

On Accreditation and the Peer Review of Education in Geographic Information Systems and Science

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Abstract: *This article considers the need for a formal quality assurance mechanism for college-level education in geographic information systems and science. A voluntary accreditation process that emphasizes self evaluation and peer review of individual GIS-related courses is proposed. To attract and retain voluntary participation, accreditation must provide meaningful benefits to all stakeholders, including prospective students and employers, educational institutions and departments, and course instructors. Fortunately, it is possible to tailor accreditation programs to the goals and constraints of particular communities of practice. In the context of the geographic information system community, it may be most productive to conceive of accreditation as a form of peer-reviewed publication analogous to the established process used to evaluate the quality of academic research. By publishing portfolios of accredited courses and programs, accreditation has the potential to foster and recognize faculty excellence and to enable prospective students and employers to identify courses and programs that meet their needs.*

Introduction

Colleges and universities contribute to the advancement of geographic information systems (GISs) and science through research, education, and service. It goes without saying that the value of these contributions depends on their quality. Formal quality assurance mechanisms are well established in academic research, but less so in education. The primary mechanism for awarding public and private research funds, and for publishing research findings, is peer review. Readers can be confident that expert reviewers have evaluated the arguments and evidence presented in articles published in scholarly periodicals such as the URISA Journal. The textbooks that many educators advise their students to purchase are also subject to rigorous peer review. Textbooks often play only supporting roles in GIS-related courses, however. And in most cases, prospective students and their employers cannot be certain that the courses themselves, or the certificate and degree programs of which they are a part, have been subjected to rigorous scrutiny.

“Just as the period starting in 1945 led to the extraordinary growth in master’s degree programs,” LaPidus (2000:9) observes, “so the period we are in now, characterized not only by socioeconomic change but also by technological revolution, is leading to growth in certificate and other non-degree programs [in U.S. academic institutions].” The so-called “certificates phenomenon” (Marchese 1999) is evident in many information technology fields, including GIS.

In addition to the GIS certificate programs offered by academic institutions and private businesses, two professional organizations—the American Society for Remote Sensing and Photogrammetric Engineering (ASPRS) and the Urban and Regional Information Systems Association (URISA)—have developed or are in the process of developing their own GIS certification procedures. By definition, certification seeks to assure the competency of individual practitioners. A related concern, which certification does not directly address, is the effectiveness of educational courses and programs that claim to help individuals develop the competencies they need to become qualified GIS professionals. The formal process of evaluat-

ing the qualifications and effectiveness of educational programs and institutions is called accreditation. Unlike planning, engineering, and teacher education, no accreditation process focuses specifically upon geography or many of the other disciplines that offer GIS-related courses and certificate and degree programs.

While much has been written about GIS certification, accreditation has received little attention within the GIS community. The purpose of this article is to explain what accreditation is and to suggest how it might contribute to geographic information systems and science education. Specifically, the article proposes that accreditation be implemented as a freely available online publication to which individual GIS-related courses as well as entire degree and certificate programs are voluntarily submitted for peer review and in which the portfolios of accredited courses and programs are published. The article begins by considering the status of academic and professional certification, whose attendant controversies have illuminated the inadequacy of quality control in GIS-related education.

Academic Certification Programs

Certification refers to the process of assuring that individuals possess the knowledge, skills, and dispositions that constitute competence in a profession, in the judgment of some authority. Professional organizations, academic institutions, and private businesses all confer certificates. In the GIS profession, academic and industry certification are most common. Certification has received increasing attention in recent years because of the growing number of GIS certification programs offered by colleges and universities. Michael Phoenix, the former Environmental System Research Institute (ESRI) Higher Education Coordinator, recently estimated that there are more than 200 academic GIS certification programs in the United States alone (Phoenix 2000). At last count, ESRI’s online database of academic GIS programs lists 162 programs that claim to offer GIS certificates, of which 116 are located in the U.S (Environmental System Research Institute 2002).

As Thomas Wikle (1998) pointed out, GIS certification programs vary widely in scope, focus, and quality (although since educational effectiveness is rarely assessed formally in higher education, this last point can only be assumed). The diversity of academic programs is desirable in one sense, but undesirable in another. It is desirable insofar as it accurately reflects and responds to the diversity of professional practice. GIS is used in many different fields for many different purposes, each setting requiring somewhat different knowledge and skills. On the other hand, the diversity of programs also confuses students and employers who seek guidance on professional development strategies and hiring criteria. Bill Huxhold speaks for many when he complains that "Today anybody can teach anything and call it GIS education.... Who knows whether the skills being taught in these programs are needed to become a GIS professional?" (Huxhold 2000:25).

