

## **Assessment of an Architectural Engineering Technology Program**

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# Assessment of an Architectural Engineering Technology Program

## Abstract:

Reviewing degree programs periodically beyond ABET accreditation self-studies or college assessment report requirements can yield valuable insights. Course offerings of similar programs at other institutions can be compared, feedback from students and recent graduates assessed and the job market for graduates re-examined. In 2019 the author of this paper was awarded a campus Title III Students First Assessment Grant to assess the Architectural Engineering Technology Program at their institution using the proposed aforementioned approach. The need for this assessment beyond the normal ABET self-study or campus required annual assessment report arose from an increase in student requests for a professional architectural program and the lack of a Bachelor Architecture programs being offered at state institutions in our region. Students applying to our four-year ABET accredited BSc Architectural Engineering Technology Program often question how this program differs from five-year pre-professional National Architecture Accrediting Board (NAAB) accredited Bachelor of Architecture programs offered at other institutions, beyond the duration of study. Other engineering technology degree programs also face similar questions as to how their program differs from engineering programs. The answers to these questions are invariably that engineering technology programs are based on the practical application of engineering with graduates working to support licensed engineers/architects. In addition, engineering programs are theory and design based with graduates focused on designing and managing projects [1]. Students enrolled in Architectural Engineering Technology Programs who plan to become registered architects face an additional challenge however depending on the state that they plan to seek licensure. Unlike other engineering technology programs and engineering programs which are both accredited by ABET, Bachelor of Architecture programs are accredited by the National Architectural Accrediting Board (NAAB). “The National Architectural Accrediting Board (NAAB) accredits professional degrees in architecture offered by institutions accredited by a U.S. regional accrediting agency. All 55 U.S. registration boards accept the NAAB-accredited degree for registration; 38 of those boards require it” [2]. Although Architectural Engineering Technology graduates, have traditionally been the support staff to licensed architects, graduates from this program can also become licensed architects in many states. As an example, to reach this goal in New York State, it takes Architectural Engineering Technology graduates a total of three years longer than their Bachelor of Architecture peers. By comparison, this is one year longer than engineering technology graduates pursuing a Professional Engineering (PE) license. This time lag places BSc Architectural Engineering Technology graduates who plan to pursue architectural licensure at a disadvantage, and may affect the enrollment, retention, and graduation rates for this type of program. The objective of this paper is to compare course offerings of a four-year B.Sc. Architectural Engineering Technology Program to NAAB-accredited five-year Bachelor of Architecture programs, examine qualitative feedback from students regarding the Architectural Engineering Technology Program and their career goals, and assess the continuing viability of the architectural engineering technician career. Two main questions are asked: Is it feasible to maintain a B.Sc. Architectural Engineering Technology Program and offer a pre-professional NAAB Bachelor of Architecture Program at the same

institution? Alternatively, how would the addition of a NAAB accredited Master of Architecture Program to the ABET Architectural Engineering Technology Program benefit graduates? The result of potentially offering students different tracks to for a BSc in Architectural Technology Program and Bachelor of Architecture Program at one institution will also be evaluated. The relative benefit of performing a periodic program assessment of this type that is independent of accreditation or other self-study requirements will be discussed.

