Pursuit of Initial Accreditation of a Collaborative Chemical Engineering Program Under ABET EC 2000

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Abstract- The University of Kentucky (UK) Extended Campus Programs in Paducah recently had their initial accreditation visit from ABET evaluators. The programs consist of bachelor's degree programs in Chemical Engineering and in Mechanical Engineering. Murray State University and Paducah Community College collaborate with UK in offering a curriculum that culminates in a B.S. degree in chemical engineering awarded by the University of Kentucky. The unique preparations and events surrounding the visit are discussed, with a focus on three particular areas: the unique collaborative arrangement amongst three distinct institutions and its impact on the accreditation process; the necessity to distinguish a program under ABET criteria when it is offered at a location distant from the main university campus, but shares a curriculum and an academic administrative structure with the main campus; and the issues encountered in pursuing accreditation for a new program under ABET EC 2000 criteria. This paper provides information that will assist new engineering programs to account for their unique structures and partnerships while pursuing ABET accreditation.

Keywords: ABET, EC 2000, accreditation, distance learning

PROGRAM ORIGIN

In the early 1990's, there were only two ABET-accredited chemical engineering degree programs in the state of Kentucky: one at the University of Louisville and the other at the University of Kentucky in Lexington. Both of these institutions are over 200 miles east of the heavily industrialized Jackson Purchase region of Western Kentucky. Many of the managers of plants in this area were concerned about their difficulties in hiring and retaining qualified engineers for their plants. A lack of continuing education resources and a lack of employees with familial ties to the region were cited as significant barriers to continued economic development in the region.

One economic opportunity in particular drove the region to push for an engineering education outlet in western Kentucky. The United States Enrichment Corporation (USEC) was expected to close one of their two gaseous diffusion plants for uranium enrichment; one is located in Paducah, Kentucky, and the other in Portsmouth, Ohio. USEC is the largest employer in western Kentucky, with an average pay scale on the order of $40/hour. The Department of Energy (DOE) initiated a search for a replacement plant site in the late 1980s. Before ultimately canceling the search, DOE informed the Paducah representatives that the lack of engineering education in the area was a negative factor in their consideration for locating the new plant there. In order to make retention of the Paducah plant as attractive as possible, local leaders sought to improve continuing education opportunities for engineers employed by USEC and to increase the number of engineers available for employment from the region. After an extended political battle regarding what institution would be the provider of engineering education in western Kentucky, the state legislature charged the University of Kentucky with establishing engineering programs in chemical and mechanical engineering in Paducah. The University was required to collaborate with Paducah

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Community College and Murray State University in the delivery of these programs. The history of this program has been previously documented,[1][2][3] but the history relative to the quest for accreditation will be included.

PROGRAM STRUCTURE

The University of Kentucky Extended Campus Program in Paducah is a unique collaborative effort, linking three institutions to provide students the opportunity to earn an engineering degree without leaving their home region. This collaborative arrangement led to some unique issues with ABET during the accreditation process.

The statute that established the state funding for these programs called for a cooperative arrangement with Paducah Community College (PCC) and Murray State University (MuSU). PCC would be responsible for lower-level instruction culminating in an Associate of Science degree. Block transfer of these credits to UK fulfills the general studies requirement of the UK degree. Murray State University faculty members teach upper-level math, chemistry, and general engineering courses. Some MuSU faculty members have received a joint appointment with UK, enabling them to teach certain courses as UK courses. All chemical engineering courses are taught by UK chemical engineering faculty located at Paducah, with the exception of one elective. The program is hosted on the campus of Paducah Community College in an $8.4 million building constructed from locally-generated funds.

The degree that the Paducah students work toward is a Bachelor of Science in Chemical Engineering awarded by the University of Kentucky. The academic supervision of the program is conducted by the Chemical and Materials Engineering Department (CME) in Lexington, while administrative responsibility begins with a site Director who collaborated with the Lexington-based College of Engineering's Associate Dean for Commonwealth and International Programs, both of whom report to the Dean of the College of Engineering. The CME director of undergraduate studies (in Lexington) is responsible for approval of all transfer students and approving any deviations from the published curriculum.

The UK faculty members in Paducah are appointed to the CME department under a Special Title Series. This appointment enables a focus on instruction with reduced research expectations. The Special Title Series position was relatively new to engineering but was necessary due to the absence of graduate students, research facilities and equipment at the Paducah program.

