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ASSESSING CONSTRUCTION MANAGEMENT HIGHER EDUCATION  
STRATEGIES: INCREASED DEMAND, LIMITED RESOURCES,  
AND OVER-ENROLLMENT

By

Kristen Lea Wynn

A thesis submitted to the faculty of

Brigham Young University

in partial fulfillment of the requirement for the degree of

Master of Science

School of Technology

Brigham Young University

December 2005

BRIGHAM YOUNG UNIVERSITY  
GRADUATE COMMITTEE APPROVAL

of a thesis submitted by  
Kristen L. Wynn

This thesis has been read by each member of the following graduate committee  
and by majority vote has been found satisfactory.

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FINAL READING APPROVAL

I have read the thesis of Kristen L. Wynn in its final form and have found that (1) its format, citations, and bibliography were consistent and acceptable and fulfill university and department style requirements; (2) its illustrative materials including figures, tables, and charts are in place; and (3) the final manuscript is satisfactory to the graduate committee and is ready for submission to the university library.

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## ABSTRACT

### ASSESSING CONSTRUCTION MANAGEMENT HIGHER EDUCATION STRATEGIES: INCREASING DEMAND, LIMITED RESOURCES, AND OVER-ENROLLMENT

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Master of Science

The purpose of this research was to see how Baccalaureate Construction Management Programs accredited by the American Council for Construction Education (ACCE) were managing increased enrollments within their programs. The review of literature identified related topics, comparable studies, and relevant issues surrounding over-enrollment.

Forty-nine of the 53 accredited ACCE programs responded to the survey instrument. Over two-thirds of the respondents stated that they were either approaching, or were at the limits of enrollment capacities. Most of the respondents listed limited enrollment, the use of adjunct faculty, and funding from industry as leading strategies for managing or obtaining resources. Because CM programs will not be willing to sacrifice quality, more and more CM programs will implement limited enrollment controls.

The demand for Construction Management graduates will continue to increase. As more CM programs initiate enrollment controls, it will become increasingly difficult for the construction industry to fill entry level positions with college graduates. Limited enrollment will create a deficit of qualified CM graduates needed by the industry.

Because CM programs are having difficulties acquiring resources through the university, it may be necessary to acquire additional resources through industry. According to a number of program directors, one of the best ways to raise funds within industry is through the use of Industry Advisory Boards. Industry Advisory Boards can help in another critical aspect to the future expansion of CM programs; improve university perceptions about Construction Management education.

## ACKNOWLEDGEMENTS

To Dr. Newitt for giving me the idea, to Dr. Burr for always responding, and to Dr. Christofferson for giving me his total attention. To my mom for always nagging, to my dad for never nagging, and to my sister who let me sleep in her room when the midnight oils made the bugs too bad.





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## **Chapter One**

### **Introduction**

#### *Background of the Problem*

A study performed by Robert W. Dorsey (1992, pp. 35-37) stated a projected need of 10,000 new construction managers each year. Within his research, Dorsey discovered that more and more of these managers were no longer being pulled from the ranks to management promotions, but rather recruited heavily from Construction Management education programs.

The marketability of construction management related graduates within the industry is not in doubt. Most construction management education programs boast 100% placement, indicating multiple offers (Bilbo, Fetters, Burt, & Avant, 2000). These graduates fill entry level positions with multiple titles and duties within the industry. Such titles include estimator, field engineer, scheduling engineer, office engineer, project engineer, and project manager (Gunderson, Schroeder, & Holland, 2002). In addition, the Bureau of Labor Statistics projected a 10-20% increase in construction management employment between 1996 and 2006 (DOL, 2005). These statistics project an annual, steady, growth rate that will provide predictable employment opportunities for future graduates (Gunderson, Schroeder, & Holland, 2002).

Research at Texas A&M University provided further information on the demand of college graduates in the construction industry. Based on their research statistics, the demand for graduates in the industry will have increased almost 38% by 2005. However, based on constant enrollment statistics, a supply deficit of 5,880 graduates will arise (Bilbo, Fetters, Burt, & Avant, 2000).

With high industry demand and competitive entry-level salaries, it is no surprise that student enrollment in Construction Management programs are increasing dramatically. Programs like Arizona State University have increased enrollment by over 50% in the last fifteen years (ASU, 2005). Many programs are having difficulties sustaining current enrollments based on their resources. For example, programs like Brigham Young University implemented limited enrollment in their programs by setting restrictions in admissions (BYU, 2005).

Unfortunately, many Construction Management programs do not have the resources available to meet the dramatic increase in student enrollment. Several CM programs are struggling with the inability to acquire adequate funding to create new teaching positions, difficulties finding new faculty to fill available positions, and a general lack of resources for expansion options, including equipment and facilities (Jakubowski & Keith, 1981).

### *Statement of the Problem*

The demand for Construction Management graduates is on the rise. The problem is that as a result of demand, a growing number of CM programs are experiencing

increasing enrollments within their student populations that exceed their current resources.

### *Statement of Purpose*

Because of increased demand and limited resources in CM programs, the purpose of this research is to identify what strategies baccalaureate Construction Management programs accredited by the American Council for Construction Education (ACCE) are using to manage increased enrollment demand and limited resources.

### *Delimitations*

For consistency, the research was narrowed to ACCE accredited programs. The subjects were limited to a list of names provided by the ACCE who would best represent the status and philosophy of their Construction Management programs. The subjects held titles such as Program Chair, Department Head, Director, Program Coordinator, Interim Chair, Interim Coordinator, etc. and for the purpose of this study will be referred to as program directors.

### *Assumptions*

The following assumptions were associated with this study:

1. Programs not accredited by the ACCE face the same enrollment problems as accredited programs.



2. The individual responses provided by the program directors were accurate and truthful.
3. The varying times and dates of the administration of the survey had no affect on the responses provided by the program directors.

