the added benefits of a Certified Green Professional Designation⁹ for industry professionals.

The Certified Green Professional (CGP) designation is part of the NAHB Professional Designation and Green Building Program. It was created by NAHB Education, the training division of the NAHB. This designation was originally designed to give building professionals continuing education and credibility in green building. Homebuilders with the CGP designation have the potential to become more successful at green building because they have learned to identify and adapt to the social, economic, political, environmental, and technological issues affecting green building and their businesses. Industry-university collaboration has been recognized as a value added component of construction management education^{8,11}. NAHB Education has created license agreement with university construction management programs to teach professional designations since 2009. The faculty believed that an industry-university partnership with the NAHB would greatly enhance residential construction management (RCM) course offerings. A long-term working relationship has been maintained with NAHB through their student chapter and involvement with the annual NAHB Student Competitions. The advancement goal of this partnership was to facilitate faculty and student professional development as well as to incorporate a nationally recognized industry professional designation program into the RCM area of concentration. It was also the goal of this CM / NAHB collaboration to become a model for university residential construction education programs. This program could be replicated at peer institutions, therefore increasing the impact and the number of students and industry practitioners with NAHB professional designations^{5,6}.

Since 2009, NAHB has partnered with ten university CM programs to teach the CGP designation at the college level; Purdue University, University of Nebraska - Kearney , California Polytechnic State University, Michigan State University, University of Arkansas, Southwest Michigan College, Pittsburg State University, University of Montana - Missoula, Colorado State University, and Texas A&M University. There are nine university faculty that have become certified CGP instructors, resulting in 21 CGP course offerings to college students. All 21 course offerings were electives, meaning the 329 students who have taken the course did so willingly and not as part of the required core curriculum. The students are primarily CM students, but there are some architectural, engineering, and interior design students that have taken the courses. NAHB does not track the students' major on their evaluation form, so exact numbers by major are anecdotal from the CM CGP instructors.

methodology

The study is a mixed method study, utilizing quantitative data analysis of the student evaluations, and qualitative analysis of the interviews of the CGP Instructors. The student evaluations survey data was given to the researchers by NAHB education. The evaluations did not collect any identifying information from the students. It had only their responses to the survey questions, listed as a numerical response to a Likert scale of 5 (strongly agree) to 1 (strongly disagree). The instructor interviews were conducted via email invitations and phone calls. Researchers engaged the instructors in casual conversation about their experience teaching the CGP curriculum to

their college students. Both student and instructors identity were protected and this study was IRB approved.

research question

This study attempted to answer the following question: What lessons have been learned through the incorporation of the NAHB CGP designation courses into construction management programs?

CGP designation requirements

The CGP designation requires completion of two NAHB courses; the two day (16 hours) “Green Building for Building Professionals” and the one day (eight hours) “Business Management for Building Professionals”. These courses are normally taught through a local Home Builders Association (HBA). The Business Management course is a requirement for other designations as well. Once a student has taken Business Management, it can be applied to the other designations. For each course, NAHB provides an instructor manual, PowerPoint slides, a student guide, a skills check exam, a Scranton answer sheet, as well as course and instructor evaluation forms.

contractual relationship

A license agreement must be established for use of NAHB copyright materials and was required before the CGP curriculum could be taught in the university classroom. The agreement lists details for payment of NAHB fees, instructor requirements, and use of the NAHB curriculum. There is an annual site License Fee of \$300. The CM instructor follows the same procedure to order the instructional material from NAHB as an industry professional would follow. There is a \$90 per student course material fee for both the Green Building and Business Management courses, along with a \$145 graduation fee for the CGP designation. In most cases, the CM students pay \$180 for the course fees and the students guide. They view this cost as part of their normal book cost. They receive a certificate of course completion from NAHB. It is up to the students to pay the \$145 NAHB Graduation Fees to fully complete their CGP certification. Some of the universities are utilizing grant funds from the National Housing Endowment (NHE) Homebuilding Education Leadership Program (H.E.L.P) to pay for the student’s course and graduation fees.

requirements of the educators

Faculty members completed the NAHB CGP instructor approval process. To become an instructor for any of the NAHB professional designations, the faculty has to have industry experience related to the designation. They must take the designation courses in the original industry format that they were offered, pass the skills check, and earn the designation. They also must take the NAHB “Train the Trainer” Course. They then submit their instructor application for review by the NAHB instructor review committee. The committee review takes three to six weeks and the committee reserved the right to withhold instructor approval.

