A Process Model for Establishing Engineering Technology Programs at Technical Colleges

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Abstract

This paper will outline the procedural steps for starting a new associate degree level engineering technology program at a post secondary technical college. It will include the motivation and reasoning behind establishing the program as well as the methodologies used to create the curriculum and course offerings. It will also document what procedures worked well in the process and what did not. A unique feature of the process is obtaining input from both university faculty and industry professionals as to the learning outcomes/levels that program should attempt to achieve. This therefore, would maximize the student's opportunities upon graduation by providing them options to either continue their education at a Baccalaureate degree level or enter the workforce with employable skills. By following the methods used in developing this engineering technology program, it is hoped that other institutions can implement the start up of new and emerging engineering technology programs with proven methods of success.

Introduction

Workforce development programs continually seek ways to supply adequate numbers of well-trained people capable of performing tasks associated with the continuous and rapid advancement of technology within our global marketplace. Engineering technology education has always been on the forefront of delivering skilled technicians and technologists to help with those needs.

The distinction between technician and technologist lies in the educational achievements of the students entering the workforce. At the associate degree level, students graduate as technicians; with a bachelor's degree in Engineering Technology, they are referred to as technologists. Each degree offers unique approaches to applied engineering tasks within specific levels of education. Industry continues to hire students in both disciplines in an effort to improve productivity in the engineering and manufacturing areas. Today, many students are looking to obtain an associates degree before going on to get a bachelor's degree. This approach offers significant financial advantages. This natural progression for many engineering technology students begins right after obtaining their associate degree or after having been employed with a company for a short time. Nationally, there are many opportunities for this smooth transition to occur from the associate degree to a baccalaureate degree.

However, in the Wichita, Kansas area, there is a gap within the engineering educational delivery system. There does not exist within this regional area any true engineering technology programs at the associate degree level. This is difficult to believe due to the overwhelming presence of commercial and military aircraft production in this area. The key issue is that the region is not providing a gateway for future educational development within the engineering and engineering technology fields of study. There needed to be more opportunities for technology-oriented students wishing to pursue an engineering related discipline, but are not quite ready for the rigors of a four year baccalaureate program. Adding to the frustration is the fact that there are two excellent regional universities, Kansas State University at Salina and Pittsburg State University that offer bachelor degrees in Engineering Technology. Wichita State University offers a Mechanical Engineering program that could also provide areas of collaboration between the similar disciplines.

Therefore, the leadership at Wichita Area Technical College (WATC) proposed to initiate transferable engineering technology programs within their curriculum structure. In developing these programs, the curricula will provide the overall hands-on workforce skills required by industry while maintaining an educational level conducive to upper- level degree transferability. The proposed curricula will serve to enhance and elevate the knowledge base, thereby affording each student more opportunities upon graduation as well as being much more valuable to their prospective employer.

WATC initially proposed a two-year, Associate of Applied Science degree in Mechanical Engineering Technology (MET). The curriculum was extensively reviewed and modified by both industry and academia prior to submittal to the Kansas Board of Regents for approval. This will be a unique opportunity for both groups to work together to ensure a smooth transition of the engineering technology graduate into either the workplace or further university studies. The resulting program will maintain a “dual” advisory committee so as not to lose input from one of the sectors. By establishing this program we hope to provide a flexible degree program that will enhance the image of high technology and manufacturing careers while at the same time integrating and articulating with university programs to provide growth and lifelong learning potential for its students.

Historical Background

Wichita Area Technical College is a two-year, degree granting, public institution serving the Wichita, Kansas, Metropolitan Statistical Area (MSA). WATC operates under the jurisdiction of the Kansas Board of Regents. The actual roots of the institution can be traced back to the late 1800’s and early 1900’s when courses in manual training, commerce and domestic arts were offered to high school students during the day at the local high school and to adults at night through “Lamplight” classes now referred to as Continuing Education. The application to establish the Wichita Area Vocational Technical School (WAVTS) was prepared in 1964 and approved by the Kansas State Board of Education in January 1965.