The proliferation of academic certificate programs is not unique to GIS, of course. The U.S. Department of Education lists more than 2000 post-baccalaureate certificate programs (that is, programs designed to serve individuals who previously earned bachelors degrees) serving an estimated potential market of 40 to 45 million people in the U.S. alone (Irby 1999). A recent survey of 1288 certificate programs offered by 77 U.S. colleges and universities suggests that the disciplines that account for the largest shares of all certificate programs include business, information science, and health sciences (Patterson 2000). Given the rapid pace of social and technological change associated with what some describe as an increasingly global knowledge economy, its not surprising that "postbaccalaureate certificate programs constitute one of the fastest-growing areas in higher education" (LaPidus 2000:6).

Academic departments that wish to establish certification programs are typically not bound by the same rules that govern graduate and undergraduate degree programs. The result, as Kohl and LaPidus (2000:234) observe, is that "certificates represent a completely unregulated segment of higher education." Ted Marchese (1999:4), long-time vice president of the American Association for Higher Education and editor of *Change* magazine, argues that "the certificates phenomenon seems almost entirely good news," insofar as it represents the ability of departments to design and implement certification programs relatively quickly in response to the needs of target markets, sometimes in collaboration with industry partners. The trouble with the phenomenon, Marchese (1999:4) admits, is that "...developments in the post-secondary marketplace are quickly outrunning the capacity of existing quality assurance mechanisms to assure fair practice." This "can make it difficult for students and employers to assess the value of these programs" (LaPidus 2000:7). Caveat emptor is thus the best advice for consumers. And as the World Wide Web and a new class of "course management systems" software enable asynchronous delivery of entire GIS certificate and even degree programs online, the choices confronting students are no longer limited to programs offered locally. Unfortunately, there is not yet a "buyer's guide" to GIS education to help prospective students and employers make informed decisions about which programs are most likely to meet their needs.

Professional Certification Programs

A frequently suggested strategy for influencing the quality of GIS education is for a professional organization to accept responsibility for evaluating and certifying the technical competence and ethical performance of individual GIS practitioners (Obermeyer 2000). Unlike the rapid growth of academic certification programs, and of certification programs administered by professional organizations in other fields, however, certification by professional organizations in the GIS community has not yet caught on.

Many professional organizations offer certification programs, of course. The second edition of *The Guide to National Certification Programs* (Barnhart 1997) describes 558 unique professional certifications administered by U.S. professional organizations. America's Learning Exchange, a searchable online database sponsored by the U.S. Department of Labor, lists 2525 professional programs (U.S. Department of Labor 2001) that certify expertise in a wide range of fields from accounting (American Institute of Certified Public Accountants), to teaching (National Board for Professional Teaching Standards), to planning (American Institute of Certified Planners), and even to poetry therapy (National Association for Poetry Therapy). Surprisingly, keyword searches on "GIS" and "geographic information systems" yield no matches. The keyword "map" produces three relevant matches, however: the Cadastral Mapping Specialist certificate administered by the International Association of Assessing Officers, and the Certified Mapping Scientist programs for GIS/LIS and Remote Sensing, which are administered by the ASPRS.

The Certified Mapping Scientist GIS/LIS program of the ASPRS is most relevant to the GIS community. Applicants are expected to possess three years of professional experience (toward which relevant academic degrees may be counted) and four letters of recommendation. They are also required to declare compliance with a code of ethics and pass a proctored, four-hour examination. The examination contains questions related to photogrammetry, remote sensing, ethical conduct, standards, as well as GIS/LIS. Certificates are valid for life, although optional re-certification is available (American Society for Remote Sensing and Photogrammetric Engineering 2000). The impact of the ASPRS GIS/LIS certification program has been modest, however; through June 2000, fewer than 60 individuals had earned certificates (Renslow 2000). As Nancy Obermeyer (1993:72) points out, "If a GIS certification process does not gain universal (or near-universal) support, it will be ineffective as a tool to assure the quality of GIS practitioners."