integration of NAHB industry curriculum into CM programs

Different universities integrated the NAHB CGP designation in different ways. It was stipulated in the license agreement that the 24 hours of content required for the CGP designation be taught using the NAHB curriculum as provided to the university. The 24 hours was spread across quarters and semesters. Some universities taught the NAHB content as a standalone course and other universities incorporated the NAHB material into an existing course that used the balance of their additional contact hours to explore and expand upon other topics by the instructor. The CGP curriculum has been integrated into and as part of a design course, building codes and inspection, residential construction, and green building courses.

The NAHB CGP designation course objectives were incorporated into the overall course objective list for CM Green Building course is as follows.

At the completion of the course, the students will be able to:

- Explain the goals of the National Association of Home Builders, the National Green Building Program, the Green Building Guidelines, and identify the individual components of the program.
- Explain the basic building science principles behind the growth of the green building movement.
- Explain considerations for locating and designing green development sites.
- Describe the strategies for effective moisture control and durability for each component of the building envelope.
- Describe various resource-efficient materials used to achieve comfortable, safe, and sustainable buildings.
- Describe green building energy efficiency requirements and the strategies for meeting, exceeding and verifying them.
- Describe indoor and outdoor water conservation practices.
- Identify methods for achieving indoor air quality.
- Describe important considerations for approaching green building objectives in a remodeling project.
- Explain a homeowner's and builder's role in effective operation and maintenance of a green home.
- Identify successful business management, marketing, and sales strategies to sell green.
- Discuss common business challenges for residential construction as well as practical tips and tools to overcome them.
- Apply the key measures of business performance to a residential construction business.
- Complete an audit of a residential construction project, using the NAHB Verifiers Guide and Checklist.

Success in the student's achievement of the objectives was assessed by utilizing the Green Building and Business Management section review questions as assigned homework, individual student research combined with class presentations, a group Green Building Scoring Tool certification project, and two multiple choice exams provided by NAHB. Most of the faculty used the NAHB exams for the Green Building and the Business Management curriculum as the final exams for the course. A grading key for the exams is included in the instructor's manual.

Successful completion of the course, submission of a graduation application, signed Code of Ethics, and two years industry experience are requirements of CGP graduation. The NAHB accepts a completed four year CM degree in lieu of the two year industry experience requirement.

survey results: student evaluations

The teaching faculty utilized a survey instrument that was provided by the NAHB to collect the student evaluations about the course. The students were asked to check any of the items that applied on question one. Items two through ten were answered by the students on a Likert scale of 5 to 1 with 5 being strongly agree to 1 being strongly disagree. The students completed the survey questions in Table 2.

Since the Fall semester of 2009, there have been a 21 course offerings at 10 different universities, for a total of 329 students taking the CGP designation training. All 329 students answered the survey. The survey was anonymous. The results are posted below.

NAHB Participant Feedback Questions

1. What were your objectives for attending this course (check all that apply?)

Earn Designation-58% (192 of 329)

Professional Growth-52% (170 of 329)

Networking Opportunity-9% (28 of 329)

Interested in Topic – 39% (129 of 329)

Other – 6% (20 of 329)

	Frequency					Mean
	Strongly Agree 5	4	3	2	Strongly Disagree 1	
2. I will be able to apply what I learn to my job.	206	88	23	7	1	4.46
3. The audio-visual aids helped me follow along and learn the information.	141	103	58	15	3	4.02
4. The course increased my knowledge of the subject.	208	103	13	3	0	4.55
5. The examples and activities helped me understand the information.	157	113	47	8	0	4.24
6. I could follow along with the instructor(s) in the student guide.	241	74	10	0	0	4.65
7. I was encouraged to ask questions and participate throughout class.	219	84	23	1	0	4.57
8. The course prepared me for the test.	205	87	24	2	0	4.40

9. I would recommend this course to others.	208	85	25	7	0	4.47
10. Overall, the course met my expectations.	200	96	17	10	0	4.42

Fifty-eight percent (58%) of the students responded that they wanted to earn the NAHB Professional Designation as a reason for attending the course. Fifty-two percent (52%) attended for Personal Growth. Only nine percent (9%) were interested in taking the course as a networking opportunity. The researcher's feel the networking opportunities part of the question is focused more toward industry groups than students.