In 1993, the Wichita/Sedgwick County Task Force on Training Wichita’s Workforce conducted a survey that addressed the need for WAVTS to become a two-year technical college. As a result of the positive feedback from this survey, permissive legislation was introduced in 1994 to

make this a reality. In 1995, Kansas Governor Bill Graves signed Senate Bill 257, which authorized transition of the Wichita Area Vocational Technical School into Wichita Area Technical College. The college now has the benefit of granting college credit and awarding the Associate of Applied Science degree. State supervisory jurisdiction over WATC was changed from the Kansas State Board of Education (KSBE) to the Kansas Board of Regents (KBOR) with the passage of Senate Bill 345 in 1999.

Program Objectives

The proposed Mechanical Engineering Technology program will be an Associate of Applied Science degree that combines a unique integration of engineering product design knowledge with appropriate manufacturing systems applications and programming.

The MET program will be taking elements from three current WATC programs; Computer Aided Drafting, Computer Integrated Manufacturing and Machining and is adding engineering design components along with 15 hours of general education courses.

Based upon the input from the MET Advisory Committee, the following objectives were established for the program.

- To educate and graduate students with the necessary knowledge and skills to become mechanical engineering technicians proficient in the fundamental applications of science and engineering within the fields of mechanical design and manufacturing systems. Graduates will be able to provide high-level technical support to a variety of industries through the following outcomes:

    - Design various machine components, mechanisms and assemblies
    - Design work-holding devices and fixtures
    - Make preliminary sketches and detailed drawings of machines and their components
    - Take accurate measurements with a variety of instrumentation
    - Apply and perform quality control methods and procedures
    - Utilize current solid modeling and CNC graphical programming software
    - Operate basic machine tools
    - Solve for analytical forces on rigid structures
    - Perform standard material testing procedures, to include stress and strain
    - Write technical reports
    - Solve fluid power calculations and interpret hydraulic schematics
    - Relate electrical controls to the operation of mechanical systems

- To meet the practical application needs of the product design and manufacturing industries within the south central region of Kansas.

- To establish upward articulation agreements for transferability into similar disciplines within Bachelor of Science programs offered by Kansas Universities.

Start Up Process Objectives

From the beginning, WATC took the philosophical approach to get input from both industry professionals as well as university faculty in the start up of the MET program.
We felt this unique perspective would ultimately provide the college/region with a solid stand alone program that would also maximize students' opportunities for upward articulation into university programs. Contacts were made from a variety of constituencies, including professional organizations/committees, WATC general advisory board members and the Wichita chamber of commerce. Once the overall committee was established, a meeting was scheduled and an agenda was formalized. The agenda reflected the following topics:

I. Greetings and Introductions (roster)
II. MET Perspective and Proposal (handout)
III. Advisory Board Scope and Role (handout)
IV. KBOR Requirements (handout)
V. Program Content / Level (handout)
VI. Curriculum Elements (handout)
VII. Employment Outlook/Need Assessment (handout)
VIII. University Articulations / Collaborations
IX. Facilities (handout)
X. Chair Appointment / Next Meeting
XI. Tour

The meeting produced a wealth of knowledge for the establishment of the MET program.
Both industry and university perspectives were voiced and ultimately a curriculum of content and level was developed and approved that would satisfy both groups. Industry representatives were elated to see such a program and thought the need had been there for quite sometime. They were also enthusiastic about the timing for their future employment needs. Job placement surveys were also developed during the meeting and sent to the various industries within the region. Responses were very favorable and most companies listed multiple job opportunities for the MET graduates. The university faculty representatives were also very excited to have an associate degree program established within the states largest metropolitan area. This would also establish a better recruiting base for their baccalaureate programs within the area. University representatives were satisfied based upon their input that the level of education would be acceptable for transfer agreements to be established into their programs. Prospective student surveys were also handed out to both current WATC students enrolled in similarly related disciplines as well as a selected group of high school juniors/seniors. The data collected from these students also was very positive and showed a significant interest in enrolling in such a program if it was available.
The overwhelming, enthusiastic input from all the interested parties (industry, university and prospective students) provided us with enough support and information for us to begin the formal pursuit of establishing a Mechanical Engineering Technology program at Wichita Area Technical College.

