

**Ferris State University Surveying Education Panel
21st Surveying & Mapping Educators Conference**

Big Rapids, Michigan – July 12, 2007

Summary by Earl F. Burkholder, PS, PE

Participants:

Mr. James Plasker, Moderator	ACSM Representative on ABET Board of Directors
Mr. Curt Sumner,	Executive Director of ACSM
Dr. David Gibson	ACSM Representative to ABET/EAC
Dr. Steve Frank	ACSM Education Representative to FIG
Dr. James Crossfield	Former ACSM Representative to ABET/EAC
Mr. Mike Falk	Chair, ASCE Geomatics Division

Two questions for the panel were posed in background materials compiled by the ASCE Geomatics Division. Although neither question was directly answered, they provided context for the discussion. The questions were:

1. What is the role of Surveying & Mapping Educators in preparing students for a productive career in surveying, geomatics, or related spatial data profession?
2. What are the appropriate EAC criteria for Surveying Engineering programs?

Plasker opened the discussion with summary statements about ABET including:

- ABET is made up of Professional Societies (including ACSM and ASCE).
- Role of ABET in evaluating the quality of educational programs.
- Environment in which ABET operates and recognized by Council of Higher Ed.
- Establishment of criteria and evolution to “outcomes assessment.”
- Partnership of ACSM and ASCE providing criteria for surveying.
- Current re-evaluation of criteria from various commissions – renumbering etc.
- All EAC program have “engineering” in title (except Navel Architecture)
- Difference between “general” criteria and “program” criteria (all commissions).

Gibson described the history of surveying & mapping education in the US starting with veterans returning from WWII, surveying being included in CE programs, the Grinter Report of 1955 (with its focus on theory rather than practice), enrollment trends during 1950’s & 1960’s, emergence of “separate” surveying programs, the ASCE “Body of Knowledge” document – search provides only 2 hits on surveying, and noted that, of the many civil engineering programs formerly including a significant surveying component, Professor Robert Schultz at Oregon State University is the only person still carrying that banner at a major university.

Crossfield was the ACSM representative to the EAC during the development of “outcomes criteria” and noted that the EC2000 criteria contained 8 parts. Six parts were categorized as general criteria and only 2 parts were program specific – curriculum and faculty. According to guidelines provided in 1995, the criteria were to be short, flexible, and inclusive.

Furthermore, they were to vary as little as possible from commission to commission. Crossfield worked with the ACSM CAR Committee to develop surveying criteria for the various ABET commissions. Particular features of the new criteria included:

- Each program was to identify competence in a particular area (as opposed to 5 of 6 areas identified in the RAC criteria developed in the early 1980's).
- Faculty who teach design should be licensed (or qualify by experience).
- 30% of each curriculum is to be devoted to major area courses.

It was also noted that in the 1990's ACSM was focusing on EAC and RAC criteria and did not devote much attention to TAC criteria - except for Associate Degree programs.

Frank described the background and evolution of the surveying program at NMSU. The program was begun in the early 1990's by Dr. James Reilly and Dr. Frank has been associated with the program since 1994. The NMSU program is a 4 year program first accredited by the ABET Related Accreditation Commission (now the Applied Science Accreditation Commission). The RAC criteria included establishing competency in 5 of 6 curricular areas. However other differences between EAC and RAC criteria were quite small and the NMSU Dean of Engineering pushed for the NMSU surveying program to be evaluated and accredited by the EAC beginning with the visit in 2000. The dual-degree option at NMSU works quite well in that students qualify for each degree separately even though it takes more time to fulfill requirements for both the CE degree and the SE degree.

Due to low enrollment, the Surveying Engineering program at NMSU was merged with the Engineering Technology Department in July 2006. Although the curriculum is the same and the graduates still earn a surveying engineering degree, students feel that the professional "image" of surveying is important and that the image has suffered. Full integration into a singular department will take time.

