

ASCE Policy Statement on The First Professional Degree: Where Does it Stand?

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Abstract

The primary purpose of this paper is to present the chronology of events and the current status of the issue of the first professional degree in civil engineering. In 1991, the author published a paper “Why Four Years?” in an ASCE journal. In 1995, the author presented a position paper on this subject that was accepted for the 1995 ASCE education conference. This subject was widely discussed at that conference and responses were subsequently published in a special forum section of an ASCE journal. The topic was then debated in many ASCE circles, and in October 1998, the ASCE Board of Direction adopted Policy Statement 465. This statement begins: “The ASCE supports the concept of the master’s degree as the First Professional Degree (FPD) for the practice of civil engineering (CE) at the professional level.”

There was a special forum section on ASCE’s web site devoted to this topic. There were many, many responses. By and large, the academic community was in favor and the practicing community against. In October 1999, the ASCE Board formed the Task Committee (TC) for the FPD. This committee was charged with “developing a vision statement of full realization of ASCE Policy Statement 465 ... and a strategy for achieving this vision.” In May 2001, the TC issued a 147-page (including over 60 pages of appendices) draft report.

The TC report states that the fundamental issue of Policy 465 is that **“The current four-year bachelor’s degree is inadequate formal preparation for the practice of CE at the professional level in the 21st Century.”** The report goes on to list strategies and an implementation plan. The report closes with the thought that although a “no action” option is possible, it is not prudent and that, “No action would lead to a diminished role for the civil engineering profession and its members.”

Shortly after release, the TC posted their report on the ASCE web site and gave a few months during which responses and comments could be received. Well over 100 responses were posted. One contained a lengthy discussion and a resolution from ASCE’s Seattle Section to “Rescind the Policy.” Most of the comments take issue with some or many of the arguments or conclusions made by the TC. The TC recently submitted its final report to the ASCE Board of Direction. There were only subtle, but telling, changes from the draft. The Board approved the revised policy statement and appointed a new task committee that was charged with

implementing the policy. This paper gives some background, a broad overview of the TC report, the comments about it, and the status of the issue.

Background

In the 1950's and early 1960's, most five-year programs in existence were being phased out as the engineering programs, in general, were reducing credit requirements. The reduction was accomplished by elimination of many skill courses (such as drafting) and some courses were pushed back into high school. When this transition was taking place, many engineering educators justified the reduction in credits by arguing that a master's degree would become the minimum requirement for entrance into the profession. While some schools at the time adopted a professional program, they were few and far between.

In 1958, ASCE conducted a survey in which 66 percent of its membership favored extending the civil engineering curricula to five years¹. In 1960, the ASCE Conference on Civil Engineering Education addressed this subject extensively². A group of 30 eminent civil engineering educators adopted the following resolution:

Resolved that "the growth in universities and colleges of a pre-engineering, undergraduate, degree-eligible program for all engineers - with at least 75% -interchangeably among various engineering curricula - be followed by a professional or graduate CE curriculum - leading to the first engineering degree, with a CE degree awarded only at the completion of the professional or graduate curriculum."^{2,3}

Despite the overwhelming acceptance, implementation was sparse, but the issue has never gone away. Every five years from 1960 to 1995, ASCE held an education conference. It is interesting to look at the content of the conferences. The same issues seem to continually surface, including the issue of the length of the program. Many proposals have been made over the years for curricula leading directly to the MS degree with, possibly, alternate paths or an intermediate degree or certificate awarded.

In 1991, the author posed the question "Why Four Years?" in a paper published by ASCE⁴. This paper addressed the increasing difficulty in obtaining a BS degree within four academic years and it presented a possible curriculum model leading to the MS. Prior to the 1995 conference, there was a call for position papers. The author posed the question of "Why Four Years?" in one of the position papers. This topic had the most written responses and was a prime issue at the conference. Many of the responses to "Why Four Years?" that were presented at the 1995 conference were subsequently published in 1996 in a special forum section of ASCE's Journal of Issues in Engineering, Education and Practice⁵. This is part of the background that led the Educational Activity Committee of ASCE to prepare policy statement 465. This paper presents the chronology of events that followed, presents and comments on the overwhelming volume of feedback from the profession, shows where the issue is now, and tries to look into the future. It also offers some continuing education compromises that, while not requiring an MS, could lead to the desired increased preparation for the professional practice of civil engineering.