## **Introduction:**

In 2019, the author was awarded a Title III campus Students First Grant to assess our B.S. Architectural Engineering Technology Program. This assessment was determined to be necessary based on the changes in the profession with more intern architects filling the role traditionally held by architectural technicians/drafters; the number of questions from students and prospective students about the program in comparison to Bachelor of Architecture Programs; and the lack of a Bachelor Architecture programs being offered at state institutions in our region. Architectural Engineering Technologists/drafters support architects, engineers, and planners in the planning and drafting of construction drawings and specifications for buildings and city design [3]. According to the ABET website, there are 7 ABET accredited two-year Associate is Applied Science (AAS) Degree Programs and 5 ABET accredited four-year B.Sc Degree Programs in Architectural Engineering Technology in the United States [4]. As background, students in AAS Architectural Engineering Technology degree programs at community colleges typically transfer the majority of their degree credits to BSc Architectural Engineering Technology Programs. On the job front, there is no category for architectural engineering technician or architectural technician on the U.S. Bureau of Labor Statistics website. The closest title is “drafter” with an entry level education as an associate degree and a job outlook between 2019 and 2029 with a decline of 4% or -7,100 jobs [5]. As a comparison, the Bureau of Labor Statistics report for Architects is a 1% or 1,100 job increase in the same time period [6]. The loss of jobs for architectural drafters may be due to the widespread use of computer drafting programs such as AutoCAD and Revit amongst other programs, and the fact that junior architects intern in architectural practices to meet the National Council of Architectural Registration Board (NCARB) and local state requirements to take the Architecture Registration Exam (A.R.E.) are filling the roles of architectural drafters.

## **Background:**

In the United States, four-year engineering bachelor programs are predominately accredited by ABET and four-year Bachelor of Science (BSc) Engineering Technology degrees, in various specialties including architectural engineering, are accredited by ABET or non-accredited. Graduates from engineering bachelor programs can sit the Fundamentals of Engineering (FE) Exam near or upon graduation and the Professional Engineering (PE) Exam with four years of post-college work experience in their chosen discipline of engineering (education + internship = 8 years). In New York, BSc Engineering Technology graduates work for six years under a professional engineer before being permitted to sit the PE exam (education + internship = 10

years). Also, in New York, Architectural Engineering Technology graduates who wish to become registered architects may sit the six Architectural Registration Exams (A.R.E.) after four years of post-graduation work experience under a licensed architect, and become fully licensed as a Registered Architect (RA) with three additional years of work experience under a licensed architect (education + internship = 11 years). Graduates from National Architectural Accrediting Board (NAAB) professional five-year undergraduate institutions are permitted to sit the six A.R.E. exams upon graduation and work for three years under a licensed architect to be fully licensed (education + internship = 8 years). Therefore, our students have a total of seven years between graduation and full licensure compared to Bachelor of Architecture graduates who only have three years between graduation and full licensure. With the one-year difference in education between these two programs the net difference is three years of additional internship required for Architectural Engineering Technology graduates. This time lag places these graduates at a disadvantage and may affect the enrollment, retention and graduation rates in this program. It is important to note that Farmingdale State College, SUNY, is the only public institution in our region with an architectural degree program and that our tuition is a fifth of the cost of the architectural program offered at a local private college. This study has found that this cost difference is a major factor for students who are seeking a far more cost-effective path to architectural licensure entering the Architectural Engineering Technology Program at our institution despite the longer duration to reach this goal. This may be an advantage for enrollment, retention and graduation rates in our program countering the potential negative effect of the longer path to licensure post-graduation.

**Objective:**

The objective of this paper is to compare course offerings of four-year B.Sc. Architectural Engineering Technology Program to an NAAB-accredited five-year Bachelor of Architecture program, examine qualitative feedback from students regarding the program and their career goals, and assess the continuing viability of the architectural engineering technician career. Two main questions are asked: Is it feasible to maintain a B.Sc. Architectural Engineering Technology Program and offer a pre-professional NAAB Bachelor of Architecture Program at the same institution? Alternatively, how would the addition of a NAAB accredited Master of Architecture Program to the ABET Architectural Engineering Technology Program benefit graduates?

The objective of this study is to evaluate qualitative student feedback regarding their opinion of the existing program and their career goals post-graduation, y assessment is to compare our ABET accredited program courses to a sample of NAAB accredited programs courses, and

**Target Population:**

The target population for the student survey is our Architectural Engineering Technology Program students. In Spring 2020 there were 165 Architectural Engineering Technology students. The potential benefits of this study would affect all of our students at time of implementation and all future students in our architectural program.

