

2006-931: A COMMUNITY COLLEGE/UNIVERSITY EDUCATIONAL PROGRAM IN TECHNOLOGY – MAXIMIZING PARTICIPATION THROUGH VARIED MODES OF DELIVERY

Clifford Mirman, Northern Illinois University

CLIFFORD R. MIRMAN received his Ph.D. degree from the University of Illinois at Chicago in 1991. From 1991 until 1999, he was a faculty member in the Mechanical Engineering Department at Wilkes University's. He is currently the Chair of the Department of Technology at NIU. His research areas are CAD, finite-element-analysis, and kinematics, both securing grants and writing publications. Dr. Mirman is actively involved in ASEE and SME.

Xueshu Song, Northern Illinois University

XUESHU SONG received his Ph.D. from Penn State University in 1987, and has been a faculty member at NIU since that time. Dr. Song has written numerous refereed journal papers and conference articles. In addition, Dr. Song has an extensive history of funded research with NSF and other state and regional granting agencies. His research areas are in manufacturing, educational material development, and development of computing interfaces, and he is actively involved in ASEE and NAIT.

Promod Vohra, Northern Illinois University

PROMOD VOHRA received his Ed.D. degree from Northern Illinois University in 1995. After serving as an electrical engineering technology faculty member for over ten years, he assumed the role of Associate Dean of the NIU College of Engineering and Engineering Technology in 1998, and he was selected as the Dean of the college in 2004. Dr Vohra has developed numerous federal grants through US Army and Department of Transportation, and is actively involved in ASEE and NAIT.

A Community College/University Educational Program in Technology – Maximizing Participation Through Varied Modes of Delivery

Abstract

To obtain a 4-year degree in a technical field, students typically choose from two options; attend either a 4-year university, or a 2-year community college, followed by transfer to the 4-year school. The community college transfer process is gaining a wide acceptance, especially when the one examines cost and accessibility issues associated with higher education. While the route to transfer is difficult in any major, it is very difficult in a vertically structured curriculum like Engineering and Technology. In these areas, the entry point and course prerequisites are of great concern. Within the State of Illinois, there are many community colleges that offer a multitude of programs. The transfer process is further complicated by the fact that the transfer student population is comprised of a wide variance in age demographics. While many of the students in the 18-22 year old population can “move” to the university, older students are place bound with families and/or full-time employment. To satisfy the needs of adult learners, the community college districts are requesting assistance from universities in the development of educational programs at off-campus sites.

Within the State of Illinois, as well as in many other states, there is a strong community college presence and there is a great need to provide affordable, quality education to these students. However, in these days of budgetary constraints, the question arises how does one support on-campus and off-campus programs offered at several external sites. Over the past ten years, the Northern Illinois University Department of Technology has developed a unique partnership with Rock Valley College, which has resulted in the development of a technology 3+1 program. With a current enrollment of over 100 students, the program is offered off campus through live and distance video formats. The Department is now looking to develop two additional programs utilizing clusters of community colleges as program feeders. This program places much emphasis on the infrastructure needs, namely articulation, advising, marketing, scheduling, and Inter-college program development. This paper will discuss the modes used to develop this complex program and to provide the needed communication between the partners and students.

Program Need

The community college system within the State of Illinois is wide spread and represents a unique educational experience within the state. Overseen by the Illinois Community College Board of Education (ICCB), the community colleges must provide the students with a fundamental education core within a two-year education. The education received through this system satisfies a significant need for quality education to students within the respective community who are place bound, or are unable to attend a four-year institution. However, these programs are 2-year offerings, and in many cases, the students who are in the program or the program graduates desire a 4-year education. This is especially true in the technical fields, where graduates of the

technical programs offered at these community colleges are finding that their employers are requiring 4-year B.S. degrees in order to maintain employment. Since the community colleges are not permitted to confer 4-year degrees, there is a definite need within the State of Illinois to provide a mechanism where students possessing the 2-year degree can complete a 4-year degree [1]. To satisfy the need within the State, and to provide a model within the educational community, the Department of Technology at Northern Illinois University has developed a 4-year Industrial Technology program. The NIU Industrial Technology program incorporates a unique mechanism to allow students who have graduated from or are currently enrolled in a 2-year technical degree to obtain a 4-year technical B.S. degree in Industrial Technology.