ASCE Policy Statement 465

The Educational Activities Committee (EdAC) of ASCE considered several issues that were discussed at the 1995 conference. On September 9, 1998 they approved policy statement 465⁶. This was subsequently approved by ASCE's Committee on Policy Review (10/2/98) and then the Board of Directors (10/17/98). The policy statement reads:

The American Society of Civil Engineers (ASCE) supports the concept of the master's degree as the **First Professional Degree** for the practice of civil engineering at a professional level.

ASCE encourages institutions of higher education, governmental units, employers of civil engineers, and other appropriate organizations to endorse, support, and promote the concept of mandatory post-baccalaureate education for the practice of civil engineering at a professional level. The implementation of this effort should occur through establishing appropriate curricula in the formal education experience, appropriate recognition and compensation in the workplace, and congruent standards for licensure.

The policy statement then has a section on the issue that presents the perceived changes that have created a market requiring greater breadth of knowledge and specialized technical competence, including:

- Globalization
- Increased information availability
- New technologies
- Enhanced public awareness
- Infrastructure demands changing from development to renewal and maintenance

The policy statement then presents the following rationale:

Increased educational requirements beyond the baccalaureate degree for the practice of civil engineering at the professional level are consistent with other learned professions. The body of knowledge gained, and the skills developed in the formal civil engineering education process, are not significantly less than the comparable knowledge and skills in these other professions. Is it reasonable in such complex and rapidly changing times to think that we can impart the requisite engineering knowledge and skills in four years of formal schooling while other learned professions take seven or eight years? Four years of formal schooling were considered the standard for three professions (medicine, law, engineering) 100 years ago, and while medicine and law education lengthened with the growing demands of their respective professions, engineering education did not. Perhaps this retention of a four-year undergraduate engineering education has contributed to the lowered esteem of engineering in the eyes of society, and the commensurate decline in compensation of engineers relative to medical doctors and lawyers.

Current baccalaureate programs, while constantly undergoing review and revisions, still retain a nominal four-year education process. This length of time limits the ability of these programs to provide a formal education consistent with the increasing demands of the practice of civil engineering at the professional

level. There are diametrically opposed forces trying to squeeze more content into the baccalaureate curriculum while at the same time reducing the credit hours necessary for the baccalaureate degree. The result is a production line baccalaureate civil engineering degree satisfactory for an entry-level position, but inadequate for the professional practice of civil engineering. The four-year internship period (engineer-in-training) after receipt of the BSCE degree cannot make up for the formal educational material that would be gained from a master's degree program.

The implementation of this concept will not happen overnight, nor can ASCE will that it be done in a specified time period. This concept is a legacy for future generations of civil engineers. However, perhaps the most important aspect of the implementation of this policy is already in place. Within the U.S. system of higher education, high quality, innovative and diverse master's degree programs currently exist in colleges and universities to support this concept. The active support of this policy by all of the stakeholders in this process, such as the educational institutions, the registration boards, and the various employers of civil engineers, will be required to develop and promote the elements necessary to eventually implement this concept.

Comments Concerning the Policy

During the period of the approval of this policy and the deliberations of The Task Committee for the First Professional Degree, ASCE set up a forum web page to solicit comments. There were nearly 50 messages posted, mainly from practicing engineers. The overwhelming majority of the responses were negative. A summary of the opinions follows⁷:

- The benefits of two years of practical experience far outweigh the benefits of two years of graduate level education.
- Most of the work performed in civil engineering does not require the level of theoretical education that the master's degree provides.
- If the present civil engineering education does not meet the needs of industry in four years, it should be modified.
- Enrollment in civil engineering programs is down at many colleges and universities. This policy will exacerbate the situation.

Pro and Con

In 1999, the author presented a paper at the ASEE Annual Convention in Charlotte⁸. This paper presented the chronology of events to that point and summarized some of the pros and cons of the master's degree. Briefly, on the pro side were that the current program is not equivalent to other professions, already takes more than four years to complete by many undergraduates, there is increasingly more to know, undergraduate programs are squeezed by many ancillary requirements, many entry-level employers want it and the movers and shakers of the profession possess advanced degrees. On the con side were that the marketplace seems to be accepting of the current program, many potential engineers would be lost to other fields, a five year program would mean six to

many, there are additional costs to taxpayers and students and not all engineers require more technical courses.

