NCA Self Study

Criterion 4 Documents

Eastern Illinois University   *Year* 2013

Program Review- IBHE Sample Report and Feedback AET

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AET

1. **Reporting Institution:**   Eastern Illinois University

2. **Program Reviewed:**   B.S. in Applied Engineering and Technology - 15.0612

3. **Date:**   May 3, 2013

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5. **Overview:** Formerly known as the Industrial Technology (INT) program, the AET program at EIU has as its primary objective, preparing baccalaureate level industrial leaders and professionals capable of assuming diverse leadership responsibilities in business, industry, and government. Emphasis has been placed on providing students with opportunities to utilize knowledge, skills, and understanding in the areas of Science, Technology, Engineering, and Mathematics (STEM). Additionally, students have participated in practical experiences and applications relating to computers, human resources, industrial materials and operational processes. The AET program is a unique, balance, interdisciplinary; four-year curriculum of studies drawn from the broad University offerings, designed to prepare individuals for technical management, production supervision and related types of professional and leadership positions. The AET program instills in students a sound understanding of the principles of management, economics, concepts of industrial management, and human relations.

    Finally, the AET Program Committee has adopted six learning objectives for the AET program, which includes, a student should be able to: (a) demonstrate an ability to identify mechanical behavior associated with industrial materials; (b) demonstrate quality management concepts; (c) demonstrate effective technical writing skill; (d) demonstrate ability to spatially visualize objects and ability to use CAD software; (e) demonstrate promising ability for future technical managerial decision-making; and (f) demonstrate ability to apply engineering principles.

6. **Major Findings and Recommendations:**

6.1 **Description and assessment of any major changes in the program and disciplinary context e.g.,**

    a) **Changes in the overall discipline or field.** In 2009 the AET program's accreditation body changed its name and mission from National Association of Industrial Technology (NAIT) to the Association of Technology, Management, and Applied Engineering (ATMAE). This change of focus in the accrediting body resulted in changing EIU's program from Industrial Technology to AET to better reflect the current language of the industry and the accreditation agency. With the program name change to AET came new standards driven by ATMAE, which set standards for academic program accreditation, personal certification, and professional development for educators involved in integrating technology, leadership and design. ATMAE's primary mission is to prepare faculty, students, and industry professionals that are dedicated to solving complex technological problems and develop the competitive technologist and applied engineering workforce. With this change the AET program has enhanced its undergraduate curriculum by incorporating the necessary components that meet the demands of industrial partners through the region, state and country, while fulfilling the requirements of the accreditation body. With the changes to the program, reaccreditation was obtained in November 2011. This has placed a greater emphasis on developing and enhancing previous curriculum based on standards set forth by professional organizations, industrial partners, and the School of Technology Advisory Board.

b) **Student demand.** The economic down turn has taken a toll on the potential growth of the AET program. Since the IBHE 2005 review we have seen the numbers of INT/AET dip to a low of 114 students in Fall 2009, then increased to 145 students during the 2011-2012 academic year Change of the program's name in 2009, updating curriculum (2010 to 2012), adding the Renewable Energy concentration, and recruiting both new students and transfer students (2+2 programs) is enhancing steady growth of the program admits to the numbers that were present during the turn of the preceding decade (150+ students).

c) **Societal needs.** Students graduating from the AET program offer a specific set of skills and tools required and needed by employers either locally, statewide, throughout the country, and with the potential of meeting the needs of a global economy. Primary skill sets needed by current and future employees include the proficiencies that comprise of adaptability/flexibility, critical thinking/problem solving, creative communication, leadership, and collaboration/teamwork skills. As mentioned earlier, curriculum and learning outcomes for the AET program directly correlate with the needs expressed by employees in technical journals and reports of what the employee of the future needs to bring to the workplace. As the demands for highly trained technologists, engineers, managers, and technicians are increasing, there is a sense that the AET curriculum must continuously adapt to meet those needs. Technological career paths are growing faster than most other similar career choices.

d) **Institutional context for offering the degree.** The AET program's main goal is to support the technological growth of the country's growing economy through the offering of new and advancing technological driven courses and programs. In addition, this traditional on-campus program is looking at ways to take the classroom to the student through online learning opportunities. In supporting the efforts of the growing technology based transfer students, the AET program has begun, through the General concentration to provide a mechanism that allows students to gain the higher level technical and managerial skills often associated with upper division coursework within a four year program. We are seeing transfer students coming to the AET program looking for those skills. In addition we have students from other programs on campus coming to learn and gain skills in technological based curriculum.

e) **Program comparative cost.** The available data reflects that the AET program is in line with other state universities. At Eastern the cost per credit hour for the AET student is at $237.77. This is less than SIUC ($254.99), but slightly more than ISU ($204.77). As for lower division coursework, EIU-AET program is $158 compared to the dollars/credit hour of SIU at $199.44. An overall dollars/credit hour shows that the EIU-AET program is $240, compared to SIUC ($280) and ISU ($195).