While the ability to provide a relatively seamless transition between the community college and the university is relatively novel [2,3,4], a partnership between a group of community colleges and a university is novel educational model [5]. In the model which has been developed for the NIU Technology transfer program, there are seven community colleges involved in the development and delivery of this program. As such, there are many issues which provide challenges for the students. These challenges include articulation, course development, advising, admissions, assessment, and course and program marketing. In addition to the development of this unique partnership, the NIU Department of Technology had to develop a mode to offer this program. Since many of the individuals who will be in this program are older, place-bound students, and the communities served by the cluster of community colleges are 50-60 miles from the main NIU campus, a new delivery mode needed to be developed. Figure 1 shows that McHenry, Lake, Harper, Elgin, Oakton, Triton, Dupage county community college districts comprise the partnership.

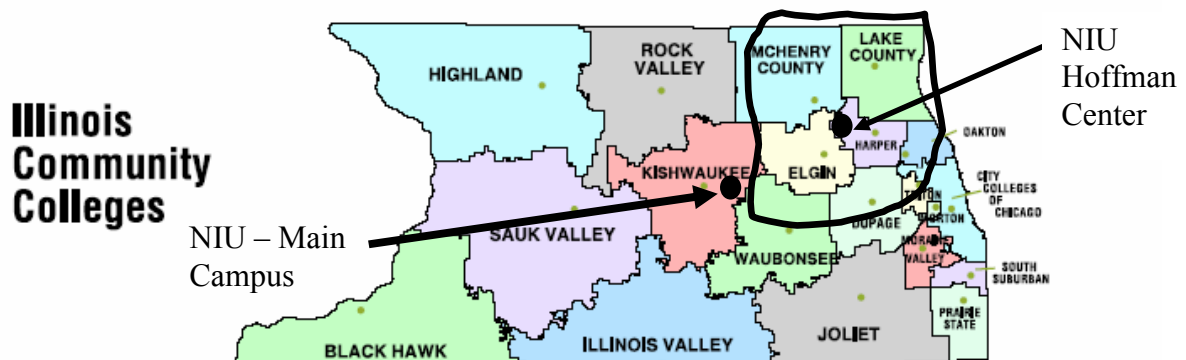


Figure #1 – Community College Districts in Northern Illinois

From the preceding picture, one can see the vast region and community college districts which will feed into this degree program, as well as the distance from the districts to the main NIU Dekalb campus. While the distance from the Main campus to each college district is far, NIU maintains a satellite campus in Hoffman Estates (Hoffman Center) and is shown in Figure #1. The use of this site as a central location to deliver this distributed program allows the department the ability to provide cost effective education to this region. Table 1 shows the distances from each college district to the NIU Hoffman satellite and main campus.

Table #1 - Distances from Community College districts to NIU Locations

Community college district	Commute Distance to DeKalb	Commute Distance to Hoffman Estates
McHenry	47 mi	24 mi
Elgin	35 mi	11 mi
Lake County	71 mi	24 mi
Harper	53 mi	3 mi
College of Dupage	44 mi	15 mi
Waubonsee	45 mi	42 mi
Oakton	63 mi	12 mi
Triton	60 mi	20 mi

As one can see from table #1, all of the community college districts are within an easy commute to the NIU Hoffman center.

Development of Off-Campus Industrial Technology Program

Prior to the formation of a remote cluster of community colleges surrounding an NIU satellite campus, the Department of Technology developed a program which would allow the transfer of a 2-year community college technical degree. The Industrial Technology emphasis is a unique undergraduate program which culminates with a Bachelors of Science in Technology. The Industrial Technology degree provides basic and advanced education with both a strong technical component and a management/supervision component. The NIU Industrial Technology program received initial accreditation by the National Association of Industrial Technologists (NAIT) in 1998, and was reaccredited in 2002. On the main DeKalb campus, the Department has well equipped laboratory facilities to provide basic and advanced education in technical areas like Plastics Technology, Manufacturing Technology, Environmental Health and Safety, and Computer-Aided-Design. The departmental faculty recognizes that many other technical areas exist and are taught very successfully at the community college level. As such, the department has developed a unique Special Technical Area of Study which allows for transfer of this technical component from the community college. This Special Technical Area of Study allows students to transfer their 2-year AAS degree for 23 semester hours of credit at NIU, which is independent of the area in which their 2-year degree was granted. In addition to the 23 credit hours, the typical transfer student enters the NIU Industrial Technology with an additional 20-30 hours of accepted college credit, based upon the course work which was taken as part of the AAS degree. Students entering the Industrial Technology Special Technical Area of Study are provided with a listing of courses which are needed to complete the 4-year baccalaureate program. The Department of Technology Industrial Technology emphasis requires 120 semester hours of credit for graduation, which are broken down into the groupings shown in Table 2.