### *Definition of Terms*

ACCE – The American Council for Construction Education who’s mission is to be a leading global advocate of quality construction education; and to promote, support, and accredit quality construction education programs (ACCE, 2005)

ACCE Accredited - Construction Management programs that are attested and approved as meeting a prescribed standard by the American Council for Construction Education

Adjunct Faculty - For the purposes of this research, adjunct faculty will be defined part-time, industry personnel

Construction Management – An educational term that can refer to number a construction related majors such as Construction Management, Construction Science, Construction Technology, etc.

Full-Time Equivalent (FTE) Faculty – The count of full time instructors; the numerical equivalent of multiple part-time instructors equaling one full-time instructor, including adjunct faculty and full-time professor

Industry – The Construction Industry



## **Chapter Two**

### **Review of Literature**

#### *Introduction*

This chapter discusses the literature related to Construction Management programs and the measures that are implemented to manage increased enrollment demands. Little to no information has been published about over-enrollment in CM programs. The review of literature was extended to university programs that have experienced a parallel lack of resources based on enrollment demands. The literature identified related topics, comparable studies, and relevant issues surrounding over-enrollment.

#### *Over Enrollment*

Construction Management is not the first higher education program to encounter over-enrollment. Nursing, business, engineering, and journalism have all faced similar situations; and the consequences are the same. A list of consequences associated with increased enrollments includes (Kraybell, 1981)

- Heavier teaching loads
- Reduced research activities
- Tighter operating budget
- Reduced student-faculty interaction
- Increased used on adjunct professors
- Unavailability and decreases in quality of facilities and equipment

Based on the consequences listed above, increased enrollments can pose a serious problem when resources are not available to meet demand.

When demand exceeds resources, the principles of supply and demand offer two options; either reduce the quality of the product by attempting to meet increasing demand, or maintain quality by increasing the price and limiting the product (Jakubowski & Keith, 1981). The effects of supply and demand are not un-similar to what is happening in Construction Management programs across the nation. In matters of inadequate resources meeting increasing demand, educators have a choice; either limit enrollment or create alternative solutions (Dixon, 1983).

### *Alternative Solutions*

When additional resources are not available and limiting enrollment is not an option, universities can employ the use of alternative solutions. A list of alternative solutions available for educators could include the following; the use of adjunct faculty and/or teachers' assistants, increased night class enrollment, and departmental reorganization. These options will be reviewed below.

### *Adjunct Faculty*

The use of adjunct faculty is a popular alternative solution when additional resources are unavailable. Adjunct professors are industry professionals, working full-time in the field, who teach part-time at the university level. The use of adjunct faculty is on the rise and is estimated to be as much as 40 percent of the nationwide part-time faculty (Gosink & Streveler, 2000). Unlike full-time faculty under contract, adjunct professors provide a means for quick responses to changing demands in enrollment (Laxpati & Saad, 1996). Adjunct faculty can provide an assurance of temporary coverage (Gosink & Streveler, 2000).

Adjunct faculty can add variety and enrichment by bringing practical experiences to the classroom setting, while providing current industrial applications and problems (Gosink & Streveler, 2000). In addition, adjunct faculty can provide valuable links between universities and industry. An adjunct instructor's exposure to both academics and industry can provide valuable research information for full-time professors as well as valuable insight in the development of current and viable goals for the department.

Industry connections within the program can also facilitate fundraising (Laxpati & Saad, 1996). Industry donations can provide the means necessary to hire new faculty, provide facilities, purchase new equipment, etc. Finally, industry connections are valuable in future employment opportunities for graduating students. All of these aspects can make adjunct faculty a valuable resource in the world of academia.

There are, however, numerous opinions on the actual effectiveness of adjunct faculty. They may be hired with impeccable technical skills, but have little formal training in education. The temporary nature of adjunct instructors presents a number of

difficulties. Given that adjuncts are not a permanent fixture within the program, instructional training is not a priority. Due to their full-time professions, adjunct faculty have a limited amount of time on-campus. This leaves little opportunity for adjuncts to improve their teaching skills or interact with their students (Gosink & Streveler, 2000). It is the opinion of some that “No matter how dedicated and responsible part-time teachers are, the practice of hiring, year after year, large number of transient workers to teach the courses central to an undergraduate education has already damaged higher education and will continue to do so” (Franklin, Laurence, & Denham, p. 37).

The use of adjunct faculty can be an effective resource in relieving the temporary strains of over-enrollment. It can provide a way to relieve the teaching loads of full-time professors while bringing unique industry prospective to both students and faculty. Nevertheless, the potential problems associated with the use of adjunct faculty must be considered.

### *Teaching Assistants (TAs)*

The use of TAs is another resource in dealing with expanding enrollments. A number of universities and programs have developed a way of using both undergraduate and graduate students to help teach classes. For example, a student who receives a “B” or better (actual qualifications depend on individual university requirements) can serve as a teacher’s assistant. These TAs can perform a number of duties for a professor, for example; paper/exam grading, preparing homework assignments, help sessions, and student tutoring (Dixon, 1983).

According to research by Dr. John Dixon, in a class of about 150 students a TA program that adds 1 TA per 30 students can relieve a work load equivalent to one full-time professor. TA programs make additional time and resources available to professors; thus making it possible to create additional lectures and labs, as well as increase current classes sizes (Dixon, 1983). Dr. Dixon's study presented no evidence of a decrease in education quality due to TA's.

According to Dr. Dixon, the funds associated with creating a TA program are miniscule compared to its overall effectiveness. Still, many schools may find it difficult to obtain the resources necessary to fund a TA program.

### *Night Classes*

The University of Oregon established a pilot program that granted financial incentives to students who enrolled in non-traditional time slot classes starting after 3 pm. The goal of the program was to maximize student capacity by encouraging enrollment in non-traditional time slots; thus relieving classroom overcrowding. Incentive hour classes were also taught at a time at which more adjunct faculty were able to teach. This was not a perfect solution. There were questions as to the fairness of which classes were offered at the incentive hours and how accessible the classes were to student schedules (Farrell, 2002).