6.2 Description of major findings and recommendations, including evidence of learning outcomes and identification of opportunities for program improvement: Based on the learning objectives mentioned in Section 5 (Overview) and since the 2005 IBHE Review, the AET program has been reviewed by: 1) the ATMAE Reaccreditation process; and 2) the Eastern Illinois University Center for Academic Support and Assessment (CASA). In addition, the AET Program Committee has completed a self-audit of the AET Program.

1) The AET program has been ATMAE accredited since 1983. The AET program believes assessment is an integral part of the reaccreditation process for ATMAE. Assessment data has been effectively used to enhance student learning to meet the standards established by ATMAE, the reaccreditation body for such programs. As mentioned the ATMAE accrediting process had granted the AET program Full Reaccreditation in November 2011.

2) Each year since the 2005 IBHE Review, CASA has completed an evaluation of the AET program. During the past review (2012) it was felt by CASA that the AET Program had: 1) defined learning objectives that were

clear, measurable and programmatic; 2) that the program details of the expectations for student learning were good; and 3) there is a feedback process in place that assessment data could be extracted from.

3) The AET Program Committee began an overall review of the program in Spring Semester 2006 based on feedback from sources such as the Technology Advisory Board, Industrial Technology graduates, employers of Industrial Technology graduates, Association of Technology, Management, and Applied Engineering (ATMAE) accreditation guidelines, professional organizations, and faculty's industrial experience. The ongoing review process resulted in major revisions to multiple courses and curriculum, including the generating of two new concentration areas of study in Renewable Energy and General Technology. The 10-year Graduate/Employer surveys (2010) administered during the gathering of the reaccreditation process indicated that AET alumni perform equal to, if not better than, their peers in the areas the assessment data tracked. Over 92% 0f the employers surveyed by the surveys administered during the process indicated that AET alumni felt that this undergraduate preparation was appropriate for his/her job/position.

6.3 Description of actions taken since the last review, including instructional resources and practices, and curricular changes;

a) **Program Title Change.** In 2009, the program title change from "Industrial Technology" to "Applied Engineering and Technology" was approved.
b) **Program Curriculum Change.** In 2010, the new AET Program curriculum change focused on providing additional management concepts for the student. Changes included the development of: 1) a core curriculum of introductory courses (Digital Media, Materials, Electricity, Machine Design, and Computer Technology); 2) an approach of introducing students to other fields within the AET program through a Technical Development area; and 3) the introduction of a required Professional Development emphasis area, which included coursework in Project Management, Operations Management, Facility Security, Statistical Quality Assurance, and Supervision.
c) **Introduction to New Concentrations.** New concentrations for the AET program included: 1) Alternative Energy and Sustainability, which focuses on energy technologies; and 2) a General concentration which supports the student who is transferring with a degree not currently offered at AET, but whereby the students need the management component of the AET program or for students who are not sure of the career path or direction they want to follow.
d) **Name changes and Merging of Current Concentrations.** The following actions took place with name changes associated with current concentrations.
    a. Digital Printing, Imaging and Web Technology to *Digital Media Technologies*
    b. Production to *Manufacturing*
    c. Alternative Energy and Sustainability to *Energy and Sustainability*
    d. Automation and Control to *Integrated Computer Systems*
    In addition to these changes, some of the coursework from the Automation and Control concentration were merged with the new Manufacturing concentration (driven by industrial partners' reviews and suggestions).
e) **Community College and International Agreements.** The AET program continues to work with state community colleges, in addition to International colleges in China (current agreement with Zhijiang College, developing agreement – Shenyang Jianzhu University) in establishing 2+2 agreements. These agreements are designed to allow a student completing an Associate degree at a community college the opportunity to easily transition into the four-year AET Bachelors degree program. The AET program currently has multiple agreements and is working with colleges both in the state of Illinois and Indiana to meet student's needs.
f) **Upgrade to Laboratory Facility and Equipment.** During the Fall 2010 and Spring 2011 semester, multiple upgrades to the AET laboratories where made, including painting, masonry work, new vinyl floor, lighting and electrical work, and laboratory layouts. Since the 2005 IBHE review, equipment allocations for labs have been completed through donations, gifts-in-kind of equipment, grants, and

operations/equipment funds. New software and equipment includes CAD/AM Software, Computer Workstations, Mac G5s, UV Test Chambers, 3D printers, 3D scanners, Computer Numerical Control – Shopbot, Wind Turbine Simulator, Biomass Gasification Engine, two (2) industrial robots and other equipment used to enhance the teaching and learning in the classroom and laboratories of the AET program.

