

Enrollment Challenges and “Best Practices” of Selected two-year College’s Electronic
and Manufacturing Programs

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Abstract

The primary purpose of the study was to identify successful electronic and manufacturing engineering programs at two-year colleges that Northeast Community College (a pseudonym) programs can be benchmarked against. The project examined two-year college programs for increased enrollment and the number of graduates for the academic years 2000 to 2005 to determine what factors caused those programs to be successful.

Data were collected from two-year colleges for enrollment increases for the electronic and manufacturing programs. Data were collected in two parts. Part I data were collected from Ohio two-year colleges. For part II, data were collected from two-year colleges outside the state of Ohio.

Three Ohio colleges and three two-year colleges outside the state of Ohio were selected to participate in this project based upon enrollment increases and “best practices”. Tables were constructed showing the description of the electronic and manufacturing engineering programs and the year for review.

A secondary goal was to ask two-year college administrators to report on reasons for increases to determine if their ability to increase enrollment provides any suggestions on how Northeast Community College can do the same. The reasons for success will show “best practices” for that particular two-year college. For Ohio two-year colleges, one commonality surfaced for “best practices”-- the importance of Industrial Advisory committees. For non-Ohio two-year College, there were no commonalities for “best practices” reported as responses varied greatly by college administrators.

Method of Collecting Data

Data for this report on enrollment and graduation were collected directly from two sources. First, data were collected from Ohio two-year colleges' department of Institutional Research and college administrators. Second, data were collected from administrators in two-year colleges throughout the United States that are listed in the ABET (Accreditation Board for Engineering and Technology) Community College Directory. The American Society for Engineering provided information on how to contact two-year colleges with accreditation in ABET.

Departments of Institutional Research and two year colleges with ABET accreditation were contacted via e-mail explaining the purpose of the study, request for participation, and a time line for participation. After all two-year colleges were contacted via e-mail, a follow-up telephone call was made to solicit support of the project. After a time period of one week, a second telephone call was made due to low response from the initial e-mail message and telephone call.

Next, for two-year colleges that had increasing enrollment, administrators such as Deans, Directors and Chairs were contacted and asked to provide three to five reasons why they felt enrollment had increased. These reasons for success are considered "best practices" for this report.

Information was collected on Northeast Community College (a pseudonym), the college under review, in order to show the enrollment pattern for the Electronic and Manufacturing Engineering programs. The reason for studying other two-year college

programs is to benchmark Northeast Community College's programs against successful two-year colleges with "best practices" for enrollment increases.

Due to the vast majority of Ohio and non-Ohio two-year institutional reporting of declining enrollment, information was collected on comments made by administrators about why they believe enrollment had declined. The names of the two-year colleges and the administrators that reported on declining enrollment in the Electronic and Manufacturing Engineering programs will remain anonymous per the request of some.

Data on Enrollment and Graduation for Northeast Community College

Northeast Community College is an urban university-based campus with approximately 3,000 students enrolled for Fall, 2006. Northeast Community College has both an associate and a bachelor degree program for both the electronic and manufacturing programs. Data were collected for the associate degree programs because participating colleges reported data in the same manner. Table 1 for Northeast Community shows that enrollment in both the electronic and manufacturing programs increased for the 2001 and 2002 academic years but overall decreased for the year 2000 compared to 2005. Enrollment for the electronic program decreased by 11% from 65 students in 2000 to 58 students in 2005, while the enrollment in the manufacturing program decreased by 31% for the same period.

Table 1

Enrollment and Graduation data for Northeast Community College

Description	2000	2001	2002	2003	2004	2005
Electronic Engineering Associate	65	75	81	65	57	58
Graduated	12	6	10	20	9	11
Manufacturing Associate	35	47	44	34	29	24
Graduated	14	5	5	12	15	4

Source: The University of Northeast Community College of Institutional Research.

Results of data collected for two-year colleges with increasing enrollment, Part 1

For part 1, the following Ohio two-year colleges were selected to participate in this project because they had enrollment increases in the electronic or manufacturing engineering programs: 1) Community College A, 2) Community College B and, 3) Community College C. The majority of the two-year colleges in the state of Ohio submitted data for this project but had to be excluded because of declining enrollment for the electronic and manufacturing programs. Many did not offer a manufacturing program.