Eighty nine percent (89%, 294 out of 329) of the students agreed that they will be able to apply what they learned to their job. Ninety five percent (95%, 311 out of 329) agreed that the course increased their knowledge of the subject. This is encouraging to the researchers and NAHB education. Positive student feedback and the increasing awareness and demand for green building is part of the driving force to continue to offer this course to both industry and university students. For many university programs this course is the only building science training that students receive, so the researchers feel it is important that the students like the course and think that it prepares them for their industry.

Ninety Six percent (96%, 315 out of 329) of the students agreed that they could follow along with the instructor(s) in the student guide. Eighty nine percent (89%, 292 out of 329) agreed that the course prepared them for the test and that they would recommend this course to their friends. This is a positive statics for NAHB Education and the committee that created the curriculum. This may also help validate to faculty that this curriculum is worth considering and using for the green building courses. It also helps the recruitment for an elective course when the past students speak highly of it to their peers.

As with most curriculum there is room for improvement, especially in the area of green building that is evolving every year. Only seventy four percent (74%, 244 out of 329) of the students agreed that the audio-visual helped them follow along and learn the information. There were some who felt the audio-visual aids could be improved to help them follow along and learn the information (Question #3, low mean of 4.02). The Green Building course PowerPoint presentations were designed in 2006. The slides discuss topics in green building that are still relevant to today, but with excessive bulleted lists and verbiage. Others struggled with the some of the activities and examples in the curriculum (Question #5, the second lowest mean of 4.24). The original audience for this curriculum was intended for industry professionals with field experience, something that many of the students have yet to gain.

faculty perceptions of the CGP curriculum

The researchers interviewed the nine faculty who have taught the CGP curriculum at the college level since 2009, to gain their insight and perceptions about the CGP program and curriculum. The entire faculty thought that offering the professional designation was a great opportunity for their students. The faculty also believe that the CGP designation and training does set the student apart from their peers. Seven out of nine faculty will continue to offer the CGP designation within their program. One faculty will not continue because of the lack of student interest primarily because their program focuses on commercial construction and the CGP is a residential

construction market designation. The other faculty is unsure if the CGP offering will continue because the decision to continue is up to the program's administration, and not him. One of the university programs has not continued to offer the CGP program due to the job transition of their certified instructor to another university. Because of the NAHB Certified Instructor requirements, it is not a program that can be quickly picked up by another faculty unless they become a NAHB CGP certified instructor.

There are many things that the faculty like about the CGP curriculum. The first is that it is a comprehensive curriculum package. Everything is included; a well scripted instructors guide, PowerPoint lecture slide decks, and a student guide that follows both the instructors guide and PowerPoint slides. Another positive noted is that is built around the national green building standard, (ANSI) ICC 700-2012, and not just the topic of green building. One faculty noted that it is whole systems focused on the topic, and not just a bunch of individual parts. Many of the faculty praised it for the building science section and said that it was the only building science teaching that many programs offer to their students.

One of the challenges noted by the faculty regarding the CGP program is taking a course designed for industry training and re-pacing it for their academic calendar. The original format design of the CGP curriculum was a three-day course. The PowerPoint presentations, questions, and activities were paced for the three-day format. During the day-long format, the time was more flexible to allow for good discussion and closure before moving on. On frequent occasions, good discussion of a section was cut short by the end of class. This required the instructor to reconnect the line of thinking during the next class period.

Many of the faculty felt that the CGP curriculum book and lecture PowerPoint's charts, graphics, and bulleted list and verbiage are out of date. They stated that this makes it difficult for the instructors to present a dynamic presentation and erodes the credibility of the NAHB with the students. There are many more visual and web media resources on the topic of green building available today and university students seem to respond better to multiple media teaching tools. To incorporate this updated material, the instructors have added secondary presentation material alongside the NAHB Curriculum. Students were encouraged to use up-to-date resources for their research topics and presentations.