### *Departmental Reorganization*

One mass communications program reorganized their department by requiring a Bachelor of Arts (BA), rather than a Bachelor of Science (BS) degree. The move claimed



to increase diversity and cultural sensitivity within the program; but off the record, the faculty contributed the change to a desired decrease in student enrollment (Rawlins, Soenksen, & Jensen, 2002).

Within a university, there are other departments that have the funding necessary to compensate program expansion. By being under another department, a program may find the resources necessary to meet increasing student demand.

### *Limited Enrollment*

For those programs that do not expand their enrollment, there is a second option available to manage increasing student demand. Limited enrollment can control a program's availability by limiting the enrollment of students to a manageable number (Jakubowski & Keith, 1981). Limited enrollment is not a new idea; for years it has been a viable option available to educators in preventing a loss of quality due to increased enrollment demands. It is used in both the private and public spheres of education, and at both the graduate and undergraduate level. It can be used as a way to sustain educational quality and prevent an oversupply of outgoing graduates within an industry (Jakubowski & Keith, 1981) (Boley & Marker, 1994).

One of the most important steps in implementing limited enrollment is to establish enrollment parameters. Parameters define the amount of students, faculty, and facilities desired within a program based on resources. Deciding how many students a college or department can handle can be difficult. This decision should be based on a number of factors. In his paper on enrollment, Dr. J. Meriam recommended the following considerations when establishing enrollment parameters; enrollment numbers, the

number of teaching faculty, student credit hours, direct instructional costs, available equipment, funds, computers, and facilities (Meriam, 1970).

An additional method of establishing enrollment parameters is the Key Course Method. When using the Key Course Method, the amount of students allowed to enroll in a program is based on the class capacity of the key courses that students must take. Once the key courses are established and analyzed, future enrollment capacities can be estimated (Jakubowski & Keith, 1981). After a university has instituted a consistent method of establishing enrollment parameters, the next step is to establish enrollment criteria.

While limited enrollment is not uncommon in many universities and programs, establishing enrollment criteria is a sensitive subject. Dr Wallace Venable has stated that, “While setting numerical limits is relatively easy, the establishment of criteria for the retention, rejection, or expulsion of individual students is difficult and dependant on a wide variety of social, intellectual, economic, and ethical assumptions” (Wallace, pg. 128). When considering enrollment criteria, the real difficulty is to decide where, when, and how should the line be drawn (Jakubowski & Keith, 1981).

Limited enrollment criteria can come in many forms; it can be based on GPA (both high school and university), SAT/ACT scores, pre-requisite courses, voucher systems, etc. These methods can also be combined to create a list of admissions criteria. Each method has unique advantages and disadvantages; and each system is chosen based on the individual needs of the university. The paragraphs that follow are a review of several methods used.

### *Grade Point Average (GPA)*

There are a number of ways to use a GPA based limited enrollment program. Some universities and colleges use GPA from either high school records or at the university level as their only admissions criteria. Others choose a more complex approach. For example, Michigan State University bases its admittance on a technically weighted average GPA, with a minimum of 3.00 (on a 4.00 scale). Based on the number of enrollment applicants, the Michigan State's GPA has floated from a 2.7 to a 3.2, with only the top academic applicants admitted each semester (Jakubowski & Keith, 1981). Weighted average GPAs based on pre-requisite courses can be an effective method of predicting future success within a program.

Limited enrollment based solely upon GPA has a number of disadvantages. GPA padding can occur by taking easier classes. In addition, there are many aspects to a student other than their academic record. Future employers demand characteristics such as leadership, communication skills, and work experience (Gunderson, Ra, Schroeder, & Holland, 2002). Many of these attributes cannot be determined by a student's GPA.

### *Two-Tier Enrollment*

Two-tier enrollment includes academically distinguished lower-division and upper-division courses. Pre-majors are invited to enroll in lower-division courses, although they are not guaranteed admission within the program. Upon completion of the lower-division courses, pre-majors are invited to apply officially to their perspective programs. Admitted students are free to enroll in upper-division courses (Parker & Haynes, 1985).

Two-tier enrollment provides an effective way to limit student enrollment, while significantly increasing the quality of students. Two-tier enrollment may not be the best solution for those who are searching to maximize limited resources. Program administration is time consuming for faculty as they focus on tracking and advising both current and prospective students (Parker & Haynes, 1985). In addition, conflicts can arise when students are rejected from the program after expending time and resources on lower-division classes.

### *Enrollment Voucher Systems*

For universities whose problems center around the inability to provide ample enrollment in key courses, there is another solution; a voucher system. When enrollments increase, key courses often reach a demand level that is unattainable. This creates a number of problems, especially for students who need key classes in order to graduate. Students desperate to enroll create long lines at registration and frustrations for both students and faculty. A nursing program at the East Campus of Indiana University attempted to solve this problem by creating a voucher system that gave enrollment priority to the students who had the most completed credits (Boley & Marker, 1994).

In attempt to distribute the vouchers fairly, the program established priority criteria. Initially, those at the top of the list were full-time students already admitted into the nursing program who needed the required pre-requisite science classes before they could begin their core programs. The priority criteria digressed to six different levels, ending with part-time students at the beginning of their programs. Based on the school's

individual needs, the criteria were changed to meet the demands of part-time students, etc.

The voucher system can be an effective method of limiting enrollment to those students whom priority deems are most in need. Overall, the university seemed pleased with the changes. Students were content that there were no longer lengthy lines for registration and faculty no longer had to deal with disgruntled students attempting to add classes. However, change does not come without a price. The time and effort put into ranking students and creating vouchers can be toilsome on the program faculty and staff (Boley & Marker, 1994).