Table 2 – Distribution of Credits in IT program

Number of Credits	Content Area	Taken At
23	Technical Portion of AAS Degree	Community College
18	General Education Core	Community College
9	English and Communications courses	Community College
20	Math and Science Core	Community College
7	General Elective courses	Community College and/or NIU
10	General Technology basics	Community College
27	Technology supervision and Management Core	NIU
6	General Technology Elective courses	Community College and/or NIU
120 total Semester Hours		

The unique transfer aspect of this program lies in the fact that the students receives 23 credits hours for obtaining a technical AAS degree. In addition, these credits are transferred to NIU as proficiency credit. The University permits acceptance of a maximum 66 credit hours from the two-year college, however, the fact that proficiency credit can be applied results in a maximum transfer credit of 89 hours. Based upon this transfer credit total, students in this program must complete at least 31 hours of NIU credit. This fact is the basis of this unique program. A total of 89 transfer credit hours can be taken at the community college level. The typical student graduating from the Industrial Technology program in this area of study must take a minimum of 31 semester hours from NIU. To satisfy the credit needs, the department offers courses on a rotating basis at various off-campus locations. As part of the 4-year Industrial Technology degree, the following NIU Department of Technology courses (approximately 31 semester hours of credit) are required of each student.

Required program courses (all required)

- Tech 302 – Graphical Presentation and Communications
- Tech 395 – Industrial Data Processing
- Tech 404 – Supervision in Industry
- Tech 429 – Plant location, Layout, and Materials Handling
- Tech 434 – Human Factors in Industrial Accident Prevention
- Tech 391 – Industrial Quality Control
- Tech 496 – Industrial Project Management

Elective courses (3 required)

- Tech 402 – Industrial Training and Evaluation
- Tech 442 – Work Simplification and Measurement
- Tech 443 – Engineering Economy
- Tech 444 – Production Control Systems
- Tech 484 – Energy Management

- Tech 492 – Applications in Supply Chain Management
- Tech 432 – Disaster Preparedness
- Tech 436 – Design and Administration of Industrial Safety Programs

Within this off-campus program, students may be required to take additional coursework depending upon the total number of courses accepted in transfer. If additional NIU credits are needed, students can take additional NIU elective courses (listed above) which are offered at off-campus locations.

Off-Campus Program Development

To date, the Department of Technology has developed one off-campus Industrial Technology program, which has been delivered in the Rockford, Illinois region; a metropolitan area about 25 miles from the university's main Dekalb campus. The program offered in Rockford has grown to over 100 students in about 5 years. During this time, the Department has offered a combination of live and distance video courses to satisfy the needs of the program [6]. However, the addition of this new distributed community college model has necessitated a major change in the mode of course offering. To satisfy the off-campus need of this program, several departmental faculty members have obtained external funding to develop web based courses. The following courses have been developed for web based delivery in this program,

- Tech 432 – Disaster Preparedness
- Tech 429 – Plant location, Layout, and Materials Handling
- Tech 391 – Industrial Quality Control
- Tech 492 – Applications in Supply Chain Management

In addition to web-based delivery, the following courses were developed for distance video distribution at remote NIU facilities,

- Tech 442 – Work Simplification and Measurement
- Tech 443 – Engineering Economy
- Tech 444 – Production Control Systems
- Tech 484 – Energy Management

Through these eight courses, the department has the ability to provide for the off-campus degree completion program using minimal departmental resources. This is made possible, due to the fact that each of the above courses is taught by NIU faculty or adjuncts to both on- and off-campus students. It should be noted that the cluster of community college program will commence in the fall 2006 semester, and the off-campus Rockford program has been offered over the past 8 years. The addition of both distance video and web based delivery allows the department to offer these quality programs in a cost effective manner. This program will provide accessible undergraduate education to non-traditional older working students, as well as traditional students who are place bound due to work and family commitments. In addition, the scheduling of the courses will provide non-traditional timing of course offerings utilizing weekend and evening scheduling.

