
AC 2011-2074: INTERNATIONAL ARTICULATION ISSUES AN ENGINEERING TECHNOLOGY EDUCATION RESPONSE TO GLOBAL CHALLENGES

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International Articulation Issues an Engineering Technology Education Response to Global Challenges

As part of Northern Kentucky University's (NKU) strategic plan in 2007-2012, the university stated – that increasing globalization will require the university to become more international in scope. In accordance with this policy the engineering technology division has undertaken international student recruitment efforts and articulation agreements with universities abroad.

This paper will discuss challenges in formulating such articulation agreements while maintaining the integrity of existing accredited programs. The paper explains what it means to internationalize a campus? The paper will also discuss types of experiences necessary to infuse global perspectives into the curriculum and build successful international education programs.

Introduction - Internationalizing the Campus

NAFSA – Association of International Educators is an organization committed to the notion that the world needs to be a prosperous place for all citizens around the globe, aiming for a better understanding of others through education. [North Carolina document]. As part of its mission, NAFSA promotes association of individuals worldwide in advancing international education and exchange of global workforce development. The organization believes that international education does not just open eyes, it also broadens perspectives.¹

Annually, institutions that have well integrated international campuses submit proposals to NAFSA to be judged based on their campus internationalization efforts. Among the institutions that apply, few are selected to receive the Paul Simon award. Some of the criteria used to select these institutions include internationalization of the campus across all schools, divisions, departments, and disciplines, broad-level support for internationalization, demonstrable results of internationalization for students, international education as part of the institution's mission and goals, faculty involvements in the internationalization efforts, evidence of international dimensions in some research conducted along with faculty exchange activities and student, faculty, and scholars international activities and study abroad program supported and valued by the institution.²

As American higher education becomes less competitive and less financially affordable, the possibility and benefits of international education for American students becomes a more attractive and necessary measure. The focus of this article is to look at the study abroad aspect of internationalization. Global education has been described as a portable education for activity in a globalized economy. It is a way to educate students for a global citizenship. It is important to distinguish between internationalization and globalization, by explaining that international education often seems to mean inter-national education.³

The experience of international education has practical implications, both in the short term, as well as long term, on what is taught at NKU. Curricula need to be designed to address the

requirements of American students as well as students from different countries with differing cultures.

Challenges Internationalizing a State University with Majority Commuter Students

Northern Kentucky University is one of the Kentucky State universities. The university was established in 1968, and currently enrolls more than 15,000 students. Located seven miles south of downtown in the Greater Cincinnati area, a large percentage of students attending NKU are commuter students. NKU students are often the first-generation in their families to enroll in university. Many are part time students, working full time, and attending college on part time bases. The combination of factors in some cases prolongs their degree completion, and complicates study abroad opportunities.

A similar institution to NKU in enrollment and commuter type campus is Northeastern Illinois University (NEIU). NEIU has succeeded in creating a comprehensive strategy and effective programs through a decade of steady expansion. According to the published report in 2004, over 400 NEIU students had participated in 23 International Study Tours to 15 countries including Belize, England, India, El Salvador and Jamaica.⁴

NKU offers study abroad opportunities in over 30 countries. The International Education Center is composed of the Office of Education Abroad, the Office of International Students and Scholar, and the Office of American English Language Programs. There are five different programs provided under the Office of Education Aboard. These programs are: 1) Academic Exchanges, 2) Short-Term Programs, 3) Cooperative Center for Study Abroad, 4) Kentucky institute for International Studies, and 5) International Student Teaching Program.⁵

NKU offers two TAC-ABET accredited bachelor degree programs in Mechanical and Manufacturing Engineering Technology. One of the university visions for growth is the internationalization of the campus. The International Center at NKU has a mission to:

“Develop and promote global perspectives through engagement in the international arena and to become a regional resource for global initiatives. NKU achieves its international mission through high quality study abroad experiences; international student recruitment, retention and involvement; an international curriculum; international scholar exchanges.”⁵

