

Linking Engineering Technology with a Business Administration Program

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Abstract — The paper describes the curriculum of the individualized option in the baccalaureate Business Administration program. The individualized option is a multidisciplinary curriculum which links the Mechanical Engineering Technology and Electrical Engineering Technology associate degree programs with the baccalaureate Bachelor of Science in Business degree program. Graduates from this program will be prepared for management positions in the manufacturing industry

Introduction:

The competitive job market of the 21st century forces college graduates to seek and develop unique and rare skills. The acquisition of these skills is often the deciding factor in achieving employment goals. In a constantly changing work environment, these interdisciplinary skills are more important than ever before. As a result of this situation the accrediting body, ABET, has encouraged and supported interdisciplinary projects in the curriculum. Much support was given to the project at Penn State Hazleton that involved the coupling of business and engineering, since it was in line with some new goals set forth by ABET which included the encouragement of multidisciplinary courses.

Curricular Issues:

Penn State Hazleton offers traditional mechanical technology and electrical technology programs. These programs are ABET accredited and are offered in Hazleton at the associate degree level. The graduates of these programs can either seek employment or continue their education at the baccalaureate level. A majority (approximately 80%) of the students continue their education in the baccalaureate degree programs (Fig. 1).

Unfortunately, those baccalaureate degree options are not available at Penn State Hazleton. Depending on the choice of major, most students continue their education at the Capital College in Harrisburg, the Altoona College, or the Berks-Lehigh Valley College. Penn State Hazleton also offers associate and baccalaureate degree programs in business administration. Similar to the engineering technology students, business administration students who graduate with an associate degree can either enter the job market or continue their education in a baccalaureate degree

program. In contrast to engineering technology, however, a baccalaureate degree program in business administration is available in Hazleton.

By linking these two programs, students at Hazleton in the Engineering Technology programs are afforded the opportunity to complete a baccalaureate degree and remain at Hazleton. In this two plus two design, Engineering Technology students complete their associate degree and then reenroll in the baccalaureate degree the following semester. The transition is virtually seamless and allows students to complete both the associate and the baccalaureate degrees in approximately nine semesters.

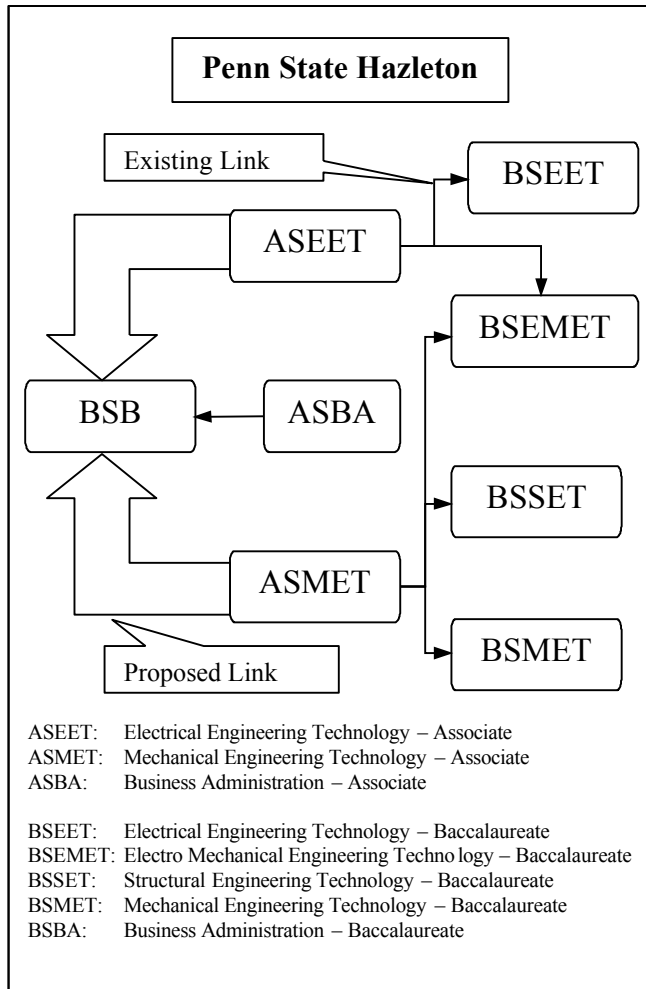


Fig. 1. Existing and proposed program links

Figure 1
Existing and Proposed links

One might think that a conjunction of business concepts with engineering principles is hugely unlikely. The reality is that engineers may be some of the best resources to market and sell various product lines due to the fact that they have the ability to describe the reliability, functionality and needs for buying parts and/or products. Successful salespeople share some commonalities: highly motivated, creative, knowledgeable, and dependable, to name a few. A

primary function of selling includes providing pertinent and relevant information on products and services to potential customers. This is another example of a business application in which engineers can thrive based on their knowledge of products and functionality.¹