Sumner stated that education is very important to ACSM and noted that we are all accountable to stakeholders in both the educational arena as well as the professional arena. Although surveying shares an overlap with and (education wise) largely grew out of engineering, the point is that surveying is distinct from engineering and has made impressive progress in the recent past. Acknowledging that surveying and engineering both need competent technicians, the importance of high level professional practice was acknowledged and needs careful consideration. He went on to offer additional questions:

1. Specifically, what is to be accomplished by an EAC surveying program?
2. What is the definition of surveying and for what audience?
3. What is it that surveyors themselves really want?
4. How should the impact of technology be evaluated/included in education?
5. What is the intent of a credible surveying program? Is a 5-year degree needed?

Falk started by noting his involvement in the ASCE Geomatics Division (GMD), having helped change the name from Surveying Engineering to Geomatics 15 years ago and serving as current Chair of the GMD. With a BS from Purdue University, experience in Arizona and

work on the Texas Super-Conducting Supercollider, he started PLI (a surveying and engineering company) 12 years ago. PLI primarily serves the steel industry and provides laser tracking and scanner technology in many industrial applications. He hires graduates from various places at various levels but noted a particular Purdue dual-degree graduate who stated he enjoys working at PLI because “every day I come to work I get challenged.”

Mike went on to make the point that PLI specializes in “risk management” in the same manner as accountants and lawyers. With surveying constituting 3-15% of the budget for large projects the quality assurance provided by risk management is critical. A high level of professional talent and integrity are both essential. That means that students must develop an understanding of error propagation and the ability to think in 3-D. It is ironic that high level engineering managers use 2-D drawings for all things “professional” but save their 3-D visualization for helping the kids build a 3-D play-house as a hobby. And, given that everything “moves,” we should be talking about 4-D.

After those opening statements, the discussion included other insights from various individuals – including persons from the audience.

Dave Gibson related a conversation in the early 1980’s when he, as the ACSM representative to ABET, had a discussion with George Wadlin, ASCE Education Director, who cautioned that surveying should not attempt to ride on the coat tails of engineering. Steve Frank commented on the long-standing animosity he observed in California between surveying and engineering and suggested that surveying is making progress on the “separate but equal” status with engineering. A further comment was that the market place will “dictate” the flavor of individual programs through the industrial advisory committees.

Jim Plasker noted that other disciplines such as architects/engineers and others have challenges in finding the best interface. Mike Falk related the experiences of his company where surveying is 80% of the business and engineering is incidental while many other companies use their surveying capability (20%) to enhance their engineering work (80%). ASCE is pushing a 5-year degree (or equivalent) for entry into professional licensure. Is it a name issue, a content issue, or a political issue? In the outcomes assessment mode of ABET, it seems that individual programs are able to identify rather modest objectives and are able to meet those objectives with little commitment to quality and/or rigor. Sayed Hashimi noted that all of the above are part of the issue and need to be addressed.

Josh Greenfield spoke of the experience of TAC programs at Alfred State in New York and at the New Jersey Institute of Technology. He noted the similarity of program criteria between commissions and commented on the math requirements related to the “body of knowledge.” What is it that surveyors really need to know?

Steve Johnson then related the recent Purdue experience where the Department Head suddenly informed the surveying faculty that the EAC undergraduate surveying program accreditation was being terminated in favor of an unidentified alternate. Optimistically, it provides the Purdue surveying faculty an opportunity to “re-invent themselves” with a multi-disciplinary program, a masters level geospatial engineering degree, or an option within the Building Construction Technology program. That one still needs to play out.

Joe Pavia (ACSM representative to ASAC) noted the conflict inherent in the notion that (licensed) property boundary surveyors somehow presume to speak for the entire spectrum of surveying through licensure laws. He suggested (to me) that all surveyors are land surveyors but that only a percentage of land surveyors are boundary surveyors. He noted that other disciplines such as physics and health safety share similar challenges. The goal is to help people realize the importance of formal education and to seek appropriate degrees.

John Bossler (keynote speaker for the conference) described his experience at Ohio State after he retired from NGS in 1987. The overall surveying program was healthy but the undergrad program was dying. The geophysicists at Ohio State gravitate toward the College of Math and Science while photogrammetrists and geodesists tend toward engineering. Bob Burtch related some of his experiences at Ohio State and wrestling with the question, “where does surveying belong?” He noted that we need to expand horizons for our students by being well grounded in the present but looking to the future. How do we find the best way to do that?