A letter was written to the NKU executive administrator in 2006, expressing ideas for internationalization of the campus. Some of the highlights of the letter included; Greater Cincinnati including Northern Kentucky area is home to a number of multinational Companies such as GE, P&G, Toyota, and some smaller companies. One of the key features of large corporations is their capability to conduct research and development (R&D) work that is hard to match by the R&D activities conducted in most universities. While the majority of these activities are proprietary and not shared, regional higher education institutions, including NKU are perceived to be a hub for exchange of some R&D activities. This in turn is believed to help

foster research in fields valued by the universities as well as the multi-national companies located in the greater Cincinnati area. It is also believed that a closer collaboration between local industries and universities could create environments suitable for scientists, engineers and other graduates needed to stay competitive in the global world markets.

Working with Multinational companies would help further internationalization of the university. There needs to be a cohesive effort to provide opportunities for faculty and staff to work with other higher education institutions abroad on joint degree programs. Faculty members should be encouraged to teach in other countries during their sabbatical and on random bases. This could be accomplished with closer cooperation with multinational companies through joint projects. Another method used to increase internationalization activities is through establishment of extension offices in Developing countries and start to offer courses toward degree programs from NKU.

Scientists, engineers, and staff working in industry should be sent overseas on a normal basis to help carry-out projects in other countries. NKU should work with these companies to learn how to expand its horizon and in turn, produce graduates who are truly versatile and effectively functioning in various environments.

In an effort to help carry out this mission, NKU created an International Education Council consisting of faculty, staff and students. In addition, all international travel authorizations are processed through the Center. This enables the Center to leverage current faculty time abroad to support international efforts and planning already taking place on campus. Faculty are invited to make visits to potential university partners, help establish individual exchange cohorts, and meet with government agencies that sponsor fully funded international students during already scheduled trips abroad.

The letter sent to the president also suggested that NKU should facilitate interested students to study and Co-op with companies abroad on a normal basis. It takes time for a person to understand other cultures and function within a different environment. By being exposed to a different culture, for a short amount of time, an individual goes through a cultural shock. That is the first stage of a broader understanding of a particular culture.

Infusing Global Perspective in the Course Curricula

Infusing global perspective into course curriculum is an essential part of internationalization. Designing the understanding of globalization in curriculum “is not a single goal but a family of interrelated abilities” for students.⁶ In curriculum design the goal for clear student understanding through the means of good curriculum design has raised a number of vital questions. One of the proposed methods is to design a curriculum and instruction to engage students in inquiries that promotes transfer of knowledge by means of a conceptual framework for students to make sense of discrete facts and skills in dealing with global issues.

The curriculum is at the center of any attempt in internationalization.⁷ Buczynski (2010), lists the objectives for a course to be designed with a global perspective:

- Learn to respect, to value and to celebrate other cultures.
- Learn about developing countries and their issues in a positive way.
- Become socially and environmentally responsible, by learning about their interdependence with other peoples and species.
- Gain a positive outlook on their role in making the world a more peaceful and just place
- Global Education clarifies connections to real life.

Articulation agreement with Al-Jubail Industrial College (JIC)

In line with the views expressed above, the author worked with the Office of International Students and Scholars, to draft an articulation in 2010. The articulation agreement was signed between NKU and Al-Jubail Industrial College (JIC) in August 2010 after a visit to Saudi Arabia in the previous year. Al-Jubail Industrial College is part of the international higher education consortium in Saudi Arabia. The institution offers 2-year and 4-year degrees, primarily in different Engineering Technology fields. JIC was established in 1978 and currently offers 12 associate degree programs plus 4 bachelorette degree programs.⁸

Curriculum / Equivalencies / Transferability

The curricula designed need to address questions of quality and competency in terms of ‘best international practice’.⁴ Designed courses need to be characterized by professionalism and quality as judged by international and accreditation benchmarks. Courses designed to comply with international accreditation benchmarks are more likely to promote comparative international academic contents valued among both educators and students.