Issues in Providing a Seamless Transition Between Institutions

- Articulation

One of the main issues in the transfer process either between 2-year schools or between 2- and 4-year schools is course articulation. Approximately 40% of the students entering the NIU Department of Technology on-campus programs transfer from a 2-year college; this number increases to 100% in the off-campus programs. The issue of articulation must be addressed prior to the development of any off-campus program. In this case, the department is dealing with seven community colleges which will feed this off-campus program. Since each individual college maintains its own curriculum and curricular process, the articulation process is both difficult and delicate. In the articulation, one must examine content and prerequisites, as well as other accreditation concerns including assessment and outcomes. The State of Illinois has developed a statewide articulation initiative in nearly all content areas, which assists students in determining coursework that will transfer between each institution [7]. This process looks at the groupings of courses that students should be taking at each institution to ensure that, upon transfer, the courses transferred will apply at the universities and the proper prerequisites will be fulfilled. In addition to the statewide articulation initiative, articulation efforts are also in place between each university and each community college. This process examines course level information, rather than programmatic issues to enhance the ability to transfer from one institution to another.

Peer-to-peer articulation agreements are the main form of articulation that will be used at for the NIU off-campus programs. For these agreements, the community colleges provide course information, typically the course syllabi, to the four-year institution. The four-year school's transfer coordinator then sends the information to the proper department for their decision on whether the course meets the Department's course requirements and assessment models used [8]. After the process is complete, the transfer office compiles a listing of all of the articulated courses from each Community College. This articulation information is then made available to all parties that rely upon the transfer of coursework (http://www.reg.niu.edu/regrec/Com_Coll/Handbook.htm). Figure 2 shows one group of articulation entries for the CDT program offered at RVC and the courses that transfer to NIU.

ROCK VALLEY COLLEGE		
CATALOG YEAR: 2001- 2003 NIU CATALOG: 2003-2004 DATE: JULY, 2003		
EFFECTIVE FOR COURSES TAKEN FALL 2003, SPRING 2004, AND SUMMER 2004. PAGE: 4 OF 12		
COMMUNITY COLLEGE COURSE NUMBER/TITLE	NIU SUBSTITUTION	IAI CODE
COMPUTER-AIDED MECHANICAL DESIGN TECHNOLOGY (CDT)		
103 MATERIALS OF INDUSTRY	TECH 393	MTM 912
104 MANUFACTURING PROCESSES	TECH EL	MTM 913
141 DESCRIPTIVE GRAPHICS	TECH EL	
142 TECHNICAL GRAPHICS	TECH EL	
150 INTERPRETATION OF INDUS DRAWINGS	TECH EL	
211 INDUSTRIAL ORG AND OPERATION	TECH EL	
220 MECHANISMS (220 + 221)	TECH 214	
221 MACHINE DESIGN (221 + 220)	TECH 214	

Figure 2 – Articulation of courses from RVC CDT program into NIU

In order to provide all of the program students with the appropriate number of transfer courses, the authors have been working with the administration from the seven community colleges shown in Table 1 and Figure 1. The ultimate goal is to work with these institutions to minimally modify their programs where needed to provide similar matches to the NIU on-campus curriculum, and thus, the students will receive the full 66 hours of transfer for the 66 hours required for the completion of the AAS degree. Therefore, there will be very few credits lost in the transfer process.

- Advising

Typically, after obtaining their AAS degree from the community college, the students apply to NIU through the main Admissions Department process. During this process, all of the courses are examined and compared to the specific college articulation agreements which are in place. Due to the fact the NIU Department of Technology maintains numerous undergraduate programs within the technology realm, and as such, the department cannot provide articulation for a course unless it can be applied across all of the programs within the department. Therefore, there are many technology courses and general courses which are not articulated by the admissions process. After the admissions process, the departmental off-campus advisor examines the transcripts for additional courses that could be accepted for transfer into the program. At the conclusion of the process, the student is given a check-off sheet which outlines the requirements remaining for completion of the program. The students are required to take the 30-36 upper level credit hours within the NIU Department of Technology, as shown previously. Typically, the students are instructed that they need additional foundations courses including,

- | | | |
|---------------------|---------------------|-------------------|
| ○ Chemistry | ○ Math | ○ Computer-Aided- |
| ○ English | (Trigonometry) | Design |
| ○ Technical Writing | ○ Statistics | ○ Basic |
| ○ Physics | ○ General education | Manufacturing |
| ○ Accounting | course (6 required) | ○ Electronics |

Upon matriculation at NIU, the students typically need about 22-24 courses to complete their B.S. degree, where half of the courses are taken at the NIU off-campus facility and the other half at the community college. Since the NIU advisor can only see courses which have been taken at NIU and courses that have been accepted for transfer, issues arise in advising students while they are taking courses at the community college. Typically, these students take 1-2 courses per semester, and thus, they may not take NIU courses for a long stretch of time. Thus real time advising is impossible! To solve this advising issue, the Department of Technology is in the process of obtaining funding to develop computer software which will interface with the Records and Registration programs at the seven community colleges involved in the partnership and NIU. The student will have the ability to logon to the system and see which program courses are completed and which are still left to complete. Thus, the students will have access to real-time information in developing their path to completion.

