

**AC 2009-510: GROWING PAINS: MANAGING RAPID GROWTH IN A
GRADUATE ENGINEERING TECHNOLOGY PROGRAM**

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Growing Pains: Managing Rapid Growth in a Graduate Engineering Technology Program

Abstract

The School of Technology at Purdue University Calumet offers a newly approved Master of Science degree in Technology. The Master's program has experienced dramatic growth, with the enrollment of graduate students rising in a few short months from 28 in Spring 08 to 69 in Fall 08. This paper will explore the growth in enrollments, and discuss the challenges and methods used by the School in managing a rapid and unanticipated rate of growth. Issues discussed will include marketing, international enrollment, planning of diverse course offerings for seven different programs and interdisciplinary areas, meeting the needs of part-time and full-time graduate students, faculty load, resources, planning for assessment, and related issues. Also considered are balancing program level issues and concerns with School-level planning for the graduate degree. This is a further development of the experiences in planning curriculum for a new degree discussed in a previous paper. The degree is intended to prepare students for leadership or supervisory roles in technology and technology-related fields. Recommendations for how to address some of these challenges will be made, based upon the author's experiences as graduate program coordinator.

Background

Purdue University Calumet is a regional campus serving approximately 9,300 students, located in a highly urban environment in a large metropolitan area.ⁱ The campus is located in Northwest Indiana, just outside Chicago. The campus serves a diverse population of about half traditional students and half non-traditional students. Sixty percent of the student population is full-time. Seventy-four percent of its students are first generation college students (neither parent attended college). Minority students comprise about 30% of the total body and female students comprise 57% of the student body. Most of the students are commuters, with a small but increasing percentage of residential students.ⁱⁱ The University is a master's level campus, with a renewed emphasis on and commitment to graduate level education. Currently, the campus has 1000 graduate level students, up from 904 for Spring 2008.ⁱⁱⁱ

The MS in Technology is a directed-project based, thirty-three hour degree program: three core courses (9 credit hours) taken by all students in the program, Measurement and Evaluation in Industry & Technology, Quality and Productivity in Industry & Technology, and Analysis and Research in Industry and Technology; four primary area courses (12 credit hours) in the area of concentration, three courses in technical electives (9 credit hours), which vary by student area of interest; and a directed project course (3 credit hours) also taken by all students in the program. Students may focus on any of the program areas for their primary area or area of concentration, or may choose to study an approved interdisciplinary area. The program areas available for study are:

- Computer Graphics Technology

- Computer Information Technology
- Construction Management & Engineering Technologies
- Electrical & Computer Engineering Technology
- Industrial Engineering Technologies
- Manufacturing Engineering Technologies
- Mechatronics
- Organizational Leadership & Supervision

Admission to the program does not require the GRE: enrollment is based on an evaluation of undergraduate work as well as the applicant's relevant professional experience.

The degree was approved by the state agency for offering at this campus for the spring semester 2008. It was the first graduate program approved for the School of Technology at the campus, although other graduate programs are offered, including a degree in interdisciplinary engineering. At the time of approval, a pilot program was in place through the auspices of the main campus. This meant that when the program started it had, on approval, the twenty-eight students actively enrolled at that time, with limited curriculum and some approved graduate faculty. At approval time an assistant dean who had a half-time release for graduate program responsibilities coordinated the program. The assistant dean worked with a graduate education committee to review applications and make policy decisions. The assistant dean position reported directly to the dean.

Nearly all of the twenty-eight students enrolled in the program at that time were part-time students, primarily working adults returning to school for an advanced degree to further their career goals or expand their opportunities.

By Fall of 2008 there were 69 students in the major (which included a few non-degree seeking students). Of those 69 total students, 22 were female, the remaining 47 male. Nineteen of the 69 were fulltime students. The average enrollment load was around 6 hours (2 courses), because the majority of students were working adults employed full time who generally enrolled in one or two courses per semester. The sixty-nine students were concentrated in a few program areas, but the enrolled students included those interested in almost every one of the eight program areas offered by the School.

Discussion

The following discussion touches upon some of the numerous issues that arose in the less-than-a-year time period that followed the approval of the degree. The topics included for comment include scheduling and curriculum, faculty and resources, marketing, international enrollments, assessment and some suggestions for others facing these issues.