After a break, Charles Ghilani summarized ABET accreditation in three commissions (TAC, ASAC, and EAC). Really, ABET has accommodated the needs of surveying by including criteria in all three commissions but the question could be asked if the voice of surveying has been diluted by the fragmentation. He also noted that surveying programs have been marginalized within and by academic administration. One graduate program in the US is not sufficient and we need more national level support for graduate programs (and development of future surveying educators).

Mike Falk described the ASCE rule 465 which requires a 5-year degree (or equivalent) for entry to professional licensure. The pass rate is not good and ASCE is looking to improve the stature of professional practice. Falk also said something about “an ambitious horse does not return to the old stable.” ?????

Dave Gibson noted that in 2004 the Surveying Program at the University of Florida left the Civil Engineering Department and moved to Forestry. That seems to be a much better environment in which to “grow” surveying with its own identity rather than making it look like just another engineering program. (A counter comment would be to look at the success of the Surveying Engineering Program at Calgary Canada which raised the bar on entrance to the Geomatics Department by requiring successful completion of the rigorous freshman engineering curriculum prior to admission.) Mike Falk noted later that Calgary grads have exemplary professional surveying engineering qualifications but are not eligible for licensure in the United States.

The comment was made that EAC is not the answer to recruiting more students into surveying (except for the experience at Ferris State University). Is the problem one of trickle down impact or is it a quality issue? Or maybe surveying faculty are required to teach too much. Is a heavy teaching load is compatible with the (research) policies of the college of engineering?

John Bossler noted that Ohio State graduate program has about 20 PhD candidates and about 30 Masters candidates in the graduate program and that the graduate program does not suffer the same challenges as the undergraduate program. Bob Mergel teaches both at Ohio State and Columbus State Community College and noted that in each case the program is at the mercy of the administrative bean counters.

Khagendra Thapa of Ferris noted that switching from RAC to EAC accreditation in 1990 greatly assisted student recruitment, gave the program more stature, and made a noticeable difference in the starting salaries of their graduates. Ferris currently has about 120 undergraduate students. But, the Illinois Board of Licensure recently “decertified” the Ferris EAC Surveying Engineering program as being acceptable for licensure as a professional engineer. The Board still recognizes the Ferris degree as acceptable for surveying licensure but not engineering.

_____ (I didn’t get who brought it up) Maybe one of the unintended consequences of outcomes assessment is that programs get to “define” their program as they wish and are measured against goals (objectives) not readily recognized by the individual state licensure boards. It seems the boards are reviewing the ABET accredited programs with the idea of doing a better job of protecting the citizens of their own state. This is probably an issue for ABET to consider carefully.

Mike Falk emphasized that he hires graduates at all levels. He needs to match the background and talent of each candidate to the position. Graduates of Calgary are important, but so are graduates of other programs and at other levels. But PLI gets most of their jobs on the basis of their reputation in surveying (spatial data, location, and risk management) rather than engineering.

Charles Ghilani brought up the design issue within surveying. For many surveyors and surveying teachers, we see many surveying tasks as being comparable to (and sometimes more involved than) traditional engineering design. Dave Gibson noted further that when looking at all engineering disciplines, about 75% of all engineering graduates do not seek licensure – going to work in industry or enjoying the government exemption.

Finally, the question was asked about GIS. Geomatics is all-encompassing but it seems that GIS is a part of almost everything we do – even Homeland Security. Plasker noted that GIS is just a tool and that professionals are responsible for the manner in which the tool is used. (EFB comment – GITA posted a question last year on their web site, “is GIS a profession, a niche, or a tool?” According to the replies, GIS is much more than just a tool. I believe it is premature to write off GIS as a subordinate sub-discipline. Spatial data professionals in many places are commanding more respect and power of the purse than does the surveying profession.)

Professor Schultz provided closing comments in describing his role in surveying education within the Oregon State University Department of Civil Engineering. Professor Schultz still teaches large courses for CE and from those Junior level classes is able to “entice” students to pursue a surveying career. Having lived in Oregon for 15 years, I can attest to the positive impact Professor Schultz has had on the surveying profession there and beyond.