Community College A (a pseudonym)

Community College A, campus is an urban campus with approximately 10,131 students enrolled for Fall, 2005 (OBOR, 2005). Table 2 shows the enrollment increased in the electronic and manufacturing engineering programs. From 2000 to 2005 the Electronic Engineering Tech increased 76% from 42 to 74 students, and Manufacturing/Industrial Tech. increased 120% from 10 to 22 students. The number of students graduating was small compared to the number enrolled.

Table 2

Enrollment and Graduation Data for Community College A

Description	2000	2001	2002	2003	2004	2005
Electronic Eng Tech	42	58	65	70	71	74
Graduated	6	6	4	2	7	1
Manufact/Industrial Tech.	10	24	14	22	24	22
Graduated	0	1	1	0	0	0

Source: Community College A Department of Institutional Research

Community College B – Ohio (a pseudonym)

Community College B is a rural campus with approximately 3,130 student enrolled for Fall, 2005 (OBOR, 2005). Table 4 shows that Community College B experienced enrollment increases for both the electronics and manufacturing programs for the years 2000 to 2005. Enrollment for electronics rose to a high of 84 students in 2002, and 81 students in 2004. Overall, the enrollment in electronic increased by 61% from Fall 2000 compared to 2005 or 28 to 45 students. The number of students graduating from the electronic program increased from 8 to 16 students. Enrollment for the manufacturing program increased, by 44%, from 52 to 75 students for 2000 compared to 2005. The number of students graduating was small compared to the number enrolled.

Table 3

Enrollment data for Community College B - Ohio

Description	2000	2001	2002	2003	2004	2005
Electronics Engineering Tech	28	75	84	67	81	45
Graduated	8	3	12	7	16	16
Manufacturing	52	44	30	85	68	75
Graduated	7	3	6	8	13	7

Source: Community College B's Department of Institutional Research.

Community College C (a pseudonym)

Community College C, is a large suburban campus with approximately 18,801 students enrolled for Fall, 2005 (OBOR, 2005). Community College C -Toledo campus from 2000 to 2005 experienced enrollment increases for the manufacturing technologies program of 3 to 28 students. The number of students graduating was small compared to those enrolled.

Table 4

Enrollment and Graduation data for Community College C

Description	2000	2001	2002	2003	2004	2005
Manufacturing Technologies	3	16	30	25	30	28
Graduated	0	0	3	6	2	3

Community College C’s Department of Institutional Research.

Results of data collected for two-year colleges with increasing enrollment, Part II

The following two-year colleges outside the state of Ohio were recognized as having enrollment increases for electronic and manufacturing programs (The names of all colleges have been changed but are from actual states): 1) Georgia Technical College, 2) New York Community College, and 3) North Carolina Community College. A number of other colleges submitted data but had to be excluded because of declining enrollment for electronics and manufacturing engineering. Many did not offer a program in manufacturing engineering.

Georgia Technical College (a pseudonym)

Georgia Technical College is suburban two-year college serving seven rural counties with approximately 2,400 students enrolled in the college. Data in Table 6 shows that enrollment in the electronic program increased by 49% from 2000 to 2005.

The number of students graduating from the program was low compared to the number enrolled.

Table 5

Enrollment and Graduation data for Georgia Technical College

Description	2000	2001	2002	2003	2004	2005
Electronics	78	85	81	111	99	116
Graduated	7	13	1	23	17	16

New York Community College (a pseudonym)

New York Community College is an urban college with approximately 6,927 students enrolled in Fall 2000 and 8,479 students enrolled for Fall 2005 (Department of Institutional Research). Table 7 shows that the enrollment for the Electronic program at New York Community College increased by 18% from 2000 to 2005. The number of students graduating from the program oscillated up and down but was relatively small compared to the number of students enrolled in the program. New York Community College does not have a program for Manufacturing Engineering.

Table 6

Enrollment and Graduation Data for New York Community Campus

Description	2000	2001	2002	2003	2004	2005
Electronic	101	116	117	122	122	120
Graduated	13	10	7	12	8	12

Source: New York Community College’s Department Office of Institutional Research & Testing.

North Carolina Community College (a pseudonym)

North Carolina Community College, located in North Carolina, is a large urban college with approximately 56,805 students enrolled in 2005 (Department of Institutional Effectiveness, 2007). Table 8 shows that enrollment in the Electronics program increased by 113% from 32 students to 68 students. The number of graduates in the program was small compared to the total number enrolled.