## Chapter 3

### Methodology

#### *Population and Sample*

The population within this research was Construction Management programs within the United States. In order to maintain consistency, the research sample was narrowed to ACCE accredited programs. A list of the 53 ACCE accredited programs was acquired through the ACCE official website (ACCE, 2005) and can be found in Appendix A.

#### *Subjects*

The subjects interviewed for this research were chosen based on the program contact information provided by the ACCE. The subjects held the following titles: Program Chair, Department Head, Director, Program Coordinator, Interim Chair, Interim Coordinator, etc. For the purposes of this research, the subjects will be referred to as program directors. The program directors were contacted based on a list of phone numbers provided by the ACCE. They were then asked if they would be interested in answering questions concerning enrollment issues within their respective Construction Management programs. An example of the opening dialogue and questions can be found in Appendix B.

### *Instrumentation*

The instrument used for this research was a survey. The survey questions were based upon a review of applicable literature and interviews with associates of the ACCE.

The survey was designed to be both qualitative and quantitative in nature. Quantitative questions were derived from a review of literature surrounding similar topics. This information provided much of the foundational aspects for the qualitative data to be gathered.

The qualitative questions were intended to be open-ended. As mentioned before, there is little to no literature currently published concerning Construction Management programs and over-enrollment. This implies that there is little to no information known as to how CM programs are handling the documented increase of enrollments. By asking open-ended questions, the researcher gathered information specific to each school that has not previously been published.

### *Survey Administration*

In discussion with a member of the ACCE Board, it was felt that the survey would best be performed over the telephone. Due to the dual nature of the survey, a telephone survey would allow the interviewer to discuss in detail the qualitative responses to open-ended questions. In addition, a telephone survey would provide the highest response rate.

The telephone survey was conducted in an office located in the School of Technology at Brigham Young University.

### *Survey Questions*

Each question in the survey instrument was designed to provide an overall and complete assessment of the current state of enrollment within individual Construction Management programs. The following is a breakdown and explanation of each question contained within the survey:

*Question 1* – Do you have the resources available to admit every qualified student that applies to your Construction Management program?

This question sets the tone of the survey. It induces the respondent into contemplating their program's current resources in conjunction with current enrollment demands.

*Question 2* – If not, do you feel limited by \_\_\_\_\_?

This question is followed by a list of possible limitations including finding qualified faculty to fill positions, inadequate funding for expansion, lack of university support, or other. The possible limitations were added to help guide the researcher, in addition to giving the subject a sense of structure while encouraging open-ended answers.



*Question 3* – What do you feel currently is the maximum capacity for student enrollment within your program?

This question establishes the size of the program.

*Question 4* – How many students are currently enrolled in your program?

This question is two-fold; it is used to establish how near the program is to their maximum capacity. In addition, the response can be used to establish a student to faculty ratio.

*Question 5* – How many Full-Time Equivalent (FTE) Faculty do you have?

The question can be used in conjunction with Question 4 to establish a student to faculty ratio.

*Question 6* – Are you experiencing over-enrollment based upon lack of resources?

This question was developed to derive whether or not the program director felt that, based upon the information provided in questions 3-5, they were experiencing an over-enrollment problem within their CM program.

*Question 7* – If so, what strategies are you using to accommodate student demand based on your resources?

This question was intentionally left open-ended. Due to the fact that there is little literature available concerning this specific topic, this question was intended to generate

new ideas as to what strategies Construction Management programs are using to handle over-enrollment.

*Question 8* – Are you using limited enrollment as one strategy to address lack of resources issues?

This question was designed specifically to generate qualitative statistics concerning limited enrollment in Construction Management programs.

*Question 9* – If not, do you expect to implement limited enrollment in the next few years?

This question addresses the future of limited enrollment in Construction Management programs.

*Question 10* – How do you limit your enrollment? What criteria do you use to admit students?

Like Question 2, this question is followed by a list of guidelines that directs the researcher, in addition to giving the respondents a sense of structure while encouraging open-ended answers. The criteria guidelines included GPA, work experience, SAT/ACT, minimum standard in order to apply, leadership, personal interviews, and other.

This question was established to see what criteria are being used by ACCE accredited CM limited enrollment programs. In addition, this question would be valuable for future research involving limited enrollment in Construction Management programs.

### *Validation*

Once desired topics and questions were established, the survey was submitted for professional evaluation. Each question was examined by Dr. Jay Newitt, a faculty member at BYU with many years of service and experience with the ACCE. The questions were then analyzed by survey expert, Dr. Kevin Burr, also at BYU. In addition, the survey was presented to the Program Director of Construction Management at Brigham Young University to ensure survey clarity. Finally, the survey instrument was approved by the Brigham Young University's Office of Research & Creative Activities (ORCA).

### *Data Analysis*

Upon completion of the interviews, the survey data was compiled into a Microsoft Excel worksheet where the individual schools were listed vertically. The survey questions were then listed horizontally. The following is an example of the created database:

Table 3.1 – Data Analysis Database

<b>Question 1</b>				
<b>Do you have the resources to admit every student?</b>				
	<b>Yes</b>	<b>At Limits</b>	<b>Must Admit All</b>	<b>No</b>
Individual School	x			
Individual School				x
Individual School				x
Individual School		x		
Individual School		x		
Individual School		x		
Individual School				x
Individual School				x
Individual School				x
Individual School				x
Individual School			x	
Individual School	x			
Individual School				x
Individual School				x
<b>Totals</b>	<b>5</b>	<b>4</b>	<b>2</b>	<b>9</b>
<b>Average</b>	<b>10%</b>	<b>8%</b>	<b>4%</b>	<b>18%</b>

The survey results were examined to identify the individual answers from the open-ended questions and then add them to the horizontal list. The surveys were then re-examined and marked according to the categories that applied to their programs. At the bottom of the horizontal list, cells were created to generate statistical averages based on the total number of participating programs and the number of programs that were associated with that category. The data analysis is further expounded in detail within Chapter 4.