In order to facilitate ABET accreditation at the earliest possible date as required by the state legislature, the curriculum of the Lexington program was adopted for the Paducah program in its entirety. It was anticipated that due to the possibly different constituencies of the Paducah program, the curriculum could be modified independently of the Lexington curriculum once the program was in place and producing graduates. The apparent lack of distinction between the Lexington and Paducah academic programs became a significant issue in the accreditation process. The curriculum is readily available on the UK website (http://www.engr.uky.edu/cme/). The curriculum content was not an issue during the evaluation visit. Since the approach to the curriculum for ABET purposes is not unique to this program, it will not be discussed further in this paper.

The chemical engineering program in Paducah graduated its first two students in May 2001. Eight students graduated in 2002. The programs have a total enrollment of about 30 chemical engineering students and 90 mechanical engineering students.

ACCREDITATION PREPARATION

A resolution by the (Kentucky) Council on Higher Education, the CHE (predecessor of the current Council on Postsecondary Education), on November 13, 1995, called for a Regional Center to be created in the Purchase Area of Kentucky, within which UK, MuSU, and PCC could construct cooperative educational programs to serve the needs of western Kentucky. The framework guided the cooperative programming in mechanical and chemical engineering. The resolution specified that the "program should be limited to modest UK College of Engineering extended campus programs" and that "no free-standing bachelors programs in engineering should be permitted." It

further specified that the principle program partner with UK must be MuSU. Lastly, the Council resolution stated that "(F)ailure by UK to achieve ABET accredited status for these two programs should result in program termination".[4] Without an understanding of the ABET accreditation process, nor the challenges in offering programs through multiple institutions, the state's higher education leadership prescribed the direction that the Paducah programs were to follow.

With the goal of achieving accreditation status at the earliest opportunity, College task forces began discussions immediately among ABET-EAC staff and Lexington-based College faculty with significant experience with ABET processes and with EC2000 evaluator training, to ensure that program development progressed toward this goal. In 1996, an experienced EAC visitor was retained by the CHE for advice about program development and accreditation.[4] The consultant concluded that there were two means to request review for accreditation: (1) as part of the established programs at Lexington or (2) as distinctive programs at Paducah but linked to and guided by the UK College of Engineering. The consultant strongly advised that the College request accreditation in the second format– as distinctive programs serving unique constituents in a region distant (400 km) from the College's other engineering programs. In either case, it was clear that this set of "cooperative" programs[5] could be set into motion under the auspices of the UK College of Engineering and under a single dean and with a chair shared between Paducah- and Lexington-based programs.

From 1994-2000, during the ramp-up phase of program development, much discussion, debate, and no small measure of community angst ensued. The news media in Paducah, Lexington, Louisville, and Murray closely covered the controversy about funding and accreditation for the new programs. The repository of news items on the subject, maintained at UK for posterity's sake and for review by prospective new-hires into the program, is voluminous and contains numerous lead articles and feature editorials replete with accusatory statements, exaggerations and extrapolations, and, unfortunately, too few rational, balanced statements of fact. Included were quotes attributed to university presidents and chief academic officers, deans and associate deans, faculty involved in early development efforts, chief industrial supporters of the programs, a CHE executive, and even the serving Kentucky governor. Headlines ran the gamut from "Communication, trust absent",[5] "Paducah, Murray mired in fight over engineering school plans",[6] "UK-Murray rift imperils funding for universities",[7] finally to "MuSU offers engineering support"[8] and "All parties back Paducah engineering education plan".[9] The controversy over whether the programs would be designated as free-standing, linked, or as an extension of existing programs on the Lexington campus was consistent with the rancor over discussions among economic development leaders, local politicians, and college and university presidents that began *circa* 1990, but that now has subsided. The improved relations are attributed to the following: (1) the acceptance of a Statewide Strategy for Expansion of Engineering Education, which was adopted by the Council on Postsecondary Education (CPE, successor to the CHE) in July 2000, and serves to guide future expansion of engineering programs in Kentucky; (2) the successful collaboration among UK, MuSU, and PCC, as evidenced by the current status of the Paducah baccalaureate programs; (3) the removal of the community college system from UK and the placement of thirteen of these institutions into a State system in 1998, providing comprehensive universities an opportunity to more easily expand their educational and service programs; and finally, some may assert, (4) the change in leadership of all three partnering institutions. The

[4]The reader is reminded that in 1996, there were very few cooperative, multi-institutional programs in engineering, nationwide, and certainly none hosted on the campus of a two-year institution. The only known engineering program remotely similar to the Paducah program were under the purview of Washington State University (Richland, WA), visited by UK administrative personnel during early stages of Paducah program development. Since that time, other innovative engineering programs with origins similarly tied to regional economic development and with administrative structures that are similarly complex to ours are under development at the University of Missouri-St. Louis, Georgia Tech (Savannah, GA), and at the University of West Florida (Pensacola, FL).