Table 7

Enrollment and Graduation data for North Carolina Community College

Description	2000	2001	2002	2003	2004	2005
Electronic Tech.	32	38	55	57	62	68
Graduated	0	3	2	3	1	3

Source: North Carolina Community College Department of Institutional Effectiveness.

Reasons (Best Practices) for Program Success reported by College Administrators

Part I – Ohio Two-Year Colleges

Community College A, Ohio – Best Practices

Associate Dean, Business and Technologies reported that the reasons for success in the electronic and manufacturing programs at CCA are: 1) The College has been working with high school students over the past five years in an after school PSEOP program focusing on robotics technology. Students take courses at CCA then form competitive teams at their high school. The teams compete in regional and national competitions. Relatedly, CCA was awarded an NSF grant for distance learning opportunities for CMSD students; 2) Nationally there is a focus on STEM courses so grant funding has become easier to obtain for equipment purchases, recruitment activities, partnerships, etc.; 3) CCA has been able to hire a program manager to research

grants and recruit students. The program manager is responsible for student retention and success initiatives; 4) There has been an emphasis on creating outcomes for all programs. The process has involved the establishment of industry focus groups to assist in curriculum review/development. The outreach to local industry has significantly assisted in program recruitment, etc.

Community College B, Ohio – Best Practices

Dean, Business and Technology Division at CCB reported four reasons why the electronic and manufacturing program options are successful. He reported the following:

1) Faculty members in the engineering department spend a great deal of time recruiting students from local high schools and vocational schools/career centers. Faculty visit classes and teach in these schools on occasion. Faculty members get to know the students and instructors, thus building trust among all; 2) Industrial advisory committees help define and build curriculum that is relevant to modern manufacturing and engineering. No decisions are made without IAC approval; 3) Faculty members have years of industrial experience in both manufacturing and engineering. As a result, they bring a great deal of real world experience into the classroom. Students experience more than the standard theoretical manufacturing and engineering curriculum. They see and hear about real applications from instructors who have actually done it; 4) All courses in these areas have some kind of hands-on activities. Activities range from lab work with traditional lab reports to programming and operations on actual industrial equipment. The “lab” environment is more of a real world setting. The Dean of Business Technology commented that he believes the most significant factor is the faculty time spent in the recruitment of students into the programs.

Community College C, Ohio –Best Practices

According to Dean, School of Technology at CCC – the reasons for successful program in engineering are: 1) Corporate partnership, 2) Active involvement of the industrial advisory committees, 3) Listening to the “Voice of the Customer”, 4) “Can do” attitude of faculty and staff, and 5) partnerships with high schools and Tech Prep.

Reasons (Best Practices) for Program Success reported by College Administrators

Part II, Non-Ohio Two-Year Colleges

Georgia Technical College, Georgia – Best Practices

The Engineering Technology Coordinator reported that the reasons for growth in the Electronics option are: 1) Georgia Technical College gained SACS (Southern Association of Colleges and Schools) level 1 accreditation in 2003, 2) In 2001, the name changed from Georgia Technical Institute to Georgia Technical College, and 3) Industry growth for local production facilities spurred an influx of student population.

New York Community College, New York – Best Practices

According to the Chair, Department of Physics & Technology, the reasons for program success for the two engineering programs, electronics and manufacturing, are as follows: 1) Enrollment for the overall college has increased by 22% from 6,927 in 2000 to 8,479 in 2005, 2) Aggressive recruitment at local high schools, in particular, those with technical and vocational programs, and 3) Internal recruiting at the college from introductory courses such as orientation and career development that are required for entering freshmen. The Department Chair further commented that recruitment efforts take time to pay off as high school counselors and administrators need to be convinced that the technical programs at the college are valuable career paths for their graduates.

North Carolina Community College, North Carolina – Best Practices

The Department Chair for electronic at North Carolina Community College reported that the reasons for success in the electronic program are: 1) NCCC has focused on marketing and have created several brochures to distribute through the college, high schools and those that visit their facility, 2) Open houses, etc. with little return, 3) Local Apprenticeship program with three companies, and 4) The state of North Carolina just completed the CIP (Curriculum Improvement Process) which updated the Curriculum Standards at the state level focused on flexibility to allow each CC to serve their respective industry.