While the topic of graduate education was addressed recently in the Journal of Engineering Technology, many of those articles dealt with mature programs.^{iv} This paper will focus specifically on the issues of a new and developing program.

Scheduling, course offerings and approved curriculum

Due to the predominance in the program of part time students who are working adults, courses are scheduled in the evening or are also offered in an online format. There are ten courses in the degree (not including the directed project), and only three of those are shared by the entire group. Cohort scheduling has not been an option, since the degree was planned as a broad umbrella degree with numerous focus areas. While it has been easier to fill and run classes with a minimum number of students as total enrollment has increased, there are still low enrollment courses in some of the focus areas.

In order to address some of the enrollment management issues, suggested electives were approved by the Graduate Education Committee. The suggested electives designated were those courses which were deemed to be good rounding courses for almost every technology area. The three suggested electives were Project Management, Leadership and Ethics, and Technology from a Global Perspective. Having three agreed-upon technical electives allows some degree of enrollment management. Students are told that the suggested electives are suggested and not required, and in fact some do include other electives in their plans of study. However, most students seem to find that these courses work well in a wide variety of plans of study and focus areas. In addition to designating a common set of technical electives, the School has worked to create a schedule which allows maximum enrollment. Focus area courses are scheduled on Monday and Wednesday evenings, and core classes and suggested technical electives are scheduled on Tuesday and Thursday evenings. This allows the students, who average two courses, to take one focus area course and one required course or suggested elective each semester.

While efficiently managing class enrollments has been an issue, the bigger challenges have been the lack of fully approved permanent curriculum, and planning for curriculum over the short and long terms.

One of the significant efforts in the School has been to plan a three year schedule of course offerings which would allow any given student in a focus area to complete the degree in two years if that student were to be enrolled full time. Faculty in each program were requested to designate four focus area courses for the three-year plan and a schedule for offering those courses in the three-year period, along with staffing suggestions. It has been a challenge to encourage faculty to start small and focused, with room to ramp up as demand increases. Since the enrollments have increased so steeply over a short period of time this has not been as serious an issue as it might have been. Still, faculty who wish to work with graduate students in a given research area may not want to be as patient as enrollment limitations require. A three-year plan for nine or twelve courses in a given program simply is not workable with enrollments of fifteen or twenty students in a given program area. Each course would attract minimal numbers of students, so that three or four courses in a semester in a given program area would enroll possibly three to five students, none of which could be justified in a time of limited budgets, whereas a single course in the program area each semester would meet minimum enrollment requirements and run at or near capacity. This alternative would also allow students to graduate in the two-year window if they were enrolled full-time. The School has attempted to compromise with faculty who wish to work with students in a particular research area by allowing the faculty and interested students to develop an independent study course in that area. However, this is

something that is not compensated in faculty load and is done on a volunteer basis by interested faculty members.

Permanent curriculum is an ongoing effort. If given the opportunity to plan this again, the author would strongly encourage faculty to have at least some of the prepared curriculum documents in reserve, ready to go forward for approval as soon as degree approval was issued. While there is a risk that the degree might not be approved, at some point in the process it becomes much more likely, and devoting the time to preparation of proposed curriculum documents yield dividends in efficiency and time savings once the degree is approved. Since the graduate curriculum process is more stringent and time-consuming than the undergraduate process, at least for a regional campus, the graduate program is struggling to meet the current demands of students and also get curriculum “on the books”.

A side effect of not having permanent curriculum is that there is no readily available online or other resource to which to direct students to aid them in planning their studies. The course catalog is drawn from permanent curriculum, so that resource is not available to students if the permanent curriculum has not been added to the catalog. This means that both faculty and students need to rely on another resource, and that resource has turned out to be the program coordinator for the graduate program, the assistant dean. This is a significant burden in emails and phone calls on simple course description issues. One technique to ameliorate the burden is to provide a list of course descriptions for planned courses to supplement the three-year plan, but it is still a work-around and not as convenient as permanent curriculum listed in the catalog.