It is too early to count out professional certification in GIS, however. At the 2001 Annual Conference in Long Beach, California, the URISA Board unanimously approved an implementation schedule for a new certification program proposed by the Association's GIS Certification Committee. The proposal calls for the creation of an independent organization that will certify and re-certify applicants who earn a requisite number of "achievement points." Point values are defined for achievements related to education, experience, and contributions to the profession. No

examination is planned. Interestingly, in the section of the first draft document in which initial point values for achievement categories were proposed (Urban and Regional Information Systems Association Certification Committee 2001), the heading “Professional Development Courses” (including certificate programs) included the parenthetical question “how accredited”? It seems clear that even if the new URISA certification program is successful in gaining the near-universal support that Obermeyer says is required, the need to accredit academic programs, especially academic certification programs, will remain.

Accreditation

Accreditation has been called “the most fully developed institutionalization of the idea of accountability in higher education” (van Vught 1994, cited in Lubinescu et al. 2001:6). Hamm (1997:3) characterizes it as a “conformity assessment process” involving the development of educational standards, self evaluation, and peer review of the extents to which applicant organizations conform to standards, and subsequent granting or withholding of accreditation by recognized, independent authorities. The earliest accreditation efforts in the United States included a rating of 150 medical schools commissioned by the American Medical Association Council on Medical Education and published in 1910. At approximately the same time, the North Central Association of Colleges and Secondary Schools began evaluating colleges and published its first list of accredited institutions in 1913. Today, eight regional commissions administer accreditation programs in which most of the nearly 3600 degree-granting higher education institutions in the U.S. voluntarily participate (Hamm 1997, Cook 2001).

In addition to the accrediting bodies that vouch for entire institutions, other organizations accredit individual academic programs. For example, the Accreditation Board for Engineering and Technology (ABET), a federation of 28 professional engineering and technical societies, accredits some 2300 educational programs in engineering, engineering technology and engineering-related disciplines at more than 500 U.S. colleges and universities, in 6-year renewal cycles (Accreditation Board for Engineering and Technology 2000). The National Council for Accreditation of Teacher Education accredits some 1300 degree programs offered by U.S. schools of education (Murray 2001). The Planning Accreditation Board, sponsored jointly by the American Institute of Certified Planners, the Association of Collegiate Schools of Planning, and the American Planning Association, accredits graduate and undergraduate planning degree programs at some 68 North American institutions (Planning Accreditation Board, no year).

The accreditation process employed by the Planning Accreditation Board requires that applicant programs first demonstrate that they meet certain pre-conditions for accreditation review, including an emphasis on professional practice, a minimum of 2 years worth of required coursework, a minimum of 25 graduates, and the inclusion of the word “planning” in the title of the degree. Applicants who satisfy these and other pre-conditions become candidates for accreditation. Candidate programs submit exhaustive self-evaluations in which they document performance related to 11 criteria, including:

- 1) Goals and objectives that align with the program’s mission and with other accreditation criteria;
- 2) Relationships with the program’s department, school, college, and other relevant units within the institution that contribute to the advancement of the overall quality of the program and its goals and objectives;
- 3) Sufficient autonomy, suitable governance, and competent leadership within the candidate’s institution;
- 4) Curricula that are properly aligned with the program’s objectives;
- 5) Faculties that are adequately populated with qualified personnel;
- 6) Adequate attention to teaching, advising, and other student support services;
- 7) Research and scholarly activities that support the program’s mission, goals, and objectives;
- 8) Professional and public service that advances the competence and currency of faculty and students relative to evolving standards of practice;
- 9) Student bodies characterized by excellence and equity;
- 10) Adequate organizational and physical resources; and
- 11) Fair practices and policies, such as those concerned with student grievances, non-discrimination and affirmative action program information, confidentiality of student records, and on-going monitoring and evaluation of administrative policies and procedures.

After it receives a candidate’s self-evaluation study, the Planning Accreditation Board appoints a site review team “consisting of a minimum of two planning academics and one planning practitioner from its approved list” to visit the program (Planning Accreditation Board 1994). The site review team’s report is then submitted to the program for comment, and to the Board for decision. Successful programs are accredited for periods of 5 years; after 3 years, the cycle begins again as the program prepares a new self-evaluation study.