In the State of Kansas, all new higher educational programs must be submitted for approval to the Kansas Board of Regents. Specific evaluation criteria must be addressed with sufficient documentation and data in support of the new program. In general the criteria are as follows:

- Program Description and Information
- Faculty Requirements
- Demand for the program
- Duplication of existing programs
- Cost and funding of the proposed program
- Program review and assessment
- New program curriculum committee/program advisory committee

During this process, we enlisted the support of various internal and external resource personnel. Many methods were used to satisfy the required criteria, including narrative descriptions, data collection/evaluation, personal interviews, letters of support, and possible funding sources. All of the criteria responses were organized into a binder with individual tabs for each distinct requirement. This helped both in putting together the correct responses and assisted the Board of Regents in review of the criteria. Timing was also an issue, due to the fact that the KBOR has a cut off date for receiving new program submittals, which allowed approximately one month to totally complete our work from the date of our advisory board meeting. We were able to meet the due date because of the commitment from both our WATC administrative / instructional team and the dedicated efforts of our advisory board members. WATC received official approval from the Kansas Board of Regents without any revisions to the originally submitted documentation. KBOR staff were very complimentary as to how well the proposal was organized.

The college has now commenced a marketing campaign for the MET program which includes, radio ads, post card mailings to prospective students, job fair / industry trade show participation and company lunchtime visits. Another unique approach to notifying new students involves a national high school program called “Project Lead the Way”. This is a two year program in pre-engineering studies for high school students. Wichita currently has three local high schools involved with this program and will be establishing articulation agreements for their graduating students. Obtaining start up scholarship money is also very important to a new program and we have been fortunate to have The Boeing Company donate $7,200 in scholarship monies specifically in support of the MET program. With this recent announcement, we believe that some of the other major aircraft companies will follow suit with scholarship donations. It is imperative to recognize how important it is to have maximum public exposure about the new MET program, and to also realize it will take some time to begin saturating the market area. Traditionally, successful graduates and company employers give programs their best recruiting tool by “word of mouth”, therefore it will take a few years to generate those graduate profiles for a brand new program.

Conclusions

Starting a new engineering technology associate degree program clearly has its share of challenges and rewards. The challenges involved the first of its kind engineering technology program at a technical college that has traditionally focused on more vocational education areas of study. Several lessons were learned and should be included in any set of new program start-up guidelines.

- Communication / Contacts
- Support Documents / Data
- Program Follow Up

Communication of this new collegiate type discipline had to be established both internally and externally. Administrations support internally is vital and helped establish the dissemination of information campus wide. WATC staff and faculty were informed via administrative / faculty meetings, email communiqués, and individual departmental meetings. It is extremely important that the message gets out to all internal sources regarding this pursuit prior to any external exposure. This forms an internal foundation of overall awareness and the ability to answer general questions regarding the program start-up.

Industry professionals and university faculty contacts are critical to the success of establishing the programs value and content level. Individual meetings on a face to face basis were conducted to initially discuss the program objectives and request their participation on the advisory committee. It is also worth noting that due to the nature of engineering technology programs; advisory committee members must come from both practicing engineering technicians/technologists as well as upper level management positions. Once a group of committee members have been chosen, ideally between seven and ten members, an appropriate meeting date and time should be scheduled. Meeting agendas should also be prepared and mailed out prior to the actual meeting.

Some support documents and data can be presented at the initial advisory board meeting. However, it is also possible to generate specific surveys based upon the committees input and concerns. These surveys can then be sent to both advisory committee member companies as well as other key businesses within the service area. One good source would be a regional or statewide “Manufacturing Directory” listing the various manufacturing companies by city and type of business. This would also provide email contacts that surveys could be sent electronically.

As the data and documentation are being received and produced, the advisory committee must be kept informed as to the results and progress. This follow up should be done electronically, with some information requiring their approval to proceed or change course. Once the entire document has been finished, it would be advantageous to invite the committee members individually to review and make comments prior to the formal submittal.

Once the proposal has been officially accepted, the real follow up begins with a series of meetings with supportive company representatives. This will establish an initial dialogue between your institution/program and the key individuals responsible for securing and managing engineering technicians within their company. University articulations should also commence so as to enhance the associate degree students understanding of their curriculum transferability into a baccalaureate related program.

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