Another issue for the faculty is that the group activities and discussions were designed for industry professionals with field experience. A majority of the students did not have the field experience to understand or relate to some the group discussion activities. Many of the faculty either skip the book exercises or incorporate other exercises designed for the students' experience level.

faculty recommendations

Some of the faculty utilize a green scoring project as a final project for the course. One of faculty had the class score house plans for the local Habitat for Humanity (HFH) chapter. The local chapter already had their homes Energy Star certified and was interested in having them Green Certified. The students were broken into small groups and given one of the "typical" plans that the local chapter builds. They were required to score the homes using both the Green Building

Guidelines and the National Green Building Standards online scoring tool. They were also required to provide a scoring report, a written report documenting the areas that HFH needed to add to their construction process to meet the Bronze and Silver Level, and a group presentation for the class and HFH.

The green scoring tool final project of the HFH house reinforces the lectures and discussions from earlier in the semester. A larger impact is made on the students when they score each chapter as it's being discussed during the semester, instead of waiting until to the end as a final project. It allows them to ask questions about a particular topic in the scoring tool and go more in depth into each chapter. Waiting until the end of the semester makes it just a final project the students work through with the attitude of "Just get it done!"

Due to the low score on question five in the student evaluation survey, energy auditing equipment was purchased by one university program. The faculty member is exploring ways to better incorporate this equipment into the course to provide students with better examples and activities. Current ideas of examples and activities are to seek out homes under construction in their local area that are in the pre-drywall stage, to perform a pre-drywall energy audit inspection. Once the home is dry walled, the class then performs a blower door envelope air leakage and duct blaster air leakage test. They also use an infrared thermal scanning camera and air testing to assure safe levels of carbon monoxide.

The importance of energy auditing equipment is discussed throughout many sections of the green building course. Because of the importance of these tests and the third party verification for a Green Home certification, it would be a beneficial teaching experience to actually see these tests performed. During the fall 2009 semester, one program did not own the required testing equipment, so a field trip to a home being tested was planned. Unfortunately, the verifier did not show up at the jobsite during the class period as they were scheduled, so the students were unable to observe the test.

The faculty would like to have CGP curriculum updated with up to date charts, graphics, and exercises geared for students with no industry experience. They would also like to have more regional climate zone energy code data incorporated into the program, since many of the students who go into the residential industry usually stay close to their home area and school. The regional data would make the experience more tangible and enhance the learning experience of the students.

One of the faculty has added the CGP curriculum into a residential design course. Students learn the components of green homes and how they are scored. Then they must design their house plans and specifications according to the green building standards. This gives them building science and construction materials efficiency knowledge that need to be incorporated into their design, as a requirement for the class.

conclusions

There have been many lessons learned by incorporating this NAHB CGP program in university CM programs. The license agreement developed by NAHB and the original school to

incorporate the curriculum is now a standard agreement used with any university that wishes to incorporate the program. Faculty now has a professional industry designation to offer the students in the area of residential green building. And the syllabus, learning objectives, and course re-pace developed by XXXXX University is being utilized by other schools as a model for incorporating the course into their program. Faculty is also learning from each other different ways to enhance the learning activities for the students. The added value of green building design, energy audits, and green building scoring is not part of the original NAHB curriculum and creates enhanced learning experiences for the students.

The researchers believe that the NAHB CGP designation offering has been successfully incorporated into undergraduate construction management programs, and this program will continue in to the future. Fifty eight percent (58%) of the students taking the course did so for the NAHB CGP designation. The students realize the value of the Certified Green Professional training and professional designation. In the tight job market, the added designation sets them apart from their peers. They are better prepared to work in the residential industry and have a better understanding of what it takes to build green certified homes. Also, eighty nine percent (89%, 293 out of 329) of the students said they would recommend this course to their peers. The administration of many university programs interprets this as a success unto itself. Another measure of success is the seven out of nine faculty (78%) believe that the CGP program is important and will continue to offer it to their students, and NAHB Education continues to support those faculty through the license agreements, training, and course material. NAHB Education continues to seek out other university programs to offer the CGP designation to their students.

Much additional work is required to continue development of undergraduate education in principles of residential green construction. Continued input from the students is needed to continue to enhance the incorporation of the Certified Green Professional (CGP) designation from the National Association of Home Builders (NAHB) into the curriculum. Additional surveys may be performed in order to analyze the results of future improvement to the course. A potential area of further research would be a follow up study NAHB to see how many students have continued with the CGP designation program into industry. And does having the CGP designation increase the retention of the students within the NAHB organization once they graduate and enter the construction industry.

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