## **Method:**

A two-pronged approach was used for this study. First, to survey students asking why they chose our program, if they plan to become registered architects, if they would prefer a professional architectural program, and to seek their views on potential improvements to our Architectural Program. This qualitative data was obtained to establish if students support changing our four-year Architectural Engineering Technology ABET accredited program to a five-year B. Arch Program NAAB accredited program or if there was a need to keep the ABET program and add a NAAB program at the undergraduate and/or graduate level. This change or addition would enable students in the NAAB program to take the Architecture Registration Exam upon graduation instead of the current requirement of four years post-graduation after working for a licensed architect.

Secondly, a comparative assessment was also performed by collecting and analyzing our Architectural Program courses against eight regional B. Arch. NAAB accredited professional architectural programs to ascertain the changes that we would need to make if we upgraded our program to this level.

In fall of 2019, thirty-four Architectural Engineering Technology students (20% of the total number of Architectural students) responded to the student survey and the data was assessed.

In fall 2019 and spring 2020, the college's Architectural Engineering Technology Program courses were compared to courses required in eight NAAB Accredited B. Arch Programs (five-year programs) in our region to ascertain the changes that we would need to make if we upgraded our program to this level.

### **Fundamental Questions:**

1. How many of our current students plan to become registered architects?
2. How is our program different from that of an NAAB accredited architectural program?
3. What changes to our program would be necessary to apply for NAAB accreditation?
4. Would it be preferred to keep our ABET accredited 4-year program and add a 2-year NAAB accredited Master of Architecture Program?

## **Results**

- a. Respondents ranked their reasons for attending our institution in the following order of possible choices:
  - This institution's graduates find jobs in their field of study at very high rates
  - The tuition at our college is affordable
  - I can commute to the college from my home
  - The Architectural Engineering Technology Program is a strong program

Discussion: It is interesting to note that the rate of employment was first on the list. Implementing a B. Arch program could further improve graduate employment rates. Students were asked how they felt our existing program could be improved – please see 'e' below.

- b. 79.4% of respondents stated that they plan to take the Architectural Registration Exam (A.R.E.)
- c. 82.3% of respondents stated that they would prefer if the Architectural Program at our institution was NAAB accredited instead of ABET accredited so that they could take the A.R.E. upon graduation instead of having to work four years under a licensed architect before being permitted to take this exam.
- d. 58% of respondents stated that they planned to attend graduate school. The reasons for their plans to attend graduate school were write-in responses, of which the following typifies the most popular response:
  - “I had learned that if I attend graduate school I would be able to apply for the exam to receive my license faster once I finish my masters.”

Per the NYS Office of Professions License Requirements “Category E: Master's degree in an architecturally-related profession following the award of a degree from a non-NAAB-accredited program, depending on the category of the first degree, Maximum Credit Granted: 1 unit.” Therefore, a two-year or three-year Master’s Program will only reduce the initial four-years of work under a licensed architect by one year.

- e. 82.3% of respondents stated that the existing Architectural Engineering Technology Program could be improved.  
The following are the student’s comments pertaining to the program’s accreditation:
  - “5-year NAAB program!!! Only (regional) program is \_\_\_\_ (a private college). Ok program with Columbia tuition,,,,,No way! Our AET is unnecessarily engineering and advanced math heavy for the needs of an architect, with very little emphasis on art and architectural studies. The current program falls into an abyss of not being sure of what it wants to be. It only makes sense for those seeking a 4 + 2 Masters, but most students are not aware...SUNY should put a 5 year professional program here, the student base exists, why only in Buffalo...ridiculous!”
  - “first off by getting accredited and becoming a true 5-year program I love the mechanical focus of construction our institution offers but to be a competitive architect one needs a balance of mechanical and design theory instruction...”
  - “By actually being accredited by the NAAB”

**Comparative assessment of our four-year Architectural Program courses against the following eight five-year B. Arch. NAAB accredited professional architectural programs:**

1. Cornell University,
2. Syracuse University,
3. Rhode Island School of Design,
4. Rensselaer Polytechnic Institute,
5. CUNY City College of New York,
6. New Jersey Institute of Technology

7. New York Institute of Technology
8. SUNY Alfred

Note: SUNY Buffalo has a non-accredited B. Sc Arch Program and an NAAB accredited M. Arch Program.