Faculty and resources

Before the degree approval was sought, relatively few faculty members in the School of Technology at the campus were approved for graduate teaching. Most faculty had not sought appointment to the approved graduate faculty because there were few or no graduate level courses offered in the School. During the pendency of the application to approve the degree, some faculty went through the approval process and were appointed to the graduate faculty. Getting faculty approved was not difficult, although it could be somewhat time consuming. As it turned out, the record-keeping end of the process was more challenging. There was a significant effort to make sure that the faculty lists at the main campus and at the regional campus were current and accurate. A recommendation to others in this situation is to keep a current “unofficial” list to check against the official one. Issues as to faculty status still arise, and it is very helpful to have a master list to organize the information or to make any corrections which may be required.

Working with graduate students is the heart of a master’s program, and the university system does require a mentoring workshop for those who wish to be appointed graduate faculty in order to show faculty how best to mentor graduate students. However, mentoring faculty in how to work with graduate students is a continual process which goes beyond the initial workshop. The author, as coordinator of the graduate program, has found it useful to meet regularly with the graduate faculty, especially those who are working with students in the directed project phase of their master’s education.

Resources are also a major consideration, and that includes faculty resources. Knowing how many graduate faculty are available in the School and their areas of expertise is helpful, but the truly necessary determination is how many graduate students your existing faculty, laboratories and classrooms will be able to handle before additional resources are needed. Consultation with peer institutions with similar programs can be very helpful in determining the level of enrollment which can be supported by existing resources. The rate of growth, as well as total capacity, should be considered in this analysis. Working with graduate students is very time consuming, and discussions of how many students a individual faculty member can advise through their directed projects at any given time is a serious issue. Not only is being the chair of the faculty committee/faculty advisor a large time commitment, just serving on a committee is also time consuming. If your school has a limited number of graduate faculty, all of those faculty members will soon be either chairing or serving on a large number of student committees.

Marketing

Marketing the degree was planned for implementation upon approval, since marketing the degree before approval is prohibited by the Commission for Higher Education which approves degrees for the State of Indiana. This actually allows time to prepare a marketing strategy prior to the approval, which can then be implemented immediately upon the decision. In this case, there was a close collaboration between University communications, admissions, academic affairs, and the School of Technology on marketing strategies. The School had a logo and brand, and those were both consistently displayed in marketing communications from the School of Technology. The University website prominently featured the new degree on its home page, and supporting web pages for the degree were created and ready to post upon approval. Press releases were also prepared for issuance upon approval. The School also planned an open house, which was well attended, in the Spring of 2008. The current and former undergraduates were a natural market for the graduate degree, so several communications were sent to current students in junior/senior status and to alumni of the School technology programs. Depending on the circumstances, those in a similar situation may wish to allow plenty of time to prepare mailing lists/distribution lists of alumni, as these can be time consuming to request and obtain. The School chose to use electronic contacts where possible in order to save on print and mailing costs.

Monitoring of student interest and applicants seems to suggest that the web information and word of mouth have played a significant role in the enrollment growth. Even international student enrollment has benefited to some degree from word of mouth. One touchy point has been that a few students have “defected” from other graduate programs on campus and transferred to the technology degree. Good relations within the various graduate programs on the campus are necessary to avoid any concerns about poaching students.

Although a comprehensive marketing plan was created prior to and after approval, the marketing plan has not been fully implemented as planned due to the overwhelming interest based on the minimal advertising to date. The rapid growth of the program has obviated the need for marketing.

In some ways the degree markets itself; the flexibility of the degree and the ability to customize one’s plan of study has made it attractive to many of our students. This phenomenon comports

with thinking on the future of education. Gary Marx, a commentator on future trends, notes that one trend of the future is that education will shift away from averages toward individuals, that is, move away from standardization and toward personalization.^v The degree allows for the individual student to follow an intense, field-specific plan of study, or a more general, interdisciplinary focus, depending on the student's interests and career goals.

As a side note, the fact that the GRE is not required for our degree is also attractive to students. The admission standards for the Master of Science in Technology degree are based on undergraduate performance and professional experience, although the GRE may be considered as a helpful factor in evaluating credentials. Many of the returning working adult students are not interested in taking the GRE to be able to get back into education, or in delaying their admission to coincide with the GRE exam requirements.

