

PUBLIC SUBMISSION

As of: 5/2/19 10:32 AM Received: April 19, 2019 Status: Pending_Post Tracking No. 1k3-99fp-y42m Comments Due: May 13, 2019 Submission Type: Web
--

Docket: NSF_FRDOC_0001

Recently Posted NSF Rules and Notices.

Comment On: NSF_FRDOC_0001-2280

Agency Information Collection Activities; Proposals, Submissions, and Approvals: Generic Clearance of the National Center for Science and Engineering Statistics Improvement Projects

Document: NSF_FRDOC_0001-DRAFT-0393

Comment on FR Doc # 2019-04478

Submitter Information

Name: Paul Clark

Address:

4135 Manor Drive

South Bend, IN, 46614

Email: clark620@purdue.edu

Phone: 7657726335

General Comment

Equal access to education is important to all however there are still areas of academia that are restrictive. The natural progression of achieving the associates degree after high school, and before advancing to higher distinctions, is supplied with a technology accreditation that renders the student at a disadvantage. Specifically, in comparison to their ABET/EAC counterpart for the path of professional engineering in a predominant percentage of the national programs. In these states, the low income student must supplement their technology courses with additional criteria, to meet the professional engineering exam requirements, which is frequently analogous to achieving the next level of academic distinction.

Attachments

Guarded Gate 2019

Engineering programs by sector and credentials - AACC Data - December 11 2015

THE GUARDED ENTRY OF U.S. ENGINEERING

Paul R. Clark, MBA

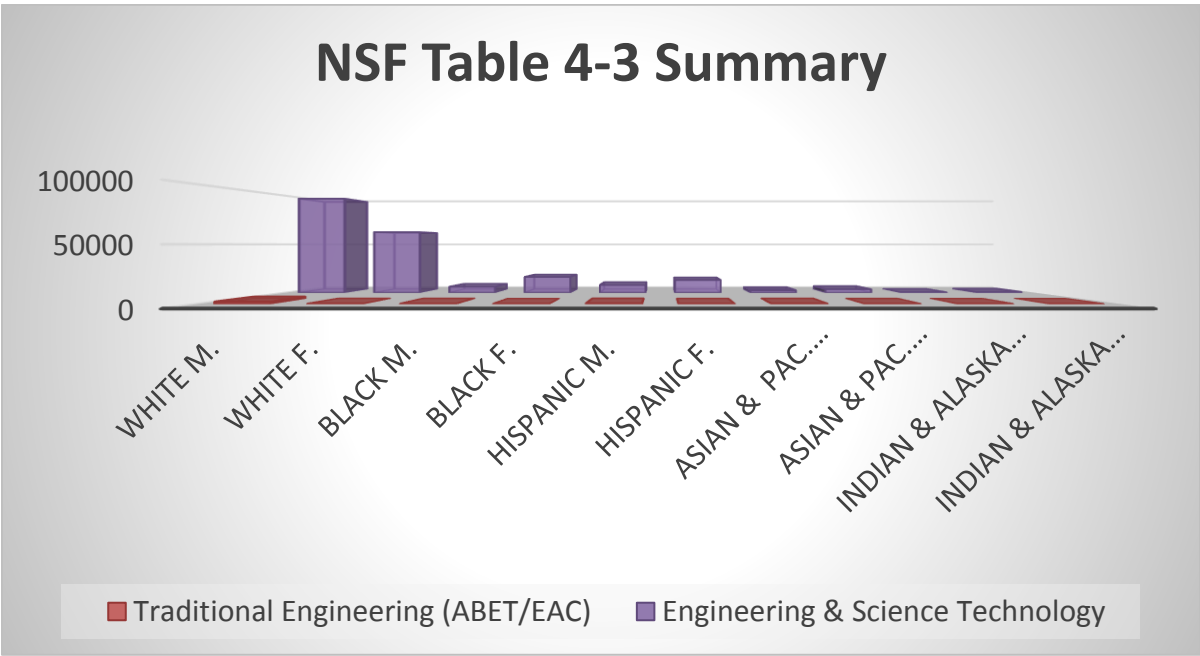
Abstract

Equal access to education is important to all however there are still areas of academia that are restrictive. The natural progression of achieving the associate's degree before advancing to higher distinctions is supplied with a technology accreditation that renders the student at a disadvantage. Specifically, in comparison to their ABET/EAC counterpart for the path of professional engineering in a predominant percentage of the national programs. In these states, the low income student must supplement their technology courses with additional criteria, to meet the professional engineering exam requirements, which is frequently analogous to achieving the next level of academic distinction.

I. Introduction

A review of the National Science Foundation, TABLE 4-3. S&E and S&E technologies associate's degrees awarded, by sex, citizenship, race or ethnicity, and field: 2012 data reveals that a cultural separation has

occurred between technology and traditional engineering students at the associate's degree level. Furthermore, national stratification has materializes with the comparison of four year and two year students in the engineering fields.



The total number of associates degrees awarded in all engineering related fields were (169,169).

- Of these programs the most were in science and engineering technologies (165,631).