One of the most basic rules in business is the 80/20 Rule. This basically states that 20 percent of a firm's customers generate 80 percent of a firm's revenue.² Some experts believe that customer retention is key and may have more of a significant impact on profit than does market share in terms of competitive position in the market place.³ Some basics of customer retention include: trust building, personal contact, proper installation and training, and seeking customer feedback by follow-up.

It is in the best interest of firms to employ and grow engineers with solid mechanical and/or electrical backgrounds who can communicate effectively to customers with a firm understanding of the product design and functionality, as well as an understanding of how the use of the product will impact their businesses. This has been evidenced by discussions within two of Penn State Hazleton's committees: the Business Advisory Committee and the Industrial Advisory Committee. These two groups are comprised of employees in the field who work for local, regional, national, and international companies.

Each group operates independently of the other, however, both support the link between business and engineering. The first reason is due to the need for promoting employees within a company to management levels. Most engineers with a strictly quantitative background do not possess the necessary managerial skills required in management level positions. The linked two plus two design is very attractive to manufacturing companies for this reason. Secondly, as mentioned earlier, engineers could become very successful sales and marketing people for an organization due to their detailed knowledge of products and/or services.

In the 1999/2000 academic year, an agreement was reached between the engineering technology program and the business administration program. This agreement created an individualized option in the baccalaureate BSB program. This new individualized option allows ET graduates to enter into the BSB program at the junior level. This agreement created a very valuable and attractive option for associate degree ET graduates.

The curriculum developed for those individual options is shown in Table 1. During the first two years the students take engineering technology courses. Business related courses are taken by the students during the junior and senior years. Presently, a number of students are successfully pursuing this option. At the end of the 2003 spring semester, a number of engineering technology students will graduate with a BSB degree. The feedback received from the students who are pursuing this individual option is very positive. The Penn State Hazleton Industrial Advisory Committee supports the program.

The graduates from this individualized, interdisciplinary program will have the skills necessary to seek manufacturing management positions in industry. The multidisciplinary background of the graduates will allow them to work and communicate effectively with the engineering and technical staff. The graduates will also be able to work effectively with the marketing and accounting staffs.

as well as with financial institutions.

TABLE I
Curriculum content for BSBA/MET option

BACHELOR OF SCIENCE IN BUSINESS / 2MET OPTION			
Semester 1		Semester 2	
EET 101/109 (Electrical Circuits & Lab)	4	SpCom 100 (Speech Comm)	3
ET 2 (Engineering Seminar)	1	* IET 101 (Manufacturing Materials, Processes & Lab)	3
Math 81 (Technical Math I)	3	EGT 114 (Spatial Analysis & CAD)	2
EGT 101/102 (Tech Drawing & Intro to CAD)	2	Math 82 (Tech Math II)	3
Engl 15 (Rhetoric & Composition)	3	AHS (General Ed)	3
AHS (General Ed)	3	* MCHT 111 (Statics)	3
	16		17
Semester 3		Semester 4	
* MET 206 (Dynamics)	3	MET 210 W (Product Design)	3
MCHT 213 (Strength of Materials)	3	IET 215 (Production Design)	2
MCHT 214 (Strength of Materials – Lab)	1	Phys 151 (Tech Physics II)	3
EGT 201 (Advanced CAD)	2	AHS (General Ed)	3
Math 83 (Tech Math III)	4	Engl 202D (Business Writing)	3
Phys 150 (Tech Physics I)	3	NatSci (Natural Science)	3
IET 216 (Production Design Lab)	<u>2</u>		
	18		18
Semester 5		Semester 6	
BA 321 (Contemporary skills for Business Process)	3	BA 322 (Negotiations)	3
* MKTG 301 (Principles of Marketing)	3	* BLOG 301 (Business Log Management)	3
* MGMT 301 (Principles of Management)	3	ECON 2 or 4 (Macro Economics)	3
MIS 204 (Intro to Business Information Systems)	2	ACCTG 211 (Managerial & Financial Accounting)	4
* FIN 301 (Management & Financial Accounting)	3	BA 243 (Social, Legal, Ethical Environment of Business)	4
ECON 2 or 4 (Micro Economics)	3		17
	17		
Semester 7		Semester 8	
BA 421 (Project Management & Planning for Business)	3	* BA 422W (Contemporary Business Seminar)	3
IB 303 (International Business Operations)	3	BA 495 (Internship)	6
MSIS 200 (Introduction to Statistics for Business)	4	Engl 419 (Advanced Business Writing)	3
SpCom 352 (Speech Communications in Organizations)	3	MIS 103 (Microcomputer Applications in Business)	3
HPE (Health & Physical Activity)	4	Arts, Humanities (General Ed)	3
	17		18
Summer			
Arts, Humanities (General Ed)	3	BA 495 (Internship)	6
Tech Elective	3	can be completed in summer	
* Course requires a grade of "C" or better			

