THE CURRENT STATUS OF SURVEYING EDUCATION CURRICULA IN THE USA

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ABSTRACT

Surveying education curricula in the United States varies considerably between the several universities that have educational programs for the profession. Surveying and mapping education in the USA has historically been rather fragmented. Each of the major areas of the profession, as practiced in the USA, cartography, cadastral survey, and geodesy are customarily taught as separate discipline majors, usually at different institutions. The subject area of cadastral or land surveying is sometimes combined with and/or taught within civil engineering programs. In the past there has been almost no coordination or interaction with the earth sciences and other related disciplines or personnel and business management. That is rapidly changing! Practitioners in the surveying and mapping fields are moving rapidly from being collectors of data to being managers of both data and business. They will continue to make intricate measurement and evaluate boundary evidence, for which they will need sound technical education, but they will also have to exhibit superior management skills. The advent of Geographical Information Systems technology and the development of new tools and methods such as global positioning require intensive study at the university level to encompass theoretical, practical, and management skills necessary to operate productively in today's environment. We need to encompass education that is adaptable to the ever-changing requirements of the information age that we are now progressing into. This puts a new level of importance on our curriculum design and assessment. As new methods of teaching strategies are designed and implemented, the assessment of their effectiveness must be undertaken. We are finding that we must continue to change our scheme of education as the profession that we are preparing graduates to enter evolves to fit the changing requirements of society.

PRESENTATION

In order to evaluate first one must consider the definition of surveying practice in the United States of America. This definition includes the cadastral aspects of land ownership, boundary determination, precise positioning relative to the various State Plane Coordinate Systems that make up the national net and the geographic information systems applications of these aspects including parcel plat preparation. One can not state an overall national definition as each state and territory government dictates their own. In some jurisdictions surface hydrology is included in the surveyors responsibility. In other jurisdictions surveyors are not allowed to work with water flow at all. The area of

engineering site layout is not addressed in most jurisdictions. None of them place land valuation in the accountability of the surveyor.

There are approximately twenty academic institutions in the USA providing baccalaureate surveying education programs. While there is much individuality and diversity in their programs, each take into account the model law for professional registration that is recommended by the National Council of Examiners for Engineers and Surveyors (NCEES). This national council is comprised of representatives of the individual state registration boards. Each state in the USA has their own board of registration consisting of prominent professionals appointed by their elected governor. Each board in turn appoints one or more of their own members to sit on the NCEES. This council creates and promulgates a model law for surveying registration. The model is periodically updated. This council also creates the examinations that are used by the states to qualify those that are allowed to practice surveying on a professional level. Each state conducts their own registration qualification process using the model law as a guide. There are varying education and experience requirements and registration must be completed separately in each state that a surveyor wishes to practice in.

The current NCEES (approved 1999) model law states that "the practice of surveying or land surveying includes, but is not limited to, any one or more of the following:

(a) Determining the configuration or contour of the earth's surface or the position of fixed objects thereon by measuring lines and angles and applying the principles of mathematics or photogrammetry.

(b) Performing geodetic surveying which includes surveying for determination of the size and shape of the earth utilizing angular and linear measurements through spatially oriented spherical geometry.

(c) Determining, by the use of principles of surveying, the position for any survey control (non-boundary) monument or reference point; or setting, resetting, or replacing any such monument or reference point.

(d) Creating, preparing, or modifying electronic or computerized data, including land information systems, and geographic information systems, relative to the performance of the activities in the above described items (a) through (c).

(e) Locating, relocating, establishing, reestablishing, laying out, or retracing any property line or boundary of any tract of land or any road, right of way, easement, alignment, or elevation of any of the fixed works embraced within the practice of engineering.

(f) Making any survey for the subdivision of any tract of land.

(g) Determining, by the use of principles of land surveying, the position for any survey monument or reference point; or setting, resetting, or replacing any such monument or reference point.

(h) Creating, preparing, or modifying electronic or computerized data, including land information systems, and geographic information systems, relative to the performance of the activities in the above described items (e) through (g).”