Although most higher education institutions seek accreditation, many individual disciplines do not. No organization specifically accredits degree or certificate programs offered by the 251 North American academic departments of geography, for instance, which account for the largest share (about one-third) of the GIS-related course offerings in higher education (Phoenix 2000). Although few departments of geography or related fields offer academic degrees in GIS per se, the relatively large and growing number of courses and certification programs in GIS offered by academic institutions and private businesses may justify the creation of a new accrediting body, or at least a new, specialized accreditation program to be administered by an established organization.

Hallmarks of Contemporary Accreditation

Accreditation is time consuming and costly. Indeed, the arrival of a new accreditation cycle “is generally met with the same level of enthusiasm as the announcement of an upcoming Internal Revenue Service audit” (Hamm 1997:x). Unlike taxes and similar certainties, however, accreditation is voluntary. To have an impact

on the quality of GIS education, accreditation must attract and retain voluntary participation by a large proportion of education and training providers. To accomplish this, "the value of accreditation must be perceived by the applicant as a fair economic trade for the expense and work required to achieve and maintain accreditation" (Hamm 1997:72). Toward this end, those who design an accreditation plan for GIS education must recognize and avoid the pitfalls that have weakened similar efforts in other fields in the past. These pitfalls include systematic bias against smaller institutions, over-emphasis on conformity, and inadequate disclosure of results. As discussed in the following three sections, these pitfalls can be overcome by emphasizing performance-based evaluation criteria over resource-based criteria, by encouraging responsiveness and innovation, and by promoting the fullest possible disclosure of the data consumers need to make informed decisions.

Emphasizing Performance

Historically, external accreditation reviews tended to devote the most attention to the resources that institutions bring to bear on education, such as facilities, faculty credentials, and admissions policies. Resource-oriented accreditation plans are sometimes accused of privileging larger institutions, which tend to have the most resources. Real or perceived, bias against smaller institutions is unacceptable in GIS education, given the vital roles played by community colleges and other 2-year institutions. Fortunately, trends favor more inclusive accreditation processes. Recognizing that "resources should not be a basis for department-level assessment of student learning" (Hatfield 2001: 23), accrediting bodies like the Planning Accreditation Board now charge peer review teams to "interpret quality within the context of the program's own aims and activities" (Lubinescu et al. 2001:8). Indeed, the Board's Site Visit Manual (Planning Accreditation Board 1994) states that:

The single most important trend in accreditation is represented by its elevation from a process focusing on minimum criteria of adequacy, quantitative criteria, and input measures as indicators of meeting the criteria to a process highlighting criteria requiring adequacy but also encouraging excellence qualitative criteria involving more assessment and judgment output or performance-oriented measures.

While assessment of educational outcomes is hardly less time consuming than resource-based evaluation, the performance-based approach is less likely to disenfranchise smaller institutions and more likely to benefit students and employers.

Encouraging Responsiveness and Innovation

Another critique leveled against accrediting bodies in the past is that they have tended to be "too rigid in the standard setting and review process" (Hamm 1997:31). Over-emphasizing conformity tends to discourage targeted and innovative approaches to curriculum design and instructional delivery, which in turn poses "a particular concern for many fields undergoing rapid technological change" (Hamm 1997:31). In the realm of GIS education, disincentives to innovation might result if accreditation processes over-emphasize conformity to standardized curricula, particularly if standards are not

frequently revised. After all, conformity says little about the extent to which students have achieved learning objectives (Murray 2001). Curriculum guidelines such as the National Center for Geographic Information & Analysis (NCGIA) Core Curriculum (Kemp and Goodchild 1991) and the Model Curricula currently being developed under the auspices of the University Consortium for Geographic Information Science (UCGIS) (Marble 1998) are clearly useful, but strict conformity with such guidelines should probably not be required for accreditation in a field as diverse as GIS.

Innovative instructional delivery strategies, such as those involving asynchronous learning mediated by the Internet, pose even greater challenges to accrediting bodies. Charles Cook, director of The Commission on Institutions of Higher Education of the New England Association of Schools and Colleges, acknowledges that "these new phenomena, unheard of 5 years ago, challenge the capacity of regional accreditation commissions to provide meaningful quality assurance" (Cook 2001:20). There are hopeful signs, however, that accrediting bodies recognize that "the emergence of new varieties of postbaccalaureate training and education underscores the need for regional accrediting associations to generate and advance standards and processes appropriate to a new age" (Crow 2000:145). Evidence of this recognition includes the recent publication of "Guidelines for the Evaluation of Electronically Offered Degree and Certificate Programs" drafted by the eight U.S. regional accreditation commissions in cooperation with the Western Consortium for Education Telecommunications (2000). Program accreditors also recognize that organizational agility and responsiveness are characteristics as desirable as conformity. As the Planning Accreditation Board observes in its Site Visit Manual, "the accreditation process is viewed as an opportunity to learn of innovative and unique practices occurring in the field" (Planning Accreditation Board 1994).