- Course databases

The other issue that affects the students in the off-campus program is the availability of courses at the community college. The typical student in the off-campus program is

employed full-time, either working or living in the general vicinity of the community college. As such, the students may find themselves working and living near different colleges. Further complicating the situation is the fact that some colleges do not offer certain required courses, and the times at which they are offered vary between colleges. Thus, students may have trouble finding times at which courses are offered at various colleges, and which course is offered at each college. This is especially true when dealing with a cluster of seven community colleges which are feeding the off-campus program. To rectify this scheduling issue, the authors are developing a partnership database which provides the students with time and location of each of the required courses. This database will greatly simplify the process of finding the needed time and location of programmatic courses that are required in the NIU technology off-campus program which is being developed.

Conclusion

There are numerous paths to a technical degree in the areas of Technology. In most cases, students either obtain a 2-year AAS degree from a regional community college or a 4-year degree from a university. Typically, issues arise when students who have obtained an AAS degree attempt to obtain a 4-year degree using the work completed at the 2-year level. This transfer process is gaining a wide acceptance as the students examine cost and accessibility issues associated with higher education, and thus issues like location, costs, program content, and articulated coursework must be solved in order to provide accessibility to these transfer students. To provide the needed cost-effective, quality education to this group of students, Northern Illinois University's Department of Technology has developed a unique partnership with seven regional community colleges. This community college cluster has been formed around one of the Universities off-campus facilities which are centrally located within the community college cluster. Based upon this cluster, the department has developed a unique nearly 3+1 off-campus Industrial Technology program. The total number of credits needed for graduation is 120, where approximately 80-90 credit hours are taken through the nearby community college, and the remaining hours are taken at the NIU facility. The program is offered through live, web-based, and distance video formats. Through all of the delivery formats used, students will have a blend of teaching styles and required and elective courses needed to provide them with quality instruction leading to completion of the IT degree. There are several important issues which must be tackled in order to make this a seamless program. The issues of articulation, assessment, and advising must be addressed in order to provide a student-oriented program.

This type of undergraduate degree-completion off-campus type of technology program is competitively placed to serve the region and allows NIU, the College, and Department of Technology to take a leadership position in the offering of undergraduate degrees within the region. The other major benefit to this program is the fact that the off-campus working graduates of this program will provide a market for the NIU Department of Technology Masters degree, which is also taught at various distance sites.

Bibliography

1. Cliff Mirman, C.R. and Skattum, G. Community College/University Articulation- A Programmatic Approach in Engineering and Technology, *Presented at the 2004 ASEE Regional Conference*, Valparaiso, Indiana, February 2003.

2. Barger, M., Goff, G., and Rogers, H. Bridging a Gap: A.S. to B.S. Articulation in Florida. *Proceedings of the 2003 ASEE Annual Conference and Exposition*, Nashville, Tennessee, June 22-25, 2003.
3. Newman, R., Munukutla, L., and Robertson, J. Building Bridges with Community Colleges “Partnering for Educational Success”. *Proceedings of the 2002 ASEE Annual Conference and Exposition*, Montreal, Quebec, June 16-19, 2002.
4. Hawat, G. and Regis, H. Articulated Pre-Engineering Programs: How Community Colleges can be Effective Partners with Universities to Deliver Engineering Curriculum to Students *Proceedings of the 2002 ASEE Annual Conference and Exposition*, Montreal, Quebec, June 16-19, 2002.
5. Juliano, T.M., Rockland, R.H., Bloom, J.S., and Gonzalez, G. Enhancing the pre-engineering curriculum - a multi-partner initiative. *Proceedings of the 2003 ASEE Annual Conference and Exposition*, Nashville, Tennessee, June 22-25, 2003.
6. Hines, J.W., Weber, F.E., Prados, J.W., and Gramoll, K. Transfer Facilitation for Engineering Students Through Distance Education. *Proceedings of the 2003 ASEE Annual Conference and Exposition*, Nashville, Tennessee, June 22-25, 2003.
7. State of Illinois Articulation Initiative - www.itransfer.org
8. Mirman, C.R. and Vohra, P. Programmatic Assessment within an Engineering Technology Program, *Proceedings of the 2003 ASEE Annual Conference and Exposition*, Nashville, Tennessee, June, 2003.