## Chapter Four

### Findings

Of the 53 accredited programs in the United States, 49 responded to the telephone survey conducted by the author. Question 1 of the survey inquired if their Construction Management programs had all the resources available to admit every qualified student that applied. In response to that question, 33 percent of the program directors replied that they had all of the resources necessary, 26 percent felt they were approaching the limits of capacity, and 41 percent felt that they could not handle any additional students (see Figure 1).

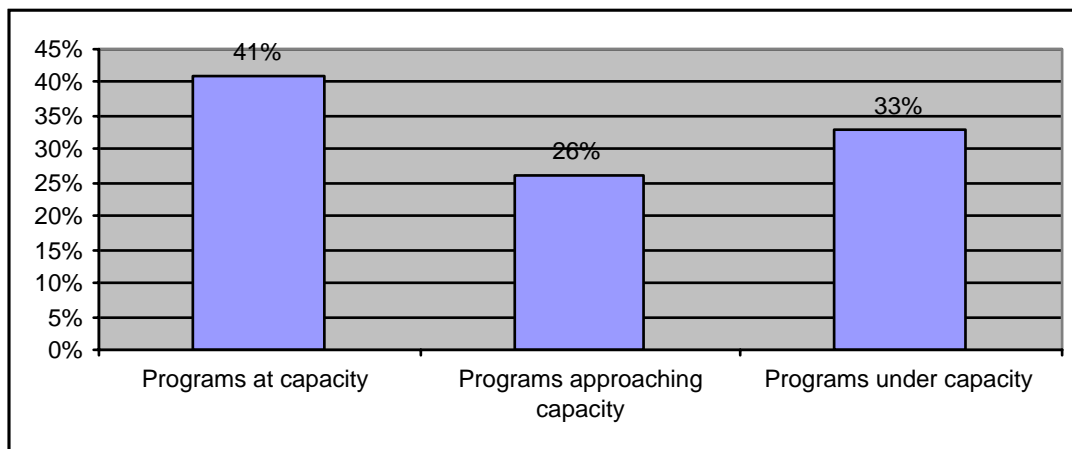


Figure 4.1 – Program Capacities

Over 67 percent of ACCE accredited Construction Management programs were either approaching capacity or already at the limits of capacity.

Questions 3-5 of the survey established the current enrollment, maximum enrollment capacity and number of Full-Time Equivalent Faculty for each of the ACCE Construction Management programs surveyed. The chart below breaks down those capacities and provides the difference between many of the program's current and maximum capacities. The bold numbers in parenthesis identify programs already at, and beyond, their maximum capacities. Also included is the number of full-time equivalent (FTE) faculty in each program as provided by the program directors and the student-to-faculty ratio. The identity of each program was kept anonymous (see Table 4.1).

Table 4.1 – Current Program Enrollments

Max Capacity	Current Students	Difference	FTE Faculty	Student/FTE Ratio
200	204	<b>(4)</b>	4	51
80	90	<b>(10)</b>	6	15
125	125	<b>0</b>	3	42
400	400	<b>0</b>	11	36
460	550	<b>(90)</b>	11.2	49
150	220	<b>(70)</b>	2.5	88
120	165	<b>(45)</b>	6.5	25
400	150	250	4	38
145	145	<b>0</b>	3.5	41
150	175	<b>(25)</b>	6	29
560	530	30	13	41
125	100	25	3.25	31
N/A	200	N/A	8	25
N/A	350	N/A	7	50
120	180	<b>(60)</b>	6	30
200	215	<b>(15)</b>	6.5	33
200	160	40	5	32
70	48	22	2.75	17
312	400	<b>(88)</b>	7	57
600	600	<b>0</b>	14	43
130	110	20	3	37

Table 4.1 – Current Program Enrollments continued

Max Capacity	Current Students	Difference	FTE Faculty	Student/FTE Ratio
132	65	67	3.5	19
500	450	50	12	38
500	500	0	13	38
170	165	5	4	41
200	130	70	3	43
180	89	91	4	22
220	240	(20)	4.5	53
250	210	40	5	42
257	257	0	2.75	93
180	280	(100)	6	47
500	540	(40)	17	32
180	165	15	5	33
130	130	0	4	33
600	900	(300)	24	38
350	200	150	6	33
287.5	230	58	7	33
300	80	220	5	16
N/A	400	N/A	12	33
175	175	0	5	35
250	250	0	20	13
75	35	40	3	12
450	400	50	10	40
N/A	290	N/A	7	41
90	90	0	3	30
262	300	(38)	6	50

Maximum capacities listed as “N/A” were either unsure of their program’s capacity or confident that they could expand to meet demand.

#### *Resource Limitations*

Question 2 of the survey asked the program directors what they felt limited by.

The program directors listed the following limitations:



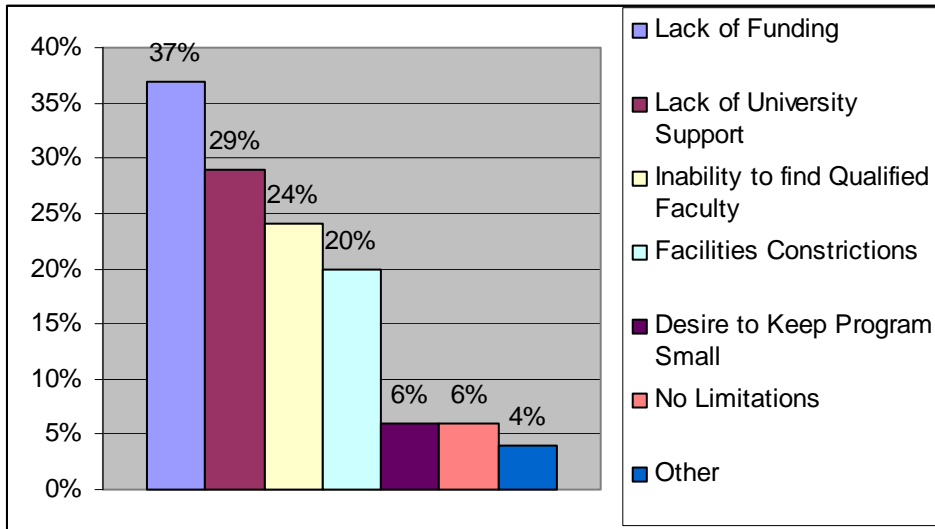


Figure 4.2 – Resource Limitations

Lack of funding and university support constituted more than half of the respondents' limitations. One program director felt that Construction Management was not a priority in his university's eyes, while another stated that other programs "were bleeding worse than they were". Funding was also a concern in finding qualified faculty. One program director felt that the program was unable to afford the few qualified PhDs that were available.

The "Other" category included one program director whose program established class sizes that would not allow for expansion. Another program director expressed a desire to establish consistent growth within his program before expanding.

### *Resource Strategies*

Question 7 inquired what strategies were being used by ACCE Construction Management programs to accommodate increased student enrollment demand. Over two-

thirds of the program directors listed limited enrollment, the use of adjunct faculty, and funding from industry as leading strategies for managing or obtaining resources (see Figure 4.3).

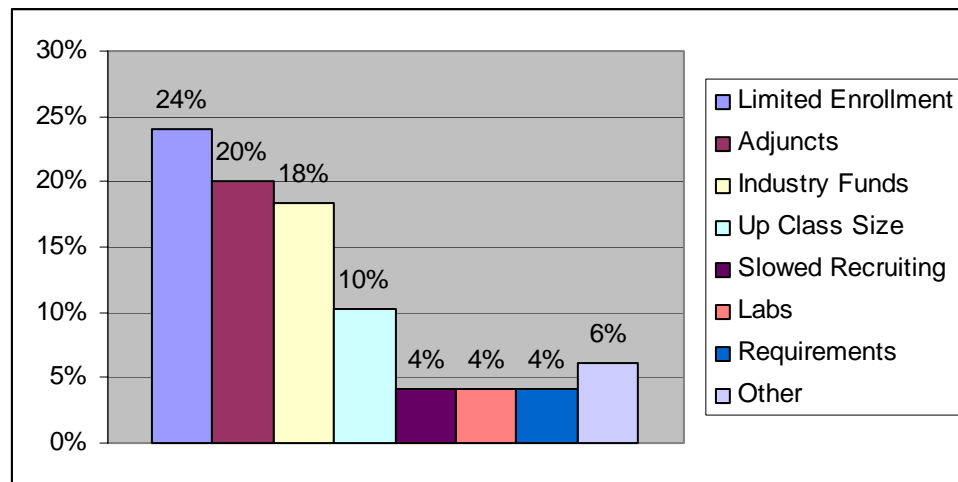


Figure 4.3 – Resource Managing Strategies

Each of the strategies specified in figure 4 above is discussed in detail in the following paragraphs.

#### *Limited Enrollment*

Twenty-four percent of the programs use limited enrollment as a method for dealing with increasing enrollment demands. The use of limited enrollment within a program was established in Question 8 by asking directly if limited enrollment was one of the strategies utilized by their program. Once the use of limited enrollment was determined, Question 10, “How do you limit your enrollment? What criteria do you use

to admit students”, established the following list of limited enrollment criterion used by ACCE Construction Management:

GPA	61%
SAT/ACT Score	25%
Work Experience	21%
Pre-Requisite Courses	21%
High School Records	18%
Essay	18%
Leadership/Extra Curricular Activities	14%
University Level Admission	7%
Other	11%

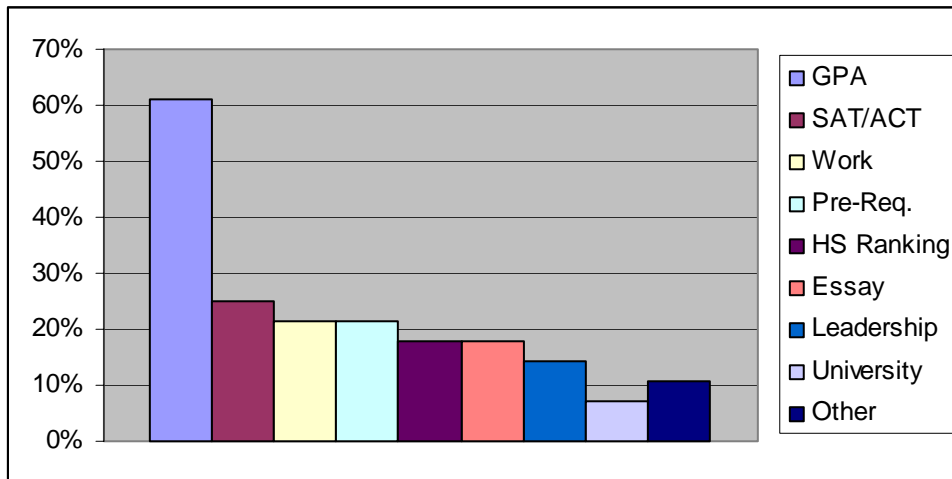


Figure 4.4 – Limited Enrollment Criterion

GPA is the criteria most often used in determining admission to an ACCE Construction Management programs. It can be used as the sole criteria for admittance, or combined with other criteria to create enrollment limitations. For example, one program based admittance upon the GPA of required pre-requisite courses, work experience, and a letter/essay. Another school based admission solely on the student’s ACT score because

they felt that it was the best method of measuring a student's aptitude and future performance.