The pro and con debate continued when the author was invited to respond to a set of questions presented by an editor of ASEE's Prism magazine for publication in a pro/con article⁹. The author was requested to present the pro side of a mandatory master's program and William Ballhaus, an engineer at Lockheed Martin, the con side. Many of the arguments previously cited were contained in this article, and in summary the author stated, in part:

“I am not fully committed to the master's degree (as the first professional degree). I am primarily in favor of whatever it takes to improve the competency of engineering graduates, and I believe that if done properly, the master's degree could be the vehicle to help bring this about.”

William Ballhaus stated, in part:

Universities are making great strides in trying to be responsive to what industry needs without sacrificing the core values of the university.... If universities don't change fast enough, without sacrificing their core values, then I think that entrepreneurs will come along and provide that service – making their graduates very marketable while producing them much more cost effectively.

The Task Committee for the First Professional Degree – Draft Report and Comments

The ASCE Board of Direction charged the Task Committee (TC) with “developing a **vision** of the full realization of Policy Statement 465.” Appointments were completed in October 1999 and the TC was asked to deliver its final report to the Board by October 2001. After a year and a half of deliberations, the committee issued a draft report in May 2001¹⁰. This was posted on ASCE's web site and comments were solicited. During the period between May and October, over 100 comments were posted. Many comments were similar to those posted on the previous web site. Many others referred to particular statements, appendices and arguments presented in the draft report. Of particular note was a resolution (6/13/01) by the Seattle Section of ASCE to rescind the policy. This resolution states, in part:

NOW, THEREFORE BE IT RESOLVED that the Seattle Section Board requests that the policy be amended in title to “Professional Development” and that the policy be reworded to “The American Society of Civil Engineers supports the concept of further education for professional development in the practice of civil engineering.”

The Seattle Section also submitted detailed comments on many points and issues raised by the TC draft report including:

- The decline in quality and content in the basic requirements for graduation in CE is not discussed by the TC.
- Where was ASCE (especially educator members) and ABET during the period of curriculum deterioration? And, why was ABET accreditation not withheld when the curriculum became inadequate (The TC report has a section entitled “Inadequate Preparation of Civil Engineers for a Rapidly Changing Work Environment”).

- If the master's degree is required for recognition as an entry-level engineer, it will ultimately result in the requirement of a doctorate degree for specialization.
- ASCE's influence should be brought to bear in establishing minimum course content for the bachelor degree.
- The society was not invited to participate in the strategic planning process nor was the membership asked to vote on its acceptance.

This last point was cited in several of the over 100 other comments received.

The comments received were separated on the web site into the categories of: (1) full realization of the policy, (2) the type of master's degree, (3) the adequacy of the current baccalaureate degree, (4) implementation, and (5) unrelated discussions. The Seattle rebuttal was part of this first category, full realization. Some of the other comments in this category (1) include:

- Robert Adamski - "I was pleased to see compensation and declining appeal of CE to highly motivated young people identified as issues. I do not see how the recommendation addresses either one."
- David Schwegel - "Students will decide not to go into civil engineering, but instead pick majors that lead to higher paying jobs with less education."
- Tom McDonald - "Most of the day to day knowledge is based on years experience, not education."
- David Page - "... I have learned more from good mentors and experience in the work place than from school ... A requirement for a minimum number of continuing education or professional development credits may be more helpful for the long term."
- Ronald Reid - "It is truly amazing that the administrators of ASCE have chosen to force feed this elitist measure to the Society."

Many other comments focused on the importance of avenues other than formal college programs in providing appropriate training and preparation for the profession.

The TC recommended a master's degree or equivalent that could take many forms. Comments were solicited on what form it should take. Appendix P to the report shows a matrix of educational experience. Some of the comments for this category (2) concerning the type of master's degrees included:

- Ruben Cantu - "Master's or equivalent - what will be an equivalent?"
- David McGlasson - "It seems to me that's a very hard sell to the average high school student...The 'learned professions' require advanced degrees to begin practice, and require that one attain a relatively 'useless' BA or BS along the way ... let's upgrade the required education and be done with it."
- Andrew Tilton - "I went back ... to obtain a masters ... not to broaden, but to specialize ... If the purpose is to broaden...then demand, through the ABET process, that a BS degree have more than the 120 semester hours that many now require."
- Ken Berg - "A master's degree could never have prepared me for the 'rapidly changing work environment' like my practical experience."
- Greg Thein - "I question whether current masters programs will solve the problem"

It is apparent that the responses did not specify a form for the MS degree, but questioned the need.