In the author's opinion, the most significant factor which has contributed to enrollment growth is customer service which includes the personal touch. The person who handles the contact with potential students needs to be accessible to and able to make a positive connection with the students. Having the right person in this position makes a difference. Assigning this role to a faculty member who does not have adequate time or support (or desire) to meet the need is self-defeating, since faculty may not be able to provide the level of service which pays off in enrollment and retention.

As noted in the background information, at the campus most of our students are first generation college students. The geographic area is underserved in graduate education. In Lake County, where the campus is located, only 5.5% of adults 25 or older in the county have attained a graduate or professional degree.^{vi} Compared with a 7.2% rate for graduate and professional degrees in the state, and 8.9% for the nation, the region is well below both state and national averages.^{vii} (according to 2000 census data)

Most of our students are departing from their comfort zone by seeking graduate education, and need special attention and encouragement. As program coordinator, I have an ongoing internal debate over whether it is ultimately encouraging or discouraging to students to tell them just how small the club is which they are attempting to join. Being a first generation student myself, I tend to lean toward the conclusion that it may ultimately be overwhelming to many of them. The attitude of "these are adults and they can figure it out for themselves" is a poor fit for our particular student population of first generation students, and the difference in approach will, in the author's opinion, make the difference in retaining/attracting students.

International Students

The regulations involving international students are complex, on both the admission side (evaluation of credentials) and on the visa side. A good working knowledge of the visa process and a good relationship with the International Students Office is essential. One may also wish to consider how foreign credentials will be evaluated. On this campus, an assigned person in admissions evaluates undergraduate foreign credentials, but graduate credentials are evaluated by the various schools and programs reviewing applications. There are some good resources on the web, but it may be useful to look at adding a foreign credentials specialist at the campus level for

graduate applications. There is a strong degree of interest in the program from international students, and approximately twelve of the sixty-nine students from Fall 2008 were international students.

Assessment

Another challenge has been to implement assessment in the frantic pace of meeting the needs of rapid program growth. The first set of graduates came quickly, and our first graduating class consisted of eight students. The exit surveys were a small sample but critical to benchmarking the program. The surveys pretty consistently mentioned the new program issues, but most of the early students were understanding of the start-up issues in the program. Ultimately, it is important to implement something to benchmark from, even if the assessment process is later refined.

School versus department administration and communication issues

Addressing the administrative issues in coordinating a school level program within an administrative structure formerly focused on the departmental and/or program level has been another challenge. Before the existence of the graduate program in technology, administration of scheduling, book orders and related matters were done at the departmental or program level. Since the graduate degree is school based, there are courses which are addressed at the school level only, and courses which need to be coordinated at the school and departmental level. Courses should not be either scheduled or cancelled without consulting both the graduate studies coordinator and the department involved, including the faculty member who is assigned to the course. New channels of communication should be put in place and used regularly to deal with flow of information among the faculty, dean, departments, and graduate program coordinator.

As an example, an issue arose involving cancellation of a course without consulting the graduate coordinator. When students affected by the cancellation began contacting the coordinator, some confusion arose because of the gap in communication. Because the graduate coordinator was not involved, no one had checked to see if cancellation would affect any student's graduation or plan of study. The concept of required class is different at the graduate level. When department chairs are not accustomed to consulting with the graduate dean or coordinator, similar issues can arise.

There is also a level of disconnect between the faculty involved who are working at the program level and not accustomed to working together on a School level, or working with a graduate dean. The Graduate Education Committee members and department heads may not be accustomed to sharing information about the graduate program in their department meetings or with their fellow faculty. The author would suggest that, based on experience, it is more effective to share status reports and other information periodically by email directly with faculty, rather than relying solely on others to regularly share important information.

Conclusion and suggestions

Growth continues to be an issue, as the program has grown from 69 students in Fall 08 to 84 students by Spring 2009. Growth is a good problem to have, but still a problem which needs oversight and control where possible. There is a concern that growth will plateau when the pent up demand for this degree has been met, but the growth to date shows no sign of reaching a plateau. Given the significant foreign student interest and the rate of growth without much advertising, it seems that the growth is still rising at least for the short term.

As an aid to others who may be facing similar issues, the table below is included with some suggestions for consideration.