Promoting Disclosure

The tension between the desire of institutions and programs to maintain the confidentiality of evaluation data and the public's desire to make informed choices poses a third challenge to effective accreditation. The diversity of professional practice in GIS, reflected in the diversity of education and training opportunities available, amplifies the public's need for disclosure. Hamm (1997:123) observes that although "most accrediting review information is confidential and must be kept private to protect the rights of applicant organizations...the long-term trend...is moving toward more disclosure..." While it is useful to know whether or not a program is accredited, that knowledge alone will be insufficient if accreditation is successful in attracting participation from the majority of education providers. Prospective students and employers should also be able to compare curricula and learning objectives, student performance data, faculty qualifications, instructional delivery options, costs, and the value of degrees or certificates in the context of a professional certification program such as the one proposed by URISA. Although program promotional materials already tend to disclose some of these sorts of information, performance data are seldom included (if they are even collected), and those data that are available tend not to be reported in comparable forms. One solution to this dilemma may involve

portfolios in which accreditation candidates articulate goals, provide evidence of the ways in which goals are achieved, and reflect upon opportunities for improvement. The Urban Universities Portfolio Project (Ketcheson 2001:84) demonstrates how institutional portfolios can be used not only as self-evaluation instruments, but also “for communicating quality assurance and institutional improvement information to the public.”

Accreditation is necessarily burdensome. The extent to which most institutions and some disciplines voluntarily participate in accreditation attests to its value to providers and consumers alike. GIS education is not specifically accredited by any professional organization, however. Since GIS education is diffused among numerous disciplines, the majority of which do not participate in accreditation, it seems unlikely that existing accreditation bodies are well suited to serve the GIS community. The time may be right, however, to develop a new accreditation system tailored specifically to the needs of stakeholders in GIS education enterprise. Stakeholders, after all, “are the true judges of the process. They have the power and the ability to modify, change, or develop new accreditation programs that better meet the needs of the field and the concerns of the public” (Hamm 1997:145). The following outlines an innovative approach to accreditation intended not only to assure the quality of GIS education and training programs, but also to improve it in the process.

Accreditation As Peer-reviewed Publication

To attract and retain motivated participants, accreditation must provide benefits to all stakeholders in the GIS education enterprise, including those who account for the demand for education as well as institutions and individuals who account for the supply.

To stakeholders on the demand side, including prospective students, employers, and society at large, accreditation is valuable as both a seal of approval and as a buyer’s guide. On the supply side, benefits accrue directly to administrators of programs and institutions, for whom accreditation provides a benchmark against which success can be gauged, as well as a useful marketing tool. Individual faculty members, the ones who design and teach GIS classes, may benefit only indirectly, however, and those who are unfamiliar with accreditation may perceive it as an unwelcome form of quasi-governmental regulation.

Accreditation is more likely to be effective in assuring quality education if educators have an incentive to participate. To be viewed as a fair economic trade for the effort involved, accreditation should include recognition of instructors’ scholarly effort in designing and conducting successful courses. Ideally, course authors and instructors ought to benefit from successful teaching in ways that are comparable to the benefits they earn by producing successful research proposals and by publishing research reports in peer-reviewed publications. Such is not the case at most institutions at present, of course.

If, as accreditation expert Michael Hamm suggests, it is stakeholders’ prerogative to develop an accreditation plan that best suits

their needs, then it ought to be possible to conceive of accreditation in terms that educators already know and trust: that is, as peer-reviewed publication. Despite occasional second thoughts about its reliability as a mechanism for assuring scholarly merit (e.g., Berry 1995 and Goodstein 1995), peer review is a fixture of academic culture, and publication in peer-reviewed journals is the coin of the realm. In principle, the quality of a certificate or degree program in GIS, or of an individual course for that matter, is as amenable to peer review as the quality of a research project. By the same token, the self-evaluation documents that accreditation candidates prepare are analogous to manuscripts submitted to journals for review. And the granting of accreditation itself is analogous to the acceptance of an article for publication. While it is true that informal peer review takes place whenever an instructor asks a colleague’s advice about teaching, when faculty members meet to review departmental curricula, or when scholars from different institutions collaborate in projects such as the University Consortium for Geographic Information Science Model Curricula, the act of formalizing such ad hoc processes is likely to bolster their impact on educational quality, and thereby increase their value to stakeholders.