By far the greatest number of comments was directed to category (3) concerning the adequacy of the current baccalaureate degree. Over 50 comments were posted. A representative sampling follows:

- Alfred Herget – “Is there a problem with the engineering service industry that has not always existed from the birth of the profession? No. Is the percentage of failures increasing? No. Then, what is going on here? We engineers are trying to fix something that has no need to be fixed.”
- Lyle Brehm – “The biggest problem I had with the report was that I very quickly realized that the Task Committee started out with the recommendation that the master’s degree should be a requirement, and then it worked backward from there.”
- David Schweigel – “If I were still in school and ASCE were to implement the master’s degree requirement, I would definitely change majors ... I am, however, in agreement that the current four year ... curriculum is inadequate. However, the master’s degree requirement will not solve the problem.”
- D. Cole – “A bachelor’s degree should be adequate. Unfortunately universities are not teaching what is needed ... A master’s degree will never replace experience.”
- Andrea Nugent – “In ... the Executive Summary, the TCFPD acknowledges that civil works will always be in demand, but it seems that their biggest concern is with who will be LEADING our profession.”
- Chris Corbitt – “The undergraduate degree will not be adequate in the future ... I would like to see, 10 or 20 years from now, a graduate degree required in order to get a P.E. license”
- Dennis Randolph – “It is unfortunate that many engineers leave school with their degree and the idea that they are done learning for life. The BS is only an early step along what should be a life long learning experience.”
- Jennifer Steff – “The minimum is four years. That’s all you need to get started, not what you need to be really good.”
- Mark Cacamis – “Excellence is a function of self motivation, not more formal education. It’s not the length of the education, it’s what the individual does with it.”
- A. McGlenn – “I have encountered all types ... PhDs that were brilliant and insightful yet others that couldn’t design a shearwall that was constructible. On the other end of the spectrum, I have worked with entry level BSCE individuals who worked hard and cranked out quality work, learning the ropes fast and others who lacked the fire and never seemed to catch on.”
- Alan Berg – “It wasn’t until schools began offering courses to engineers such as ‘Physics for Poets’ and attempting to turn us all into warm and fuzzy human beings that these issues (concerning first professional degree) began gaining momentum.”
- David Herring – “I could only support MS as the first professional degree if the BS required a broader, less technical curriculum. How can an engineer do an

effective job without a knowledge of our language, proper report writing, the history of our country, the way it works, and even economics and contract law?”

- An Oklahoma Engineer – “On the financial side, it is not practical to get a master’s degree. There is little compensation for having an MS over a BS in industry. Any engineer that has worked in a design firm knows that the way you increase your salary is through experience and strategic job jumping.”
- Jim Delton – “If the problem is ‘not enough money’, the solution is not burdening ourselves with barely relevant additional education in the hope that someday it will nudge the supply and demand curve in a favorable direction, or that it will somehow make people ‘respect’ us more and then throw money at us. We need to identify the **real** problem, whatever it might be, and then formulate a strategy that addresses it.”
- Charlie Hodge – “I want to give you my conspiracy theory ... Every so often ASCE becomes dominated by academicians ... If they can increase ... CE education by 25% - what a deal ... six of the nine TCFPD members are or were academicians - that says it all about this proposal.”

This represents quite a diversity of comments, mostly unfavorable to the conclusions or arguments contained in the report.

Concerning the implementation of the vision, category (4), there were at least eight people commenting who either asked for a vote of the full ASCE membership or for a more open decision making process on the part of the Board of Direction. Other comments addressed the image of the profession, the possible “watering down” of the MS, the need to not sell CE services too cheaply and the need to “grandfather” existing licenses. One of the comment statements (from Gary Kramer) raised the following questions on implementation:

- Will universities combine the masters and bachelors programs?
- Will universities grant admission to their masters program without a suitable undergraduate GPA in civil engineering?
- If the masters is required for licensure, will four years of experience then be considered inadequate?
- Will four years experience combined with some minimum amount of continuing education credits be adequate?
- What universities have supported the masters as the first professional degree?

Notable in the comments that were considered as not directly related to the TC report, category (5), included an anonymous comment that market forces should be used to improved CE salaries. Several other comments concerned the role and training of technologists versus engineers. Dr. Doug Hambley wrote that, “Raising the entry standard to a master’s degree will not guarantee a higher standard of performance on the job, and it may drive a lot of potentially brilliant engineers into other careers.” This type of comment showed up in many of the statements submitted.