The actual curriculum content at each of the institutions is strongly influenced by the criteria of the Accreditation Board for Engineering and Technology. This currently requires 30 semester hours of math and science, 15 semester hours of humanities and social science and 45 semester hours of surveying engineering subjects out of a minimum total of 120 semester hours required for the baccalaureate degree.

In 1990 the American Congress on Surveying and Mapping (ACSM) assembled a panel of futurists to conduct a study on the status and recommended future of surveying and mapping education. "A panel of educational leaders representing industry, government, and academic professionals in surveying and mapping met to discuss and study surveying and mapping education in the United States. One of the objectives for this study was to review innovative approaches to surveying and mapping education which have been introduced in the USA and elsewhere; and to develop strategies for further development and enhancement of surveying and mapping education in the USA.

“The *Report of the American Congress on Surveying and Mapping National Study on Surveying and Mapping Education* was promulgated in February 1993. This report described an investigation into developing a shared vision for survey and mapping education in the USA. It stated that “New education curricula should be carefully designed to provide:

(a) broad general education which gives basic understanding of the world, its institutions, and its cultures (communications, literature, humanities, social sciences, basic sciences).

(b) comprehensive education in the technology of spatial information: data gathering technology (field surveys, photogrammetry, remote sensing) and data management technology (GIS).

(c) basic exposure to many areas where spatial information may have applications: law, real estate, environmental studies, sciences, economics, engineering, geography, anthropology, forestry.

(d) application course work where societal problems are identified and spatial information is applied toward a solution: environmental assessment, land development planning, land ownership and administration, economic planning of operations and facilities, and physical planning of facilities. All these subjects should be taught from a spatial information orientation.”

This report was not well received by either the surveying and mapping practitioners or by most academic teachers in the USA. Indeed it was widely criticized. It was totally rejected by the state registration boards that control who can practice in the profession.

However in the decade since that report was published, there has been a considerable

number of surveying academics that have retired from teaching. Many of their replacements have been emigrants from other countries that did not have the same ingrained concepts that surveying is a subset of engineering and have embraced many of the concepts put forth in the aforesaid report. We are therefore seeing curricula based on a spatial information orientation being introduced into several academic institutions. These programs are being successful in obtaining accreditation from the Accreditation Board for Engineering and Technology**.** It remains to be seen whether graduates of these programs will have similar success in obtaining professional registration from their respective state boards of registration.

REFERENCES

1. National Council of Examiners for Engineers and Surveyors Model Law (1999)

2. Rouch, Julian “Jud”, 1999 “Surveying Education Curricula Design In The USA” *Proceedings of the 22nd General Assembly Meeting* in Sun City, South Africa

3. Rouch, Julian “Jud”, 1996. " Surveying Education in USA - The Need for Innovation” *Proceedings of the 63rd Permanent Committee Meeting of ACSM* in Buenos Aires, Argentina

4. ACSM Report, February 1993, *Report of the American Congress on Surveying and Mapping National Study on Surveying and Mapping Education*

5. McDonnell, Porter, 1990. "Who Wants a B.S. in Surveying and Mapping?," *1990 ACSM-ASPRS Annual Convention Proceedings, Vol* 1, pp. 165-170.

6. Mueller, Ivan I., 1990. "Surveying Education at a Crossroads," Keynote Address, XIlIth North American Surveying and Mapping Teachers Conference, The University of Calgary, Department of Surveying Engineering UCSE Reports Number 60008.

7. McLaughlin, John, et. al., 1989. Managing our Land Information Resources, U.S. Department of Interior, Bureau of Land Management, BLM-AA-AE-89-003-4540.

8. Rouch, Julian “Jud”, 1989. "Educating the Twenty First Century Surveyor" paper presented to the Western Federation of NSPS affiliates during their convention at Phoenix, AZ.

9. Lapham, Paul, 1987. "What the Practitioner Needs from a New Graduate" Address, XIIth North American Surveying and Mapping Teachers Conference, Madison, Wisconsin.

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