The articulation program with JIC is similar to a 2 + 2 agreement, where student transfer close to two years of college credit hours toward their bachelor degree at NKU. The number of hours transferred depends on the student’s major in their associate degree program and the bachelor’s degree program courses being transferred.

In the beginning stages of the articulation, JIC sent a copy of all course syllabi, their catalog, and assessment related materials. Courses were evaluated in comparison to NKU curriculum to ensure that students would have the background and knowledge (prerequisites) necessary to be successful in their studies at NKU.

JIC Technology Programs are not currently accredited by TAC-ABET. However, documents provided by JIC indicate that the institution is in its primary stages of accreditation preparation process. Documents provided shows JIC shadowing curriculum designs similar to ABET accredited institutions such as Michigan Technology University (MTU), and The University of Main (UOM). ABET non-U.S. accreditation is still relatively new with the first visits taking

place in 2007 within Saudi Arabia and early reports show that the process is filled with cultural challenges.⁹

Faculty:

Review of the JIC faculty credentials' indicated that majority (>95%) held Masters and/or Doctorate degrees. About 40% of the faculty received their higher education / terminal degrees from U.S. or other western countries.

To further ensure a smooth transferability of the courses, a proposal is being considered to exchange faculty/administrators between the two institutions. Under this proposal, one of the Engineering Technology faculties would visit JIC for a semester in return for a qualified JIC faculty to teach at NKU.

Transferability and Student Performance Entering the EGT Programs:

At present there are about 75 students who have transferred due to the articulation agreement with JIC. Approximately, half of these students have entered the Mechanical and Manufacturing Engineering Technology or Electronics Engineering Technology programs at NKU. The other half are currently going through the intensive English program.

Transfer of credit is described as a process for coordinating the linkage of institutions within a community or across national and international borders to help students make a smooth transition between institutions and from one program to another with limited duplication of courses.⁸

The academic performance of JIC transfer students observed so far, indicate satisfactory level of academic preparation. However, students often find aspects of the American system of higher education different and difficult. This is especially true in the case of academic advising. Some of these common adjustment issues has also been noted by DePauw University and adapted from *The Handbook of Foreign Student Advising*, by Gary Althen which notes the following adjustment issues for international students:

Selecting from a number of possible courses rather than following a prescribed curriculum.

Specializing later, rather than earlier, in the undergraduate program (having to take courses outside one's area of interest in order to obtain a "liberal arts" education).

Being assigned an academic 'adviser' rather than simply being told the specific courses and the order in which they must be taken.¹⁰

The followings are transferred credits from one of the JIC students in the Mechanical and Manufacturing Engineering Technology Program

ART 100	Art Appreciation	2010-2011	Not Transferred	3.00
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EGT 320	Robotic Systems and Material Handling	2010-2011		Not Transferred	3.00
EGT 340	Applied Dynamics	2010-2011		Not Transferred	3.00
ENGD080	Writing Lab	2010-2011		Not Transferred	1.00
ENGD090	Writing Workshop	2010-2011		Not Transferred	3.00
PHI 194	Global Ethical Viewpoints	2010-2011		Not Transferred	3.00
AELP000	Non-Credit/American English Lang	2010-2011		Not Transferred	0.00
CHE 120	General Chemistry I	2010-2011	D	Transferred	3.00
CHE 120L	General Chemistry I Lab	2010-2011	D	Transferred	1.00
EGT 100T	Elective Transfer Credit	2010-2011	A	Transferred	1.00
EGT 100T	Elective Transfer Credit	2010-2011	C	Transferred	3.00
EGT 100T	Elective Transfer Credit	2010-2011	B	Transferred	1.00
EGT 100T	Elective Transfer Credit	2010-2011	C	Transferred	3.00
EGT 100T	Elective Transfer Credit	2010-2011	B+	Transferred	3.00
EGT 116	Intro to Industrial Materials & Process	2010-2011	C	Transferred	4.00
EGT 161	D.C. Circuit Analysis	2010-2011	C+	Transferred	3.00
EGT 161	D.C. Circuit Analysis	2010-2011	B	Transferred	2.00
EGT 200T	Elective Transfer Credit	2010-2011	B	Transferred	1.00
EGT 265	Manufacturing Processes and Operations	2010-2011	B+	Transferred	3.00
EGT 300	Statics and Strength of Materials	2010-2011	B	Transferred	3.00
ENG 110	English for International Students I	2010-2011	C	Transferred	3.00
ENG 111	English for International Students II	2010-2011	A	Transferred	3.00
ENG 200T	Elective Transfer Credit	2010-2011	B	Transferred	3.00
GGV 200G	General Education Credit	2010-2011	A	Transferred	1.00
INF 120	Elementary Programming	2010-2011	A	Transferred	2.00
MAT 119	Pre-Calculus Mathematics	2010-2011	B+	Transferred	3.00
MAT 129	Calculus I	2010-2011	B	Transferred	4.00
NCD 100T	Elective Transfer Credit	2010-2011	C+	Transferred	3.00
PHY 211	General Physics with Lab I	2010-2011	C	Transferred	4.00
PSY 100	Introduction to Psychology	2010-2011	D+	Transferred	2.00