The Task Committee for the First Professional Degree – Final Report and Board Action

The Task Committee presented their final report to the ASCE Board of Direction on October 9, 2001. A copy of the Executive Summary was obtained from ASCE¹¹. It is almost identical to that of the draft report. The only significant exception being that there are now some references

to technicians and “specialty certification”. The reporting of the Board action¹² states “The Board unanimously adopted refinements and clarifications of policy statement 465.” The report goes on to state that:

“The recommendations of the task committee set up earlier to develop a policy on licensing and professional practice were approved by the board. The action changes the title of policy statement 465 from ‘First Professional Degree’ to ‘Academic Prerequisites for Licensure and Professional Practice.’ The previous committee said this title more accurately reflects the intent of the policy. The question is not what should be the first professional degree, the committee said in its report to the board, but instead what should be the educational prerequisite for the practice of civil engineering at the professional level.’ New language defines ‘professional level’ as the ‘practice of engineering as a licensed professional engineer.’ It also clarifies the educational requirements for such a license as a baccalaureate degree and a master’s or equivalent (MOE). The revised language also states that ASCE will be an active partner with other groups and organizations to accomplish this policy. The ultimate full implementation may not occur for 20 years or more.”

In addition to adopting the “refinements and clarifications” of Policy Statement 465, the Board of Direction of ASCE also appointed a task committee to work on implementing the revised policy.

Status and The Future

Appendix V¹³ to the Task Committee report contains “suggested revisions to ASCE Policy Statement 465.” The first sentence of the policy now reads as follows (additions are noted in **BOLD** and deletions with ~~strikethroughs~~):

The American Society of Civil Engineers (ASCE) supports the concept of the Master’s degree **or Equivalent as a prerequisite** ~~the First Professional Degree~~ for **licensure and** the practice of civil engineering at a professional level. Additionally, the suggested revised policy now states that: “**The practice of civil engineering at the professional level means practice as a licensed professional engineer.**” To the author, the inclusion of “licensure” completely changes the focus of the policy. What happens from here on is anyone’s guess, but it seems to the author that the change in the title of the policy and that practice at the professional level equates to licensure are very telling.

The fact that a 20-year (or more) time period is suggested shows that the Board realizes that its task is monumental. The ASCE membership is obviously not convinced, and convincing 50 state licensing boards (or even one for that matter) will not be easy. In a recent article¹⁴ it was stated that any implementation plan must include cooperation from ABET as well as the overseers of state licensing boards, NCEES. With the change in tone of the revised policy, the author believes that discussions concerning implications for licensing and policies of licensing boards will escalate.

It is inconceivable to the author that an engineering licensing agency will change requirements for only civil engineers. So, ASCE will probably need to first convince all

the other licensed engineering professions to adopt a similar policy, and what are the chances of that? It is further inconceivable that licensing agencies would adopt the complicated 'or equivalent' matrix contained in Appendix P of the TC report. Instead, they would probably opt for experience to offset some of the educational requirements, and then we would be almost right back to where we are now. Alternatively, continuing education credit could be part of the "equivalent" mix in obtaining the "first professional degree." Since many states require continuing education credits (and many others are leaning in that direction) for maintaining licensure, the adoption of some continuing education prior to the licensure exam may not have insurmountable opposition.

The Department of Civil and Environmental Engineering at the University of Connecticut recently held an advisory board meeting at which the question was raised as to what should be done relative to ASCE's Policy 465. The advisory board represents a cross section of people from industry and education. In responding to the question, the most compelling arguments were that, at present, the marketplace for engineering graduates does not require the kinds of change that full implementation of the policy would produce. Many employers currently require or give strong preference to CE applicants with an MS. Personally, the author would like to see the market place be the impetus behind obtaining the MS. If, by some force unforeseen at the present time, the MS is required for licensure, fewer CEs would be licensed and the market place would eventually put MS degree holders in a much better salary negotiation position.

Adopting the master's as the first professional degree would be easier in those fields where licensure is either required or a recognized asset. There is no way, however, that civil engineering can stand alone among the engineering disciplines with this requirement. Unless the engineering profession as a whole promotes this change, any movement in this direction is destined to have an extremely adverse effect on the civil engineering profession. The author believes that ASCE recognizes this and is gracefully looking for a way to retreat from full implementation. The author suggests that perhaps a compromise is in order whereby the time in actual practice required for licensure is increased, in phases, and the MS degree reduces that time by more than the time spent obtaining the MS. If employers then significantly reward licensure, the effect would be exactly what ASCE set out to accomplish in adopting Policy Statement 465.

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