[5]By CPE definition a "cooperative" program is "under the sponsorship of a single institution but contains elements of resource-sharing agreed upon by one or more other institution(s) or organization(s) when offered on the campus of the non-degree granting institution."

chronology of events, although perhaps worthy of treatment in a separate publication, are offered as simple milestones in Table 1.

Table 1. Accreditation-related Chronology of Events (exclusive of routine ABET preparations).

November 15, 1995	CHE (Council on Higher Education) adopts resolution creating a Regional Center, under which academic programs can be created.
March 1996	Kentucky General Assembly adopts resolution and budgets $200,000 for initial program development.
Summer-Fall, 1996	Three meetings of a 20-member New-Program Task Force, membership of which includes program faculty, provosts and chancellors, deans and associate deans, and an EAC consultant retained by the CHE.
October 20, 1997	First hire into the new programs, Director of Student Services.
January 14, 1998	First class meets in Crounse Hall (Science and Engineering Building).
July 1, 1998	Program (local site) director assumes duties.
August 16, 1998	First on-site faculty member hired in special-title series (Chemical Engr.).
October 1998	UK programs in Lexington undergo ABET visit under EC2000, one of first fourteen institutions in the U.S. to be evaluated under the new criteria.
August 11, 1999	Paducah ABET Planning Committee Meeting, Kenlake State Resort Park, attended by representatives from UK, MuSU, and PCC: ABET 2000 overview.
January 2000	Final decision made to seek accreditation as "distinct" programs.
May 2000	First Paducah Mechanical Engineering graduates.
August 2000	Faculty staffing complete.
November 6, 2000	Workshop on Engineering Education for Kentucky, Frankfort, KY: discussions among State educational leaders and CPE representatives concerning application of distance learning technologies; includes a telephone conference call with ABET's Director of Accreditation.
May 2001	First Paducah Chemical Engineering graduates.
December 4, 2001	"Mock" ABET visit by experienced ABET evaluator and team chair.
April 17, 2002	SACS (regional accreditation team) visit to Paducah's Extended Campus; splinter group includes former ABET President.
October 13-15, 2002	ABET program visit, Engineering Extended Campus Programs, Paducah.

The UK decision was to guide program development efforts in such a way as to reasonably expect the programs to be ultimately viewed as distinct from their Lexington-based sister programs by virtue of their differences in location (4.25-hour drive); facilities (all laboratories, classrooms, and library facilities are Paducah-housed), faculty (nearly all instruction is provided live and on-site by Paducah- or Murray-based faculty; student demographics (approximately 95% of students are PCC transfers); and administration (all academic policies, procedures, and personnel review processes are consistent with those on the main campus, with local, on-site administration provided via a local site director, who also serves as a regular-series faculty member in mechanical engineering). Consideration by ABET of the new programs as "distinct" (but not "separate" or "free-standing") gives the faculty in each discipline the prerogative to respond to local stakeholders' input to make changes to the curricula over time, while not necessarily impacting the sister program. At the outset, however, the Paducah-based

programs are both mirror images of the Lexington counterparts, with opportunities for deviation limited to the students' selection of technical electives. Lastly, but not insignificantly, faculty approval of the programs in Paducah was predicated not only on a funding stream distinct from the Lexington-based programs but also on the fact that the programs would be designed with distinct accreditation as the aim. This approach is consistent with the regional nature of the programs yet is not incongruent with the long-term expectations of the educational stakeholders in the region to have baccalaureate engineering programs in far western Kentucky that are of high quality, are responsive to the needs of local industry, are aligned with local economic development efforts, and, of great importance to the Paducah community, are managed and controlled by UK.