Accrediting Individual Courses

To the extent that it is public, susceptible to critical review and evaluation, and accessible for exchange and use by colleagues in one’s field, teaching is a scholarly activity (Shulman 1998). The individual course is the basic unit of analysis in the scholarship of teaching and learning, since “it is within the course that knowledge of the field intersects with knowledge about particular students and their learning” (Hutchings 1998:14). In the same way that scholars assure the quality of research, it is possible to assess the quality of a course through self evaluation and peer review (Hutchings 1996a).

One instrument for teachers’ self-evaluation of their courses is the course portfolio. A course portfolio is a reflective collection of evidence that documents the goals, effectiveness, and ongoing development of a single academic course (Hutchings 1998). Pertinent evidence includes documentation of the design, implementation, and results of a course, including its syllabus, description of student activities, and examples of student work and feedback, bound together by the author’s reflective narrative. Most important, however, is evidence of student achievement: “The heart of the course portfolio, its center of gravity, is evidence the teacher gathers about students’ learning and development (through the use of classroom assessment techniques, interviews with students, peer review of student work, and other strategies...)” (Hutchings 1998:14). Specifically, course portfolios can provide evidence that students have developed competencies that GIS professionals are expected to possess, such as the competencies outlined in a recent study commissioned by the National Aeronautics and Space Administration’s (NASA) National Workforce Development Education and Training Initiative (Gaudet et al. 2001). In general, course portfolios ought to enable reviewers to answer such questions as:

- Are measurable objectives for student learning defined?
- How well do the objectives align with the needs of the GIS profession?

- Is compelling evidence presented that the course is effective in helping students achieve its objectives?

One of the strengths of course portfolios is that they encourage educators to pay more attention to assessing student outcomes than they otherwise might. With this in mind, Malik (1996) suggests that the process of preparing and maintaining portfolios is ultimately more valuable than the accreditation credential itself.

Course portfolios need not be the only forms of evidence that reviewers consider. Although site visits are likely to be impractical, course reviewers might contact individual students by telephone or e-mail. For example, the Accreditation Council on Services for People with Disabilities evaluates the effectiveness of service providers who apply for accreditation through extensive interviews with samples of the clients they serve (Hamm 1997).

However they may be evaluated, there are several good reasons why individual courses should be accredited in addition to certificate and degree programs. For one thing, the point system in the proposed URISA certification scheme does assess value to individual courses as well as complete certificate and degree programs. Second, course accreditation has the potential to attract participation by GIS instructors who are not affiliated with degree or certificate programs. Instructors working in schools whose missions are primarily educational may have the greatest incentive to participate—a desirable counterbalance to the tendency of accreditation programs to privilege larger institutions. Perhaps most important, by recognizing the scholarly work of individual instructors, course accreditation can provide an incentive to involve the individual course authors and instructors who have the greatest potential impact on the quality of GIS education. The quality of individual courses is, after all, a crucial element in the quality of certificate and degree programs.

Accrediting Certificate and Degree Programs

The main reason to accredit GIS education is the need to assure the quality of certificate and degree programs. Criteria for program self evaluation and on-site peer review might be similar to those used by the Planning Accreditation Board and kindred accreditation bodies. Portfolios may be useful instruments for program self-evaluation; they will certainly be useful for communicating programs' qualifications to prospective students and their sponsors. Whatever the instrument, however, self evaluation and peer review should emphasize performance—specifically, the extent to which students achieve program objectives. Applicants should be able to provide multiple measures of student achievement, including not only student grades and satisfaction surveys, but also some combination of program completion rates, professional certification rates, evaluations of program graduates by employers, rates of professional recognition and participation in professional activities, and rates of professional advanced study, among others. Although none of these measures alone proves that a program is effective, “taken together, they may converge and align and constitute an improved evidentiary base for the programs faculty’s

claim that the program’s graduates are competent” (Murray 2001: 57). Many of the programs that may wish to participate in accreditation cannot currently collect and maintain such data. The absence of mechanisms needed to generate reliable student performance data will be one of the most challenging obstacles to accreditation. Without such evidence, however, accreditation may not be worth the trouble.