Since management styles have changed dramatically over the last few decades, with a team of directors leading organizations rather than one sole leader as was done in the past, it makes

perfect sense to include individuals with quantitative abilities as one or more of the team members. Due to this current need in almost all businesses, it has become clear that quantitative thinkers need to understand communication and management styles to be effective and successful. As organizations move toward becoming more team-oriented and collaborative, it is essential to learn effective communication styles for the common good of the team and essentially, the organization.⁴

Teams and groups now dominate in most work settings for decision making, whereas individual efforts were once hailed. Since business in general has become more complex, with innovative technology that is constantly changing and firms diversifying product and service lines of business so rapidly to stay competitive, it seems to follow logically that engineers should be an integral part of the upper echelon of individuals who lead an organization. Probabilistically speaking, to make engineers more successful, the event of business concepts and applications (call it Event A) is the perfect complement to the event of engineering talent (Event B). The probability of Event A in union with Event B ($P(A \cup B)$) will be equal to $P(S)$, the probability of the sample space, which is a perfect number 1.

Conclusions:

The management style has changed dramatically over the last few decades. Key management decisions are now being made by a team of middle management personnel rather than a solo leader. Teams and groups are now dominate in most workplaces where the decision making process is concerned. At the same time, the constantly changing technology and increasing competition forces industry to rapidly change and diversify its products and services. The engineering staff has become an important part of the management team. Graduates with a combined engineering and business background can effectively assume that responsibility

Bibliography:

1. This discussion draws on Chapter 1 of Barton A. Weitz, Stephen B. Castleberry, and John F. Tanner, Jr., *Selling: Building Partnerships*, 5th ed. (New York: McGraw-Hill, 2004).
2. More detail can be found in Chapter 7 of Michael R. Czinkota, Peter R. Dickson, Patrick Dunne, Abbie Griffin, K. Douglas Hoffman, Michael D. Hutt, John H. Lindgren, Jr., Robert F. Lusch, Ilkka A. Ronkainen, Bert Rosenbloom, Jagdish N. Sheth, Terence A. Shimp, Judy A. Siguaw, Penny M. Simpson, Thomas W. Speh, Joel E. Urbany, *Marketing: Best Practices*, (Orlando, Florida: Dryden Press, 2000).
3. Further discussion can be found in Chapter 9 of Michael R. Czinkota, Peter R. Dickson, Patrick Dunne, Abbie Griffin, K. Douglas Hoffman, Michael D. Hutt, John H. Lindgren, Jr., Robert F. Lusch, Ilkka A. Ronkainen, Bert Rosenbloom, Jagdish N. Sheth, Terence A. Shimp, Judy A. Siguaw, Penny M. Simpson, Thomas W. Speh, Joel E. Urbany, *Marketing: Best Practices*, (Orlando, Florida: Dryden Press, 2000).
4. More in-depth discussion regarding self-disclosure and group dynamics can be found in Chapters 1 and 2 of Suzanne C. de Janasz, Karen O. Dowd, and Beth Z. Schneider, *Interpersonal Skills in Organizations*, (New York: McGraw-Hill, 2002).