Significant Finding

Declining enrollment in

Electronic and Manufacturing Engineering for two-year colleges

The majority of the two-year colleges contacted throughout the state of Ohio and the United States experienced declining enrollment for the years 2000 to 2005 for both the electronic and manufacturing engineering programs. Some agreed to share what they felt were reasons for declining enrollment but asked not to be identified in reporting the data. Some two-year colleges would not share the data or report on the reasons for enrollment. One two-year college administrator indicated that the enrollment was down in the single digit; therefore, due to the sensitivity of the information did not want to share the information in a public forum.

Several two-year college administrators gave reasons they felt enrollment in the electronic and manufacturing programs were declining. A two-year college from the New York area reported that when Northrop Grumman Company left the area, it hurt

enrollment in the Electronics program. He reported that “jobs just aren’t here to support the Electronic program.” Still another urban public comprehensive college in New York reported that enrollment in the college has experienced a 4% reduction in the past five year period. One administrator reported, “I strongly suspect that the drop in the number of students enrolling in the Electronics program can be directly attributed to the drop in the number of telecommunications jobs in New Jersey.” A college in Southern Nevada reported that enrollment for the electronic program has been declining for the past 8 years. This administrator felt that the decline is related to an industry where service related jobs, such as, gaming and resorts or “tipping jobs” are in high demand.

Another two-year college in New Mexico reported that the decline in enrollment in electronics and manufacturing is directly related to the shifting of thousands of jobs off shore. Students are reluctant to enroll in programs when many companies are laying off employees that have those skills. Overall enrollment has increased while programs offering education in the manufacturing specialties have declined. The college relies heavily on input from each programs advisory board. Although the smaller companies are hiring and in need of those trained in electronics and manufacturing, the industry giants get all the press which is negative. One of the problems colleges face in marketing programs and trying to increase enrollment is that prospective students do not always hear that there is still a need for the skills provided in manufacturing and electronics programs by the many growing smaller companies. These companies remain invisible to the public because the media pays no attention to their efforts of economic development in the region. The public only hears about layoffs and jobs going off shore.

In agreement, a two-year college in South Carolina reported that while enrollment in the overall college has increased by approximately 6% per year from 2000 to 2005 and earlier, the manufacturing and electronic programs have declined significantly over the same time period. The administrator reported that the reasons for decline may be related to manufacturing jobs that have gone overseas and thus resulting in layoffs. This administrator believed that while normally layoffs help to increase enrollment, people are reluctant to continue their education in a field that layoffs have occurred.

Discussion of Findings

Northeast Community College's electronic and manufacturing program was benchmark to six colleges for "best practices" as reported by administrators in those colleges. Overall, the most significant finding is the large number of two-year colleges with declining enrollment for the two engineering programs: electronic and manufacturing. A total of 23 two-year Ohio colleges and 74 non-Ohio ABET accredited two-year colleges were contacted and asked to participate in this study. The overwhelming majority of the two-year colleges cooperated and responded to my inquiry for help. This project consisted of Part I examining two-year colleges within the State of Ohio for enrollment increases, and Part II investigating colleges outside the state of Ohio.

For part I, only three Ohio two-year colleges has electronic or manufacturing programs that increased in enrollment from 2000 compared to 2005. Data on the reasons for program success were collected from college administrators at the three two-year colleges selected for this project.

For part I, the only commonality for “best practice” reported by Ohio two-year colleges for successful programs for electronic and manufacturing is the importance of Industrial Advisory Committees. Community College B of Ohio reported that the industrial advisory committees assist in defining and building curriculum relevant to modern manufacturing and engineering. Similar to data reported for Community College B, the dean of the engineering program at Community College C of Ohio-Main campus commented that a reason for success was active involvement of the advisory committees.

For part II, two-year colleges outside the state of Ohio, a total of three colleges participated in the study. All three two-year colleges reported on reasons or “best practices” for enrollment increases for the electronic engineering program. For these two-year colleges, no increases in enrollment were reported for manufacturing engineering. The two-year colleges reported on various “best practices” for successful programs in electronics. One reported on achievement of accreditation and growth in the local production facilities. Another reported on aggressive recruitment at the local high school and internal recruiting at the college from introductory courses. The third two-year college reported that a reason for success is the apprenticeship program with local companies.