6.4 Description of actions to be taken as a result of this review, including instructional resources and practices, and curricular changes. As a result of this review, the AET program will thoroughly look at all aspects of its product, services and their eventual outcomes. Having conducted a thorough review of the program the AET program will take the following actions are being initiated as a result of this review: 1) The AET program committee will explore innovative ways for recruitment; 2) More effort will be devoted for the assessment of student learning (CASA Summary Report); 3) Revising the curriculum will continue and more industry-academia collaboration will be cultivated; 4) Contributions to support lab equipment will be sought; 5) Encourage establishment of student scholarships and research; and 6) Integrate more web delivery instruction.

In regards to the encouraging of student scholarship and research, the AET Program has over the past 4 years held a School of Technology Student Research Symposium. Additionally, faculty have sustained and enhanced their efforts in promoting current undergraduate research and mentoring projects. Included in this research effort are: 1) awarded 2012 - National Science Foundation (NSF) grant entitled – "Enhancing Undergraduate Education Through Student-Led Research in Biomass Renewable Energy; and 2) in-work/process - NSF proposal entitled "Research, Evaluation and Technical Assistance (RETA), including STEM Education Resource Collaboratory", which is a collaborative project with AET Faculty, Students and community K-12 schools.

7. Responses to Institution-Assigned Issues

a) Further the Support of Integrative Learning Experiences.

The AET program has always revolved around the key principles of integrative learning. Students within the AET program are not only provided the knowledge and skills needed to succeed in the workplace, but coursework is often designed for students to actively apply knowledge and skills associated with current real world workplace scenarios. The AET faculty supports a strong strategy of incorporating learning opportunities that can be reflected in the context of the workplace. Problem solving applications that simulate the workplace are readily available to both faculty and students. Solving problems common in the workplace through determining proper solutions to the problems through critical thinking skills is essential in today's workplace. These outcome-based learning experiences are then demonstrated through the use of collaborative projects, research and presentations. Courses within AET are directly tied to developing skills important for effective integrative learning such as building effective teams, facilitating change, appreciative inquiry, and dealing with conflict.

Previous and current projects include subjects or projects associated with, 1) biomass research projects; 2) renewable research with the EIU Renewable Energy Center; 3) project management applications with NSF grants; 4) restoration of the Old Main Administration building; 5) student participation in community service, such as, Habitat for Humanity; 6) Student run organizations that are based on general business principles, such as, Graphics Club; and many others.

b) Opportunities for Improving Students' Creative Communication and Critical Thinking Skills.

Being able to develop skills in critical thinking and then expressing these skills through appropriate and creative communications avenues is most important to leaders and professionals that graduate from the AET program. Students' analysis, thinking, and problem solving skills are a vital part of the AET program. Each of the Professional Development core courses is a reflection of those desired outcomes and skills.

Many of the classroom projects, case studies and assignments focus on collaborating experiences that invoke the need to analyze, think critically, reach conclusions, and then communicate a solution. Connecting students in an active and engaging debate over student driven solutions is the essence of the Applied Engineering and Technology Program.

As mentioned in Section 6.4, the AET Program holds an annual School of Technology Student Research Symposium for students who are being mentor by faculty in both research and unique project development. Students gain communication and critical thinking skills through the questions and answer format of the presentation through the opportunity of presenting their research and projects. Additionally, students are being mentoring in grant awarded research that promotes those learning objectives mentioned in Section 5, which results in students being: 1) effective in oral and written communication skill; 2) able to conduct intellectual research in technology; 3) able to analyze, apply, and evaluate concepts of effective leadership; 4) capable of possessing knowledge of strategy, principles and tools of quality systems as applied to business and industry; 5) able to develop an understanding of the global impact of technology; and 6) able to apply critical thinking and problem solving skills in the areas of Applied Engineering and Technology.

8. Outcome

8.1 Decision:

     X   Program in Good Standing

          Program flagged for Priority Review

          Program Enrollment Suspended

8.2 Explanation:

1. Received full ATMAE reaccreditation in 2011.
2. Initiated a self-study in 2010 resulting in enhanced program quality through core curriculum changes and the addition of two new concentrations.
3. Conducted a 10-year satisfaction survey to collect data from graduates and employers in 2010.
4. Have maintained and increased 2+2 Agreements with Community Colleges and International Colleges and Universities.
5. Created a culture of faculty-mentored undergraduate research which is showcased annually at the School's Research Symposium.
6. Integrative learning is clearly emphasized in the program.

The following issues require attention as the program continues to expand and improve:

1. Intensify efforts to improve the program's assessment plan. Currently, only one (writing effectively) of the four University-wide learning goals has been incorporated into the plan.
2. The Program Review discusses the importance of critical-thinking to the curriculum; however, the assessment activities do not document this as a learning objective, what the expectations are, and how it is measured.
3. Work to improve recruitment efforts.
4. Continue to increase faculty/student collaborative research and coordinate these efforts with community outreach.
5. Continue to monitor the School's resources as you explore off-campus, non-traditional student enrollment in the program with careful attention to student learning outcomes.