Publishing Portfolios of Accredited Courses and Programs

In this article it has been argued that, as the Accreditation Board for Engineering and Technology observes, “the diversity of educational programs in the United States is one strength of the American educational system” (Accreditation Board for Engineering and Technology 2000). Accreditation offers the potential not only to assure the quality of programs and courses, but also to assist prospective students and their sponsors to find programs and courses tailored to their needs. It has also been argued in this article that to attract and sustain motivated participation by those who have the greatest impact on quality, it is essential that an accreditation plan for GIS education provide meaningful incentives to individual instructors. The strategy proposed to achieve these ends is to implement accreditation as a kind of peer-reviewed publication.

“Given the difficulty in standardizing certificate programmes,” Thomas Wikle (1998:502) suggests, “a more effective way to influence the development of new certificate programs may be achieved by showcasing examples of successful programmes.” Specifically, accreditation might be implemented as a freely accessible online journal that publishes the edited portfolios of accredited courses and programs. The online journal (perhaps entitled GIS Education Review) should allow visitors to search for certificate and degree programs that match criteria they specify with key words. Search queries might operate on metadata including institution name, location, credentials granted (degree, certificate, credit, continuing education unit (CEU)), schedule (semesters, quarters, continuous enrollment), duration, tuition and fees, delivery approaches (on campus versus online, for instance), and other criteria. Search results could list names of relevant programs, linked to standardized “fact sheets” for each program. Fact sheets might be provided as soon as programs qualify as candidates for accreditation, and Fact sheets of accredited programs would be duly marked, and would contain links to the program portfolio, course portfolios, and reviews that provide the detailed information that visitors need to choose the program or programs that best suit their needs. A comparable publication (although not one involved in accreditation) is MERLOT (Multimedia Educational Resource for Learning and Online Teaching), “an online community that allows visitors to search for learning materials, reviews, assignments, and people” in which contributions are peer-reviewed (Long 2001:7).

The GIS Education Review would need an editor and editorial board, like any other professional publication, and, like other accrediting bodies, it should be established as a free standing, separately incorporated entity (Hamm 1997). An executive director and a small staff likely would be needed to assist the editor in

appointing review teams, organizing site visits, analyzing reports, rendering decisions, and dealing with grievances, not to mention developing and maintaining a suitable Web presence. The executive director should seek endorsements by, and financial support from, professional societies and industry partners, representatives of which might be invited to participate in a board of directors. The executive director should also coordinate with, and discuss eventual affiliation with, existing accreditation bodies, such as ABET. The entire staff would share responsibility for recruiting participants at professional conferences and through related publications.

Conclusion

Education theorist Lee Shulman (quoted in Hutchings 1996b:103) uses the term “consequential validity” to denote a method of assessment that “advances the quality of the very enterprise being evaluated.” A consequentially valid accreditation process would provide several benefits to stakeholders in GIS education. It would provide guidance to educational programs in aligning curricula and course learning objectives with competencies needed in the profession. It would assure the effectiveness of educational offerings in helping students fulfill learning objectives. It would foster and recognize faculty competence. It would encourage programs to respond to their clientele’s needs in innovative ways, and would enable prospective students and employers to identify courses and programs that meet their needs. In addition, it would assist programs in developing ongoing quality assurance mechanisms that will be needed to demonstrate excellence through future accreditation cycles.

This article makes the case that one way to achieve these goals is to conceive of accreditation as a form of peer-reviewed publication. The analogy is potentially powerful since publication in peer-reviewed journals is a widely accepted quality-assurance mechanism among many educators, including those who might be most skeptical about accreditation. Because publication in peer-reviewed journals is such a weighty criterion in academic promotion and tenure decisions, many faculty members are likely to accept that the effort involved in implementing assessment plans and preparing course and program portfolios is worthwhile.

In principle at least, publishing course portfolios and program portfolios in a peer-reviewed online journal has the potential not only to enrich GIS education, but also more generally “to make teaching more central to faculty life and more powerful in its impact on student learning” (Hutchings 1996b:101). This potential is compelling since “until teaching is peer-reviewed, it will never be truly valued” (Edgerton 1996:vi). To the extent that it is truly valued, GIS education is more likely to achieve the full measure of quality that all its stakeholders deserve.

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