Two different programs stated the use of a percentage-based combination of criteria to limit enrollment. One school used a scale of 40 percent GPA, 30 percent work experience, 30 percent leadership, and an application resume. Another program used a scale of 50 percent GPA, 25 percent work experience, 25 percent leadership skills, and an essay.

The following were the top three combinations of enrollment criteria used by ACCE Construction Management programs:

1. GPA and Pre-requisite Courses
2. GPA and SAT/ACT Scores
3. GPA and Work Experience.

Other methods of limited enrollment were used as well. Based upon previous successes, one program was specifically looking for older students who had community college experience. Another program was planning on limiting enrollment into specific cohorts in order to control enrollment demands. In addition, one program was using two-tier GPA based enrollment.

Question 9 inquired which, if any, programs currently not utilizing limited enrollment planned to implement the method in the next five years. Although 33 percent of the program directors responded to the affirmative, 24 percent stated that they were not planning on implementing limited enrollment any time soon. There were three main reasons stated for not implementing limited enrollment. One program director stated that limiting enrollment "hurt the budgeting game" by discouraging resources that would

normally follow enrollment. Another respondent felt that their program could successfully raise funds within the industry for additional support. One respondent felt that limited enrollment was subjective and open to accusations of bias.

### *Adjunct Faculty*

Twenty percent of the schools interviewed use adjunct faculty as a strategy for accommodating student demand. The use of adjunct faculty is a method of dealing with fluctuating semester enrollments. Their use can provide a way around hiring expensive, full-time PhDs. One program stated that only 50% of their faculty members were PhDs. Additionally, a significant portion of their teaching load was handled by part-time industry professionals with baccalaureate degrees. According to one program director, however, it was difficult to find adjunct faculty that could accommodate the amount of hours and time slots needed.

### *Industry Funding*

Eighteen percent of the respondents stated the use of industry funding to support student demand. The following is a list of resources provided by industry funding according to the program directors interviewed:

- Personnel grants funded solely by industry donations - industry funding provided a number of different positions for these programs such as office managers, part-time adjunct professors, and full-time professors.

- Facilities - Programs have been successful in persuading the industry to provide labs, remodeled and new facilities, equipment, etc.

One respondent stated that the industry within the geographic area was so desperate for graduates that they were more than willing to help expand the program by providing resources. This program director said that industry “relished in their success” and were very supportive. This same program’s industry advisory board provided industry connections for funding not only for the program, but for sponsored students events as well.

#### *Increased Class Sizes and Teaching Loads*

Ten percent of the programs interviewed listed increasing class sizes and additional course sections as a way to compensate for over-enrollment. According to respondents, increasing classes enabled these programs to accommodate additional students. Program directors did note the increased teaching loads adversely affected faculty members and students.

#### *Diminished Recruiting Efforts*

Four percent of the program directors listed decreased recruiting efforts to control enrollment. Previously these schools actively recruited high school students by printing brochures, offering scholarships, and visiting campuses. With programs now at capacity, program directors decreased or discontinued recruiting efforts.

### *Labs*

Four percent of the programs used labs as a method of controlling over-enrollment. Small labs were associated with large professor lectured classes, but taught by either teachers' assistants or vocational educators. This provided programs the ability to increase student capacity without placing excessive stress on faculty members.

### *Increased Enrollment Requirements*

Four percent of the programs indicated more stringent enrollment requirements as a strategy. Although technically a form of limited enrollment, some program directors perceived a difference in the 2 categories. When increasing enrollment requirements, minimum standards for admission are created. Students that meet that standard are automatically admitted into the program. For example a minimum GPA, SAT/ACT score, or high school rankings were used to set a minimum standard. This quantitative method was perceived by respondents as less biased than qualitative methods like leadership, work experience, or essay writing.

### *Other*

One program director stated that program funding was a direct result of the program's academic research and status within the university; therefore, he felt the best way to gain resources was to encourage more research by faculty members. One program was re-organized and transferred from the Engineering Department to the Information Technology Department. Following the transfer, the program director had an increase of

available program resources. One program listed the use of TA's as a major resource to manage over-enrollments. Due to the school's large Construction Management related PhD programs, there were a number of PhD candidates available to work as teachers' assistants.

Another program director employed a hybrid method of curriculum that combined the use of electronic assignments and tests to alleviate resource deficiencies. This same program was making use of vocational educators to teach some of their lower level technical classes. While high school vocational educators are not typically PhD's and are less expensive to hire, they do have an educational background.





## Chapter Five

### Conclusion, Recommendations, Implications, and Recommendations for Future Research

#### *Conclusions*

Enrollment demands for ACCE Construction Management programs have increased dramatically. Over 67 percent of ACCE Construction Management programs are approaching, or at, the limits of enrollment capacity. Due to limited resources, CM programs are having difficulties meeting these enrollment demands. Two-thirds of the respondents felt limited by lack of funding and/or university support. These two limitations often are correlated; when there is a lack of university support, university funding is difficult to obtain. Construction Management education does not appear to be a university priority for additional funding.

To manage limited resources, a majority of ACCE CM programs are utilizing many of the same strategies used by other over-enrolled higher education programs. Most of the respondents listed limited enrollment, the use of adjunct faculty, and funding from industry as leading strategies for managing or obtaining resources. Program directors listed limited enrollment as the strategy most utilized by CM programs. Limiting enrollment appears to be the best way to keep enrollment demands at a level where resource limitations do not compromise quality. Because CM programs will not be

willing to sacrifice quality, more and more CM programs will implement limited enrollment controls.

In reviewing the limited enrollment criteria used by the program directors, it was noted that academic criteria such as GPA, SAT/ACT scores, high school rankings, etc. constituted for more than 80 percent of the criteria used for selecting future students. Work experience and leadership skills were the only non-academic attributes listed by program directors and those characteristics were only used 18 percent of the time. Attributes such as communication, organization, and ethics are not listed at all. It can be concluded that a majority of CM programs only take into consideration the academic skills of students that apply to their programs.