### **Results of Comparison and Discussion:**

Please see [Arch Eng Tech Master Comparison](#) for the Excel spreadsheet showing the comparison of our program to each of the B. Arch Programs above.

Changing our four-year B. Sc. Architectural Engineering Technology ABET accredited program to a five-year B. Arch NAAB accredited program would require an additional year of courses, and a possible realignment/reduction of Liberal Arts and Sciences courses. With the additional year the total credits would move from 125 credits in our existing program to 157 – 167 credits total for a B. Arch program. This would enable our students to take the Architecture Registration Exam upon graduation and then complete the required three years of work under a licensed architect to be fully licensed in New York State under the current requirements. Therefore, eight years total from the start of the NAAB accredited B. Arch. Program to being fully licensed. At this time with our four-year ABET accredited degree Architectural Engineering Technology students have eleven years from the start of our program to being fully licensed.

Another option would be to maintain our ABET B.SC. Architectural Engineering Technology Program and add an NAAB Masters in Architecture Program as Hartford University has successfully done. New York State only permits a one year reduction of the internship time required however, with the successful completion of a Master of Architecture Program. Therefore, permitting two years to take the masters, our students would not benefit in reducing the time to sit the Architecture Registration Exam.

It is important to note that there are 156 NAAB accredited Programs in the United States and only five ABET accredited BSc Architectural Engineering Technology Programs. Using New York as an example, there are a total of nine NAAB accredited B Arch programs. Only one of these programs is in the SUNY system at Alfred State College. The City College of New York is another public institution within the City University of New York system.

### **Conclusion:**

The student survey results show that 82.3% of respondents would prefer if the Architectural Program at our institution was NAAB accredited instead of ABET accredited so that they could reach licensure three years earlier than the current program permits. To reach enable our graduates to reach this goal the preferred outcome would be to offer our BSc program and add a B. Arch Program and a M. Arch Program. Our institution is well positioned geographically for both of these programs – especially with our proximity to New York City. A local private college has a similar degree model that permits students to progress from the Architectural Technology degree to the B. Arch degree and then to their Master of Architecture degree if they meet requirements at each stage. This model would work well at our institution and possibly many

others. Like the local private college and many of the other programs on the comparison spreadsheet, we also offer a Construction Management Program in the same school, sharing many of the same courses, so our students can work in teams as they will do in their professional careers.

#### References:

- [1] ABET (2021), What Programs Does ABET Accredit?  
<https://www.abet.org/accreditation/what-is-accreditation/what-programs-does-abet-accredit/>
- [2] National Architectural Accrediting Board (2021), About Us <https://www.naab.org/>
- [3] J. Rendel, “Architectural research and disciplinarity”*arq: Architectural Research Quarterly*, vol. 8, issue 2, June 2004 pp 141-147, Cambridge University Press  
<https://www.cambridge.org/core/journals/arq-architectural-research-quarterly/article/architectural-research-and-disciplinarity/540E6BB77F0F1BBC0065A6C18592287B> (Accessed March 20, 2021)
- [4] ABET (2021), Accredited Programs, <https://amspub.abet.org/aps/category-search?disciplines=7>
- [5] U.S. Bureau of Labor Statistics, Drafters,  
<https://www.bls.gov/ooh/architecture-and-engineering/drafters.htm>
- [6] U.S. Bureau of Labor Statistics, Architects,  
<https://www.bls.gov/ooh/architecture-and-engineering/architects.htm>