- Accredited traditional engineering degrees awarded were reported to be (3538).
- 97.9% of the programs achieved were science and technology based degrees.

Hanover Research indicates the follow:

“Community colleges, for instance, are the typical entry point for first-generation, low-income, racial-ethnic minority, and non-traditional-aged students. Additionally, community college students tend to be financially disadvantaged compare to their peers at four-year institutions. (Parkard, 2011, p.2 and Lloyd and Eckhardt, 2010, p.1).” (Hanover 2012, p.4)’

The disadvantaged students obtain an associate’s degree before a bachelor's degree.

“Today, many students are looking to obtain an associate’s degree before going on to get a bachelor’s degree. This approach offers significant financial advantages. This natural progression for many engineering technology students begins right after obtaining their associate degree or after having been employed with a company for a short time. There needed to be more opportunities for technology-oriented students wishing to pursue an engineering related discipline, but are not quite ready for the rigors of a four year baccalaureate program.” (Gray, G. & Dandu, R.,2004, p1).

II. Offerings

The disadvantaged students are provided access to associate degrees accredited as engineering technology programs in 88% of the offerings when comparing the CIP 14-

XXX to the CIP 15-XXX categories. The information was extracted by the American Association of Community Colleges from the Integrated Postsecondary Education Data System (AACC, 2015). The disadvantaged student must attend a four year institution to afford a clear opportunity to choose between the two accreditation options. The programs at this level are accredited with the engineering technology distinction in 34% of the four year institution offerings.

Geographic location becomes an issue for student(s) who wish to attend an undergraduate traditional engineering program. If transportation is a factor the student will consider the option of online degree programs. The Sloan Foundation reveals the following issue with fully accredited traditional education.

“While close to 320 engineering schools in the US have received accreditation from the Accreditation Board for Engineering and Technology (ABET) for their undergraduate programs, only two institutions offer undergraduate engineering programs that are almost completely online (Sloan, 2012, p1).”

III. Student Finance

The affordability of the four year institution becomes an obstacle to financially disadvantaged student.

“States, in particular, must confront the challenges of college affordability. Their most underserved populations are among the least able to afford the continuous escalation of tuition, the least likely to enroll in college, and the least likely to complete degree and certification programs if they do enroll. The students from these groups who do

enroll usually choose the most affordable option – community colleges.”

“Because so many students who seek a bachelor’s degree begin at community colleges initiatives to improve four-year baccalaureate completion should incorporate policies and practices that explicitly address college affordability and transfer (National Center for Public Policy and Higher Education, 2011, P1).”

The goal of satisfying the academic criteria to sit for the professional engineering licensing exam is a difficult path for engineering technology graduates. The following paragraph defines one method that addresses this concern.

IV. College Credit and Transfers

The Milwaukee School of Engineering offers an electrical engineering AAS-EET to BSEE transfer plan. The program will allow the student to achieve a BSEE with approximately 184 credit hours. The important point to realize is that the credit hour requirements to convert from engineering technology to the traditional engineering curriculum is greater than the dual credit program at Purdue University. Purdue University offers a dual degree program with the completion of approximately 172 credit hours to achieve the BSEE/MBA program (Purdue, p1, 2015). The Purdue BSEE is offer with approximately 125 credit hours (Purdue NC, p1, 2015).

V. Licensing Restrictions

The secondary path is to finish the four year engineering technology degree and add the required credit hours to satisfy the curriculum

to meet the requirements of the Professional Engineering Licensing exam. The National Society of professional Engineers indicates the following:

“This distinction between engineering and engineering technology is acknowledged in several ways. For example, ABET establishes separate accreditation criteria for each program. The criteria prohibits an accredited engineering technology program from claiming that it gives its graduates the equivalent of an engineering education” (NSPE, 2014, p1).

The NCEES indicates the following criteria is necessary to satisfy the non-ABET/EAC route.

“Applicants having engineering degrees from programs that are not accredited by the Engineering Accreditation Commission (EAC) of ABET must demonstrate the following:

- A. 32 college semester credit hours of higher mathematics and basic sciences.
- B. 16 college semester credit hours in general education that complements the technical content of the curriculum.
- C. 48 college semester credit hours of engineering science and/or engineering design courses.

Engineering technology courses cannot be considered to meet engineering topic requirements (NCEES, P1, 2016).”

VI. Market Demographics

Adam Davidson of The New York Times indicates the following:

"An estimated 21 million students attend at least some classes in a postsecondary institution. Like many categories of consumer products, though, colleges and universities do not constitute a single, cohesive market.

The larger industry can be broke down into at least three distinct higher-education markets whose offerings, customers and business priorities share little overlap. One of them comprises the 200 or so highly selective schools with national, and even international, reputations. These include the most elite schools, like the Ivies, but also any private institution with especially strong brand recognition.

Such schools enroll between 2 percent and 10 percent of all postsecondary students, depending on how "elite" is defined, and taken together they show all the hallmarks of a well-functioning competitive market....