It is projected that 10,000 entry-level construction managers will be recruited each year from Construction Management programs (Dorsey, 1992). As more CM programs initiate enrollment controls, it will become increasingly difficult for the construction industry to fill entry level positions with college graduates. Limited enrollment will create a deficit of qualified CM graduates needed by the industry.

### *Recommendations*

Because CM programs are having difficulties acquiring resources through the university, it may be necessary to acquire those resources from industry. Already, 18 percent of ACCE accredited CM programs are successfully using industry resources to manage increasing enrollment demands. According to a number of program directors, one of the best ways to acquire resources within the industry is to use an Industry Advisory Board.

An Industry Advisory Board can be used to strengthen the bond between Construction Management programs and the construction industry. Industry Advisory Boards would be helpful in the following areas. They educate industry on the extent of the problem surrounding over-enrollment and limited resources faced by CM programs. They can also educate the industry on the extent of the impact the industry will experience if a graduate deficit occurs. They can also be powerful forces in raising funds and additional resources for CM programs. Finally, Industry Advisory Boards can work with university administrators to improve their perceptions of Construction Management education.

Improving university perceptions about Construction Management education is critical to the future expansion of CM programs. Construction Management education will become a priority for university funding when they have gained the respect of university administrators. This can be done through PR campaigns and advertising within the community and the university.

Another way to gain recognition from university administrators is through professional organizations such as the National Association of Home Builders (NAHB), Associated Builders and Contractors (ABC), and Associated General Contractors (AGC). These professional organizations are associated with politics and legislation on both the local and national levels. For CM programs within public education, professional organizations can have a great deal of influence on university politics. Professional organizations can also help with fundraising. There are several states where taxes or fees are added to building permits or contractors' licenses where the proceeds are used for construction education.

## *Implications*

If limited enrollment continues to grow, in order to obtain the needed entry-level managers, industry will have to increase support of CM programs within their geographic area. If additional funding and resources are not provided, industry will have to continue to promote managers from within company ranks and provide in-house training.

As demand for CM graduates increases, college-level recruiting will become progressively more competitive. Construction companies will have to become more visible within CM programs by sponsoring activities. Already, companies are visiting campuses and offering students free pizza to come to recruitment information sessions for their company. Companies will have to continue to sponsor student events, volunteer guest lectures, and provide job-site tours to market their name within the pool of future graduates.

Recruiters will continue to increase entry level salaries to entice future employees. Benefits such as truck allowances, bonuses, relocation expenses, etc. will continue to increase for companies to secure university educated construction managers.

In order to create working relationships with future graduates, more companies will have to begin working with interns. Internships provide the employer with the opportunity to create working relationships with students before they graduate. When the employment relationship is positive, post-graduate students will be more likely to return for full-time employment with the companies they interned with during their education.

### *Recommendations for Future Research*

Although this study was narrowed to the limited resource strategies within Construction Management programs, it does bring to light further questions and topics for future research. For example, according to respondents, the use of limited enrollment was the most popular method of managing limited resources. Many of the programs used GPA, ACT/SAT, work experience, etc. as enrollment criterion. However, success within the industry can not necessarily be predicted by one or two limited enrollment criterion. A valuable study could be to research whether or not the admission standards used by CM programs are representative of future success within the construction industry.

There is another research topic that would be valuable to all higher education programs experiencing over-enrollment. Many university programs are provided with adequate resources to expand according to enrollment demands. Others programs, such as Construction Management, have growth restrictions imposed by university administrators. What criteria are used by university administrators to determine which programs are growth-restricted? In addition, how does a program achieve the status necessary within a university to acquire resources for expansion?

Another valuable research subject would be to expand on the average student/teacher ratio in Construction Management programs. Is there a significant difference in the student-to-teacher ratio in programs that are have limited enrollment, programs that are at the limits of capacity, and programs that have ample resources to expand?

Over half of the program directors that were not planning on implementing enrollment controls stated that enrollment limitations were not allowed in their university

policy. As demand increases, these programs will need to find alternative solutions to manage limited resources. When expansion and enrollment limitations are not possible, how will these programs maintain the quality of education that they are currently providing?

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## Appendix



## Appendix A

### ACCE Accredited Universities

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Program Accredited to: July 2008

#### **Boise State University**

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#### **Milwaukee School of Engineering**

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#### **North Dakota State University**

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## Appendix B

### Survey Questionnaire

#### Construction Management Limited Enrollment Measures A Thesis Study by Kristen Wynn

Name of University \_\_\_\_\_

Point of Contact Person \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

1. Do you have the resources available to admit every qualified student that applies to your Construction Management Program?
  
2. If not, do you feel limited by: (note all that apply)
  - a. Finding qualified faculty to fill positions?
  - b. Inadequate funding for expansion?
  - c. Lack of university support?
  - d. Other – Explain?
  
3. What do you feel currently is the maximum capacity for student enrollment within your program?
  
4. How many students are currently enrolled in your program

5. How many Full Time Equivalent (FTE) Faculty do you have?
  
6. Are you experiencing over enrollment based on lack of resources?
  
7. If so, what strategies are you using to accommodate student demand based on your resources?
  
8. Are you using limited enrollment as one strategy to address lack of resources issues?  
YES                      NO
  
9. If not, do you expect to implement limited enrollment in the next few years?
  - a.      YES                      NO
  - b.      If yes, when do you predict to do so?
  
10. How do you limit your enrollment? What criteria do you use to admit students?
  - a.      Guidelines for Questioning
    - i.              GPA?
    - ii.             Work Experience? How Much?
    - iii.            Standardized test scores, SAT, ACT, etc?
    - iv.            Minimum standard in order to apply?
    - v.             Leadership?
    - vi.            Personal Interviews?
    - vii.           Other?