Table 1: Suggestions for planning for new program

Pending Approval of Degree	Post Approval—Degree Offered
Begin initial curriculum planning with faculty: Prepare permanent curriculum documents for course catalog to be submitted upon approval	Finalize three year plan of course offerings
Determine graduate faculty and prepare any necessary approval forms	Maintain master list of appointed graduate faculty and monitor official lists for accuracy
Determine announcements/marketing strategies with University communications, admissions, academic affairs	Implement initial announcements and marketing
Determine any common course offerings for cohort scheduling	Schedule courses to maximize course enrollments where possible
Determine maximum number of enrolled students current resources can support	Plan for additional resources or enrollment cap
Determine program goals and outcomes (some may be part of degree approval process)	Prepare graduate surveys and employer surveys Prepare detailed course assessment and program assessment plan
Become familiar with requirements for admissions and visa status for international students; learn evaluation of foreign credentials	Maintain close communication with International Students Office and Admissions office
Develop communication plan for participating programs	Review communications flow for gaps
Determine faculty committee to work with Graduate Education	Draft handbook Plan orientation

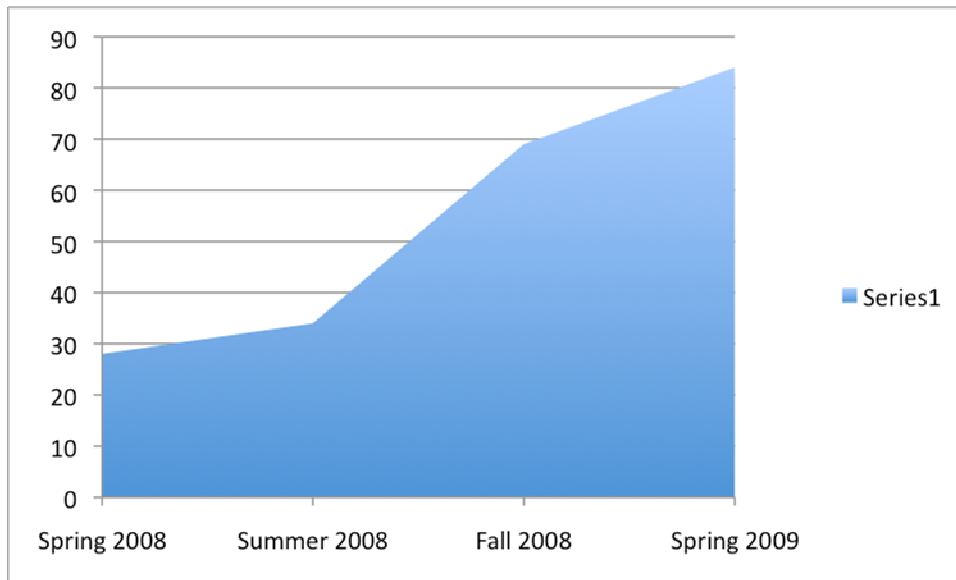


Chart 1: Enrollment Growth

Bibliography

ⁱ www.calumet.purdue.edu

ⁱⁱ See University home page at www.calumet.purdue.edu/ for link to student body data.

ⁱⁱⁱ University Institutional research at www.calumet.purdue.edu/opir

^{iv} See, e.g., Lunt, Barry M., *Graduate Education in Engineering Technology at BYU: Lessons Learned*, *Journal of Engineering Technology*, Fall 2005, pp. 30-33; Munukutla, L., McHenry, A., Darveaux, R., and Govindasamy, T., *Graduate Education with Industry Relevance*, *Journal of Engineering Technology*, Fall 2005, pp. 34-39; Fridman, E. and Solarek, D., *Master of Engineering Degree Offered by Engineering Technology*, *Journal of Engineering Technology*, Fall 2005, pp. 40-44; Grubbs, Jr., A., and Kozak, M., *Update of Master's Degree Programs in Engineering Technology*, *Journal of Engineering Technology*, Fall 2005, pp. 52-58.

^v Marx, Gary, *Ten Trends: Educating Children for Tomorrow's World*, http://www.icsac.org/jsi/2002v3i1/ten_trends accessed February 1, 2009

^{vi} <http://www.stats.indiana.edu/profiles/pr18089.html> (Lake County Information)

^{vii} <http://www.stats.indiana.edu/sip/>