With the need for accreditation at the earliest date possible, certain ABET EC2000 activities were initiated well before all the faculty members were even hired. A day-long retreat was held at a local state park to involve all the participating institutions in some early planning, as well as to bring each up to speed on the new ABET criteria and processes. Surveys of the student body were conducted to determine their parents' educational backgrounds, their career expectations, commuting distance, access to a computer at home, etc. These surveys were intended to help characterize the student body, since no one actually knew who would attend the programs before they actually began to enroll.

One unique challenge of the Paducah programs dealt with the composition of the faculty. With the exception of the local site director, all faculty were assistant professors and had never been involved with preparation for an ABET visit. Joint faculty and staff meetings were conducted to introduce them to the new EC2000 criteria and to begin discussions of educational objectives for the programs. After several such meetings, it became clear that initial educational objectives should not deviate significantly from the Lexington program. The curricula in Paducah and Lexington were identical, the student admission criteria were identical, and graduate expectations were expected to be similar (until proven otherwise after Paducah graduates were in place and until assessment efforts bore fruit). It was decided that both Paducah programs would initially adopt the same educational objectives as the Lexington programs, with the ability to deviate in the future as the needs of their local constituents might dictate.

There was recognition of the need for some local coordination for the faculty. The Director of the programs in Paducah does not take an active role in management of chemical engineering-specific issues with the program, leaving the Paducah faculty to self-govern, with input from the Lexington faculty and supervision from the CME department chair. This arrangement worked well through the first four years of the program, but could not be guaranteed to continue to work. Consequently, one faculty member was appointed as "Program Coordinator" and charged with specific administrative responsibility for the Paducah CME program. This appointment, which occurred between the self-study preparation and the evaluation visit, preemptively addressed issues raised during interviews with the evaluator.

Another issue was recognized between the self-study and evaluation visit. While a complete evaluation plan was described in the self-study, it was not immediately clear how various processes interacted. One faculty member translated the description in the self-study into a fairly complex and detailed flow chart, which was then summarized in a single page of text. Additionally, a form to be used for course evaluation was proposed and combined with the flow chart as part of a supplement provided to the evaluator.

ISSUES RAISED

The accreditation visit report indicated no deficiencies with the program. An institutional weakness was stated in reference to a transfer issue which stood out amongst a very limited number of graduates during a transcript audit. This issue has been addressed by the College. An additional institutional weakness was stated concerning the distinction of the Paducah program from the Lexington program in published literature. Since the curricula were identical, it was deemed unnecessary to list the entire curriculum twice in the University Bulletin. The Paducah program was distinctively addressed in the program description referring to the same curriculum. The evaluator expressed concern that the distinction between the programs was insufficiently clear. Modifications are in process to make representations of the Paducah program clear and distinct from the Lexington program.

Two concerns were conveyed by the evaluator. The first was deemed institutional in that it relates to a transfer issue associated with the requirement that 30 of the last 36 hours earned by a student must be UK courses in order to be awarded a UK degree. Since the Paducah program is collaborative, in one reviewed case fewer than 30 hours were from UK, since MuSU provides some courses (upper-level chemistry and math)for the program. In addition, students also may defer some of their general studies courses, taken at PCC, until their senior year. To alleviate this concern, the rule has been modified in the College to explicitly address courses offered by the other collaborating institutions as part of the Paducah program.

The last concern was one to be addressed by the Paducah faculty. The assessment procedures in the self-study were inadequately detailed, an issue recognized by the faculty. Improvement to the process and, perhaps more importantly, to the documentation of the assessment process, was made during the period between the self-study and the evaluation visit. The evaluator was shown a flow chart with documentation summarizing the assessment process in greater detail than presented in the self-study. The evaluator stated the plan should be "completed, reviewed, and revised based on feedback from all constituencies, approved, and implemented." This process is currently nearing completion.

SUMMARY

The University of Kentucky Extended Campus Program in Paducah is a collaborative program offered in conjunction with Murray State University and Paducah Community College. The unique collaborative arrangement amongst three distinct institutions had little impact on the accreditation process due to a mutual commitment to the success of the program and extensive planning at all stages of program development. Issues were raised with regard to the distinctiveness of the program, since it was identical to the main campus program with regard to its curriculum and objectives. These issues were ultimately resolved due to the distinct location, facilities, faculty, and ability to modify the curriculum and objectives to meet the needs of the program's constituents. Only minor issues were encountered during the accreditation visit, with most problems institutional in nature. All issues have been addressed subsequent to the evaluator visit. The program was successfully accredited in 2003.

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