The next educational marketplace consists of the large regional powerhouses, home to another 20 percent or so of the higher-ed student population. Usually public, with names that often begin with "University of," these schools have strong reputations in their home states and often among the residents in neighboring states...

Finally, there are the nonselective public, community and private for-profit colleges that admit nearly every paying applicant. A vast majority of people pursuing postsecondary education will start in these schools. They vary greatly in quality. Some provide a solid education, especially in technical expertise, that can lead to higher-paying, skilled jobs in manufacturing, health care and other fields. (Davidson, 2015)."

It is significant that Adam Davidson has indicated the components of the non-cohesive market. It indicates that four year programs are considered to be a separate market from the two year education programs. The community college student(s) are provided ABET/EAC accredited classes in 12% of the course offerings (as previously indicated with AACC data) this may represent an institutionalized marginalization of the same population that Hanover Research indicates, "Is the typical entry point for first-generation, low-income, racial-ethnic minority, and non-traditional-aged students (Hanover Research, 2012)."

The accreditation discrepancy is amplified when attempting to qualify for the professional engineering license in some states that do not directly recognize non-ABET/EAC course credits.

Qualifying to sit for the (EIT/FE) and other licensing criteria are occasionally analogous to or greater than achieving the next level of degree distinction. This can be an additional financial burden to those that may come from lower income roots.

Conclusions

The AACC information provides evidence that there is a deficiency in the associate level academia for the acknowledgement by the engineering licensing boards in the states that do not recognize technology credits. The deficiency creates a counter intuitive academic avenue for professional engineering that opposes the natural progression of low income students. The structure creates a stratification of the U.S. population. The market demographics and student financial status inhibit students from entering into ABET/EAC four year programs directly and therefore are less effective in allowing minorities and working class adults from participating in the professional engineering field.

References

NSF (January, 2015). TABLE 4-3. S&E and S&E technologies associate's degrees awarded, by sex, citizenship, race or ethnicity, and field: 2012

Retrieved December 2015 from

<http://www.nsf.gov/statistics/2015/nsf15311/tables/pdf/tab4-3.pdf>

Hanover Research (April 2012) STEM Programs at Community Colleges

Hanover Research, Academy Administration Practice, Washington, DC

Retrieve on December 23, 2015 from

<http://www.hanoverresearch.com/wp-content/uploads/2012/04/STEM-Programs-at-Community-Colleges-Membership.pdf>

Gray, G. & Dandu, R. (2004). A Process Model for Establishing Engineering Technology Programs at Technical Colleges. Applied and Engineering Technology Division

Wichita Area Technical College & Engineering Technology Department

Kansas State University – Salina, [Proceedings of the 2004 American Society for Engineering Education Midwest Section Conference](#). Retrieved January 24, 2016 from

https://www.asee.org/documents/sections/midwest/2004/Process_Model_for_Establishing_Engineering.pdf

AACC. (December 2015) National Program Lists of Associates Degrees for (CIP 14.XXX) Technician / Technology & (CIP 15.XXX) Engineering Categories (academic year 2103-2014). Spreadsheets provided on Dec 14, 2015 from The American Association of Community Colleges Washington, DC through data compiled from Integrated Postsecondary Education Data System (IPEDS) <http://nces.ed.gov/ipeds>

Sloan Foundation. (2012) Changing the dynamic of engineering education.
18th Annual Sloan Consortium, International Conference on Online Learning.
Retrieved June 16, 2014, from
<http://sloanconsortium.org/conference/2012/aln/changing-dynamic-engineering-education-through-technological-advancements-classr>

National Center for Public Policy and Higher Education (June 2011). Affordability and Transfer: Critical to Increasing Baccalaureate Degree Completion. Policy Alert. San Jose, California
retrieved on January 6th, 2016 from the http://www.highereducation.org/reports/pa_at/

MSE (2015). Electrical Engineering AAS-EET to BSEE Transfer Plan.
Milwaukee School of Engineering, North Broadway, Milwaukee, WI.
Retrieved on May 8, 2015 from
http://catalog.msoe.edu/preview_program.php?catoid=6&poid=263&returnto=146

Purdue University. (2015). BSEE/MBA Combined Degree Fact Sheet.
Purdue's College of Engineering and the Krannert School of Management.
Lafayette, IN, Retrieved on May 8, 2015 from
<http://www.krannert.purdue.edu/masters/programs/combined-degree-programs/bseemba/home.asp>

NSPE (2014). Issues and Advocacy: Engineering Technology; NSPE Position.
National Society of Professional Engineers
Retrieved July 1st, 2014 from
<http://www.nspe.org/resources/issues-and-advocacy/take-action/issue-briefs/engineering-technology>

NCEES (February 2016). NCEES Engineering Education Standard.
The National Council of Examiners for Engineering and Surveying. Seneca, SC
Retrieved on January 2, 2016 from
<http://ncees.org/credentials-evaluations/ncees-engineering-education-standard/>

Davidson, A (2015). Is College Tuition Really Too High?
Retrieved from the New York Times Magazine on (02/05/2018).
<https://www.nytimes.com/2015/09/13/magazine/is-college-tuition-too-high.htm>