The above transfer student has received 32 credit hours toward his major and 6 credit hours toward General Education requirements. The student needs to take another 58 credit hours toward his major requirements, and another 15 credit hours toward the General Education requirements. The following is the list of the remaining courses as part of the MMET degree requirements:

EGT211, EGT 212, EGT261, EGT 310, EGT310, EGT318, EGT 320, EGT340, EGT 365, EGT 380, EGT 417, EGT 423, EGT 450, EGT 412, EGT462, EGT 465, Phy213, and Stat 205, plus the remaining general education requirements to complete his degree.

The followings are the number of credit hours transferred for students transferring with an associate in:

ELET from JIC – to the BS in Electronics Engineering Technology:

CREDITS	CREDIT HOURS
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Transferred hours toward major	38
General Education courses transferred	10
Remaining General Education courses	27
Remaining courses in the major to complete at NKU	50
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Total credits required for B.S. in EET	125

Instrumentation and Control Engineering Technology (ICET) from JIC – to the BS in Electronics Engineering Technology:

CREDITS	CREDIT HOURS
Transferred hours toward major	41
General Education courses transferred	10
Remaining General Education courses	27
Remaining courses in the major to complete at NKU	47
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Total credits required for B.S. in EET	125

Mechanical Maintenance Engineering Technology (MMET) from JIC – to the BS in Electronics Engineering Technology:

CREDITS	CREDIT HOURS
Transferred hours toward major	32
General Education courses transferred	10
Remaining General Education courses	27
Remaining courses in the major to complete at NKU	56
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Total credits required for B.S. in EET	125

Manufacturing Engineering Technology (MET) from JIC – to the BS in Electronics Engineering Technology:

CREDITS	CREDIT HOURS
Transferred hours toward major	38
General Education courses transferred	10
Remaining General Education courses	27
Remaining courses in the major to complete at NKU	50
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Total credits required for B.S. in EET	125

Conclusion

The global economy, which ultimately governs many aspects of our life today, demands a new perspective of the world. U.S. higher education institutions, to a large degree have been in the forefront of international education, and have hence attracted the best brains from around the globe. However, internationalization of university campuses requires more genuine efforts in the implementation of policies, and integration and design of curricula that intrinsically teach every student to understand other cultures and feel comfortable working with their peers from around the globe.

In order to internationalize institutions, there is a need to undertake articulations between programs, strengthen study abroad as one of the requirements of general education, invitation of scholars from around the world on a regular basis, and establishment of close cooperation with multi-national companies. The level of research conducted by the multi-national companies facilitates internationalization of university campuses. Companies such as GE, Proctor & Gamble, Toyota, and Mazak have branches around the world and are in need of students with the skill set to design innovative products that are able to compete with other products produced around the world. These companies manage to stay ahead of local and/or foreign competitors despite the differences in their customers' cultures, languages, and religions.

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